




Impacting accounting education using integrated information and communication technologies



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Orientation: Computers, especially in the form of information and communication technologies (ICT), have changed the procedures through which bookkeeping and accounting are accomplished in business. Modern debates centre on the veracity and methodology of including of ICT in accounting education. This study assessed the impact of one method of integrating ICT in accounting education, as adopted by the University of Johannesburg (UJ) in one diploma offering. This method has been termed 'subject integrated information and communication technologies' (SIICT).

Research purpose: The purpose of this study was to evaluate the impact that the integration of ICT into certain subjects (SIICT) has had on selected key role players of the diploma in Accounting. This section of the study evaluates this impact on the students by comparing the outcomes of two cohorts of students.

Motivation for the study: In 2011, UJ replaced National Diploma offerings in Accounting with a new diploma in Accounting that integrated ICT into two core subjects. This impact study evaluated the integration, which used a theoretical model of integration that was untested in its application.

Research approach/design and method: This case study, designed as an impact study, tested the impact of integrating ICT into the core modules of the diploma. Data collection was based on a mixed-method data collection model and included research questionnaires to the students, recorded observations of lecturers, interviews with lecturers and a document investigation.

Main findings: The students were positively impacted through (1) completing their studies in a shorter time, (2) the time to obtain employment being shortened, (3) fewer students studying further and (4) experiencing a greater sense of work preparedness and confidence during interviews.

Practical/managerial implications: The average time that students spend studying is shorter, freeing university resources and costing the student less money. Different methods of study are applied, and the students are more engaged as the subjects become more 'real to life'.

Contribution/value-add: Employers' acceptance of the changes and the student comments reflect an earlier engagement with work at their place of employment.

Keywords: accountancy education; impact analysis; information and communication technologies; integration; graduateness; employability; knowledge building; distributed cognition.

Introduction

'Why accounting education needs a complete overhaul' was a lead article in the *Accounting* weekly, October 2019 (Ryan 2019). Ryan cites Jason Ackerman 'at the CPA Journal', stating that 'almost no technology is taught ...' and that '[t]he current accounting curriculum does not prepare accountants for the world they are entering'. Ackerman also states that '... colleges need to stop teaching with ledger sheets and pen and paper. This is all part of ancient history' (Ryan 2019).

The Fourth Industrial Revolution (4IR), which affects the levels of automation used, is a reality spreading across the workplaces. However, third-world and emerging countries are lagging behind and are still working on the Third Industrial Revolution (3IR) technology. Students in these countries must be taught to work in 3IR but must be prepared for 4IR. In South Africa, as in many parts of the world, teaching for 3IR is only starting to approach the reality of working in 3IR. Rhodes (2012a) investigated this 'gap between accounting education and accounting practice' in 2009 and recommended an integration model and an intervention plan to reduce this gap. This intervention was tested during the implementation of the integration model in 2011.

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In 2011, the University of Johannesburg in South Africa (UJ) commenced the phasing out of the 3-year National Diploma (in Accounting, Cost and Management Accounting, and Auditing, referred to from here on as 'N. Dip. Acc.') in favour of a single UJ-specific diploma in Accounting (Dip. Acc.). There were slight changes to the content of the modules (Table 1); however, the target market, the student base and selection criteria remained unchanged. The main curricular changes to be noted are that Business Information Systems was judged to be redundant and was removed, and law was condensed into one subject. Other subjects such as Cost and Management Accounting have been combined. However, the Dip. Acc. is unique to UJ in the methodologies used (Rhodes & Rhodes 2019) to integrate information and communication technologies (ICT) into the core finance subjects of the diploma using industry-standard accounting (Sage/Pastel) and spreadsheet (Excel) software. The integration model (Rhodes 2012a) comprises a 50% theory division presented in a traditional auditorium setting and a 50% practical application of the coursework based in a computer laboratory. In the N. Dip. Acc., the finance subjects had three lecturer contact periods a week, whereas in the Dip. Acc. there are four lecturer contact periods per week. The practical portion of Financial Accounting includes a simulated work-integrated-learning (WIL) aspect where the

students start up a company on the accounting package and follow through with transactions on the company for the full 3-year duration, simulating the theory taught.

Accompanying such a change in the curriculum should be a test of the efficacy and a reporting of the outcomes. This study, planned as an impact study within a case study, aims to achieve the goal of reporting the impact that the changes have wrought on the graduates of the new diploma.

How 'unique' is this implementation of integrated information and communication technologies?

