



**AN EVALUATION OF A COMPUTER INFORMATION SYSTEM IN
TECHNICAL VOCATIONAL EDUCATION AND TRAINING COLLEGES**

by

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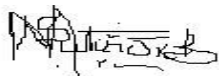
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DECLARATION

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Signed

Sept 2020

Date

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

ABSTRACT

Information systems (IS) evaluation is an important topic for study and practice in this digital era. Many researchers had performed studies and research on how to evaluate IS and different accompanying IS-related phenomena, in terms of strategies, needs and methods. Evaluation is also used as a research approach in many IS research studies. The need to constantly improve the quality of service offered by these information systems, resulted in continuous evaluation.

The ever-changing trends in information technology cause scholars to have great interests in the evaluation of information systems. Scholars interests vary and the focus and form may differ, depending on the aspect of concern regarding the IS. The major concern is how to evaluate these different information systems, given the extensive differences they have in terms of scope and operations. There are different approaches, different methods, and different knowledge interests that can govern how IS are evaluated. There exist controversies about different ways to evaluate IS, e.g. debates concerning economic vs. interpretive ways of evaluation.

According to Stufflebeam, evaluation research had continuously developed as a field, because of the need of assessing public programs that affect society (e.g. within schools, health-care, and welfare enterprises), in order to reveal whether services and improvement efforts were succeeding. Information systems are a critical resource to the business organisation, hence their constant evaluation in terms of performance becomes critical, as it gives direct instructions to the business on how to align strategies.

This research used the Delone and Mclean evaluation constructs with modification from the researcher. The researcher evaluated from a layman's perspective and uses simple statistics to evaluate a student CMIS.

From the evaluation on the ITS information system it was established that the errors that occurred were not directly related to the operation of ITS but it was as a result of users not being able to effectively use the I.S. Training was highly recommended to make all user conversant with the I.S. they are using.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

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An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

DEDICATIONS

To Sammantha Tatenda, Leeroy Asante Brooklyn and Anita Taya Yvonne

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

ABBREVIATION AND ACRONYMS

CCNA	Cisco Certified Network Administrator
CMIS	College Management Information System
CMIS	College Management Information System
CPUT	Cape Peninsula University of Technology
D & M	DeLone and McLean
ECD	Early Childhood Development
EUCS	End User Computing Satisfaction
FET	Further Education and Training
IBM SPSS	International Business Machine - Statistical Package for the Social Sciences
IS	Information System
IT	Information Technology
ITS	Integrated Tertiary System
MIT	Massachusetts Institute of Technology
MOS	Microsoft Office Specialist
NATED	National Technical Diploma
NCV	National Certificate (Vocational)
SAQA	South African Qualification Authority
TTF	Task Technology Fit
TVET	Technical Vocational Education and Training

Table of Contents

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
DEDICATIONS	v
ABREVIATION AND ACRONYMS	vi
CHAPTER ONE	1
INTRODUCTION	1
1.1. Introduction	1
1.2. Background to research problem	2
1.3. Statement of research problem	2
1.4. Research aim, objectives and questions	3
1.5. Key concepts	5
1.5.1. Management Information System (MIS)	5
1.5.2. College Management Information System (CMIS)	5
1.5.3. Technical Vocational Education and Training (TVET) Colleges	5
1.6. Case rationale	5
1.7. Thesis structure	6
1.7.1. Chapter One: Introduction	6
1.7.2. Chapter Two: Literature Review	6
1.7.3. Chapter Three: Information System Evaluation Frameworks	6
1.7.4. Chapter Four: Research Design	7
1.7.5. Chapter Five: Results and Analysis	7
1.7.6. Chapter Six: Recommendations & Conclusion	7
1.8. Chapter summary	7
CHAPTER TWO	8
LITERATURE REVIEW	8
2.1. Introduction	8
2.2. College Management Information System (CMIS)	9
2.3. TVET education landscape in South Africa	10
2.3.1. TVET programme mix	11
2.4. Information Systems - South African tertiary education area	13
2.4.1. Integrated Tertiary System (ITS)	13
2.4.2. PeopleSOFT	13
2.4.3. COLTEC	13
2.4.4. ISAMS	14
2.5. Implementation challenges of college information systems	15
2.6. Chapter summary	16
CHAPTER THREE	17
INFORMATION SYSTEMS EVALUATION FRAMEWORKS	17

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

3.1.	Introduction.....	17
3.2.	Background to systems evaluation.....	17
3.2.1.	The Wixom and Todd model.....	21
3.2.2.	Task-Technology Fit (TFT) model.....	22
3.2.3.	The End-User Computing Satisfaction Model (EUCS).....	23
3.2.4.	Delone & Mclean’s Model of Information Systems success.....	24
3.2.5.	Delone & Mclean Constructs.....	25
3.3.	Chapter summary.....	29
CHAPTER FOUR.....		30
RESEARCH DESIGN AND METHODOLOGY.....		30
4.1.	Introduction.....	30
4.2.	Empirical case.....	30
4.3.	Research philosophy.....	35
4.4.	Underpinning theoretical model.....	37
4.5.	Updated IS Success Model (D & M).....	38
4.5.1.	Rationale for DeLone & McLean.....	39
4.6.	Conceptual model.....	40
4.6.1.	Information System evaluation model.....	41
4.7.	Unit of analysis.....	42
4.8.	Sampling.....	42
4.9.	Data collection methods.....	43
4.10.	Data analysis.....	44
4.11.	Validity.....	44
4.12.	Reliability and bias.....	44
4.13.	Delineation of the research.....	44
4.14.	Contribution of the research.....	Error! Bookmark not defined.
4.15.	Ethical considerations.....	45
4.16.	Voluntary participation and harmlessness.....	45
4.17.	Informed consent.....	45
4.18.	Chapter summary.....	45
CHAPTER FIVE.....		46
RESULTS AND DATA ANALYSIS.....		46
5.1.	Introduction.....	46
5.2.	Data analysis.....	47
5.2.1.	DEMOGRAPHICS.....	48
5.2.2.	General Overview (GO) of the information system.....	50
5.2.3.	Information Quality (IQ).....	52
5.2.4.	System Quality (SQ).....	55
5.2.5.	User Satisfaction (US).....	61
5.2.6.	Individual Impact (II).....	65
5.2.7.	Organizational Impact (OI).....	68
5.3.	Conclusion.....	Error! Bookmark not defined.
CHAPTER SIX.....		72
DISCUSSION, CONCLUSION and RECOMMENDATIONS.....		72
6.1.	Introduction.....	72

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

6.2.	Recommendations.....	72
6.2.1.	User-friendliness and accuracy	73
6.2.2.	Training	73
6.2.3.	System Errors (SE).....	74
6.2.4.	Information Quality (IQ).....	75
6.2.5.	System Quality (SQ)	75
6.2.6.	User Satisfaction (US)	76
6.2.7.	Individual Impact (II).....	77
6.2.8.	Organisational Impact (OI).....	77
6.2.9.	Observation.....	79
6.3.	Conclusion.....	81
	LIST OF REFERENCES	84

LIST OF FIGURES

Figure 2.1	College Management System.....	10
Figure 3.1	The IS-Impact Measurement.....	20
Figure 3.2	The 37 Measures of the IS-Impact Model.....	21
Figure 3.3	Wixom & Todd Model (20.....	22
Figure 4.1.	TVET College structure.....	32
Figure 4.2	Nomological network of the updated IS Success Model (D & M, 2003)	39
Figure 4.3	The TVET College Conceptual Model for evaluation.....	42
Figure 5.1	Cluster bar graph – system errors Vs Level of stability.....	58
Figure 5.2	System quality in terms of reliability.....	59
Figure 6.1	Number of years vs Training Level.....	75
Figure 6.2	Accuracy vs system errors.....	76

LIST OF TABLES

Table 1.1	Research problem, aim/objective, question & sub-question.....	4
Table 4.1	Breakdown of programmes offer per campus.....	33
Table 4.2	Sampling per organisational function.....	44
Table 5.1	Data captured on IBM SPSS.....	47
Table 5.2	Data collected on IBM SPSS.....	48

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.3	Management Level.....	49
Table 5.4	Number of years working with any Education Management (information) System.....	50
Table 5.5	Number of years working with Integrated Tertiary Software (ITS).....	50
Table 5.6	Departmental participation.....	51
Table 5.7	Generally, how do you rate your information system in terms of accuracy..	51
Table 5.8	The general level of user-friendliness of the system.....	52
Table 5.9	Level of training on the information system.....	52
Table 5.10	How often do you use the information system.....	53
Table 5.11	How often do the system experience system error(s).....	53
Table 5.12	Quality of information on the information system.....	54
Table 5.13	Rate the quality of information on the information system – Availability....	54
Table 5.14	Rate the quality of information on the information system – Usability.....	54
Table 5.15	Rate the quality of information on the information system – Accuracy.....	55
Table 5.16.	Rate the quality of information on the information system – Timeliness...	55
Table 5.17	Rate the quality of information on the information system – Relevance....	56
Table 5.18	Rate the quality of information on the information system – Format.....	56
Table 5.19	How do you rate the level of flexibility of the information system.....	57
Table 5.20	How do you rate the level of flexibility - Stability.....	57
Table 5.21	How do you rate the level of flexibility – Usefulness.....	60
Table 5.22	Rate the level of flexibility - User Friendliness.....	60
Table 5.23	How do you rate the level of flexibility - Ease of use.....	61
Table 5.24	How do you rate the response time of the information system.....	62
Table 5.25	Rate user satisfaction of your information systems - System Effectiveness	63
Table 5.26	Rate user satisfaction of your information systems - User Effort.....	63
Table 5.27	Rate user satisfaction of your information systems - User Effectiveness...	64
Table 5.28	Rate user satisfaction of your information systems - Ease of Use.....	64
Table 5.29	Rate user satisfaction of your information systems - Information Quality	65
Table 5.30	Rate user satisfaction of your information systems - Service Quality.....	66
Table 5.31	Rate user satisfaction of your information systems – Usefulness.....	66
Table 5.32	Rate the individual impact of your information system - Task Productivity.	67
Table 5.33	Rate the individual impact of your information system - Task innovation...	68
Table 5.34	Rate the individual impact of your information system - Customer satisfaction.....	69

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.35	Rate the individual impact of your information system - Management control.....	69
Table 5.36	To what extent did the IS reduce administrative cost.....	70
Table 5.37	To what extent did the IS improve Organisational Image.....	71
Table 5.38	To what extent did the IS improve customer satisfaction.....	72
Table 5.39	To what extent does the IS enhance internal operations.....	72
APPENDIX - QUESTIONNAIRE		92

CHAPTER ONE

INTRODUCTION

1.1. Introduction

Many institutions of higher education (HEIs) in developing countries are still following the traditional method of managing IS with stand-alone computer machines, which store data in different departmental systems, due to a lack of infrastructure. In such cases, this study argues that poor IS infrastructures in HEIs, lead to the demise of the institutions. For any country, poor results in the educational sector will translate to higher government expenditure and low economic growth. The South African government through the Department of Higher Education, puts legislation in place to effectively manage all the information relating to student administration (Further Education & Training Colleges Amendment Act 3, 2012).

Information and communication technologies (ICTs) have become more potent over the years (Al Mamary et al., 2016:143-158) and their pervasive use has been realised in HEIs. The complexities in information systems (IS) in general, result in many problems that are experienced in the business organisation (Ibrahim et al. 2020). In institutions of higher learning where a variety of programme mixes are offered, problems always appear when it comes to results and certification. Many Technical Vocational Education and Training (TVET) colleges are struggling to cope with this aspect, causing students that are not being allowed to write examinations. TVET colleges are failing to effectively manage all the information pertaining to students' registration, performance management, results and certification, in a complex environment with various programmes with different access criteria, timeframes, structures and cost factors.

This study evaluates an information system which is run in TVET colleges, where many challenges are being experienced. The argument is that the dynamics involved in running TVET colleges' computer-based information systems, should be attended to. These dynamics lie in the multiple programmes which TVET colleges run. These multiple programmes have diverse and unrelated regulating bodies. An information system should therefore be configured to handle such a multiplicity of programmes under different bodies.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

1.2. Background to research problem

Student administration function is an important aspect of any learning environment. The importance lies in the need to manage support functions like applications, registrations, marks, attendance, student performance, graduation, and the financial aspects. This applies to universities and any other learning institutions. All colleges and universities consider the information pertaining to their clients as critical, hence there is a need to effectively manage it through clear computer-based information systems. In South Africa, Technical & Vocational Education Training (TVET) colleges are struggling to cope with this aspect, resulting in students that are not being allowed to write examinations.

To improve the governance, information management, and better general management of these institutions, the Further Education and Training (FET) Act of 2008, empowers Chief Executive Officers of these institutions to invest in an information technology infrastructure.

In any other institutions the executive management will have the power to make sure systems are in place to effectively manage all the information pertaining to students' registration, performance management, results, and certification in a complex environment, where different programmes with different access criteria, different timeframes, different structures and cost factors are being delivered. The belief is that with a better information technology infrastructure, a lot of control mechanisms can be built into the system to reduce errors in the system.

A student management information system should perform the following, but not be limited to capture student biographical information, course details, student performance management, track students' academic history, report generation, financial management, communication platform between stakeholders and provides a digital learning platform for students.

1.3. Statement of research problem

Colleges are required to run a mix of government programmes to cater for the wide range of skills that are required to build and grow the economy (Government Gazette 2014 No 37716 vol 588). Each programme will have its own administration, with different time frames and requirements. The administration of the student portfolio becomes a huge challenge for these colleges. The programme mix creates many complexities.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Programmes have different time frames, examination bodies, certifications and different quality management bodies. The courses offered include one-year, semester and trimester courses. Additionally, some courses do not have a specific duration, e.g. ICDL and CISCO, distance learning, and some part-time courses where the student can choose modules with flexibility to succeed, hence the student determines the pace. A number of students nationwide do not get results, because of what seems to be CMIS errors. This is a huge problem that negatively impacts on learners' progress and sometimes it completely affects the entire lives of these students.

In 2017 the Department of Higher Education and Training (DHET) reported that nationally an excess of 8 224 students did not receive their results, due to CMIS-related errors. The IS has some inefficiencies that need to be investigated.

These are some of the problems that were raised:

- Students get wrong results.
- Students do not get results.
- The staff cannot effectively manipulate the system to their advantage.
- Students' results are on hold or pending.

The above problems will be evaluated against the benefits of the CMIS, to see whether it is helping the administrative function in the day-to-day running of the college. Against this background, this research was undertaken to assess the current systems in use in TVET colleges, in order to isolate problems which could then be addressed.

Therefore, the research problem statement is:

TVET colleges in South Africa face multiple CMIS-related challenges that manifest in erroneous reports. It is a recurring phenomenon that many students from diverse programmes do not get their results, because of inefficient IS systems.

1.4. Research aim, objectives and questions

The research attempts to evaluate a computer CMIS in TVET colleges. TVET colleges in South Africa are currently using a uniform platform. Colleges are experiencing problems regarding results.

The objectives for this research are:

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

- To evaluate the computer-based CMIS of TVET colleges, given the complex programme qualification mix TVET colleges are running.
- To identify the benefits of a computer-based student administration CMIS in TVET colleges.
- To identify the challenges of the CMIS in TVET colleges, given their qualification programme mix.
- To recommend efficient practices relating to the utilization of existing CMIS in TVET colleges.

Table 1.1. below shows a summary of research questions, methods, and objectives.

Table 1.1: Research Questions, Methods and Objectives

Research question	How can a computer CMIS in TVET Colleges be improved, in order to process multiple programme qualification mixes to improve efficiency and effectiveness within the administrative function of the college?	
Research sub-questions	Methods	Objective
What are the benefits of the CMIS to the administrative function of the TVET college?	Questionnaire	To identify the benefits of a computer-based student administration CMIS in TVET colleges.
What are the challenges prohibiting the realization of the benefits of the CMIS in a TVET college?	Questionnaire	To identify the challenges of the CMIS in the TVET colleges, given their qualification programme mix.
What recommendations can be given to advance administrative effectiveness of a TVET MIS in processing multiple programme qualification mix.	Questionnaire	To recommend efficient practices relating to the utilization of existing CMIS in TVET colleges.

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1.5. Key concepts

1.5.1. Management Information System (MIS)

A collection of hardware and software are working together to support management in efficient running of business operations. MIS is a tool for strategic planning and coordination of business activities in a bid to maximize profits, by having an efficient and effective way of doing business. MIS involves linkages of many subsystems that collectively support the entire enterprise in terms of decision-making.

1.5.2. College Management Information System (CMIS)

It is also called tertiary education management system. It is a group or suite of software, equipment, and people responsible for the administration and management of information relating to students' enrolments, attendance, financial aspects, performance and results. A college management system assists all stakeholders in education, i.e. students, lecturers, administrators, and managers of the institutions. A college management system helps in establishing efficiency and effectiveness in terms of institutional management.

1.5.3. Technical Vocational Education and Training (TVET) Colleges

TVET colleges put emphasis on vocational, occupational, and technical education training with a major objective of equipping learners with the necessary skills that will make them functional workers in a particular skilled trade. In the Republic of South Africa, TVET Colleges are administered by DHET. Most of them are sufficiently equipped to execute their mandate at a tertiary level. They also act as pathways to other careers.

1.6. Case rationale

For the 2016 November final examination that were released in January 2017, 8224 students with examination entries did not get results, due to system and human errors. This adversely affects students' progression, certification and throughput in TVET colleges. It also gave the wrong impression of the results, hence critical decisions were made, based on accurate figures.

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One cannot consider system errors without looking at human errors, and at the entire infrastructure that builds the college management IS on which the data or information relating to students' marks and performance are captured, and where results are drawn from.

Therefore, the researcher intends to evaluate the computer-based CMIS for effectiveness and efficiency on meeting the primary objective of its existence, i.e. providing timeous, accurate, up-to-date and valid information to all stakeholders in education.

1.7. Thesis structure

1.7.1. Chapter One: Introduction

It introduces what the study is all about. It looks at the management information systems in general. It zooms in to the College Management Information systems in TVET Colleges, as well as the challenges that colleges have been experiencing.

The chapter examines the research question and sub-questions, aims, objectives and the justification of the case. It also looks at the empirical settings of the research. Finally, the chapter gives a breakdown of what is contained in each chapter of the research thesis.

1.7.2. Chapter Two: Literature Review

There will always be constant research on evaluation of information systems. Different factors influence different assumed outcomes. Chasing the wind. Information technology is changing rapidly, hence the need to continue with research to find the status thereof at every instance in time. The literature review studied other researchers work on information systems evaluation, with special focus on the DeLone & McLean (D& M) tool.

1.7.3. Chapter Three: Information System Evaluation Frameworks

This chapter explores different hypothetical outlines established by other scholars. Many researchers attempted to evaluate different information systems and they had developed different models that are particularly useful. Some had relooked at models developed by others and modified them to address what they think were weaknesses in those models. Delone & McLean modified their own initial models. Through the study of these theoretical models, the researcher developed his own model.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

1.7.4. Chapter Four: Research Design

The research design looks at the approach adopted. For this study, a quantitative method was used. For collecting data, a questionnaire was used for the entire population size.

1.7.5. Chapter Five: Results and Analysis

This section shows outcomes of responses as tabulated in the IBM SPSS software. Basically, these are graphs that show different responses to different questions in the questionnaire that was used. The graphs give a good analysis of the results.

1.7.6. Chapter Six: Recommendations & Conclusion

This is a direct response to the results of Chapter 4. Depending on the responses and findings, there are recommendations to the TVET Colleges senior management to make sure there are improvements regarding the issues mentioned in Chapter 4. The idea was to address the initial cause of the research problem. The final decision whether to implement the recommendations or not, will be with the management. This will also be based on the evaluation of the recommendations by management.

1.8. Chapter summary

Information system evaluation is an ongoing process. As new information systems are continuously developed, there is a need to check whether they are meeting the user requirements that they were designed for, hence there is always a need for evaluations. Information systems drive business and are critical to every business sector.

The chapter details the research background and specifies the research question and sub-questions that were triggered by the research objectives. The chapter also gives insight into the breakdown of the thesis. The research will now explore the literature regarding the information systems' evaluation in chapter two, and the theoretical frameworks in chapter three.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This section reviews diverse relevant publications by various researchers, thereby building arguments for the research problem which was raised in Chapter One. Information systems have a very important function in each of the different stages of internet-based operations management. They also assist in strategic businesses success and this includes educational management (Sirsat 2016:9). Much research was done in trying to establish the effectiveness and efficiency of college-based information systems (Ngoma 2009). HEIs, whether private or public, all require an efficient and effective CMIS for managing the student portfolio.

While there are many academic publications on university management information systems (Ali, Zhou, Hussain, Nair, & Ragavan 2016; Sang, Muthaa, & Mbugua (2012); Mwiya, Bwalya, Siachinji, Sikombe, Chanda & Chawala 2019), there is no scholarly literature on CMIS, and specifically for the TVET colleges landscape in South Africa. TVET colleges have unique character due to a diverse programme mix that they offer. In the programme mix, there are different examinations and professional bodies whose administration requirements, including examination handling and mark publication, should be done by one integrated system.

It is therefore a huge task to be able to manage a complex programme and qualification mix from one information system. The consequences are borne by the students, who sometimes do not get the results, or they get the wrong results. In 2017, DHET reported more than 8 224 student entries that had erroneous data resulting from the CMIS (DHET MEMO TE02 OF 2017 - OUTSTANDING RESULTS FOR 201611).

The following segment details college management information systems in general, followed by a section on the TVET landscape in South Africa. The next section presents information system platforms, which have been adopted for academic administration on tertiary level in South Africa.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

2.2. College Management Information System (CMIS)

CMIS is a software system that processes data and information about students and staff. A CMIS assists tertiary institutions to effectively manage enrolment, fees, certification, and other key functions aligned to student administration, including report generation.

A CMIS should perform the following, but not be limited to:

Capture student biographical information

Capture student information relating to a course

Display student information relating to performance

Retrieve and arrange student performance

Track students' academic history

Print reports for students

Manage the financial aspect of the student

Acts as a communication platform between the student and the institution

Provide a digital learning platform for students

College management systems have also evolved over time. Some systems give the students the flexibility to manage their own accounts, while others are more sensitive to security issues and they give students very little flexibility. The continuous development in the IT field is critical for the efficient management of these systems.

Most of these College Management Systems work as enterprise software, since they integrate the different components of the learning environment through different interfaces and portals, allowing colleges to perform some administrative and supervisory functions. Some functions that are incorporated in these systems include the procurement function, the financial function, security management and community-based activities.

Many educational institutions in developing countries are still following the traditional method of managing CMIS with stand-alone computer machines that store data in different departmental systems, due to a lack of infrastructure. The result is poor administration management results. Poor results in the educational sector translate to higher government expenditure and poor economic growth. The government through the Department of Higher Education has legislature to effectively manage all information relating to student administration (Further Education & Training Colleges Amendment Act 3 2012).

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

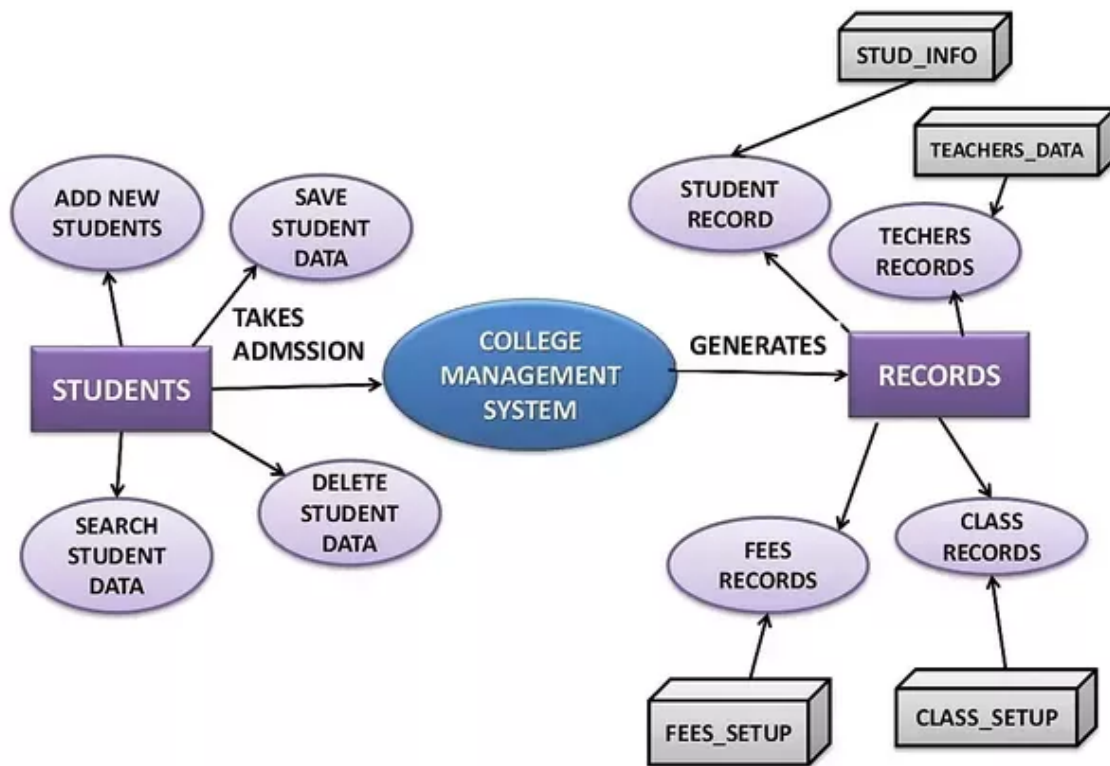


Figure 2.1. College Management System – developed by researcher

The College Management System must provide fully functional reports to executive management; accordingly, these reports are used to plan for daily operations of the institution, and definitely give insight into the strategic direction as dictated by the vision and mission of the institution.

The College Management System therefore operates as the backbone and bloodline of the institution, and without it, it will be almost impossible to manage the learning institution effectively and efficiently in this digital era. College Management Systems integrate all the basic information requirements of a student. However, having a system in place does not guarantee effective management, hence this research evaluated the efficiency and effectiveness of a college management system in the TVET colleges in South Africa.

2.3. TVET education landscape in South Africa

The government took the initiative and all TVET colleges are required to use the same software platform for student administration purposes. DHET is directly connected to the platform. The TVET colleges are experiencing the same problems nationwide.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

TVET colleges, like any other college and university, have systems in place, however, the question is how effective and efficient these systems are in terms of assisting the administration of students \in the institution. The Minister of Education announced on 9 November 1978 that the Colleges for Advanced Technical Education would in future be known as Technikons and he promulgated the amendment act on Advanced Technical Education 1978, i.e. Act 43 of 1979. (Department of National Education, Annual report 1980:6).

All Technical Institutes were declared state-aided Technical Colleges on 1 May 1982, and a process was started to transform the 28 Departmental Technical Colleges to state-aided Technical Colleges (Department of Education and Culture: 1986:25). These institutions were formally governed under The Technical Colleges Act (Act 104 of 1981). The Technical Colleges were furthermore declared Public FET.

2.3.1. TVET programme mix

As alluded to in the preceding subsection, college management information systems in TVET colleges fail to effectively handle the diverse programme mix. A typical TVET college runs the broad typology of qualifications presented in the subsections that follows:

2.3.1.1. National Accredited Technical Education Diploma (NATED)

The NATED programme is a semesterised course with a 3-year duration that is split equally into two phases, i.e. theory and practical. The programmes were established by the government as a quick fix to the skills shortage in South Africa. It combines theory and practical work. The students are required to be in class for 18 months (3 semesters), after which they will be attached to the industry to do another 18-month practical, and they will be required to complete a portfolio during that time that will be handed in at the end for evaluation. On completion, the student will leave with a Diploma which is on a Level 6, according to South African Qualification Authority (SAQA) framework. The student can decide to proceed to a degree qualification or can be absorbed by the industry.

The qualification is offered in a number of courses, e.g. Business Management, Public Management, Finance Management, Human Resources Management, Engineering, Hospitality, Educare and Early Childhood Development. The NATED framework does not exist for Information Technology courses.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

2.3.1.2. Occupational Programmes

These programmes usually come in the form of Learnerships and are offered by different Sector Education and Training Authority (SETA) with different stakeholders. Their duration varies from one SETA to another and from different service providers. They are offered in Early Childhood Development (ECD), ICT, Engineering, Tourism, and many other departments. The budget available usually influences the duration, since students enrolled will require allowances or stipends. The courses are structured in two components, i.e. the theoretical part which is done at the college or any learning institution, and the practical component which the student do at a business organisation. The student will need to perform and demonstrate the application of skills that was taught in class in a real world. However, most of the occupational courses limit the students to a 3–5-month time based at an organisation.

2.3.1.3. Apprenticeship and Trades

Students in these programmes are coming from the industry for different trades and professions. Their training duration depends on the parent company or organization that is sending these students and it is usually to complete the theoretical part of their studies. While in NATED, the college sends the students to complete the practical element in business organizations. Apprenticeships are different, because companies or business organizations send their students to complete the theoretical aspect.

2.3.1.4. National Certificate Vocational (NCV)

This constitutes the majority of the students in any TVET college. The NCV programme is modelled on a 3-year period, with an entry at Level 2 (Grade 10) and an exit at Level 4 (Grade 12). It was designed for students who do quite well in Grade 9, but who do not want to go the academic route. While other students proceed to Grade 10, 11 & 12 learning general subjects, the student who takes the vocational route, will learn a specific course, i.e. Information Technology, Business Studies, Hospitality, Engineering and many other courses.

The student will do a total of 7 subjects that are split into two, i.e. 3 fundamental and 4 core subjects. The core subjects change in depth and in name for each level and they are all related. The student will have the opportunity to progress to university or will be absorbed by the industry, since the student would have acquired sufficient skills to work. This was

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

introduced as a measure to quickly fill the skills gap that the country finds itself in. The programme suffers an identity challenge, since the learners are still very young and although they are classified as being in higher education, their qualification is, at the same time, equated to high school level.

2.4. Information Systems - South African tertiary education area

There are various ICT platforms for academic administration which are used by tertiary institutions in South Africa. The common ones are presented in the following subsections.

2.4.1. Integrated Tertiary System (ITS)

ITS was initially developed to assist tertiary institutions in managing the student portfolio. It is a college management information system or an education management information system. However, the ITS has evolved and now it is also used for other commercial business applications. ITS is a multicomponent system where institutions and businesses can get licensing for specific modules. ITS is being used in 147 countries worldwide.

ITS can now handle the financial and inventory management aspect of business, and it can easily be integrated with other applications. ITS is a web-based application. It is used by all TVET colleges and some universities in South Africa. ITS is used in many countries across the world for both education management and for private commercial business organisations.

2.4.2. PeopleSOFT

PeopleSoft Learning Management (PSLM) is a component of a larger Enterprise Human Capital Management suite of applications developed by Oracle. Oracle's PSLM is an application that improves the administration and facilitation of learning or organisational management. The information is module-based, hence organisations will pick modules that suit their business objectives. Modules are licenced separately, implying additional cost to the business organisation.

2.4.3. COLTEC

Coltec is a student education management system that was used by TVET colleges from their inception in 2006 until the introduction of ITS in 2014. Coltec had many similarities with ITS,

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

however, it was mostly query-driven, causing it to be very unfriendly towards users. The Coltec information system required users to have a strong understanding of databases and how to use access queries to manipulate the database, of which knowledge and experience was not readily available in the TVET administration and teaching staff.

Coltec Information System was highly underutilised, because of the above factor, making it boring to staff within TVET colleges. I strongly believe that this led to its replacement with ITS, which is more menu-driven and more user-friendly than its predecessor.

2.4.4. ISAMS

ISAM is a flexible application system that manages online school administration and can be tailor-made to meet every need of a school administration. It is 100% web-based, cloud or on premise, offers multiple third-party integrations, and it has an Integrated MIS & Accounting Solution. It uses independent but integrateable modules, thereby giving the opportunity and flexibility to build systems that suit particular institutions.

ISAMS relies on a database and application-based portable for both learners, teachers, administrators and parents. ISAMS gives schools bespoke management of all academic, well-being, sport, culture, administrative and financial information and Apps for teachers, students and parents to access real-time information. It assists school life by monitoring student behaviour and well-being.

It is an integrated finance solution for budgeting, fee billing, invoicing and purchase orders; an automated online admissions system, which is part of your school's website; and a fully managed service with an established local support centre.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

2.5. Implementation challenges of college information systems

Student information system implementation is considered a large-scale project operation, and as usual the usual factors that affect projects of this size will be experienced. Challenges with project scope, cost, resources, quality and schedule will constrain such a project (Project Management Institute (US), 2008, p. 6). "In order to deliver the best outcome, it is imperative that the organisation recognises these constraints and participate accordingly. Timely decision-making, support and leadership on issues that are important to the progress of the project are some of the key factors in effective participation" (Mukerjee S, 2012: 51-60).

It must be taken into consideration that a student-based information system spans a wider spectrum of business processes – time for consultation, briefings and sign-offs, tend to take a lot of time, thereby derailing the project in terms of schedule. Time is a critical resource for any project, hence one needs to get a balance between time versus cost vs schedule, on some of the business operations.

"In theory, systems are used to automate business processes where human participation can be replaced with automation, thus providing efficiencies. Therefore, it should do what and how the business requires. In practice, systems using third party products are standardised products which force users to do their business process in a standard way albeit with some customisations through allowable configuration change" (Mukerjee S, 2012: 51-60). Therefore, it implies that the system may dictate how business processes should operate to survive. Businesses are forced to re-engineer their process to make sure that they are re-aligned if they have to survive.

It is only in-house or customised built-in systems that offer the luxury and flexibility of doing exactly what the business requires and with limited technical limitations. However, there are very few in-house systems developed for learning institutions. If an organisation decides to use third-party software, then it should be ready to re-engineer some of the processes to make sure it aligns with their business requirements.

Products selection and evaluation is a critical process in any software or application development process, which if not approached carefully and pragmatically, can actually paralyze the business. "In the selection phase, in order to select the best fit for the

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

organisation, precise business requirements should be used to drive the selection process and gap analysis. Having a strong business case with clearly articulated benefits that are expected to be realised from the implementation will enable the university to measure benefits based on real agreed outcomes and not perceptions of the moment post-implementation” (Mukerjee S, 2012: 51-60).

Universities throughout the world are centres for knowledge, innovation and higher learning. It is imperative that that they incorporate core philosophies of modernization, coupled with technology, as far as planning for the entire organisational management is involved (Schwartz, 2009, p. 13). “A strong need to migrate from the traditional institutions philosophy to new corporate entities” Marginson (2000).

For survival, a business organisation and learning institution relies on continuous adaptation of technology and systems. Without adaptation a business will be left behind, and this might even result in shutting down. The modern world is continuously changing in terms of the operational environment and therefore organisations need to adapt.

Large and complex systems lack the agility, hence a shift in thinking is required and expected from management as drivers of the business organisation.

2.6 Chapter summary

The chapter explores the history of South African tertiary education and what gave birth to the current trajectory in the TVET colleges sector. The chapter also explored information systems and management information systems. College Management System and or Education Management Information System were explored, examining what exactly they should do to assist college management in driving their vision and mission.

The setup in terms of programme qualification mix offered by TVET colleges in South Africa were explored. The next chapter explores in detail some evaluation models that were developed by prior researchers and their application to the current scenario. It also explores the CMIS evaluation model or framework, developed by the researcher, that will be used to evaluate the current system to see whether it is meeting the objectives that the information system was initially developed for. CMIS should accomplish or fulfil their basis of existence.

CHAPTER THREE

INFORMATION SYSTEMS EVALUATION FRAMEWORKS

3.1. Introduction

Evaluation of a college management information system is the main purpose of this research, hence a detailed investigation of existing evaluation models was carried out. Evaluation of information systems are not 100%, because of the complexities in the IS environment as well as the number of variables and their relationships that are involved. “The complexity concept is associated with people, and things or systems (situations as perceived by people). In relation to the former, it comprises the following aspects concerning individuals: perceptions and notions, interests, and capabilities. With regard to systems, complexity includes the ideas of the number of parts, and the number of relationships between the parts” (Flood & Carson 1998).

3.2. Background to systems evaluation

An evaluation cannot deal with the entire environmental complexities, hence we developed and used abstraction, i.e. modelling. Prototypes are representatives of reality, systems, situations, or phenomena (Faucheaux et al, 1976:107-115). Models, therefore, assist in understanding, researching, and acting on systems (Ortigueira 1987). Models usually have three general purposes, i.e. prediction, description, and explanation (Finkelstein & Carson 1985).

Models are defined using a collection of variables and connections amongst them (Roldan & Leal 2003). Every variable is viewed as a bridge interfacing a theoretical concept. One indicator or several are used to express variables in empirical models. Systems and models cannot be separated from each other according to Flood and Carson (1988).

In real life prototypes and their corresponding structures are homomorphous – not all variables are going to interrelate amongst the system and the prototype (Ortigueira 1987). “The effectiveness of any model used to describe and understand behaviour of a particular system

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

as a whole ultimately depends on the degree to which that model accurately represents that system” (Ackoff 1999:34).

In the past few decades there were more discussions on information processing in a bid to support management activities. The continuous development in the field of computers and computer science in general, experienced a huge development in information processing and the need to constantly evaluate technologies that are needed for information processing. The justification, adoption of information technologies within business and government organisations, presents huge challenges in terms of fundamental issues that are needed to support IS design (Kriebel 1970:1).

Assessing the extend of impacts of computer and IT, contributes largely to information system writings (Kim et al, 1999:14-23). Most of the impacts are not directly connected to the information technology system in use, but are generally the organisational culture, operational and environmental factors, and the human element (Petter et al 2008). The argument had always been “if information systems research is to make a contribution to the world of practice, a well-defined outcome measure (or measures) is essential” (D & M 1992).

For an information system to be accepted by the business organisation, it has to be successful in meeting its mandate. Many studies had been conducted by Gable and D & M, concerning the evaluating of the success of information systems. The question at the moment is which combination of variables best determine IS success. According to Rai et al. (2002:50-69), “the problem lies in the ambiguity of the concept and the multiplicity of IS success constructs pervading the research”. Measuring success generally proved to be a challenging procedure, since there are no standard guidelines, Gable (1991). IS scholars and practitioners address unique facets of system evaluation (D & M 1992). The lack of evaluation guidelines was noticed by both Seddon et al. (1999:61) and Shang and Seddon (2000), who agreed there are very few frameworks to systematically measure the IS success.

The determination of IS adoption and the success or effectiveness thereof is crucial, as it speaks directly to the cost, benefits and value of IS management and investments. Much time is spent by the researcher evaluating the success factors. Organizational environment of the IS (Sirsat 2016) is critical, since it influences the success of the IS. D & M (1992) established and conducted a wide-ranging critique on Information Success (IS) model. This resulted in the

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

development of the D & M model. The D & M tool is widely acknowledged by many fellow IS researchers and evaluators.