A literature review and keyword search of Google Scholar and popular international journals failed to uncover any articles related to the accomplishment of integrating ICT into the teaching of accountancy; in addition, review journal articles in six popular international journals of accounting education, headed by Rabele, Watson and Apostolou as the group leaders, over the period 1995–2017 failed to mention any such study undertaken (Apostolou et al. 2001, 2013, 2015, 2017, 2018; Rebele et al. 1998a, 1998b; Watson et al. 2003, 2007). However, there has been theorising about the inclusion of ICT, the benefits that this would bring, and the theoretical implementation and methodology to be used (Brevis-Landsberg 2012; Law, Shaffer & Stout 2009; Rhodes 2012b, 2013; Rhodes & Rhodes 2006; Wessels 2006a).

The conclusion drawn was that if any such integration had taken place other than at UJ, no report had been forthcoming in the popular or ranking journals. This study addresses this literature gap by reporting the outcomes of an actual implementation and adding to the theoretical debate surrounding integrating ICT into accounting education.

As an investigative case study, no hypothesis was tested; rather, a critical review of the data collected was undertaken to assess the impact that subject-integrated ICT (SIICT) has asserted on accounting education and the graduates. Techterms.com defines ICT as referring to the technologies (both software and hardware) that provide access to information through a telecommunication network (Christensson 2010), as used in business and education.

Literature review

Background to the literature review

A skills gap in accounting education, between what the student learns and what the employer requires, has been discussed by numerous researchers (Apostolou et al. 2010; Celik & Ecer 2009; Law et al. 2009; Lawson et al. 2014; Lee 1998; Rebele et al. 1998a, 1998b; Rhodes & Rhodes 2006; Siegel et al. 2010; Wally-Dima 2011; Wessels 2005, 2006a, 2006b, 2007, 2008). The analysis of popular literature by Rebele et al. (1998b) includes a section where the literature on Educational Technology is analysed. For the period under

TABLE 1: Comparison of National Diploma subjects to Diploma in accounting subjects.

Pathway to National Diploma in Accounting	Diploma in Accounting
First-year curriculum (5 subjects per semester)	First-year curriculum (6 subjects per semester)
Cost Accounting 1 (1) – CCZ1-1	Cost and Financial Management 1A & B
Financial Accounting 1 (1&2) – BFC1-1/2	Financial Accounting 1A/B
Commercial Law for Accountants 1 – ACL 1-1	End User Computing 1A (RPL subject)
Business Information Systems 1 (1) – ABI1-1	
Entrepreneurial Skills 1 – AEN1-1	Introduction to Business Management 1B*
Economics 1 (1&2) – BED1-1/2	Economics 1A&B
Business Calculations 1 – ABC1-1	Mathematics for Finance and Business 1A/B
Communication 1 – LAN1-1	
Second-year curriculum (5/4 subjects per semester)	Second-year curriculum (5 subjects per semester)
Cost Accounting 2 (2&3) – CCZ2-2/3	Cost and Financial Management 2A&B
Financial Accounting 2 (3&4) – BFC2-3/4	Financial Accounting 2A&B
Commercial Law for Accountants 2 (2&3) – ACL2-2/3	Business Law 1A&B
Business Information Systems 1 (2) – ABI1-2	Communication 1 Module 1 (1st Sem)
Business Information Systems 1 (3) – ABI1-3	Active Citizenship 1A (2nd Sem)
Auditing 2 (1&2) – BOD2-1/2	Auditing and Internal Control 2A&B
Taxation 1 (1) – BBG1-1	
Third-year curriculum (5 subjects per semester)	Third-year curriculum (4 subjects per semester)
Auditing 3A – BOD3-1	Auditing and Internal Control 3A&B
Business Information Systems 2A&B – ABI2-1/2	Cost and Financial Management 3A&B
Financial Accounting 3A&B – BFC3-1/2	Financial Accounting 3A&B Taxation 3A&B
Management Accounting 3A&B – MAA3-1/2	
Taxation 2A&B – BBG2-1/2	
Advanced Law 3 – ACL3-1	

Source: Author's abbreviation and comparison of the University of Johannesburg's Under-Graduate Yearbook entries for 2009 and 2012.

Note: Cost and Financial Management and Financial Accounting are subject-integrated information and communication technology subjects.

review, Rebele et al. (1998b) report on four articles that describe how to use ICT to enhance instruction:

Bagranoff (1993) discussed how to use commercial-use accounting software to help students 'learn to learn' and provided a specific example used in an accounting information systems class.

Maher (1993) described a class assignment that requires students to develop a portion of a computerized general ledger system...

Coppage et al. (1996) reviewed their school's experience in implementing a master plan for computer integration throughout the accounting curriculum.

Wood et al. (1997) suggested that software packages help structure approaches taken to cognitive tasks.

Rebele et al. (1998b:207) remark that '[l]ittle research evidence is available to provide guidance on how to best integrate technology into the accounting curriculum'.

There are many other examples throughout the period reviewed. However, by the 2017 accounting research article (Apostolou et al. 2018), the methodology required, rather than the outcomes, is still the focus of the discussions:

Law Lawson, Pincus, Sorensen, Stocks, and Stout (2017) illustrated how the life-cycle approach can be useful for managing the process of developing a more integrated accounting curriculum.

Sledgianowski, Gomaa, and Tan (2017) discussed the integration of Big Data, technology, and information systems in the accounting curriculum. ... The authors discussed how to introduce Big Data into five functional accounting areas.

These illustrative examples show an awareness, by researchers, that ICT skill requirements were developing at a faster rate than formal instruction was embracing ICT. The skills gap between accounting education and accounting practice was formally acknowledged in the literature.

Impact of integrated information and communication technologies on the student

Student graduateness

'Graduateness' was first named by the UK Higher Education Qualification Council (HEQC) in 1995 (Stuart & Knowles 1999). It is described as the attributes that the student builds that define the student as a graduate. Each university attempts to instil different attributes into graduates that would define them as being citizens from that university, and as technology advances the attributes have emphasised the soft skills required for the 4IR. Kavanagh et al. (2008), in discussing stakeholders' perspectives of the skills and attributes for accounting graduates, state in their abstract that in terms of technical skills, importance is placed by the stakeholders on basic practical accounting skills, ICT skills and industry-specific awareness.

The South African Council for Higher Education (CHE) published a paper identifying eight graduateness attributes applicable to higher education. These attributes, encompassing both technical and soft skills, are listed in Box 1.

BOX 1: Council for Higher Education graduateness attributes.

Computer literacy
Computer literacy
Knowledge configuration skills
Information skills
Problem-solving skills
Teamwork
Networking
Mediation skills
Social sensitivity

Source: Council for Higher Education, as cited by Togo, M., 2012, 'Sustainability education and graduateness: A way of life?', in M. Coetzee et al. (eds.), *Developing students graduateness and employability: Issues, provocations, theory and practical guidelines*, pp. 75-88, Knowres, Randburg, South Africa.

Note that in Box 1 the CHE does not mention the discipline-related skills associated with the course that the student is studying. It would appear that these skills are therefore over and above the curriculum, yet a part of the student experience. Note also that these skills form part of the 3IR requirements.

Bernstein and Osman (2012:45) contend that graduateness stands apart from employability inasmuch as graduateness embraces 'critical competencies such as global citizenship, moral leadership, social responsibility, and a theoretical and practical understanding of ethics and their importance within communities of practice'.

The impact study focused on the impact that the new Dip. Acc. had on the key role players in the Dip. Acc. programme. Whilst the study undertaken focused on three areas of impact, namely, the curriculum, the lecturers and the student, this article singles out the impact that integrating ICT into the coursework has exerted on the student. The study argues that integrating ICT into the Financial Accounting and Cost and Financial Management subject syllabi has had a positive impact on the graduateness of students and, by extrapolation, on their employability.

This study only highlights the impact on the graduateness and employability affected by the integration of ICT into the subjects. There are numerous articles in both psychological and educational journals, highlighting the positive and negative effects of human-computer interactions and the effect this has on other graduateness attributes such as problem-solving and analytical and independent practice. However, these effects are not under review in this article. As the greatest change within the curriculum is the inclusion of SIICT, the graduateness attribute of 'ICT competence' is investigated as the major change within the graduateness attributes.

The time of first enrollment to achieving their first employment of the graduates from two cohorts (Cohort 1: pre-2013 – N. Dip. Acc. graduates; Cohort 2: post-2012 – Dip. Acc. graduates) was measured. The results indicate a certain and positive trend in (1) the time that the students take to complete their 3-year diploma and (2) the time that graduates take to find employment. Feedback from the graduates surveyed strongly agrees that ICT skills were a major factor in their employability.

Student employability

Employability is characterised by employment factors, which consist of the broad-based ideals that all employers require from their employees or potential employees (Wessels 2006b). Employment factors are usually very constant and are usually applicable to all employers. Factors such as communication skills, problem-solving skills and mobility have been requirements for a long time. More recently, ICT has been added as a factor. Brevis-Landsberg (2012) calls these factors *meta-skills* and has divided the meta-skills into macro-skills. The macro-skills were further enhanced by the inclusion of micro-skills linked to each macro-skill (Brevis-Landsberg 2012). The macro-skills are explained as the specific requirements that an employee may be looking for that all employees are required to have. Micro-skills are the individual skills required to perform the daily tasks. As an example, all employees have some technology skills (meta-skills); however, a company may require an accountant to have acquired ICT (macro-skill). Within these skills, data entry or reconciliation ability or foreign exchange market (FOREX) skills will be classed as the micro-skills.