According to Sirsat (2016), “due to liberalization and globalization, more emphasis needs to be on quality, timeline, innovation and customer orientation but it requires an accurate, fast, effective IS”. Evaluation of CMIS is necessary with these aspects of organizational objectives.

The chapter is organized as follows:

The Gable et al. IS Impact Model is discussed first, followed by the Wixom and Todd model. Task-Technology Fit (TTF), End-User Computing Satisfaction model (EUCS) is followed by the D & M tool for Information Systems Success, and the last section is the chapter summary.

In 2008, another model called the IS-Impact measurement model was built (Gable et al. 2008:377-408). This tool is a theorized-arrayed catalogue, with causal relationships on the evaluation constructs.

“The driver for the study was the lack of reliable, standardized, and empirically validated measurement model for assessing the success or impact of contemporary information systems. The IS-Impact model consists of four constructs: Information Quality (IQ), System Quality (SQ), Individual Impact (II), and Organizational Impact (OI)” (Gable et al. 2003). D & M and IS-Impact tools have some similarities, though they are different in scope, of course. They are all based on multiple constructs of IS Success that are integrated.

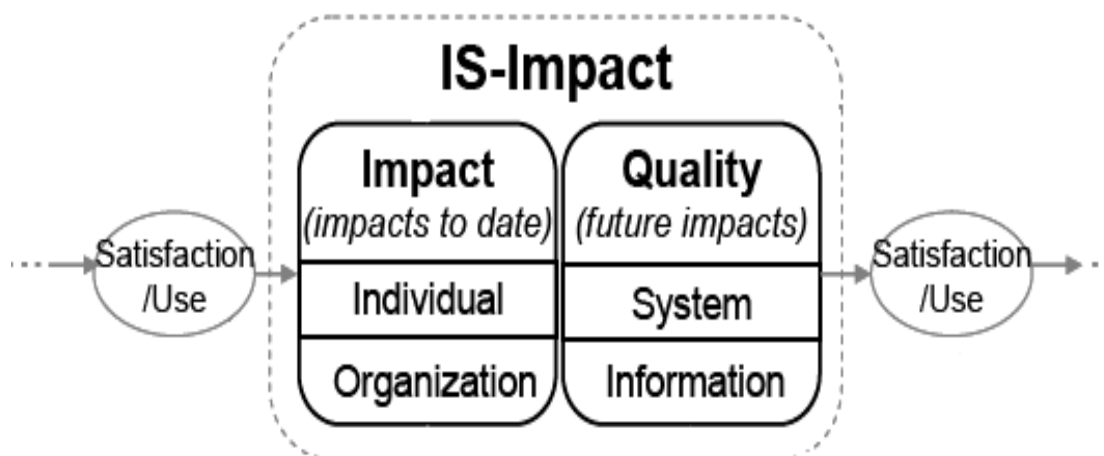


Figure 3.1. The IS-Impact Measurement of Gable et al. (2008).

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

The differences of the IS-Impact versus D & M tools:

It represents 'measurement model' not 'causal/process model'.

User or system satisfaction overall measures the success – it is not used as a construct of success.

The modern-day IS perspective and the business property is adding new measures to the model.

To reflect a holistic organisational impact construct, additional variables were added. The tool was tried and tested widely.

The IS-Impact model was constructed or built in two phases:

the exploratory phase and

the confirmatory phase

Two surveys were conducted to test for validity, using sets of unique data.

The priori model employed the D & M tool, however, it did not adopt the 'Use' variable. 'User Satisfaction' variable was removed, as it directly relates to System Quality. This left the model with only four constructs: 'System and Information' quality on the one hand and 'Organisational and Individual' impact on the other hand.

After analysis of the confirmatory phase, it resulted in the validity of the constructs mentioned above, and their relationship which converged to one phenomenon – the IS-Success.

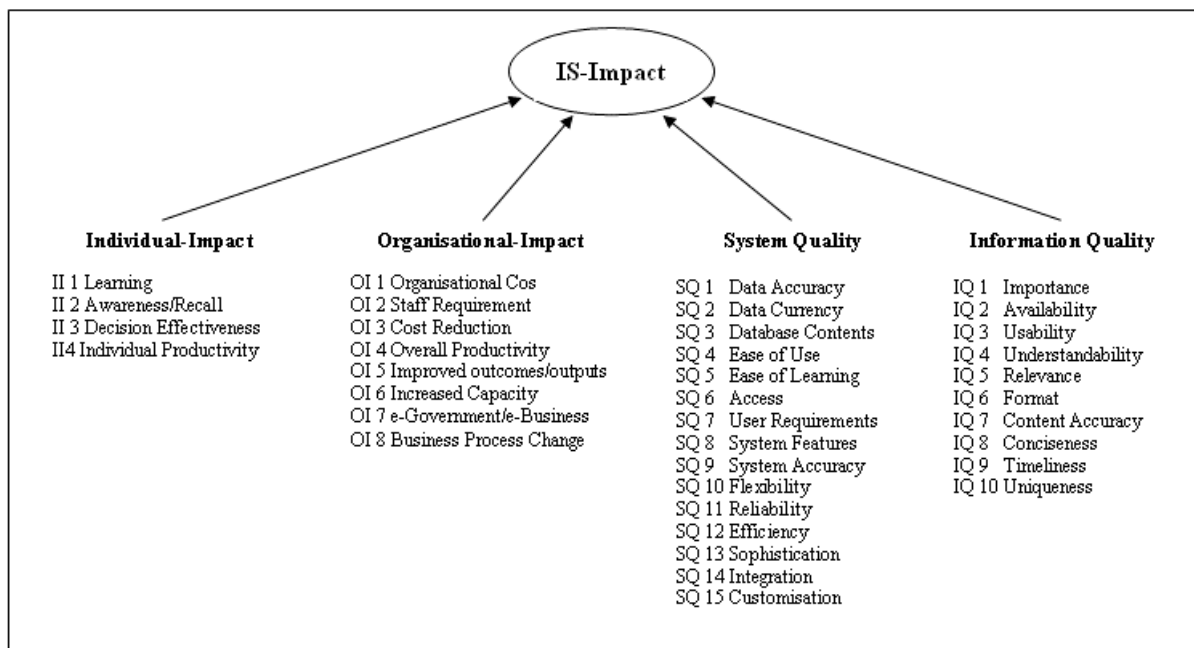


Figure 3.2. The 37 Measures of the IS-Impact Model. (Adapted from Gable et al, (2008, p. 390))

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Gable and his team assessed the items extensively, getting rid of repeating data and adding new perspectives. This model reconciles the mix-up of the role of the D & M variables against explanandum. This tested the sufficiency of the constructs.

By design the IS-Impact model, was meant to be simple, robust and should give outcomes or output that is consistent between stakeholders, systems, and perspectives (Gable et al. 2008:377-408). The IS-Impact model offers a tool that is relevant to all stakeholders, giving an opportunity to compare different perceptions regarding the evaluation constructs.

In general, the IS-Impact model is not a process and neither does it represent a causal relationship. It can be used as a datum tool to compare a wide range of versions, systems, products and or different functional areas within business organisations.

3.2.1. The Wixom and Todd model

Previous researchers and scholars have evaluated (IS) success focusing on two basic research streams, i.e. user satisfaction technology and acceptance literature. There was never efforts to integrate these streams, hence they have been developed independent of each other (Barbara H. Wixom, Peter A. Todd 2005:88).

Although both streams give valuable contributions to other researchers and scholars, they both show only one perspective. A few studies had strived to show both user perceptions as drivers of user satisfaction (Wixom and Todd 2005 and Nelson et al. 2005)

System reliability and information accuracy attributes are clearly depicted in user satisfaction literature, however, user satisfaction on its own poorly determines system use (Goodhue 1988; Davis 1989, Melone 1990, Hartwick et al 1994). This is because ordinary attributes of objects like information system, are poor determinants of behaviour (Ajzen and Fishbein n.d.). Wixom and Todd (2005:85-102) concluded that supposed usefulness was subjective to alleged ease of usage.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

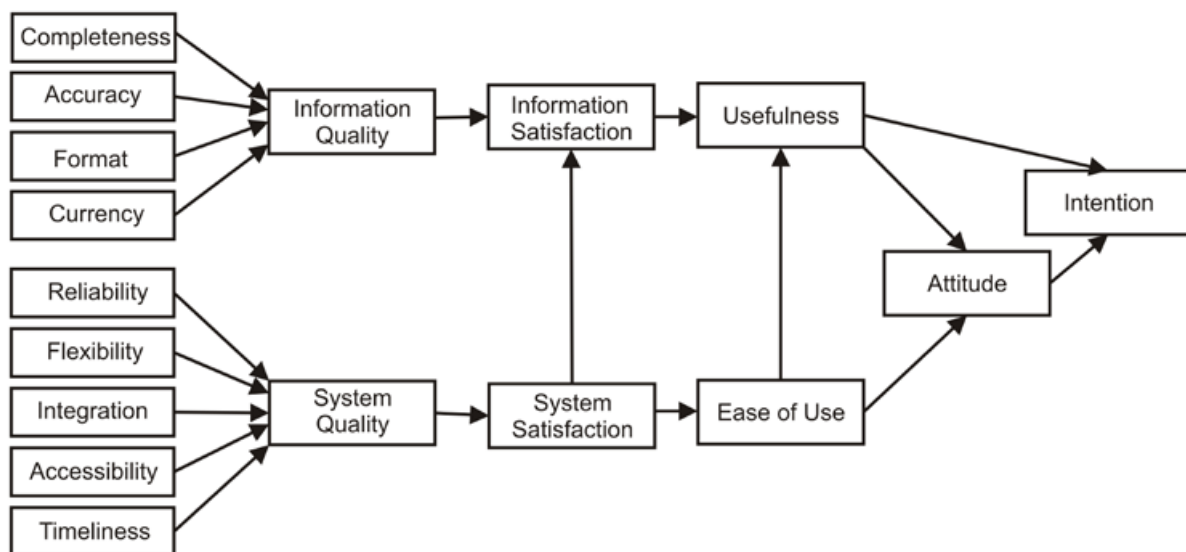


Figure 3.3. Wixom & Todd Model

“Perceived ease of use (PEOU) is the determinant of perceived usefulness (PU) Perceived usefulness (PU) and perceived ease of use (PEOU) are distinct but related construct. Improvements in perceived ease of use (PEOU) may contribute to improved performance.

Since improved performance defines perceived usefulness (PU) that is equivalent to near-term usefulness, perceived ease of use (PEOU) would have a direct, positive effect on perceived near-term usefulness”, according to Suki and Ramayah (2010:395-413).

Reliability disturb workers’ attitude towards the system, and this will influence behavioural beliefs. Behavioural beliefs directly impact on the attitude toward use and also on usage (Wixom and Todd 2005).

3.2.2. Task-Technology Fit (TFT) model

TTF is considered the degree that technology helps a user or an individual in executing their responsibilities. It is deemed higher when requirements are equal to functionality, and lower when they are different, and requirements are not met. Generally, users exploit technology when it meets job requirements.

According to Goodhue & Thompson (1995:213-236), “the completion of a specific task is directly related to an individual’s performance. A higher level of individual performance can suggest improved effectiveness and efficiency. This in turn can result in higher quality output. A high TTF increases both the chances that a technology will be utilized and

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

the user's performance". Goodhue et al. believed high TTF results in improved performance as they address user requirements.

Goodhue et al. (1995) advocate for a complete system performance-based model. The model should have enough features to assess single user routine, instead of usage only.

Various features of TTF were long-established critical systems by many scholars, i.e. Goodhue et al. (1995,1997,1998, 2000), Ferratt et al. (1998) and for explicit machineries Goodhue et al. (2000, 1998), Dishaw et al. (1998, 1999;), and for a multiplicity of jobs Ferrat and Vlahos (1998), Goodhue and Thompson (1995); Goodhue et al. (1997, 2000); Dishaw and Strong (1998, 1999); Majchrzak, Malhotra and John (2005); Staples and Seddon (2004). Zigurs et al. (1998) devised a concept of TTF to aid creation and implementation of Group Support System.

Performance in general is the fulfilment of the group. These group tasks were put into categories: simple, decision, judgment, problem, and fuzzy. These were aligned to 3 system support scopes: communication, information processing, and process structuring. This eventually resulted in acceptable outlines being established (e.g., "Simple tasks should result in the best group performance when done using a GSS configuration that emphasizes communication support", Zigurs et al. (1999), who also tested and confirmed the best fit profiles.

Further researches were conducted in a bid to improve and incorporate other technologies (Vandenberg (2001), (Barkhi 2001-2002). Similar concepts in the field of e-commerce were applied by Jahng, Ramamurthy and Jain (2000).

3.2.3. The End-User Computing Satisfaction Model (EUCS).

Wynne W. Chin et al. said that "end-user satisfaction with an information system is defined as the overall affective evaluation an end-user has regarding their experience related with the IS". The word 'experience' focused more on the IS. Past research and scholars put emphasis on satisfaction measurement of the system.

The model has undergone significant and rigorous testing and development in the last few decades. At the moment it employs 12 variables or constructs to denote five critical areas (Sue F et al, 2005).

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Computing satisfaction have highly underpinned the IS field. Some attempts have been made to view the evaluation in terms of the system use (Doll et al. 1988, 1991, 1995). Doll et al. used timeliness, ease of use, accuracy, content, and format as end-user satisfaction measures for their evaluation.

3.2.4. Delone & Mclean's Model of Information Systems success

D & M (1992) analysed 180 research studies that was a mixture of conceptual and empirical studies. They identified numerous measures which were applied in IS evaluation. D & M deduced that different researchers or studies were addressing different elements of IS success which made straight comparisons very difficult. Before the DeLone and McLean model, nothing existed as a criterion for success or classifications/groupings.

D & M (1992) based their work on Masson (1978) and Shannon and Weaver (1963), hence they suggested a model that reflected already-known variables. Their IS Success model had six main constructs or variables, namely User Satisfaction, Use, System, and Information Quality, Individual and Organisational Impact. It is a widely quoted model (Heo et al., 2003:243:256).

They faced challenges in definition and identification of concepts. Their model has related variables. They noted information and System Quality impacts, User Satisfaction, and Use equally and singularly.

““User satisfaction” and “Use” are direct antecedents of individual impact; and, lastly, this impact on individual performance should eventually have some organizational impact” (D & M 1992). D & M (1992) stated the tool was “an attempt to reflect the interdependent, process nature of IS success”.

Huberman and Miles (1994) said, “valid analysis is immensely aided by data displays that are focused enough to permit viewing of a full data set in one location and are systematically arranged to answer the research question at hand”.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

3.2.4.1. Challenges on DeLone & McLean

The tool received some criticism from a number of researchers and scholars and they decided to change the causal path. (Seddon and Kiew, 1994). Glorfeld and some other researchers modified and combined the constructs (Glorfeld, 1994), while Seddon (1997) added some new constructs to the original D & M tool. It is interesting that contradicting results on associations between variables had been picked. Glorfeld (1994) established a good association between Individual Impact and User Satisfaction, however, it was not the case with Teo et al. (1998), using similar variables.

D & M (1992) advocated usage of proven, tested variables and attributes from current inquiries. To operationalize the IS-Success model, adequate and acceptable qualities were used. The D & M model constructs are given below.

3.2.5. Delone & Mclean Constructs

3.2.5.1. Organizational Impact (OI)

The impact IS have on the entire business output, is assessed by this construct. For this study some measuring instrument of Sabherwal (1999) and Mahmood et al. (1986) was used. Items to measure the impact of IS in administrative costs reduction, organizational image improvement, internal operations enhancement, and customer satisfaction, were taken from the study of Sabherwal (1999).

Organizational impact symbolizes the overall gain for the business by using an CMIS or applications. Return on Investment (RoI) is the ultimate measure of organisational impact of the adoption of a particular technology or IS. Numerous constructs on how to measure organisational impact have been developed by several authors and scholars.

Effective management of CMIS becomes critical as IS contributes to the achievement of the broader organizational goals. Not only does CMIS affect organisational performance, but also the industry structure at large in terms of increased revenues, increased work volume, staff reduction, sales, productivity gain, operating cost reduction, profits, and market share. On completion the D&M Model received a lot of criticism, as some researchers and scholars felt it was incomplete. Some felt more dimension should be covered and that the model needs an upgrade.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

3.2.5.2. Service Quality (SQ)

This dimension measures the quality of service of the IT support personnel that is provided to the general users in the business organisation. The IT function in the business organisation must strive to provide error-free services which will translate to an enormous business gain. System or information system errors will freeze progress and increase overhead costs, thereby reducing efficiency provision of services. Profitability is easily achieved.

Once service quality is good, it becomes easy to align operations to wider organisational goals. It also becomes easy to evaluate all spheres of business operations, thereby making the organisation more profitable. Alignment of the IT service to the organisational vision and mission, is critical for any business to survive in the 21st century. Information technology is literally driving and dictating business operations in this digital era. Decision-making is enhanced with information systems that provide good quality of service, more accurate sales forecasting, improvement of work flexibility, and enhancement of reliability and responsiveness.

The net benefits derived from the service quality is very high, as users of the information system effectively and efficiently utilise the IS with challenges, thereby adding more values to the entire business chain. The usage of the system aids the accomplishment of people, departments, or the entire business.

3.2.5.3. Individual Impact (II)

This examines how the CMIS or technology is directly influencing or impacting performance of individuals in the business organisation. The ability to understand the use of the IS adds great value to the employee in terms of his or her output. The belief is that the more users master the IS, the more productive they become, and the more profits could be realised by the organisation. For this study, the Doll et al. (1988) tool is employed to assess the construct of individual impact. For this research four aspects will be measured: customer satisfaction, task productivity, innovation, and management control.

Individual impact represents a positive effect of having the correct information to make informed decisions and perform calculated operations. This positive effect of data influences the work operational behaviour of the beneficiary, and this will improve individual performance. This will automatically translate into increased profit margins, due to effective time

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

management, less repeat operations, reduced cost of operations and a motivated workforce. IS and or technology breakdowns and knowledge gaps tend to demoralise users and the result will be reduced productivity. Common indicators are analysis, learning, improved correctness, problem identification decision quality, improved individual productivity, decision-making time and task performance.

3.2.5.4. System Use (SU)

SU is a critical measure in the justification of any IS. The extent to which employees exploit the IS as a work tool, signifies the importance of that information system. The total number of applications that are used by a particular user against the available applications, will bring a number of what-if scenarios. Doll and Torkzadeh (1988) did further research on these constructs and developed an instrument to measure SU. Igbaria et al. (1989) also researched this construct further and developed a four-piece instrument for SU. A research on the reliability and validity in terms of application was performed by Anakwe et al. (1998) and the instrument proved to be effective.

3.2.5.5. User Satisfaction (US)

In recent years User Satisfaction has been used extensively by mostly e-commerce-based businesses as a way of trying to assess the level of contentment received from the services provided or rendered. It is very important for users of a particular information system or technology to be satisfied by IS services or technology. Users tend to use and adapt to a particular IS or technology if they are happy with it, otherwise they develop and adopt alternative options so that they can perform their functions with ease. For this study, the instrument developed by Seddon and Yip (1992) will be adopted. The instrument was tested by Seddon et al, (1994) and it proved to be effective and reliable.

User satisfaction does not stand on its own, since it is dependent on other constructs and variables. In general, a number of factors have a direct effect on user satisfaction. Some of these factors that influence satisfaction are attitude, system, and information as a whole, versus user's expectations and requirements.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

3.2.5.6. System Quality (SQ)

The quality aspect of any product or service is complicated to measure, as quality itself is very subjective. Some terms that relate to quality are conformity to certain agreed specifications and or guidelines, something of value, ability to meet the expectations of the customer, and excellence. Users of an IS are the best to determine this construct. Quality is not visible, it is experienced. Information systems that are easy to use with good user interfaces and shorter processes to execute, tend to enjoy appraisal from users as being of a good quality. Quality therefore, becomes a very important construct in any IS evaluation, since it speaks to experience and to the end product.