Graduates vying for the same employment opportunity who have more of the employment factors required by the employer will generally have a greater chance of obtaining the employment (Wessels 2006b). This 'greater chance of obtaining employment' has been measured in this study as the length of time a student takes to obtain employment. The study shows that the integration of ICT into the syllabus of Dip. Acc. is beneficial to both the graduateness and the employability of the graduate as it reduces the time that graduates take to obtain employment.

Additional information – Youth unemployment

Youth unemployment figures as supplied by Statistics South Africa (Statistics SA) (2015) show a rising trend in youth unemployment for the previous 8 years for which information was gathered. Youth (15–34 years) unemployment rose steadily from 32.7% in 2008 to 36.9% in 2015. This was the employment environment into which the graduates in the survey entered. No comparison is drawn or made with reference to the number of graduates who are unemployed. Table 2 displays the information gathered by Statistics SA (2015).

Objective

The objective of the study was to evaluate the changes brought about in replacing an existing National Diploma

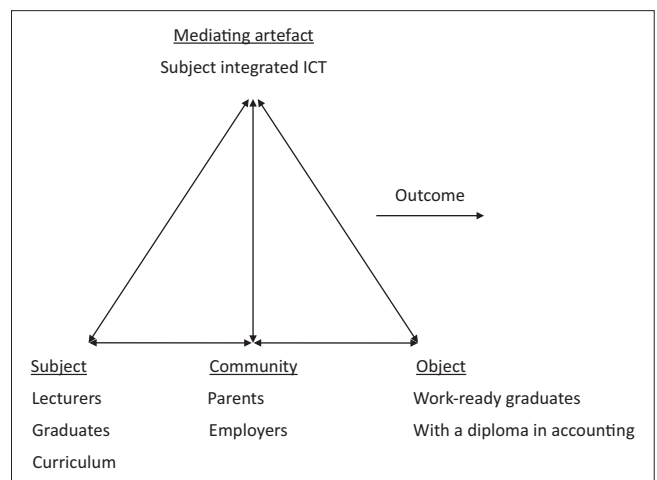
with a diploma that contains some SIICT subjects. As the diplomas differed mainly in the inclusion of SIICT subjects (Table 1), this article focuses on the impact of the changes on the students and their employability prospects. The changes were viewed from the perspectives of:

- the employers in employing the students more quickly (employability)
- the students in their study-period statistics (graduateness)
- comment from the students on the 'worth' of the SIICT subjects when seeking employment.

Methodology

The theoretical framework overarching this study is Vygotsky's (1978) activity theory. The complete study was based on the triangulation of the main subjects of the study, namely, the students, the lecturers and the curriculum changes to the subject. The Vygotsky triangle was completed with the mediating artefact being the SIICT, and the object being a work-ready graduate. The Vygotsky activity theory triangle was again scrutinised in light of Engeström's (1999) adaptation thereto.

The influences within the case design encompass the forces of the adapted Vygotsky–Engeström activity theory design. The design of the case study infers that the subjects under investigation, as well as the rules, division of labour and the community, are bound in time and place within the study. The mediating artefact, SIICT, is seen as the change that has produced a different outcome. Certain of the Vygotsky–Engeström activity theory forces have been seen to be unaffected by the introduction of SIICT and have remained as a constant that has no effect on the study. The two forces that thus remained constant and that have not changed with the inclusion of SIICT are the rules and policies of the university and the division of labour (lecturers), see Figure 1.



Source: Adapted from Engeström, Y., 1999, 'Activity theory and individual and social transformation', in Y. Engeström et al. (eds.), *Perspectives on activity theory: Learning in doing: Social, cognitive & computational perspectives*, p. 31, Cambridge, New York, NY; and, Vygotsky, L.S., 1978, *Mind in society. The development of higher psychological processes*. (Cole M, Steiner V.J, Scribner S & Soubermand, E; eds. and translators), Harvard University Press, Cambridge, MA.

FIGURE 1: Adaptation of Engeström's (1999:31) and Vygotsky's activity theory to suit this study.

TABLE 2: Youth (15–34) unemployment statistics in South Africa.

Year	Employed ($\times 10^3$)	%	Unemployed ($\times 10^3$)	%	Total ($\times 10^3$)
2008	6460	67.3	3136	32.7	9596
2009	6296	66.3	3194	33.7	9490
2010	5789	64.3	3215	35.7	9004
2011	5704	63.8	3237	36.2	8941
2012	5874	64.2	3273	35.8	9147
2013	5850	63.8	3321	36.2	9171
2014	6000	63.9	3390	36.1	9390
2015	6239	63.1	3646	36.9	9885

Source: Statistics South Africa, 2015, Statistics South Africa, viewed 28 November 2017, from <https://www.statssa.gov.za/publications/P02114.2/P02114.22015.pdf>.

Design

The conceptual framework for this study is a case study, with the boundaries and limitations inherent within a case study. Ragin (1992:5) states that '[b]oundaries around places and time periods define cases'. Flick (2015) notes that the case study is dictated by the issues being researched and is used to highlight links between the different issues being researched. Stake (2005) argues that a '[c]ase study is not a methodological choice but a choice of what is to be studied'.

Thomas and Myers (2015:21) argue that a case study should be examined through the lens of symbolic interactionism, as life is a set of 'dramatic performances', and a case study is an interaction between people and their environment. 'Symbolic interactionism' branches from interpretivism (Gray 2014); however, as this particular case study is looking at the cause and effect of actions taken, the researcher argues that this case study should be interpreted with a more pragmatic point of view, as described by Gray (2014:29). Accordingly, the lens adopted to explore the impact of SIICT is more a critical-evaluative lens.

This study was conducted as an exploratory study (Yin 2013), as it studied the impact (or outcome) that a newly introduced tool had on an object (Dip. Acc.). Thus, the study was conducted as a case study, but the analysis seeks to interpret what impact has taken place. This case study was limited to examining two cohorts of students over the period 2005–2012 for Cohort 1 and 2013–2016 for Cohort 2. This is the time limit of the study. The only place where the integration model developed by Rhodes (2012a) has been implemented is at the UJ. This study is thus limited in place to the UJ.

Limitations to the case study

The key limitations to this study were that, firstly, the research focused on the graduates of the N. Dip. Acc. and the graduates of the Dip. Acc. from the UJ. No inference was drawn as a comparison to other graduates from the UJ or from any other university. The research focused only on the key area of technology skills gained from the change in the curriculum and in what manner they may have impacted the employability of the graduate. Another accepted limitation of case studies is the difficulty in generalising all outcomes from a single case, especially a case with a small sample base. Parallel studies can be undertaken, but there can only be one first case study. All other aspects and key areas were assumed to be a constant unless the research found contrary evidence.

Population and sample

The population all came from the same department within the higher education institution, and the sampling was thus purposive, targeting the information already contained in the electronic database of the alumni offices at the UJ. Two cohorts of graduates were identified for the research: the

alumni who graduated from the N. Dip. Acc. and the alumni who graduated from the Dip. Acc. The last cohort of alumni from the N. Dip. Acc. completed their studies in November 2012. These National Diploma graduates are also referred to as the 'pre-2013 alumni'. The population of graduates from the formation of the UJ in 2006 to the last cohort of graduates of the National Diploma is estimated at 3000. However, of the students who volunteered for the UJ alumni database, only 366 email addresses were valid. A response rate of 29 out of 366 (8%) was achieved.

The first cohort of alumni from the Dip. Acc. completed their studies in November 2013 and graduated in May 2014. These National Diploma graduates are also referred to as the 'post-2012 alumni'. The population of graduates from the first cohort of graduates of the National Diploma in 2013 to the graduates in 2016 is estimated at 2100. However, of the students who volunteered for the UJ alumni database, only 492 email addresses proved valid, and this resulted in a response rate of 54 for the survey (11%).

Data collection

A mixed method of data collection and analysis was utilised (Creswell 2012; Flick 2015; Gray 2014; Thomas & Myers 2015). The basic data collection model used was Creswell's (2012) parallel convergent mixed-methods model (see Figure 2).

The student cohort questionnaire was developed to reflect three main objectives:

- How long did the graduate take to complete their studies and to find employment after completing the National Diploma and any other full-time studies?
- Has the graduate found employment commensurate with the studies in the National Diploma that he or she completed?
- Open-ended questions were included to garner insights from the second cohort on the applicability of IICT in their employment interviews and their current jobs.

Data analysis

Pre-2013 cohort and post-2012 cohort

The first round of data analysis commenced with a calculation of frequencies and central tendencies. This was followed with dispersion calculations and small sample deviations of the data. The third round of analysis was an inferential analysis, testing associations and differences between the data from the two cohorts.

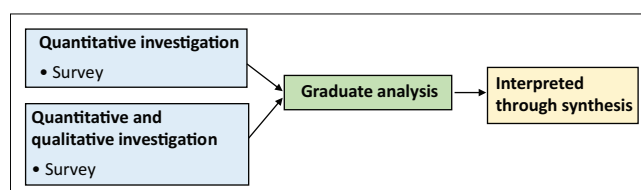


FIGURE 2: Parallel convergent mixed-methods model (Creswell 2012).