This research uses a number of measures to evaluate this construct. Some of the measures are reliability, usefulness, flexibility, and stability. According to Seddon et al. (1994), system excellence is concerned with errors in the system, flexibility in usage, the system's rate of response, the supporting documentation available to troubleshoot in the event of system challenges, consistency in interfaces, and maintainability of the entire IS.

3.2.5.7. Information Quality (IQ)

IQ tends to influence all the other constructs. In this digital and information era, the quality of information becomes critical for business operations and user performance. Businesses re-engineer processes and procedures are based upon the availability of information. However, the properties of information, i.e. relevance, validity, accuracy, format in which it is presented, and output from and to the IS, are paramount, according to Seddon and Kiew (1994).

Earlier researchers and scholars resulted in Bailey and Pearsons (1983) developing an instrument to measure or evaluate the Information Quality construct. Li (1997); Khalil and Elkordy (1999) and Mahmood and Becker (1986), used the instrument and it proved valid and reliable. This instrument has 9 variables and had been used in the IS evaluation field. It is accepted and had been adopted as a standard instrument by many IS scholars and practitioners to effectively assess Information Quality.

Business people who are supposed to take critical decisions that can break and or grow an organisation, suffer from two challenges: informational insufficiency or information deficiency and information overload. Usually managers have plenty of irrelevant information. Judgement

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

that are influenced by the two challenges above are impaired and will have severe consequences for the entire business organisation, hence information quality becomes a critical role player in decision-making and risk management.

A number of dimensions relate to information quality, conciseness of the information, accuracy and completeness, timeliness and information being up to date and the relevance and understandability and they are all critical in influencing decision-making. According to Emery (1971), characteristics like the human factor element, database content, the accuracy of the system and the response rate, need to be calculated. Widely used attributes are relevance, usefulness, security, timeliness, and ease of understanding.

3.3. Chapter summary

This chapter looked at the different evaluation frameworks or models. It can be alluded that most of these evaluation models do not effectively address all elements of an information system. The researchers acknowledged the relationships and causal effects of the elements that are involved. US is the central evaluation point, however, it is influenced by a wide range of factors that make it very subjective.

Many external factors of the IS environment are critical for optimal performance of the information system. The chapter wraps up by exploring the DeLone & McLean model, which had been widely accepted as an evaluation model for information systems. The researcher highlighted the challenges with the DeLone & McLean model and developed an instrument for data collection with those challenges in mind. The framework adopted by the researcher is a blend of different frameworks, mainly the Wixom & Todd and the DeLone & Mclean.

The following chapter examined the structure of TVET and in particular the West Coast TVET College. It also looked at the justification of adopting, with modification, the DeLone & McLean frame. The research further studied the conceptual model, the ITS Evaluation Model, its aggregate components, and how they would assist in the evaluation of ITS. Data collection, sampling and the questionnaire are discussed next.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4.1. Introduction

In the previous chapter, evaluation frameworks were discussed. The discussion of frameworks aid in framing the context as far as evaluation an information systems are concerned. This chapter is arranged by firstly, giving a detailed description of circumstances under investigation, research philosophy, evidence collection, and rationale behind the choice of the research design. The chapter ends with data analysis technique, reliability, and validity.

4.2. Empirical case

Data for this study was obtained at West Coast (WC) TVET College. WC TVET college is one of the 50 TVET colleges in South Africa, located in the Western Cape. West Coast TVET College used a universal CMIS platform just like other TVET colleges in the Republic of South Africa. While the study did not collect data from all 50 TVET colleges, West Coast TVET College was used for empirical data collection. This research was limited to the administrative function of the West Coast TVET College community, which is in the Western Cape of South Africa. However, its application applies to all TVET colleges and other institutions, since ITS is used all over the world.

Though there are 50 TVETs with several campuses, the CMIS they are using is the same. WC TVET have a number of campuses that are modelled as independent colleges hence the data collected is reflective of what maybe collected in other TVET colleges. The application of the data and the results can be precisely be duplicated to any other TVET across South Africa.

West Coast TVET college has 5 campuses and a Head Office (Central Office). Each campus runs a number of programmes. Every campus is headed by the Campus Manager who in turn has a management team of Programme Managers, Education Specialists and Support Managers. The organogram for the college is given below.

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The college structure is outlined below.

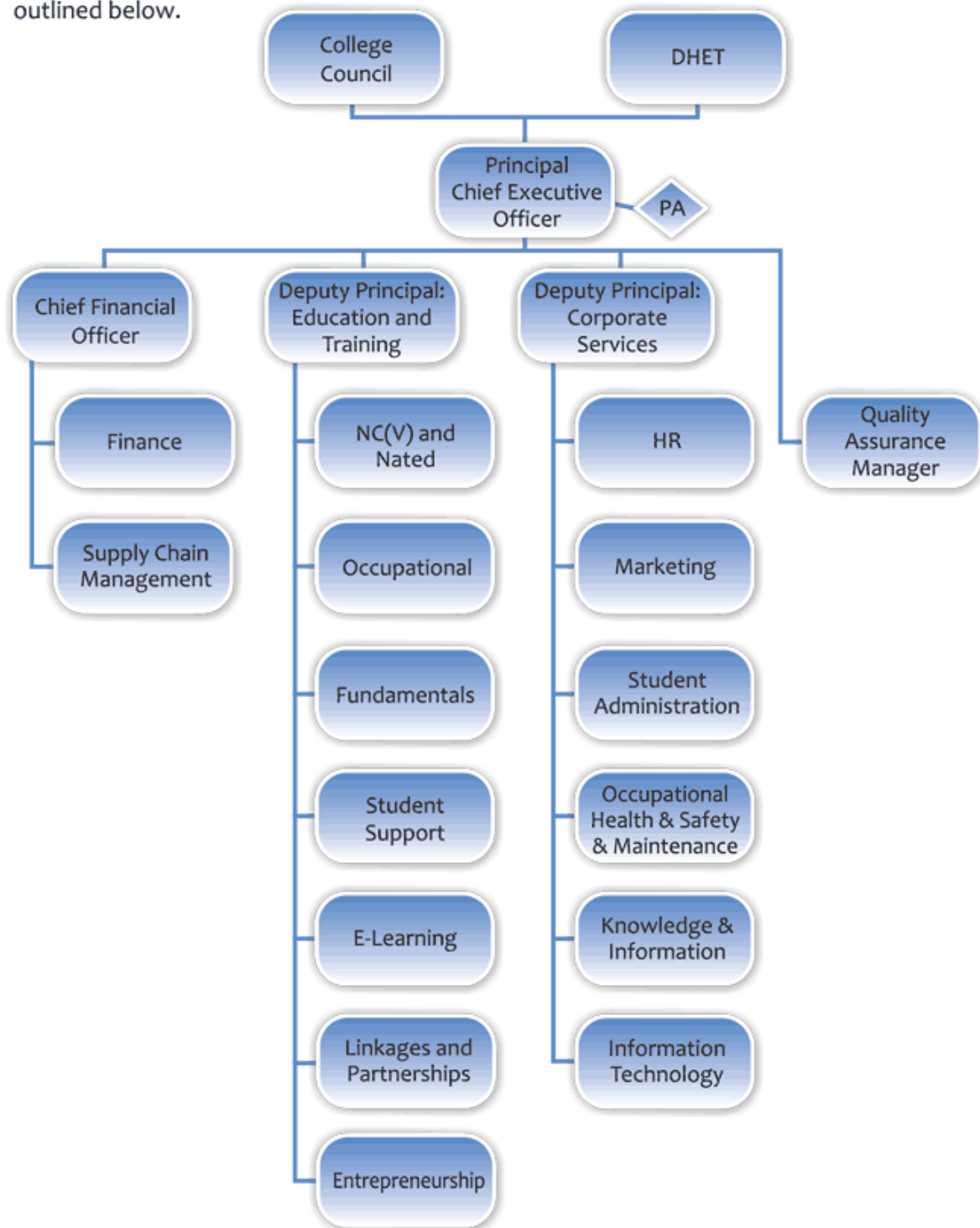


Figure 4.1. General TVET College structure - https://www.falsebaycollege.co.za/index.php?option=com_content&view=article&id=16&Itemid=250

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Table 4.1. Breakdown of programmes offered per campus

Campus	Courses offered	Specialisation
Atlantis	<p>NCV</p> <ul style="list-style-type: none"> Electrical Infrastructure Construction Management Office Administration Engineering & Related Design <p>Report 191 Trimester Programmes (N1 – N3)</p> <ul style="list-style-type: none"> • Electrical Studies <p>Report Semester 191 Programmes (N4 – N6)</p> <ul style="list-style-type: none"> • Business Management • Public Management • Management Assistant <p>Occupational Programmes</p> <ul style="list-style-type: none"> • Apprenticeships • Learnerships • Skills Programmes <p>Foundational</p> <ul style="list-style-type: none"> • Pre-Vocational Learning Programme 	General
Citrusdale	<p>NCV</p> <ul style="list-style-type: none"> Electrical Infrastructure Construction Office Administration <p>Report Semester 191 Programmes (N4 – N6)</p> <ul style="list-style-type: none"> Public Management Management Assistant Business Management <p>Occupational Programmes</p> <ul style="list-style-type: none"> Apprenticeships Learnerships Skills Programmes 	General

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Vredendal	<p>NCV Electrical Infrastructure Construction Education and Development Office Administration Primary Health Engineering & Related Design</p> <p>Report 191 Trimester Programmes (N1-N3) Electrical Studies Engineering Studies</p> <p>Report Semester 191 Programmes (N4 – N6)</p> <ul style="list-style-type: none"> • Public Management • Management Assistant • Business Management <p>Occupational Programmes Apprenticeships Learnerships Skills Programmes</p>	General
Malmesbury	<p>NCV Office Administration</p> <p>Report Semester 191 Programmes (N4 – N6) Hospitality & Catering Services Public Management Human Resources Management Management Assistant Financial Management Business Management</p> <p>Occupational Programmes</p> <ul style="list-style-type: none"> • Apprenticeships • Learnerships • Skills Programmes <p>Higher Education Degree: BEd Foundation Phase</p>	General

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Vredenburg	<p>NCV Office Administration Tourism Engineering & Related Design</p> <p>Report 191 Trimester Programmes (N1-N3)</p> <ul style="list-style-type: none"> • Electrical Studies • Engineering Studies <p>Report Semester 191 Programmes (N4 – N6) Tourism Public Management Management Assistant Business Management</p> <p>Occupational Programmes</p> <ul style="list-style-type: none"> • Skills Programmes • Learnerships • Apprenticeships <p>Foundational Pre-Vocational Learning Programme</p> <p>Higher Education Degree: BEd Foundation Phase</p>	General
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4.3. Research philosophy

The challenge in carrying out research is aggravated by different schools of thought when it comes to classifying research philosophies, i.e. doxology and axiology, ontology and epistemology, and the quantitative and qualitative paradigm. Saunders et al. (2009), Guba (1990), Ritchie and Lewis (2003), Lincoln and Guba, 1989) all used different categorisations, descriptions and classifications of research philosophies and paradigms (Mkansi et al., 2012). Saunders et al. (2009) and Ritchie and Lewis (2003) differ in classifying epistemological and ontological propositions.

This research philosophy uses the interpretivism philosophy which is also known as subjectivism. The suitability of using the research philosophy is influenced by the research question. A philosophy relates to the way facts around an occurrence is collected, examined, and utilised (Saunders M, n.d.).

“The term epistemology (what is known to be true) as opposed to doxology (what is believed to be true) encompasses the various philosophies of research approach” Dudovskiy (2015: n.d.). There are three basic approaches to research: quantitative, qualitative, and mixed. This research, though quantitative in terms of data collection, adopts or assumes a qualitative approach that ties with the interpretivism research philosophy that is used in this research. Interpretivism or subjectivism involves and or requires researchers and scholars to interpret components of the study. This philosophy includes the social interest in a research. This is opposed to positivism, which requires researchers to be independent of the research work they are carrying out. Interpretive investigators assume that admission to reality (assumed or publicly erected) is through social makings such as mutual meanings, language, instruments, and consciousness.

The challenges posed by positivism in social sciences research application, resulted in the development of the interpretivist philosophy. Interpretivism is connected to rational stance under idealism that brings together varied methodologies – comprising hermeneutics, phenomenology and social constructivism methods – that discard the objectivist’s view that meaning is autonomous from consciousness (Saunders M , 2009).

With interpretivist methodology, it is critical for scholars to understand the diversity in humans. Interpretivism research adopts various strategies to reveal diverse features of the subject.

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This research evaluates an information system, hence the interpretivism as a research philosophy aligns well with the problem. The study philosophy is influenced by the study problem.

The interpretivist approach is generally built on succeeding views:

1. Transactional/subjectivist epistemology – individuals and their knowledge cannot be disjointed, hence there is a link between the two.
2. Relativist ontology – reality is inter-subjective and is founded on denotations and understandings on societal and realistic levels.

The research strategy underpinning the study is a case study. Welman and Kruger (2000:191) defined case study research as the research method that required the researcher to conduct fieldwork when investigating a group or organization. It is a realistic approach that explores an occurrence in true perspective. The investigation is performed at West Coast TVET College. One of the reasons for selecting case study research for this research project, is that it uses multiple methods of data collection which may be qualitative and quantitative (Yin 1994:89) and Hussey and Hussey (1997:66) described the types of case study researches, as follows:

Descriptive case study: These are mainly or commonly used in social science. This study is focused and very detailed. It allows the sample to be assessed in more depth, based on the articulation of a descriptive theory. The objective of the research is based upon current practice description.

Illustrative case studies: These are descriptive in nature; however, they usually utilise one or two instances of an event to describe the situations. It allows the researcher to show new and potential innovative practices.

Experimental case studies: These are defined as research representing an epistemological study. It explores specific objects in search of an answer. It highlights difficulties in implementing new procedures and techniques in an organization and it evaluates the benefits thereof.

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Explanatory case studies: These are geared towards answering the how and why questions. They investigate distinct phenomena and are characterised by a lack of detailed preliminary research. They rely on a hypothesis that can be tested. The research environment can limit the choice of methodology. They help in explaining the current situation using existing theories.

The enquiry is deductive in nature. It adopted a quantitative study approach. A questionnaire was used to capture responses. The responses were captured using IBM SPSS, a special software for analysis. A range of deductions were drawn based on the analysis. The sample size was limited to 60. The sample cut through the organisational organogram, hence the Executive Management, Senior Management, Programme Managers, Campus Administrators, Senior Administration Clerks, all Administration Clerks, etc.

4.4. Underpinning theoretical model

Information gathering and scrutiny were founded on a conceptual framework derived from the DeLone and Mclean's models for evaluating information systems. One of the major problems of IS success is the ambiguity of the concept and the multiplicity of its constructs (Rai et al. 2002). DeLone and McLean tackled the problem by proposing a multidimensional framework based on different layers (DeLone & McLean 1992).

The updated Delone and Mclean model 2003, is a very simplified model that can be used to evaluate any IS. The model looks at the relationship of key features or dimensions of information in terms of input and processing, and map it to the benefits for both the organisation and the IS. However, user satisfaction and the intended use plays a critical role in the actual evaluation of the IS.

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4.5. Updated IS Success Model (D & M)

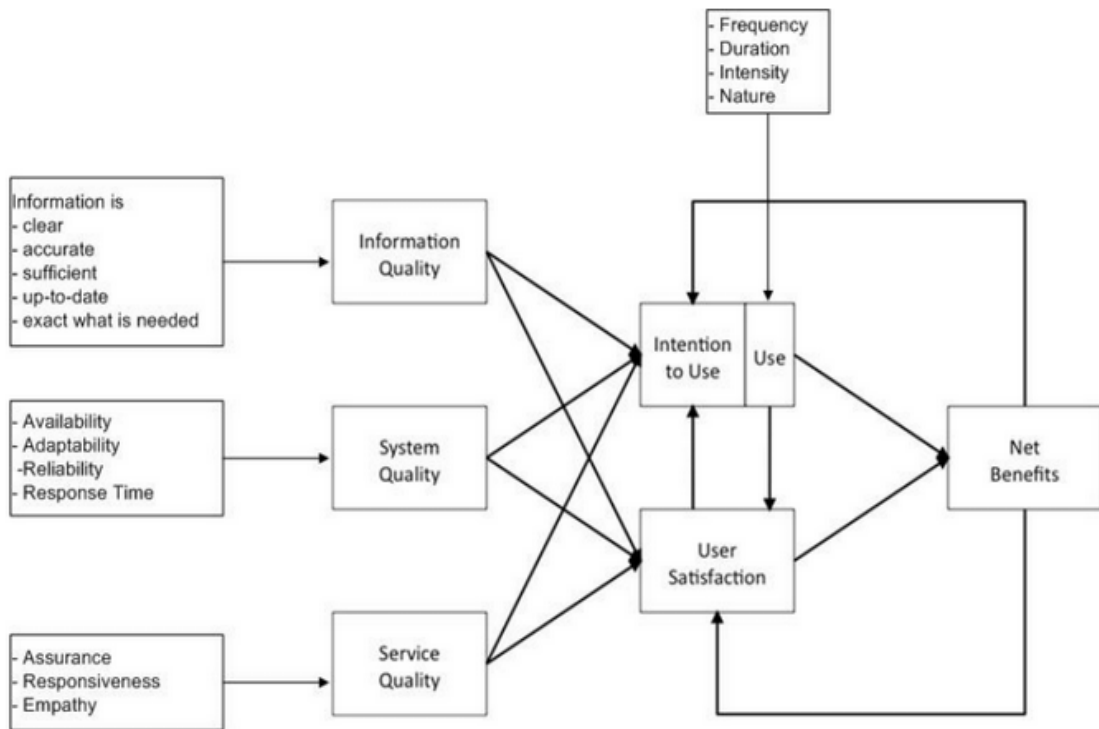


Figure 4.2. Nomological network of the updated IS Success Model (Delone & McLean, 2003)

The model looks at dependant variables, e.g. information quality, system quality and service quality as critical sources for IS success. These dimensions can be used as tools to evaluate the effectiveness of TVET colleges' IS. It looked at input, processes, and usage of data, making it very suitable to evaluate CMIS very effectively. The qualities of these variables are mapped to the intended use of the information and whether users are satisfied. The satisfaction of the users is important, because it influences the overall benefits of using the IS. All the dependant variables in this model allow for evaluation at any point to check the user satisfaction.

The model is integrated, hence a weakness in one dependant variable or dimension will affect the entire information system in terms of the net benefits from the IS. The model is crafted in such a way that it is repetitive to allow for effective modifications to meet user satisfaction and the intended goals and benefits. Each dimension is directly linked to a number of factors that

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are influencing its potential. These factors must be looked at critically and modelled accordingly, to realise the net benefit of the system.

4.5.1. Rationale for DeLone & McLean

The model is built by using much knowledge, research, other models, and tested model results. The model fit very well with the evaluation of TVET college CMIS. It allows evaluation to be done at the input level, processing, and the output level. It provides a good evaluation platform for the CMIS. The model is not rigid in nature, making it easy to evaluate the IS.

In any IS, user satisfaction is critical and directly speaks to quality – both information and system. To effectively evaluate IS success, a number of dependent variables need to be analysed and evaluated, because information systems are very well linked. Information systems need to be efficient and accurate to meet both user and system satisfaction. Shannon and Weaver (1949) define the technical level of information as the accuracy and efficiency of the system that produces information.

Mason (1978) relabelled 'effectiveness' as 'influence' and defined the influence level of information as a hierarchy of events, including receiving of information, verification, evaluation and application of information, leading to a change in behaviour or performance (Mason 1978).

The researcher adopted some dependent variables and integrated them in the context of Technical & Vocational Education Training institutions. The benefits of the CMIS for the administrative function within a TVET environment were investigated and evaluated.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

4.6. Conceptual model

The measurement and evaluation of IS effectiveness and efficiency is critical to our understanding of the value of an IS (Delone & McLean 2003). The researcher built the conceptual model based on a number of IS evaluation models.

The research adopted the greater part of the model from William H DeLone and Ephraim R. McLean models of information systems success and information evaluation. According to Shannon & Weaver the effectiveness level is the effect of the information on the receiver. The responses and or results of the TVET College CMIS were used to evaluate the quality, correctness, validity, and integrity of the system.

According to the DeLone & McLean's Success Model, 'systems quality' measures technical success; 'information quality' measures semantic success; and 'use, user satisfaction, individual impacts,' and 'organizational impacts' measure effectiveness success. User satisfaction surveys were key to this.

The model evaluated the output from the system. However, the inputs to the systems and the human resource aspect are very critical for the entire process. The questionnaire covered all the aspects of the system. Delone and McLean had identified 180 IS evaluation traits. The research was limited to a few that were selected and to the usage block.

The researcher explored the effectiveness and efficiency of a college student management system. It also explored the benefits and weaknesses of such a system. The research came up with solutions of managing the weaknesses of that IS.

The research intends to improve the application itself. Evaluation of IS performances means evaluation of performances in hardware, software, computer networks, data and human resources (Godana P Nedo Balaban, 2009 Vol 6). However, this research was limited to the software component of the IS.

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4.6.1. Information System evaluation model

ITS Evaluation model

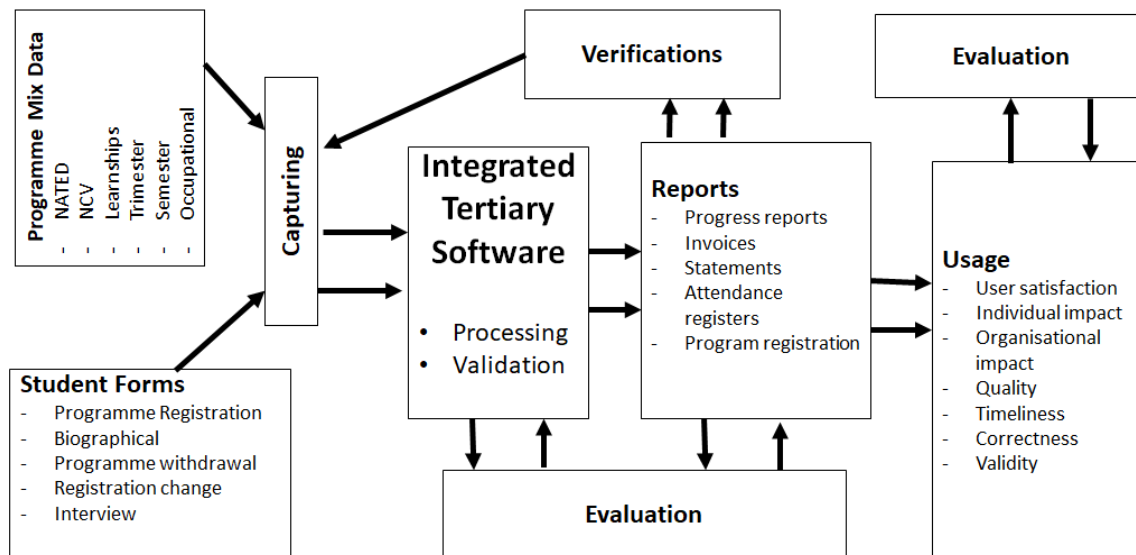


Figure 4.3. The TVET College Conceptual Model for Evaluation – developed by the Researcher

The above model is built with the following components. All the components are working together and collectively they will give the student a management information system.

4.6.1.1. Data capturing

Data is captured for a different programme qualification mix. The system itself produced different input template forms that are manually completed by prospective students during the application and recruitment process. There are various forms that relate to student biographical information to specific programme forms. Once these forms are completed, a manual check for completeness and correctness will be performed before feeding the data into the system.

4.6.1.2. Data processing

Once the student information is captured in the system, the data is processed by the ITS CMIS. Once processing and validation and errors generated during processing are corrected, then the system can be triggered to generate specific reports according to the specific fields that are selected. The systems allow users to build reports using the desired fields.

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4.6.1.3. Report generation

The system is configured in a way that reports can be generated at any given time. The report will have specific fields that the user or client requires. Reports relating to student progress academically, student financial status, exceptions report for management control, will all be generated by the system.

4.6.1.4. Validation and verification

This is a critical process in this information system and these processes allow errors selected from the reports to be corrected and fed back to the system. Verification will be a manual process, where source data (input data) is manually compared with what the system had generated as reports, and any anomalies that are selected from this process will be investigated and fed back to the system. This helps as a quality control mechanism and it is iterative in nature.

4.6.1.5. Evaluation

The reason for this investigation is to measure the IS in terms of its performance. Therefore, where there is processing and output, there will be a need to assess whether the output and performance of the IS are able to meet the user requirements and expectations. The main part of the evaluation questionnaire is focussed on the processing and output from and in the information system.

4.7. Unit of analysis

The unit of analysis is the Integrated Tertiary Software, which is an educational ERP software system, that is used by most TVET colleges in South Africa. The non-resulting and non-certification of some TVET students in the 2017 final examination, were strongly suspected to be the defect in the CMIS that did not calculate student data correctly, hence the need to evaluate this information system.

4.8. Sampling

A sample size of 60 was drawn from a population of 60, representing a 100% sampling. However, a response rate of 70% was achieved. The sample cut through the organisational

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

structure with a strong bias towards the administrative function of the West Coast TVET College. The sample was divided as follows:

Table 4.2. Sampling per organisational function

Target Department	Number of participants targeted	Actual number of participants	% Participation per dept	Approximate % contribution
Senior Management	5	2	40	5
Campus Managers	5	2	40	5
Programme Managers	10	6	60	14
Administrators	5	3	60	7
Administration Clerks	25	14	70	33
Lecturers	5	5	100	12
Other Clerks	5	3	60	7
Ungrouped		7		17
TOTAL	60	42		100

4.9. Data collection methods

The research used a printed form physically given to participants as a data gathering method. The questionnaires were given to the entire sample. A questionnaire was adopted to have a structured set of questions to ask employees who directly deal with ITS IS on a daily basis. The questionnaire was chosen as the research felt it was the most appropriate method to collect data given the nature of data required for analysis. The questionnaire was closed in nature to guide the participants in terms of scope. Administrative staff in any TVET college are always busy because of the nature of programmes they offer which have different timeframes. Using verbal interviews in this instance was not going to work given the number of participants involved and the volume of work the participants have to process.

The questionnaire was widely structured to capture all possible responses which were critical for effective information system evaluation. A questionnaire is also easy to use for participants in the sample population, since it does not consume much of their precious time. The questionnaire was structured to allow participants to choose from a wide range of possible options, making the data collection process much easier for the researcher.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

4.10. Data analysis

The data that was collected through the questionnaires was quantitative and it was fed into the IBM SPSS package for analysis. When tabulated in this application package, a number of queries were run on an individual and combined question, thereby collating data into graphs that were easily interpreted by the researcher. IBM SPSS is one of the best application packages used to analyse quantitative data, and it gives a wide range of options for data manipulation.

4.11. Validity

The research is very valid and its application in terms of the research problem, research question and sub-questions, relates to any academic learning institution all over the world. The researcher is confident that the results and recommendation from this research will help thousands of academic institutions to improve the way they manage and administer IS management in these institutions. The researcher believes technology-based education management challenges and solutions are more generic, and they need minimal fine-tuning to suit a specific environment.

4.12. Reliability and bias

The questionnaire was structured in a very simple way and the questions are not ambiguous. The researcher used simple language. The questionnaire allowed critical information to be collected. However, the sampling was biased towards the administrative function of the academic institution for the purpose of getting more information, since this function is greatly responsible for the management and administration of the CMIS.

4.13. Delineation of the research

This research was conducted in the Republic of South Africa in the Western Cape. The data was collected from the staff members of West Coast TVET College which covers the Overberg. The central office in Malmesbury houses the executive management and it was also a source of critical data.

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4.14. Ethical considerations

The researcher did not compromise the security and integrity of West Coast TVET College nor that of Cape Peninsula University of Technology. The research was only done for educational purposes and cannot be used for anything else.

4.15. Voluntary participation and harmlessness

Subjects' participation in the research was voluntary and subjects were also free to withdraw from the research at any given time without any consequences for them. The research collected data without harming the participants.

4.16. Informed consent

All subjects who participated in the study were informed about the aim and envisaged method of the study, and what the study needed from them. They were also notified about their rights of participating, and that they could withdraw without any disadvantage for them.

4.17. Chapter summary

The chapter looked at the evaluation frameworks from prior researchers in the information system evaluation area. It also examined the structure of TVET colleges and the different programmes that are offered. It focused on West Coast TVET College which was the source for gathering empirical data. The research philosophy is based on case studies, and different case study research types were explored. The DeLone and McLean model constructs were explored, and the justification was given for using the D & M Model with modification from the researcher.

The chapter further explored the conceptual model and the evaluation model that were developed by the researcher. The chapter also looked at the sampling and limitation of the research. The research added value to both the developers and the users of the ITS information system. The research analysed the data that was collected.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

CHAPTER FIVE

RESULTS AND DATA ANALYSIS

5.1. Introduction

Evidence was gathered through a survey with a population of 60. A 71.6% response rate was achieved. However, some of the participants did not respond to some questions.

Table 5.1. Data captured on IBM SPSS

	Number	Department Optional	Position	Gender	General IS Experience	Management Level	ITS Experience	Q7 General Accuracy	Q8 Use
4	4		Programme Manager		4 - 6 years	Middle	More than 5 years	Moderate	
5	5	Finance	Finance Clerk	Female	More than 10 ...	Lower	3 to 4 years	High	
6	6	Campus Man...		Female	7 - 10 years	Middle	1 day to 2 years	High	
7	7	Administrator	Campus Administrator	Female	4 - 6 years	Lower	3 to 4 years	High	
8	8	Finance		Male	More than 10 ...	Lower	3 to 4 years	Moderate	
9	9	Education		Female	More than 10 ...	Middle	3 to 4 years	.	
10	10	Support Staff	Admin Clerk	Female	1 - 3 years	Not Manag...	1 day to 2 years	High	
11	11		Campus Administrator	Female	More than 10 ...	Lower	More than 5 years	Moderate	
12	12	Administration	Admin Clerk	Female	1 - 3 years	Not Manag...	3 to 4 years	High	
13	13	Education	Programme Manager	Female	More than 10 ...	Middle	More than 5 years	Moderate	
14	14	Administration	Admin Clerk		4 - 6 years	Knowledge...	3 to 4 years	Moderate	
15	15	Administration	Admin Clerk	Female	1 - 3 years	Middle	More than 5 years	High	
16	16				7 - 10 years	Middle	3 to 4 years	High	
17	17	Education	Programme Manager	Male	4 - 6 years	Middle	3 to 4 years	High	
18	18			Female	.	Not Manag...	3 to 4 years	Vey High	

Analysis was done through a specialised software platform called IBM SPSS, version 2.0. A sample of data captured is given in Table 5.1. above.

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Table 5.2. Data collected on IBM SPSS

Model - Questionnaire Data.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

21: ITS Open data document

	Q25_SQ Response Time	Q26_US_ System Effectiven...	Q27_US_ User_Effo rt	Q28_US_ User_Effec tiveness	Q29_US_ Ease_of use	Q30_US_ Informatio n_Quality	Q31_US_ Service_ Quality	Q32_US_ Usefulnes s	Q33_II_Ta sk_Produ ctivity	G
13	Neutral	Fairly effec...	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
14	Fast	Not effective	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
15	Fast	Fairly effec...	Good	Fairly effec...	Fairly easy...	Very good	Very good	Very good	Good	
16	Neutral	Neutral	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
17	Neutral	Neutral	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
18	Fast	Fairly effec...	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
19	Fast	Fairly effec...	Good	Fairly effec...	Fairly difficult	Good	Good	Good	Good	
20	Fast	Very effective	Good	Fairly effec...	Very easy ...	Good	Good	Good	Good	
21	Neutral	Neutral	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
22	Very slow	Fairly effec...	Good	Neutral	Neutral	Good	Good	Good	Good	
23	Neutral	Neutral	Good	Fairly effec...	Neutral	Good	Poor	Good	Good	
24	
25	Fast	Fairly effec...	Good	Fairly effec...	Very easy ...	Very good	Good	Very good	Good	
26	Neutral	Fairly effec...	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
27	Fast	Not effective	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	
28	Fast	Fairly effec...	Good	Fairly effec...	Fairly easy...	Very good	Very good	Very good	Good	
29	Very fast	Neutral	Good	Fairly effec...	Fairly easy...	Good	Good	Good	Good	

5.2. Data analysis

The gathered data gives mixed outputs when put into the statistical analysis programme, and this can be interpreted differently – one will be made to believe that the ITS Information management program used at TVET colleges is performing exceptionally well when the different information evaluation variables from various information systems’ evaluation models have been applied.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.1. DEMOGRAPHICS

5.2.1.1. Employee level of management

Table 5.3. Management Level

		Management Level			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Top	2	4.7	4.8	4.8
	Middle	11	25.6	26.2	31.0
	Lower	9	20.9	21.4	52.4
	Knowledge Staff	1	2.3	2.4	54.8
	Not Management	19	44.2	45.2	100.0
	Total	42	97.7	100.0	
Missing	System	1	2.3		
Total		43	100.0		

The spread of participants is very encouraging. From the 42 participants, 25.6% represents middle management, while 44.2% represents mostly administrative clerks who use ITS more frequently than any other users of the system. The researcher believes this is important as responses from the frequent users help to evaluate the IS much better in terms of usage, efficiency and effectiveness. Top Management and knowledgeable staff are adequately represented.

5.2.1.2. IS experience

Table 5.4. Number of years working with any Education Management Information System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 3 years	13	30.2	31.0	31.0
	4 - 6 years	10	23.3	23.8	54.8
	7 - 10 years	5	11.6	11.9	66.7
	More than 10 years	14	32.6	33.3	100.0
	Total	42	97.7	100.0	
Missing	System	1	2.3		
Total		43	100.0		

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

The investigator is of the opinion that the depth of experience amongst participants was crucial for an effective evaluation of the IS. It is noteworthy that more than 69% of the participants have more than 4 years using an education management system, thereby giving them a strong insight of what exactly to expect from an CMIS.

Table 5.5. Number of years working with Integrated Tertiary Software (ITS)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 day to 2 years	6	14.0	14.0	14.0
	3 to 4 years	23	53.5	53.5	67.4
	More than 5 years	14	32.6	32.6	100.0
	Total	43	100.0	100.0	

Even though ITS were introduced to TVETs colleges 6 years ago, most of the participants have been using it from its inception, enabling a great opportunity to evaluate the CMIS effectively. With well above 80% of participants that have been using ITS, the researcher was hopeful that the weaknesses and the strengths of the CMIS would be revealed, thereby creating an opportunity to improve the information to effectively accomplish the task it was developed for.

5.2.1.3. Department mix

The department mix is well balanced with the Administration Department that has the most participants. This influenced the research outcome to be more accurate, because the focal point was the administrative function in the TVET college that uses the IS more frequently than the others.

Table 5.6. Departmental participation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		13	30.2	30.2	30.2
	Administration	14	32.6	32.6	62.8
	Campus Manager	1	2.3	2.3	65.1
	Corporate Services	1	2.3	2.3	67.4
	DHET	1	2.3	2.3	69.8
	Education	6	14.0	14.0	83.7
	Finance	4	9.3	9.3	93.0
	Support Staff	3	7.0	7.0	100.0
	Total	43	100.0	100.0	

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Even though 30.2% of the participants did not indicate their departments, the possibility that some belong to the Administrative Department is greater than 0, and this will increase the participation percentage of the focal department even more.

5.2.2. General Overview (GO) of the information system

5.2.2.1. GO - Accuracy

Table 5.7. Generally, how do you rate your information system in terms of accuracy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate	15	34.9	37.5	37.5
	High	23	53.5	57.5	95.0
	Very High	2	4.7	5.0	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

The CMIS had a high level of accuracy – a valid percentage of 57.5% which signifies great reliance on the information it generates. A sizeable number of participants indicated that the system is moderately accurate, which indicates that there is a huge gap for improvement. An CMIS needs to be precisely accurate to enforce reliability of information. Any slight weakness in information systems needs to be rectified.

5.2.2.2. GO – User-friendliness

The ease with which users can manipulate and exploit the CMIS, is very important. It enhances productivity regarding employees and processes. The majority of the participants representing users of the CMIS, strongly feel that the ITS was user-friendly enough.

Table 5.8. The general level of user-friendliness of the system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly	1	2.3	2.3	2.3
	Good	31	72.1	72.1	74.4
	Moderate	11	25.6	25.6	100.0
	Total	43	100.0	100.0	

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

All participants have a positive opinion about the interface of the CMIS.

5.2.2.3. GO - Training in ITS

Usually when users do not get sufficient training, the majority of them tend to dislike the CMIS and then they become very unproductive. Information systems are more prone to errors if the users cannot use them effectively and optimally.

Table 5.9. Level of training on the information system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Expert level	7	16.3	16.3	16.3
	Professional	1	2.3	2.3	18.6
	Weak	4	9.3	9.3	27.9
	No formal training at all	1	2.3	2.3	30.2
	Moderate	30	69.8	69.8	100.0
	Total	43	100.0	100.0	

More than 80% of the participants had moderate training on the CMIS. However, there are very weak CMIS users, and one user does not have any formal training. The knowledge gap needs to be closed as soon as possible. The gap might be as a result of employee turnover in government, because of unattractive salary packages.

5.2.2.4. GO - Rate of usage

Table 5.10. How often do you use the information system?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Everyday	33	76.7	76.7	76.7
	Once a Week	6	14.0	14.0	90.7
	Once a fortnight	4	9.3	9.3	100.0
	Total	43	100.0	100.0	

It is noteworthy that 76.7% of the users use the CMIS on a daily basis. This made them more knowledgeable, since it is believed that practice makes perfect. Repeated use of the CMIS, generally allows participants to give a more objective and correct view when they evaluate the CMIS.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.2.5. GO - System errors

System security is critical. The rate of errors signifies an unhealthy network environment. The higher the rate, the higher the threats and vulnerability. System error is a critical measure of stability, reliability, and accuracy.

Table 5.11. How often do the system experience system error(s)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once a Week	14	32.6	35.9	35.9
	Often	9	20.9	23.1	59.0
	Rarely	16	37.2	41.0	100.0
	Total	39	90.7	100.0	
Missing	System	4	9.3		
Total		43	100.0		

The rate of errors in the system is very high and poses a huge danger to the CMIS. The number of users who said errors occurred at least 'once a week' together with those who said errors occur 'often', highly exceed those who said errors 'rarely' occurred, and this poses a huge system integrity challenge.

5.2.3. Information Quality (IQ)

Information excellence very often reflects directly on the value of the CMIS. Information and system excellence reflect directly on the cost of the CMIS.