Post-2012 cohort

A fourth and final round of data analysis was conducted on the post-2012 cohort that concentrated on the open-ended questions. In addition, a lexical analysis was conducted to build up a thematic profile to the answers on the applicability of IICT to their employment. Lexical words (words that give text its meaning, such as nouns, adjectives, verbs and adverbs) were investigated and used as both a quantitative and a qualitative resource.

Validity, reliability and trustworthiness

Researchers agree that there is validity in case studies if certain criteria and/or structures are adhered to (Creswell 2012; Flick 2015; Stake 2005; Thomas & Myers 2015; Trellis 1997; Yin 2013). One of the main issues of validity revolves around the non-replicability of a case study. Weaknesses perceived in case studies are that (1) the notion exists that a case study is more suited to reporting than to theorising, which weakens the study, and (2) a case study generalises from the conclusions of an individual or singular occurrence. Thomas and Myers (2015:19) propose that a case study's weaknesses lie in the use of single events 'in establishing laws or theories by which we can explain or predict'. However, the researcher contends that the impact study's framework and the application of such a framework can be applied in similar case studies. It is accepted that the case study itself cannot be replicated, as there will never be another 'first' in the IICT that follows Rhodes's (2012a) implementation framework. This instrumental (Stake 2005) or investigative case study constitutes a case study because of the study's origins, its limitations and also because it is the first occurrence of the integration being investigated. However, this investigative case study is capable of being paralleled by applying the same or similar rigour to another university in another city or country. Such a duplication could then be combined to form a collective case study (Stake 2005).

Data validity

The questionnaires and data were scrutinised for anomalies and errors. Errors that were found were either corrected in line with the student's status or with the student's other replies. Most corrections came about because of the limitations of the survey software.

Reliability

Reliability in a case study is dependent on the stability and the quality of the data obtained (Riege 2003). Reliability has been approached from two aspects, reliability of the source of the data and reliability of the content of the data.

Reliability of the source of the data

The alumni questionnaires for both cohorts included validation of the unique student number issued to all students. These student numbers are dated at the first date of enquiry or registration. All the required student numbers were checked as falling within the validity period of the course that the student completed.

Reliability of the analysis of the data

The initial analysis of the data was conducted by an independent party and was then verified by the researcher. Statistical Consultation Services (STATCON), a statistical analysis business centre run by the UJ, was requested to verify the results of the calculations performed by the author and to recommend any calculations that they considered to be applicable.

Trustworthiness

Scientific rigour in this case study was achieved by conducting a mixed-methods approach to the data collection. Case studies are often seen as lacking in scientific rigour because of the complex nature of qualitative case-based studies. However, a case study need not be composed of a qualitative inquiry only (Creswell & Plano Clark 2018; Flick 2015; Stake 2005; Trellis 1997). Creswell and Plano Clark (2018), Stake (2005) and Flick (2015) agree that quantitative instruments can be used to support the qualitative nature of case studies, especially where case studies theorise rather than explain or report. Simons (2009) argues that though rigour may have been an issue in the past, many of the modern definitions of a case study concentrate on the complexity of the case study, rather than on the data collection method, as a greater number of case studies are now based on mixed-methods data collection strategies. Creswell and Plano Clarke (2018:174) link integrative data analysis and interpretation to mixed-methods designs and recommend methods of validating the qualitative data. Of the methods recommended by Creswell and Plano Clarke (2018:169), triangulation, reporting of disconfirming evidence and drawing data from several individuals are encompassed within this study.

Ethical consideration

Ethical clearance was given for this study by the Faculty of Education of the University of Johannesburg under clearance number: 090/2016. Clearance was granted for the researcher to conduct surveys, interviews and observations as required for the completion of the study. No ethical impact was envisaged, and no lecturer, student or graduate was harmed or could be identified in any way in this study. There were no minors involved.

Analysis and comparison of alumni

In this section, the results from Cohort 1 (the National Diploma) will first be introduced, and then the data of Cohort 2 will be shown before comparisons are made and the data are interpreted.

Analysis of pre-2013 alumni survey

Comparison of time taken to graduate against employment time

Table 3 compares the length of time taken for students to complete their studies with the time taken for the graduates to find employment. The overall average length of time

TABLE 3: Time taken for National Diploma students to graduate compared with time taken to find employment.

Time taken to obtain employment	No. of students who graduated in:			Total no. of graduates	
	3 years of study	> 3 to 4 years of study	> 4 to 5.5 years of study	n	%
0–6 months	4†	1	3†	8†	28
7–12 months	4	3	1	8	28
13–18 months	1	3	-	4	14
18 months to 2 years	1	1	-	2	7
25 months to still unemployed	5	1	1	7	24
Total	15	9	5	29	100

†, These numbers include four graduates who obtained employment before completing their studies.

taken by the students to complete their studies and to find employment has been termed the ‘study-to-employment cycle’. The weighted average length of time taken for the N. Dip. students to complete their studies was 3 years 7.7 months, and the weighted average time to obtain employment was calculated at 12.8 months, resulting in a study-to-employment cycle of 4 years and 8.5 months.