Table 5.12. Quality of information on the IS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	10	23.3	23.3	23.3
	Good	32	74.4	74.4	97.7
	Very Good	1	2.3	2.3	100.0
	Total	43	100.0	100.0	

The distribution of the responses from the participants indicate that the quality of the CMIS was generally well above 'good'. The participants all offered a positive response, which can be perceived to indicate that even the CMIS is good.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.13. Rate the quality of information on the information system - Availability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	11	25.6	25.6	25.6
	Good	32	74.4	74.4	100.0
	Total	43	100.0	100.0	

The system was very much available, as indicated by the spread of the responses from the participants. However, availability should never be compromised, as it directly relates to productivity. It should always be closer to 100%.

5.2.3.1. IQ - Usability

Table 5.14. Rate the quality of information on the information system - Usability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	10	23.3	23.3	23.3
	good	33	76.7	76.7	100.0
	Total	43	100.0	100.0	

Most of the participants were of the opinion that the quality of information on the information systems in terms of its usability is good enough. There are 23.3% of the participants that regard the system as neutral, i.e. not too good, not too bad. None of the participants had a negative perception regarding the quality of information on the system.

5.2.3.2. IQ – Accuracy

It is noteworthy that the perception is that the excellence in relation to accuracy of the CMIS is good. There are 11.6% of the participants that think it is very good, however, 25.6% feel the information systems cannot really be classified as either good or bad, but its accuracy level is just mediocre.

Table 5.15. Rate the quality of information on the information system - Accuracy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	11	25.6	25.6	25.6
	Good	27	62.8	62.8	88.4
	Very good	5	11.6	11.6	100.0
	Total	43	100.0	100.0	

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.3.3. IQ – Timeliness

The participants seem happy with the timeliness as part of the quality of the IS. Most of the users seem happy with the CMIS.

Table 5.16. Rate the quality of information on the information system – Timeliness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	12	27.9	27.9	27.9
	Good	31	72.1	72.1	100.0
	Total	43	100.0	100.0	

It is disturbing that almost 28% of the participants could not judge the system’s timeliness as either good or bad. They seem not to have great confidence in the CMIS. Notwithstanding the fact that no CMIS is perfect, the number is worrying, and a proper investigation may result in the improvement of the CMIS.

5.2.3.4. IQ – Relevance

Table 5.17. Rate the quality of information on the information system – Relevance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	12	27.9	27.9	27.9
	Good	31	72.1	72.1	100.0
	Total	43	100.0	100.0	

The relevance quality seems to be good. The majority of the participants perceived the information excellence in relation to its relevance as good. However, almost 28% felt that the information excellence in relation to the relevance is neither good nor bad. This is a very dangerous judgement, because information systems need to be effective, and of a good quality, and they should be reliant in terms of their accuracy.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.3.5. IQ – Format

Table 5.18. Rate the quality of information on the information system – Format

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	15	34.9	34.9	34.9
	Good	27	62.8	62.8	97.7
	Very good	1	2.3	2.3	100.0
	Total	43	100.0	100.0	

Almost 65% of the participants regard the quality of information on the systems in terms of formatting as good. Approximately 2% think it is very good, while 34.9% of the participants regard it as neither good nor bad. This casts a lot of doubt on the IS itself.

5.2.4. System Quality (SQ)

System quality is one of the critical dimensions identified by Delone & McLean in the revised model for IS evaluation. The quality of the system is influenced by a number of variables that affect the IS. System quality considers the information systems as a whole, hence other factors influence the end result of the system, i.e. system quality.

5.2.4.1. SQ - Flexibility

Table 5.19. Level of flexibility of the information system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not flexible	4	9.3	9.5	9.5
	Neutral	7	16.3	16.7	26.2
	Fairly flexible	20	46.5	47.6	73.8
	Very flexible	11	25.6	26.2	100.0
	Total	42	97.7	100.0	
Missing	System	1	2.3		
Total		43	100.0		

The participants had a wide range of perceptions regarding the flexibility aspect of the system quality. There were 72.1% of the participants that regarded the system as flexible enough to be effective for their day-to-day operations.

It is worrying that 9.3% of the participants regarded the system as not flexible, hence their concerns need to be addressed as soon as possible, if the system has to be beneficial to

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

them. There were 16% that judged the system as neither flexible nor inflexible, hence it is just a system to them and these users definitely need assistance on how to appreciate the IS.

5.2.4.2. SQ – Stability

The participants are equally divided over whether the system is flexibly stable. There was an almost fairly balanced response with those saying it is neutral, i.e. neither stable nor unstable (almost 21%) while 40% said it is fairly stable.

Table 5.20. Rate the level of flexibility of the information system - Stability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	9	20.9	22.0	22.0
	Fairly stable	17	39.5	41.5	63.4
	Very stable	15	34.9	36.6	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

It is interesting that 35% of the users regarded the system as very stable. However, the majority of the users regarded the CMIS as being stable. Approximately 5% of the users did not give an input regarding the question.

System stability is related to systems errors. The more errors the system gives, the less stable the system will be. Judging from these two parameters, the system does not have system errors on a daily basis, which strengthens the stability tab further.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Clustered Bar Count of How often do the system experience system error(s) by how do you rate the level of flexibility of the information system - Stability

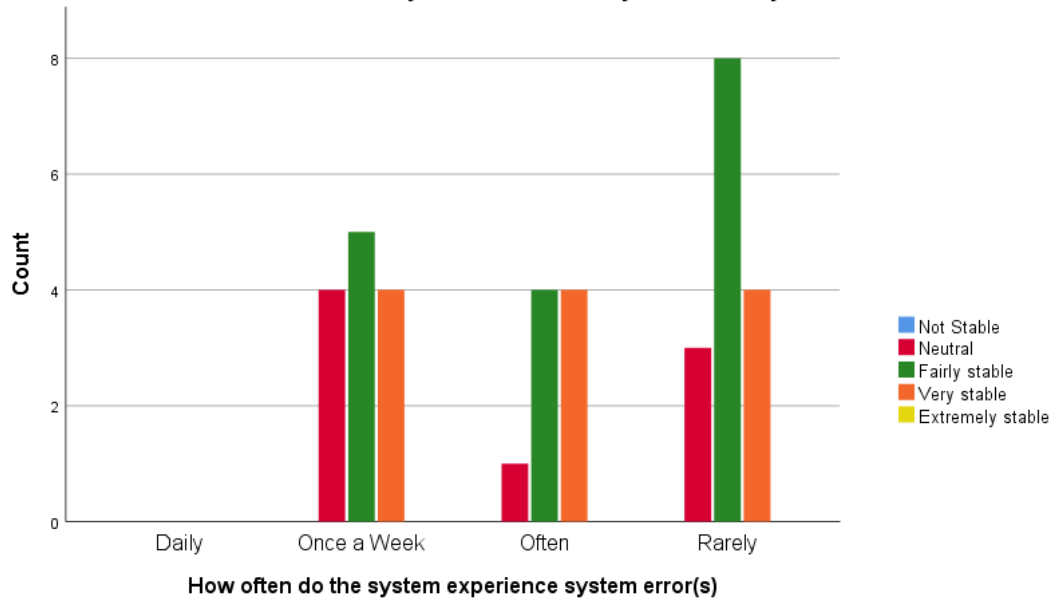


Figure 5.1. Cluster bar graph – system errors Vs Level of stability

However, a number of participants perceived that system errors do occur often and on a weekly basis. However, they do not paralyze the system as it remains fairly stable.

5.2.4.3. SQ – Reliability

Pie Chart Count of how do you rate the level of flexibility of the information system - Reliability

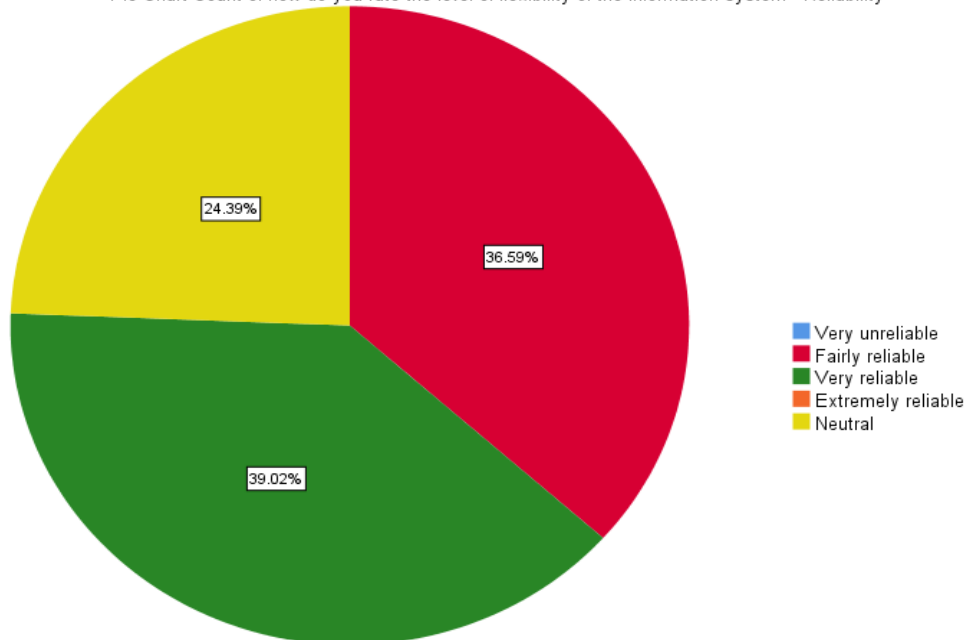


Figure 5.2. System quality in terms of reliability

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Reliance of the IS is based on the quality of the CMIS. If error-free output CMIS given, then integrity is not compromised and then users naturally tend to develop a strong reliance on the IS. It is noteworthy in this research that not all users rated this aspect in a negative way, however, 24.39% of the participants regarded the IS as neither reliable nor unreliable, and this needs to be explored further, as it might point to some weaknesses in the CMIS.

Strange enough, 39% of the users thought the CMIS was very reliable. Reliability, accuracy, integrity, and security of the CMIS should never be compromised, since their lack of results causes users losing faith and trust in the CMIS. When measured, they should always be close to the optimal levels. Reliability enhances the system.

5.2.4.4. SQ – Usefulness

The majority of the users or participants regarded the information systems of great use. Almost 40% of the participants felt strongly that the systems were very useful.

Table 5.21. Rate the level of flexibility of the information system – Usefulness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	9	20.9	22.0	22.0
	Fairly useful	15	34.9	36.6	58.5
	Very useful	17	39.5	41.5	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

About 35% of the participants viewed the system as fairly useful, while approximately 20% rated the CMIS as neither useful nor useless. This number needs to decrease; hence more training must be conducted on the CMIS for users to understand it. Understanding the CMIS is critical for task performance and system improvements and it improves evaluation for users.

5.2.4.5. SQ – User-friendliness

The system interface with the users is very important. Users tend to want systems that they can easily explore without putting in a lot of effort. A good or easy-to-use interface allows users to perform tasks much faster, and that increases productivity which is the ultimate goal

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

of any CMIS. Productivity, accuracy, and usefulness are the major objectives of any CMIS and they usually translate to productivity and improved profits margins.

From the responses gathered from users, almost 44% of the respondents strongly felt the system was very user-friendly. About 29% felt the CMIS as fairly friendly, while approximately 20% were in limbo – they could not safely say it was either friendly or unfriendly. This shows an information gap or a knowledge gap in the CMIS. It could be the CMIS that was failing to perform according to their expectations, or they do not fully understand it.

Table 5.22. Rate the level of flexibility of the information system - User-Friendliness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not friendly	3	7.0	7.3	7.3
	Neutral	8	18.6	19.5	26.8
	Fairly friendly	12	27.9	29.3	56.1
	Very friendly	18	41.9	43.9	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

Noteworthy is the fact that 7% of users regarded the CMIS as not friendly at all. This negative perception of the CMIS directly hampers the productivity and willingness to work with the CMIS.

5.2.4.6. SQ – Ease to use

Ease of use goes hand in hand with friendliness. The patterns from users or respondents regarding these two aspects, show a very close relationship. Users saying the CMIS was not easy to use, are 7% which is the same for user-friendliness. The system developers will definitely need to zoom in on the friendliness of the system interfaces. The percentage of 20% that could not judge whether the system is easy to use or not, did also not change. This number is generally high and it should convince the developers of the CMIS to examine why such a high number of users are saying the CMIS was not easy to use.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.23. Rate the level of flexibility of the information system - Ease of use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not easy to use	3	7.0	7.3	7.3
	Neutral	8	18.6	19.5	26.8
	Fairly easy to use	5	11.6	12.2	39.0
	Very easy to use	25	58.1	61.0	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

It is also important, that for the first time, participants who rate the CMIS as ‘Very easy to use’ exceed 60%, which can loosely and implicitly relate the level of confidence that the users have in the CMIS.

5.2.4.7. SQ – Response time

The response time from any CMIS or system in general CMIS very important. The lesser the time, the better. Response time directly relates to productivity, performance, and to some extend cost. Rapid response, real time online real-time systems are in place in most business sectors, and the ability to respond as quickly as possible is critical.

Table 5.24. Rate the response time of the information system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very slow	1	2.3	2.4	2.4
	Fast	22	51.2	53.7	56.1
	Very fast	3	7.0	7.3	63.4
	Neutral	15	34.9	36.6	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

The majority of the users had a feeling that the CMIS, in terms of its response time, was fast. Adding to that was the 7.3% who believe the CMIS was very fast expressing a certain level of user satisfaction. However, it was worrying that 2.4% of the participants felt the CMIS was very slow. This perception of the IS did not reflect good on the CMIS, since this view slows

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

down productivity in the business organization. This needs to be explored, whether the slowness is tied to connectivity or to the system resources.

A sizable proportion, 36.6%, could not rate the CMIS as either fast or slow, and this also is not a good reflection on the IS.

5.2.5. User Satisfaction (US)

User satisfaction, though very subjective, is very important for any CMIS to satisfy the needs of its users. As long as the users are still happy with the IS, it might imply that the IS is still good. Once the users are not happy with the CMIS, almost everything reacts negatively, i.e. productivity will decrease, operational cost will increase, staff moral goes down and the work environment becomes very toxic. User satisfaction was measured through some variables or factors that relate to user happiness:

5.2.5.1. US – system effectiveness

Table 5.25. Rate user satisfaction of your information systems - System Effectiveness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not effective	7	16.3	17.1	17.1
	Neutral	12	27.9	29.3	46.3
	Fairly effective	21	48.8	51.2	97.6
	Very effective	1	2.3	2.4	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

The system was generally fairly effective according to the majority of the participants/ users. The biggest challenge was the 17.1% users who believed the IS was not very effective. This negative percentage rate will pose a huge challenge to system managers and developers.

5.2.5.2. US – User Effort

The majority of the users were happy with the level of satisfaction they derived from the IS in terms of user effort.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.26. Rate user satisfaction of your information systems - User Effort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	35	81.4	85.4	85.4
	Bad	6	14.0	14.6	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

The percentage users with a negative perspective, was worrying, and there was a need to interact more with the users, in order to understand their viewpoint and to make the necessary changes to the CMIS if need be.

5.2.5.3. US – User Effectiveness

The ability to change the effectiveness of any user using a particular CMIS, is a major objective of any system. Improving how business operations are performed and to increase productivity through exploitation of technology, is one of the major objectives of the Fourth Industrial Revolution (4IR).

Table 5.27. Rate user satisfaction of your information systems - User Effectiveness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	9	20.9	22.0	22.0
	Fairly effective	32	74.4	78.0	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

Approximately 74% of the users regarded the system as fairly effective when it comes to adding value to the way the users perform their daily work. About 20% of the users believed the CMIS was neither improving nor slowing down their day-to-day operations, hence its introduction did not add value – they did not change productivity and output values.

5.2.5.4. US – Ease of use

It defines the flexibility of the use of the CMIS, since it enhances productivity in the business organization. Almost 60% of the users believed the CMIS was very fairly easy to use and 14.6% of the users believed the CMIS was very easy to use.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.28. Rate user satisfaction of your information systems - Ease of Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fairly difficult	1	2.3	2.4	2.4
	Neutral	10	23.3	24.4	26.8
	Fairly easy to use	24	55.8	58.5	85.4
	Very easy to use	6	14.0	14.6	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

Approximately 24.4% of the users could not judge the IS as either easy or difficult to use. Finding out more about why they could not judge the CMIS, this evaluation perspective will assist to improve the CMIS might eventually help in increasing productivity.

5.2.5.5. US – Information Quality

Information should be sufficient, it should meet end user requirements, and it should be comprehensive enough to comply with the quality aspect. Scholars and researchers had attempted to measure this aspect, basing it on understandability, completeness, accuracy and validity of information, consistency, reliability and readability of the information, etc. (Sirsat, S. 2016).

The quality of information in the CMIS was critical. Users needed to be satisfied with the quality of information. This calls for continuous improvement of the CMIS. Appreciation of the quality of information an CMIS has, CMIS based on various variables. Quality is more collective.

Table 5.29. Rate of user satisfaction of information systems - Information Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	7	16.3	17.5	17.5
	Good	24	55.8	60.0	77.5
	Very good	9	20.9	22.5	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

The majority of the users (82.5%) believe they are pleased with the information excellence of the IS, however, 17.5% feel the quality is poor and they are not satisfied. This will therefore call for an investigation to gather sufficient information about why they have this perspective of the IS. Improvement can be implemented so that all users are satisfied.

5.2.5.6. US – Service Quality (QoS)

QoS delivered by any CMIS or any service provider determines the survival of that IS or business organization. Most business organizations failed or closed down because of poor quality service.

Table 5.30. Rate user satisfaction of your information systems - Service Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	8	18.6	20.0	20.0
	Good	27	62.8	67.5	87.5
	Very good	5	11.6	12.5	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

Users of ITS are generally satisfied with the quality of service that were offered by the CMIS. It was worrying that 20% of the users indicated that the quality of service offered by the CMIS was poor. For any service provider or organization, once there is an element of poor service, there will be a need to investigate and address the situation.

5.2.5.7. US – Usefulness

Usefulness of the information systems was rated by 15% of the users as poor in terms of user satisfaction. This is a high percentage, since this is a crucial aspect of any IS. The CMIS must be useful to remain relevant to the main objective that it was designed to accomplish. This definitely needs to be explored further to determine why the users are saying it is poor and this might result in the modification of the CMIS to align with users' perspectives.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.31. Rate user satisfaction of your information systems – Usefulness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	6	14.0	15.0	15.0
	Good	26	60.5	65.0	80.0
	Very good	8	18.6	20.0	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

The majority of the users still found a purpose for the student management CMIS that is in place. An overwhelming majority of 85% of the users strongly felt the Integrated Tertiary System in place was still serving the purpose it was designed for. They found the system useful and fit for purpose. It is noteworthy that 20% of these 85% users felt that the IS was very good in terms of meeting user expectations and being able to fulfil the mandate that the CMIS was developed for.

5.2.6. Individual Impact (II)

According to Sirsat, S (2016), II is the beneficiary's influence of information on performance conduct. II relates to the ability to apprehend the information applied to decision-making, thereby improving individual productivity through enhanced performance. Information and knowledge are applied to problem-solving. It alters decision-making behavior, which eventually has an impact on organizational performance (Sirsat S, 2016).

Major indicators of individual impact are effectiveness, learning, decision quality, reduced time, improved decision analysis, and correctness.

The business organization benefits when individual impact positively affects a number of users, and they improve in productivity, accuracy and are performing effectively. This effect will result in organizational impact. Users feel confident, and passionate about the work that they do using the CMIS. The researcher used a number of variables to capture the perception of the users regarding their experience using the CMIS. Of importance will be how the CMIS had changed users in terms of behavior, work ethics, productivity, knowledge, etc.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.6.1. II – Task productivity

Task productivity is defined as the extent to which an application increases the user’s productivity per unit of time. Throughput is key to organizational development, and anything that increases productivity in a business environment, needs more focus to be able to improve it.

Table 5.32. Rate the individual impact of your information system - Task Productivity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	3	7.0	7.5	7.5
	Good	37	86.0	92.5	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

From the data gathered, an effective 92.5% felt strongly that the CMIS had enhanced their task productivity – they performed a task much faster and more effectively with accuracy within a limited timeframe. The more users use a particular CMIS, the better their productivity. However, they need to understand the system, the system needs to have a good interface (ease of use), and it should provide quality information. Some users felt the ITS did not have a positive impact on their task productivity. They felt that it is not adding any value to their tasks. Although the percentage users who felt like this is very low, it needs attention to determine what they used to judge the IS for it to be addressed, so that these users could also enjoy the benefits of the CMIS.

5.2.6.2. II – Task Innovation

Delone and McLean defined this as the degree to which software aids users to create or develop and apply new ideas in the execution of their work responsibilities. The ability of an CMIS to offer flexibility to the users is important, since it will result in innovation. The majority (90%) of the users strongly felt ITS was flexible enough and allowed them to innovate during task execution.

However, not all users share this perspective – 10% of the users felt that the IS was rigid and does not offer task innovation. Developers of the ITS IS might need to open up the system so that users can be innovate during their task execution.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.33. Rate the individual impact of your information system - Task innovation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	4	9.3	10.0	10.0
	Good	36	83.7	90.0	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

Task innovation will eventually result in overall organizational productivity, and this might translate into increased revenue or an increase in profit margins for the organization, hence every employee or user need to be able to innovate to increase productivity.

5.2.6.3. II – Customer Satisfaction

This is described as the degree to which software assists users to generate value for the organization’s inner or exterior clients. The ability to satisfy business customers is very important. The customers of any information system, are the users of the IS.

Table 5.34. Rate the individual impact of your information system - Customer satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	3	7.0	7.3	7.3
	Good	30	69.8	73.2	80.5
	Very good	8	18.6	19.5	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

An overwhelming majority of 92.7% of the users shared a positive perspective and believed that they were satisfied as users of the CMIS. Of the 92.5% of the users, 19.5% felt the CMIS was very good regarding customer satisfaction.

5.2.6.4. II – Management Control

Management control is the degree to which an application assists in the regulation of work procedures and performance.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.35. Rate the individual impact of your information system - Management control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	6	14.0	14.6	14.6
	Good	35	81.4	85.4	100.0
	Total	41	95.3	100.0	
Missing	System	2	4.7		
Total		43	100.0		

ITS has control mechanisms embedded, and periodic control reports can be printed that will assist both management and ordinary users to monitor and control business operations information. An effective 85.4% of the users believed the information system was good in assisting, building or moulding management control.

Approximately 15% of the users felt that more could be done to improve this aspect, since this aspect of the CMIS have been judged negatively. It is the negative perspective of the user that helps to improve and build the IS.

5.2.7. Organizational Impact (OI)

Organizational impact studies the influence that data has on the whole business. This is a culmination of all the variables that are involved in the evaluation of CMIS. All the contributions of other evaluation parameters lead to an organizational impact. There are a number of dimensions that can be explored in this regard.

The impact of an CMIS is reflected through improved productivity, reduction in costs, and an increase in profits. The researcher used these measures for evaluation.

5.2.7.1. OI – Cost reduction

A very good measure to find the impact of an CMIS in any business organization, will be to see the extent to which costs have been reduced. High operational administrative costs are a sign of a poor CMIS that does not have a control mechanism built in to check for deviation and to take appropriate corrective measures. Administrative costs are critical to any business organization.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Table 5.36. To what extent the IS reduced administrative costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 3%	2	4.7	7.7	7.7
	4 - 6%	6	14.0	23.1	30.8
	7-10%	2	4.7	7.7	38.5
	11 -16%	1	2.3	3.8	42.3
	17 -25%	12	27.9	46.2	88.5
	26 - 30%	1	2.3	3.8	92.3
	31 - 50%	2	4.7	7.7	100.0
	Total	26	60.5	100.0	
Missing	System	17	39.5		
Total		43	100.0		

Users had varying estimates regarding the extent to which the CMIS had reduced administrative costs in the organization. All the users agree that the cost had been reduced. It is noteworthy that 46.2% of users felt the introduction of the ITS had significantly reduced administrative costs by between 17–25%. This will be a significant reduction in any business environment.

Another significant estimate is that of a 4–6% reduction rate which was reflected by about 23% of the users. Approximately 12% of the users believe the reduction in administrative cost was more than 26%, and this translates in massive savings for the business organization, and this might result in money that could be channelled to other projects that the business might be willing to embark on.

5.2.7.2. OI – Organizational image

Table 5.37. To what extent the IS improved Organisational Image

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	6	14.0	15.0	15.0
	Good	30	69.8	75.0	90.0
	Very Good	4	9.3	10.0	100.0
	Total	40	93.0	100.0	
Missing	System	3	7.0		
Total		43	100.0		

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

A whopping 75% of the users regard the ITS as having significantly improved the image of the organization. This was very encouraging when users felt this positive impact, and this should translate to the monetary or economic value of the business organization. There were 10% of the participants that believed the CMIS was very good and was adding much value to the business’s organizational image.

However, 15% of the participants or users had a feeling that the CMIS was not adding any value to the image of the business. They were of the opinion that the CMIS was not very effective holistically, hence nothing was derived from it.

5.2.7.3. OI – Customer satisfaction

The majority of the users felt the customers of the information system are very much satisfied with the CMIS. Approximately 88% of the participants shared this perspective. The CMIS had impacted the organization in such a way, that through the effective and efficient use of the CMIS, the users had managed to serve the customers in a much better way.

Client fulfilment CMIS the final objective of any information system, since it changes the way the organization is doing business. It should allow business organizations to come up with innovative ideas, and greatly improve the way it does business.

Table 5.38. To what extent the IS improved customer satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	5	11.6	11.9	11.9
	Good	33	76.7	78.6	90.5
	Very Good	4	9.3	9.5	100.0
	Total	42	97.7	100.0	
Missing	System	1	2.3		
Total		43	100.0		

About 12% of the participants believed that the implementation and operations of ITS CMIS did not translate into customer satisfaction, as it did not have a positive impact on the business organization.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

5.2.7.4. OI – Internal operations

The purpose of any CMIS is to influence the way the business runs its day-to-day operations. Businesses changes their culture and behavior, because of information systems and technology. Big banks like First National Bank completely changed the way they do business because of their CMIS.

Table 5.39. To what extent the IS enhanced internal operations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	5	11.6	11.9	11.9
	Good	37	86.0	88.1	100.0
	Total	42	97.7	100.0	
Missing	System	1	2.3		
Total		43	100.0		

Approximately 88% of the users agree that their internal operations had been enhanced, thanks to the ITS student management system that was in place. However, almost 12% of the users or participants do not agree with this. They believed the entire system was very poor and was not enhancing their way of doing business.

CHAPTER SIX

DISCUSSION, CONCLUSION and RECOMMENDATIONS

6.1. Introduction

This section gives very critical recommendations to both, TVET colleges and developers of the ITS information system. The recommendations are based on the responses given by the users of the information system. Noteworthy, is the pattern that arises during data analysis, where a certain proportion of the sample carried a particular mind-set about the information system, and how that can be easily tweaked to improve both the organizational and individual impact of the CMIS.

The CMIS seems to be working correctly, however, the challenges are on the user's side. It can be deduced that the errors that had occurred were not system errors, but human errors in using the information system. Therefore, this calls for an in-depth interaction of the recommendations here below, to make sure such problems will never arise again.

6.2. Recommendations

The CMIS is working, it is producing the results, however, any IS has some weaknesses, hence there is always room for improvements. Without overshadowing the fact that every system has a weakness, information systems need to perform optimally if the benefits have to be fully realized and experienced. Challenges of the CMIS should not dilute quality, accuracy, integrity of data and information, and effectiveness of the CMIS.

DEMOGRAPHICS

It is important for senior managers in business organizations to participate in surveys of this nature. Their view is critical, because of the strategic space which they occupy. It was worrying that only 4.8% of management and 2.4% of knowledgeable staff participated. It is recommended that in future they should participate, since their views are important.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

6.2.1. User-friendliness and accuracy

For user-friendliness and accuracy 2.3% and 5% respectively judged the CMIS highly in this regard. These rates are very low, because the expectation for high degree of accuracy is 100%. The users need to work with developers to make sure they participate fully in developing the interfaces they desire. The researcher also recommends more training, since this will equip users with skills that are needed to manipulate the system to be more effectively and efficiently.

6.2.2. Training

Training is an ongoing process and should never end. It is clear from the responses of the participants that more training initiatives are urgently required.

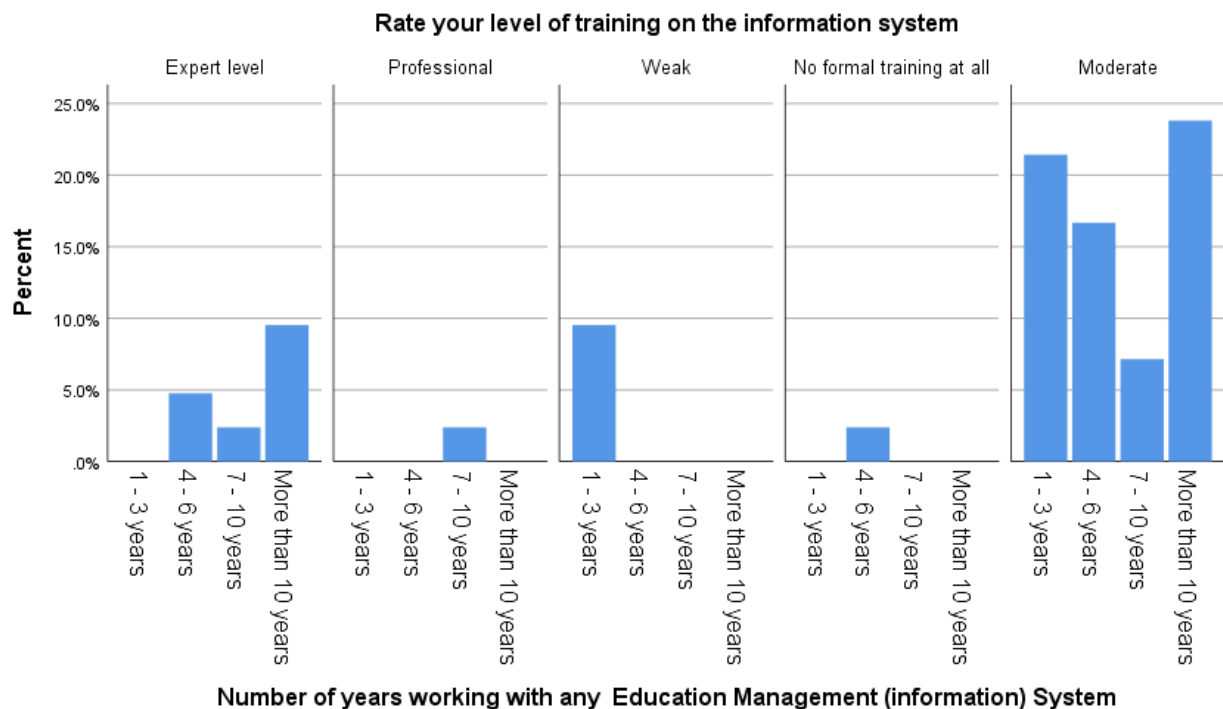


Figure 6.1. Number of years Versus Training Level

There are users who had been with the organization for more than 4 years and never had any formal training on the IS. This was worrying, and management was recommended to identify those users and enrol them on basic ITS training. The large percentage of users with moderate training need further training to advance them to a professional and an expert level. This will increase productivity and the wider 'organizational impact' benefits. The lack of professional level users from those working more than 10 years with IT systems, was

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

worrying. It might indicate a lack of solid training or of lessons not learnt through experience. However, training will address the possible causes above.

Training helps users to understand the CMIS much better, giving them the ability to exploit it effectively and efficiently. Management should draft a clear training program that could be rolled out using a phased approach.

The main research question is to attempt to determine the actual causes of outstanding results and wrong results in general. As long as the users of the system are not well conversant with the CMIS, the system is prone to user errors. Until the challenges expressed by the users are addressed adequately through training, the other problems are going to be addressed. This will give the organization a clear insight into what the actual problem at hand is as far as the system is concerned.

6.2.3. System Errors (SE)

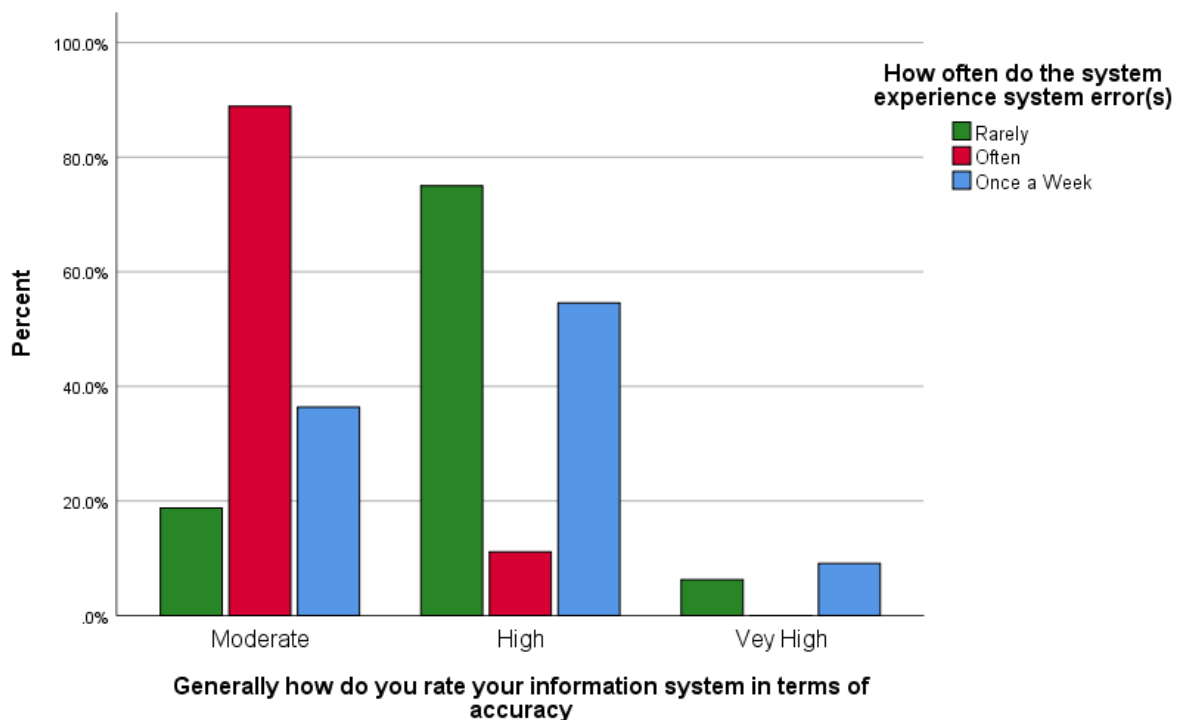


Figure 6.2. Accuracy Versus system errors

Systems errors are not 100% avoidable, however, if they continuously occur, the security of the system in terms of data integrity, accuracy and completeness. These are key features of any CMIS, hence once the system is not able to provide these, it is worthless. While a high

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

percentage users rated the system as able to provide moderate security, it is worrying, because very few participants think it provided high security and none believe it is very secure.

Therefore, the researcher recommends that the management should perform an information technology risk analysis, or risk audits, to determine the extent of the risk of the IS and to develop strategies to counter these risks or threats. System errors and accuracy feed directly to the research question that tries to find out why most students are not given results. Once system errors occur, the correctness of the data is compromised, and the possibility of having a number of students not receiving results, will be high. The cause of students not receiving results, is twofold: the users cause errors through limited knowledge and skills to manipulate the system, and errors are generated by the system itself.

6.2.4. Information Quality (IQ)

The perspective of the majority of the users is that the IS was doing well in terms of quality. There were 74% of the users that believe it is good enough, however, the percentage that says it is very good, was very small. More training on the CMIS is required. Noteworthy, was the high percentage of users – averaging above 25% – who rated the quality aspect of the CMIS as neither good nor bad. Their opinion makes it difficult to make a more informed decision on how to improve the quality aspect overall.

Availability of any data, information, or system in general should never be compromised. Data, information and or system availability should always be more or less 100%. The quality of information availability seems very low, hence the researcher recommends a complete system evaluation, driven by users to ascertain the level of improvement that is needed.

6.2.5. System Quality (SQ)

This is a critical measure of any IS success. System quality is a result of all other contributing factors. System quality helps organizational and individual impact to be realized. In terms of stability and reliability, the system was doing well with all users, indicating a positive judgement. The number of users who cannot really tell whether the system is good or bad, were worrying, since it tends to prohibit the most effective solution to be identified and implemented. This calls for more training and system fine-tuning, so that all users understand

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

the system. This would improve the administration of the student in the institution and reduce the number of students who do not get results or get wrong results.

In terms of user-friendliness and ease of use, the majority of the users felt the system was friendly enough and allows users to easily manipulate it. The major challenge on this was the 7.3% of the users who judged the CMIS as not being user-friendly. The researcher recommends that training of users takes precedence and also an analysis of the CMIS that will be user-driven. The results of the analysis should be implemented immediately. Regarding flexibility of the system, 9.5% of users perceive the system as not being flexible. This was also a cause of concern, since it limits the optimization of the CMIS. The researcher recommends the reassessing of the CMIS to find areas of improvement, as well as redesigning the user interface and some utilities to make the system more flexible.

The response time of the system was very fair, with 53.7% of the users saying it is very fast. The response rate is usually influenced by the network infrastructure in place, including internet connectivity and bandwidth. Machine specifications are critical in this regard.

6.2.6. User Satisfaction (US)

Although user satisfaction is more subjective than objective, in terms of system and user effectiveness, users are of the opinion that generally the CMIS was good. In terms of user effectiveness, 78% of the users believe that the system is able to satisfy them as users, while 17.1% of the users perceives the system as not being effective. The researcher recommends that the developers of the software should reassess the effectiveness of the system and align it with the needs of the users.

User effort and ease of use speak directly to each other. Once the user put minimal effort in, it might imply that the system is easy to use. From the data gathered, there were contradicting results, where 58% of the participants judged the, 'ease of use' as fair, against 81% of participants who judged the user effort aspect as good. The researcher recommends further training for all users to have a solid knowledge of the system. This will enable them to innovate better, because they will know where the strengths and weaknesses are.

Information quality relates to service quality. Both measures received a strong negative feedback. There are 20% of the participants that perceive service quality as poor, while 7% believe information quality was poor as far as user satisfaction was concerned. In this case

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

the researcher recommends a more comprehensive training and empowerment program, where users will go through a series of training sessions and assess them for competence. Only when user satisfaction is a 100%, then the quality of service will automatically improve. Usefulness from a user satisfaction perspective directly relates to information and system quality. There are 15% of the participants that have a negative perspective. Training is critical where there are variations.

6.2.7. Individual Impact (II)

All other variables will be observed through II, which will eventually lead to organizational impact. Three dimensions were explored. The results from user satisfactions are observed for task innovation, where 10% rated innovation as poor, but the majority (90%) agrees that the system was offering a platform that enables task innovation.