Analysis of post-2012 alumni survey

Comparison of time taken to graduate against employment time

Table 4 compares the length of study with the time taken for the graduates to find employment. The weighted average length of time taken for studies to be completed was reported as 3 years and 4.7 months, and the weighted average time to obtain employment was calculated at 10.5 months, resulting in a study-to-employment cycle of 4 years and 3.2 months.

In correlating the data between the two cohorts surveyed, a critical investigation of the data for the post-2012 alumni (Cohort 2) survey was undertaken. The students of the pre-2013 alumni (Cohort 1) were only classified as unemployed 2 years after graduation. Graduates of the second cohort who had completed their studies less than 2 years prior to the survey and were unemployed were removed from the data to eliminate skew in the data. This resulted in a balance of 30 students in Cohort 2 with data that were compatible with the Cohort 1 data, and that could be measured in this analysis.

Comparison and analysis alumni surveys

Comparison of time taken to graduate against employment time

Table 3 displayed an analysis of the time taken to obtain employment for the graduates from the first cohort surveyed. Similarly, Table 4 displayed an analysis of the time taken to obtain employment for the graduates from the second cohort surveyed. Table 5 compares the time taken by the two cohorts to obtain permanent employment despite the increase in youth unemployment percentages over the period investigated.

Table 6 reflects a comparison of the two cohorts in terms of the overall average length of time taken to complete their

TABLE 4: Cohort 2 time taken to complete studies shown against the time taken to obtain employment.

Time taken to find employment	No. of students who graduated in:			Total no. of graduates (%)	
	3 years of study	> 3 to 4 years of study	> 4 to 5.5 years of study	n	%
0–6 months	5†	5†	2	12	40
7–12 months	6	1	0	7	23
13–18 months	3	1	0	4	13
18 months to 2 years	2	0	0	2	7
25 months to still unemployed	3	1	1	5	17
Total	19	8	3	30	100

†, These amounts include two graduates who obtained employment before completing their studies.

TABLE 5: Comparison of the two cohorts’ time taken to obtain employment along with youth unemployment statistics and confidence interval.

Time taken to obtain employment	No. of Cohort 1 participants† (%)		No. of Cohort 2 participants‡ (%)	
	n	%	n	%
0–6 months§	8	28	12	40
7–12 months	8	28	7	23
13–18 months	4	14	4	13
18 months to 2 years	2	7	2	7
25 months to still unemployed	7	24	5	17
Total	29	100	30	100

†, Cohort 1, 2005–2012. Youth unemployment during the period 2008–2012 (Statistics SA 2015): 32.7–35.8%. Mean time to obtain employment: 12.8 months.

‡, Cohort 2, 2013–2016. Youth unemployment during the period 2012–2015 (Statistics SA 2015): 35.8–36.9%. Mean time to obtain employment: 10.5 months.

§, The calculations reflect that alumni in Cohort 2 found employment an average of 2.3 months more quickly despite the rise in youth unemployment.

TABLE 6: Study–employment cycle.

Variable	Pre 2013 N. Dip. Acc.	Post 2012 Dip. Acc.
Length of study	3 years 7.7 months	3 years 4.7 months
Time to obtain employment	1 year 0.8 months	0 years 10.5 months
Study-employment cycle	4 years 8.5 months	4 years 3.2 months (5.3 months quicker)

studies and the time taken to find employment. When analysed in light of rising youth unemployment, a definite argument is presented for the inclusion of ICT in the accounting curriculum of career-oriented qualifications.

Comment from the respondents

In responding to the request to comment on their perceptions of the ‘usefulness’ (or benefit) of the SIICT in the diploma, 85% of the alumni of Cohort 2 were positive that the inclusion of SIICT was advantageous. Only 9% of the students were negative towards the inclusion of ICT. The remaining 6% were undecided or refrained from commenting. The lexical analysis (Bolden & Moscarola 2000) in Figure 3, reflected a tendency to reply with the verb used in the question: ‘Please comment on your impression of the computer work included in the Accounting and Cost Accounting modules. Was it helpful? If so, in what manner?’

The word ‘helpful’ or a derivative thereof (‘help’, ‘helped’, ‘useful’) was repeated by 31 respondents, of whom two were negative, with replies similar to:

‘No, it was not helpful, as I have never used any of those computer skills at work.’ (Stu26, Female, Graduated 2015)

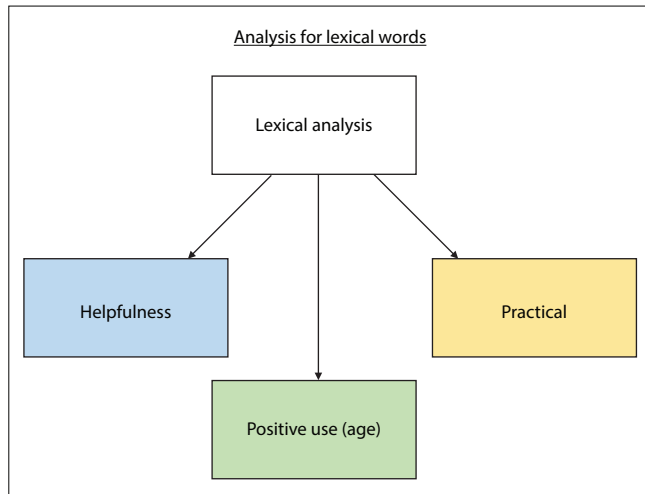


FIGURE 3: Analysis of Cohort 2's replies for lexical words (Bolden & Moscarola 2000).

The second most common code derived from the lexical analysis reflected that of the 54 students, 46 replies were classified as positive replies. Within the positive replies, 25 students noted that the inclusion of ICT had had a positive effect:

'It gives more depth, and it's practical work that [is] done on a day-to-day basis in the work environment.' (Stu4, Gender unknown, Graduated 2017)

'Yes, it prepared me.' (Stu24, Female, Graduated 2015)

'It was helpful because it opens doors for better jobs.' (Stu39, Male, Graduated 2017)

Eight students were not positive about the inclusion of ICT, and of those eight students, five had gained employment in an environment where they did not use their SIICT skills and were classified as neutral. Only three replies were negative. Participants stated:

'The work was helpful, but I did not end up getting the relevant job for my qualification.' (Stu20, Gender unknown, Graduated 2014)

'I am not doing accounting work, but I think it was helpful.' (Stu51, Female, Graduated 2017)

Other verbs that were more commonly used were aligned to 'positive use' for self (25):

'It helped me with my Excel skills.' (Stu43, Gender unknown, Graduated 2017)

'It made it easy for me to get used to the financial software that I got here at work.' (Stu20, Male, Graduated 2014)

A second round of thematic analysis based on the modified activity theory (Figure 1) was undertaken.

Common themes identified when interrogating the data for responses applicable to 'subject' focused on the curriculum and the use of the skills gained (27) and the knowledge gained (17). Within these two response themes, there were 13 students who mentioned both. The responses were mainly positive, as seen in the statements below:

'The Excel-based calculations for cost helped a lot.' (Stu2, Female, Graduated 2015)

'The practical classes made me feel like I was in the outside world.' (Stu11, Female, Graduated 2017)

'It made it easy for me to get used to the financial software that I've got here at work.' (Stu20, Male, Graduated 2014)

The qualitative responses for the students show a large positive response towards the inclusion of SIICT in the syllabus for both SIICT subjects of Accountancy and Cost and Management Accounting. The application of the software, hardware, skills and knowledge is a recurring theme that appears often in the responses.

Conclusion

The University of Johannesburg implemented a new diploma based on the ICT integration model developed by Rhodes (2012a). The model integrated ICT into the core modules of the diploma in a 50–50 division between practical and theoretical learning. A case study was initiated to evaluate the efficacy of the new diploma. This study evaluated the impact that this implementation of SIICT wrought upon the students in the diploma.

Three main aspects were investigated and synthesised. First was the student gradueness as reflected in the time taken by the student to complete the course. The students of the new diploma took a shorter average time (by 3 months) to complete their diploma. Students from the new diploma took an average period to obtain employment that was shorter by 2.3 months despite rising youth unemployment during the review period. This shorter employment time suggests greater employer acceptance of the new diploma. Finally, comments from the students indicated greater technical confidence and work-readiness by the students during job interviews. Eighty-five per cent of the students were positive concerning the inclusion of SIICT, whilst 9% of the students were negative towards the inclusion of ICT and 6% were undecided or refrained from commenting.

The shorter study–employment cycle and the positive student comments indicate that the integration of ICT into the new diploma and the accompanying SIICT subjects resulted in a positive impact on the students' employment prospects.

The results also indicate that an impact study is a positive method of analysing the success or failure of a curricular reform. The recommendations include investigating methods of ensuring the sustainability of the diploma and using the results of the investigation as an advertisement to attract prospective students to the diploma.

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Original data were confidentially collected for a PhD study and cannot be shared.

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