Customer satisfaction was rated poor by 7.3% of the participants, however, approximately 20% believed it is very good. These deviations and statistics can be addressed by taking a bold approach and starting from zero. The researcher strongly feels effective training will address most of these challenges the users are encountering, and which are resulting in a negative perception towards the IS. Once all users are conscious about the IS, user errors are going to be minimal, and this will effectively reduce the number of students not getting results, getting wrong results, or having pending results.

Is the IS assisting in management control? Almost 15% of the users believe it is not, however, the majority of 85% believe it does assist. The researcher recommends that management identify the actual gaps and devise a strategy to counter all these slight weaknesses in the system.

6.2.8. Organisational Impact (OI)

Every aspect of the IS in terms of benefits to the organization will be realized through organizational impact. The major reason why information systems are developed, is to make sure their impact is positive for the organization, thereby reducing costs and increase productivity and the overall financial position of the business organization. The researcher examined four variables that directly impact on the organization's performance.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

6.2.8.1. Cost reduction

All participants believed that the CMIS managed to impact positively on cost reduction. Noteworthy, was the fact that 46.2% of the users believed the administrative costs had been reduced by between 17% and 25%. This will be a significant cost reduction and should be able to divert the costs to income, thereby boosting the profitability of the business organization. A cost reduction of between 4%–6% was suggested by 23% of the users. The research strongly recommends that proper systems should be put in place to monitor administrative expenditure over a period and to apply models to properly analyse data.

6.2.8.2. Organizational image

It is almost impossible to achieve a perfect organizational image. The excellence of the system and the general interaction with the clients are the factors that build an organizational image. A good organizational image is as a result of many years of operations with a specific quality management system in place that every employee is trained for. The majority of the users perceived the CMIS as good enough in terms of shaping and improving the organizational image. While 10% said the system is very good, 15% said it is poor. The researcher recommends the business organization to undergo a rigorous corporate image building initiative, supported with an aggressive marketing and branding campaign.

6.2.8.3. Customer satisfaction

Almost 88% of the users believed the system was capable of satisfying the needs of its users. Approximately 12% believed it is poor in meeting user requirements. The researcher recommends a more open dialog on the information systems regarding interfaces and functionality. IS analysis should adopt a more user-driven approach to address the few weaknesses of the IS. The organization should look at customer satisfaction from a long-term perspective. Continuous improvement of processes and procedures is required to achieve any goals.

6.2.8.4. Internal operations

Just like 'customer satisfaction', 12% felt the system was not assisting in terms of improving internal operations, while approximately 88% of the participants felt the IS was assisting in overall improving internal operations of the business organization. The disparity in the results

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

is usually caused by two things, i.e. either the CMIS was poorly designed and needs re-engineering, or the users were not conversant with the CMIS, hence their limited knowledge of the system was hampering the ability to effectively and correctly judge the CMIS.

The researcher therefore recommends that management should take a bold decision and reassess the skills resources they have against the system requirements and complexities, to determine the extent of the training required by the user to effectively optimize the utilization of the ITS CMIS.

6.2.9. Observation

It seems there was a constant percentage of users who judged the ITS CMIS as negative on most of the questions. This percentage averages plus-minus 15% of the users. The institution needs to embark on training to make sure these users understand the CMIS they are using in terms of functionality, weaknesses, strength, and limitations. This will put all users in a position to critically evaluate the CMIS.

The responses from the participants showed a particular pattern. It can be concluded that the ITS CMIS was a good college management software. The majority of the users concurred this from their responses. However, there are many gaps that can be exploited to empower both the CMIS and its users.

The researcher can safely deduce from the response pattern that the small percentage of users who judged the ITS CMIS negatively, might not have a good grasp of the structure and internal workings of the CMIS. Notwithstanding the fact that there are challenges that are naturally embedded in any CMIS, the researcher believes to continuously evaluate the CMIS to strengthen its purpose, is important. IS naturally evolves, hence it needs these continuous checks to make sure they are aligned with the organizational vision and mission. As technology changes so does the CMIS.

System, service and information quality are critical in an evaluation. Business organization survives by capitalizing on the service quality to their customers or clients. Pitt et al. (1995) proposed that SERVQUAL should be adopted to provide more information on user satisfaction within the CMIS function.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Van Dyke, Prybutok & Kappelman (1999) criticized the SERVQUAL approach, while Jiang, Klein, & Carr (2002) praised it, as it offers a practical relevance. Carr (2002) used it to evaluate technical support service interactions. SERVQUAL had also been used recently in evaluating e-commerce sites and electronic service providers.

IS flexibility and security tend to go in different directions. The system according to the users, lacks the level of flexibility that is required for users to effectively perform their duties. The assumption is that the security of the system is not compromised. ITS CMIS performs fairly well for student management as far as the administrative function is concerned.

The impact that the CMIS had on individuals and the organization as a whole, was huge. If both developers and users work together, there is a possibility of having a very powerful information system that will manage the student administrative function in many educational institutions.

The major obstacle that the researcher had identified, was training. As much as ITS IS was fully functional, management should take the initiative to make sure all users are appropriately armed with the necessary information to run the CMIS, otherwise the same misunderstandings will occur. Management should always arrange training to make sure they get value for money from the CMIS. If the few weaknesses identified by the users are put into consideration and recommendations from the researcher are implemented, ITS will be the best student management software of choice for many institutions. From the responses gathered from the users, it can be deduced the ITS CMIS was working perfectly, however, the users seem to have insufficient knowledge to effectively and efficiently manipulate the CMIS for the benefit of the organization.

The researcher strongly felt the problems that are experienced by students in terms of outstanding results, might be caused by a number of factors, i.e. a sizeable number of users seems not to fully understand the functionality of the information system, hence failing to put effective control and tracking mechanisms, resulting in user error that in turn will result in other students not getting results.

The system weaknesses that had been identified by users, might have to be addressed to improve certification and results of students in the TVET sector. System quality and the

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

accuracy of the system were flagged by a number of users, and this might also be the reason why some students are not getting their results.

The researcher recommends training to clear the users of possible user input errors and system challenges, and to remain with ITS as an information system. Once users are trained and they understand the strength and limitations of the IS, then a proper system evaluation should be able to identify a number of issues that will improve the IS, once addressed.

The current challenges are as a result of both user errors and system challenges. The best approach will be to separate user and system errors and to address them individually.

6.3. Conclusion

The purpose of any IS in a business organization is to simplify the way tasks are executed. Efficiency, accuracy and cost effectiveness are some of the key features of information systems. Information systems are developed for work to be performed in a more effective way. There are no errors in the outputs of the CMIS, and business operations are performed cost-effectively. It CMIS the responsibility of the CMIS to provide the services that customers want.

Of the several dimensions and attributes that the users judged, there was a visible divide in terms of perception of the CMIS. A negative element can be traced from each and every question that was asked. The general majority of the users rated the CMIS positively. ITS CMIS providing a critical service to the clients. An almost similar rate of participants had the same negative view towards almost all the questions, and this might signify much bigger challenges regarding the IS architecture or design. It might also represent a lack of understanding of the CMIS, resulting in the user not seeing the benefits and weaknesses that might be critical in the evaluation of the CMIS. There are other evaluation factors that users left open, or they decided to remain neutral, thereby distorting the outcome of those factors.

It is believed that when users view the CMIS as easy to use, they tend to develop a more positive attitude towards the entire CMIS environment, thereby increasing the productivity and profit margins for the business organization – the organization impact is huge and positive. Reliability of the system has a direct impact on the users' attitude and it shapes or influences behavioural perceptions (Warkentin et al., 2002). It is evident from the data collected that

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

there were some users who developed this perception and therefore rated the CMIS negatively across all the questions asked.

The role of IS characteristics in TAM (Technology Acceptance model) such as exterior variables, has not been explored extensively by many researchers and scholars, according to Davis et al. (1989). It must be noted that these exterior factors have a huge impact on the organization, and these include training, the organizational structure, and the characteristics of the system.

Fishbein et al (1975) says “outside incitements impact a user’s attitude toward behavior indirectly by influencing his/her remarkable beliefs about the penalties of carrying out the behavior. IS characteristics being exterior stimuli hence they should guide beliefs on using a system”. Sabherwal et al (2004) suggested that system information excellence influences user satisfaction, usefulness, and usage.

Wixom and Todd (2005) established a cohesive tool based on technology acceptance and user satisfaction literature. They established that there is a significant effect of information and system quality on PU and PEOU. Thus, they proposed exploring the effects of the IT system itself as an antecedent to usefulness, ease of use, and other associated aspects. Davis (1989) noted that the future technology acceptance study needs to investigate how variables affect ease of use, user acceptance and usefulness.

6.4. Contribution of the research

Established in 1987, from very humble beginnings, the ITS User Group has grown to a membership of 134 Higher Education and Further Education & Training institutions throughout Africa, Ireland and New Zealand. Membership of the ITS User Group is open to all organisations and institutions utilising the Integrated Tertiary Software (Pty) Ltd administrative systems.

The research is very significant as it helped to identify the strength and limitation of the Integrated Tertiary System’s IS. ITS is used by several countries over the world. It also helps to improve the information systems, as it will identify weaknesses of the IS. The lessons learnt from the research also helps to assist other institutions of higher learning, since the software is gaining momentum in terms of its usage in education management field. The research was in

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

line with the amended FET Act of 2008 in terms of provision of efficient and effective information systems for TVET colleges. The research resulted in recommendations to different organisations and organisational functions. Recommendations were submitted to the Deputy Principal – Corporate Affairs, to ITS and to the Administration Manager at each campus.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

LIST OF REFERENCES

Ackoff, R. L. (1999). *Ackoff's Best. His Classic Writings on Management.*

Advanced Technical Education. (1978). *Act 43 of 1979.*

Ali, F., Zhou, Y., Hussain, K., Nair, P. K., & Ragavan, N. A. (2016). *Does Higher Education Service Quality Effect Student Satisfaction, Image and Loyalty? A Study of International Students in Malaysian Public Universities.* *Quality Assurance in Education*, 24, 70-94. <https://doi.org/10.1108/QAE-02-2014-0008>.

Al-Mamary, H., Al-Nashmi, M., Hassan, G.Y.A., Shamsuddin, A. 2016. *A Critical Review of Models and Theories in Field of Individual Acceptance of Technology.* *International Journal of Hybrid Information Technology* Vol. 9, No.6 (2016), pp. 143-158.

Anakwe, P., Anandaeajan, M., and Igbaria, M. (1998). *Information Technology Usage Dynamic in Nigeria: An Empirical Study.* *Journal of Global Information Management*, (7:2), pp. 13-21.

Bailey, J. and Pearson, W. (1983). *Development of a Tool for Measuring and Analysing Computer User Satisfaction.* *Management Science*, (29:5), pp. 530-545.

Barbara, H. Wixom, Peter, A. Todd, 2005: *A Theoretical Integration of User Satisfaction and Technology Acceptance.*

Barki, H. and Hartwick, J. (1989). *Rethinking the concept of user involvement.* *Biological Systems.* Letchwoth: Research Studies Press.

Churchman, C. W. and Mason, R. O. (Eds.), *World Modeling: A Dialogue*, 107-115. Amsterdam: North-Holland.

Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* *MIS Quarterly*, 13, 319-339.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35, 982-1003.

Delone & Mclean. (1992) Information system success: *The quest for dependent variables. Information Systems Research*, 3(1), 60–95.

Delone & McLean. (2003) *Journal of Management information system*, Vol 19, 2003.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30.

Department of Education and Culture: *Annual report for the calendar year 1985, 1986:25.*

Department of National Education. (1980). *Annual report for the 1979 calendar year, 1980:6.*

Doll, W. J., Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly*, 12(2), 259–274.

Dudovskiy, J. 2019. *The Ultimate Guide to Writing a Dissertation in Business Studies: a step by step assistance*

Emery, J. C. (1991). Cost/Benefit Analysis of Information Systems. *SMIS Workshop Report Number I, The Society for Management Information Systems, Chicago. IL, 1971.*

Faucheux, C., Laurent, A. and Makridakis, S. (1976) *Can we model the wild world or should we first tame it.*

Finkelstein, L. and Carson, E. R. (1985). *Mathematical Modeling of Dynamic*

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Flood, R. L. and Carson, E. R. (1988). *Dealing with Complexity: An Introduction to the Theory and Application of Systems Science.* New York: Plenum Press.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Further Education & Training Act of 1998.

Further Education & Training College Amendment Act 3 of 2012.

Gable, G., Sedera, D. and Chan, T. (2003), Enterprise systems success: a measurement model. *Proceedings of the 24th ICIS, Seattle, Washington.*

Gable, G., Sedera, D., and Chan, T. (2008) Re-conceptualizing Information System Success: the IS-Impact Measurement Model. *Journal of the Association for Information Systems. (9:7), pp. 377-408.*

Glorfeld, K. (1994) Information Technology: Measures of Success and Impacts.

Godana, Plastisa, Nedo, Balaban, 2009. *Journal of Management Information Systems Vol 4, 2009.*

Goldkuhl, 2008. *Interpretive IS Evaluation: Results and Uses.* The Electronic Journal Information Systems Evaluation, Vol. 11, No. 2, pp 97-108.

Goldkuhl, G. (2012) Pragmatism vs. interpretivism in qualitative information systems research, *European Journal of Information Systems, Vol 21 (2), p 135-146.*

Goldkuhl, G., 2012. *Different roles of evaluation in information systems research.* International workshop on IT Artefact Design & Work practice Intervention, 10 June, 2012, Barcelona.

Goldkuhl, G., Lagsten, J. 2012. *Different roles of evaluation in information system research,* 2012).

Goodhue, D. L. and Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19, 213-236.*

Government Gazette (2014). *Number 37716 vol 588.*

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Gregor, S. 2006 The Nature of Theory in Information Systems. *MIS Quarterly*, (30:3), pp. 611-642. *20th Australian Conference on Information Systems Assessing Information Systems Success Models 2-4 Dec 2009, Melbourne Rabaa'i.*

Hasan, S., Hoque, M. R., Chowdhury, S. R., Mohib, A. A., & Ahad, M. A. (2020). Challenges of IT Adoption at Educational Institutions: Lessons from Bangladesh. *International Journal of Information Systems and Social Change (IJISSC)*, 11(1), 66-90.
doi:10.4018/IJISSC.2020010105.89.

Heo, J. and Han, I. (2003). Performance measure of information systems (IS) in evolving computing environments: an empirical investigation. *Information & Management*, vol. 40, pp. 243-56.

Hirschheim, R. and Smithson, S. (1999). *Evaluation of Information Systems: A Critical Assessment*. In *Beyond the IT Productivity Paradox*.

<http://Research-methodology.net>

Huberman, A.M. and Miles, M. (1994) *Data Management and Analysis Methods Handbook of Qualitative Research*, pp. 428–44. London: Sage.

Ibrahim, F., Ali, D. N., & Besar, N. S. (2020). Accounting Information Systems (AIS) in SMEs: *Towards an Integrated Framework*. *International Journal of Asian Business and Information Management (IJABIM)*, 11(2), 51-67. doi:10.4018/IJABIM.2020040104.

Igbaria, M., Pavri, N., and Huff, L. (1989) *Microcomputer Applications. An Empirical Look at Usage*, *Information and Management*, (16:4), pp. 187-196.

Khalil, O., and Elkordy, M. (1999) *The Relationship Between User Satisfaction and Systems Usage: Empirical Evidence from Egypt*. *Journal of End Computing*, 11 (2), 21-28.

Kim, Y. and Y. Kim (1999). *Critical Issues in the Network Area*. *Information Resource Management Journal*, (4:4), pp. 14-23.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Kriebel, H., Hleatias J T, Van Horn R L (ed.).1970. The evaluation of Information systems. Management Sciences Research Report No. 226 pp 1.

Lai, P.C. (2017). The literature review of technology adoption models and theories for the novelty technology, *Journal of Information Systems and Technology Management Vol. 14, No. 1, Jan/Apr., 2017 pp. 21-38.*

Li, E. (1997). Perceived Importance of Information System Success Factors: A Meta-analysis of Group Differences. *Information and Management, (32), pp. 15-28.*

Mahmood, A. and Soon, K. (1991) A Comprehensive Model for Measuring the Potential Impact of Information Technology on Organizational Strategic Variables *Decision Sciences, (22:4), pp. 869-897.*

Mahmood, A., and Becker, D. (1986) Effect of Organizational Maturity on End-users' Satisfaction with Information Systems. *Journal of Information Systems, (2:3), pp. 37-64.*

Mason, R. O., 1978 - Measuring information output: *A communication system MIS Quarterly, 13, 53-63.*

Mkansi, M. and Acheampong, E. A. *Research Philosophy Debates and Classifications: Students' Dilemma.* The Electronic Journal of Business Research Methods Volume 10 Issue 2 2012 (pp 132- 140), available online at www.ejbrm.com

Mukerjee, S. 2012. Student information systems – implementation challenges and the road ahead. *Journal of Higher Education Policy and Management Vol. 34, No. 1, February 2012, 51–60*

Mwiya, B., Bwalya, J., Siachinji, B., Sikombe, S., Chanda, H., & Chawala, M. (2019). Are there study mode differences in perceptions of university education service quality? *Evidence from Zambia. Cogent Business & Management, 6(1), 1579414.*
[https://doi.org/10.1080/23311975.2019.1579414.](https://doi.org/10.1080/23311975.2019.1579414)

Ngoma, S. (2009). An Exploration of the Effectiveness of SIS in Managing Student Performance. PhD Thesis.

Ortigueira, M. (1987). Basic Theory of the Management Audits.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Petter, DeLone and McLean (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, 17, 236-263.

Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research*, 13(1), 50-69.

Rai, A., Lang, S., and Welker, B. (2002) Assessing the Validity of IS Success Models: *An Empirical Test and Theoretical Analysis. Information Systems Research*, (13:1), pp. 50-69.

Rai, 2002. *Theoretical foundation for Information System success in small and medium enterprises.*

Roldan & Leal, 2003). A Validation Test of an Adaptation of the DeLone and McLean's Model in the Spanish EIS Field.

Sabherwal, R. (1999) The Relationship Between Information System Planning Sophistication and Information System Success. *An Empirical Assessment', Decision Sciences*, (30:1), pp. 137-167.

Sang, A., Muthaa, G. & Mbugua, Z. (2012). Challenges Facing Technical Training in Kenya. *Creative Education*, 3, 109-113. doi: 10.4236/ce.2012.31018.

Saunders M. K. (2009) Understanding research philosophies and approaches.

Seddon, P. and Yip, K. (1992) An Empirical Evaluation of User Information Satisfaction (UIS) Measures for Use with General Ledger Account Software. *Journal of Information Systems*, pp. 75-92.

Seddon, P. B. (1997) A Respecification and Extension of the Delone and McLean Model of IS Success. *Information Systems Research*, (8:3), pp. 240-253.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Seddon, P. B., and Kiew, K. Y. (1999). A Partial Test and Development of the DeLone and McLean's Model of IS Success. *Proceeding of the 15th International Conference on Information Systems, Vancouver, Canada, 1994.*

Seddon, P. B., Staples, S., and Patnayakuni, R. (1999). Dimensions of Information Systems Success. *Communications of the Association for Information Systems*, (2:20), pp. 1-61.

Shang, S., and Seddon, P. (2000) A comprehensive framework for classifying the benefits of ERP systems. *Proceedings of the 20th Americas Conference on Information Systems.*

Shannon and Weaver (1949). *The mathematical theory of communication, 1949.*

Shannon, C. E. and W. Weaver (1963). *Mathematical Theory of Communication. Urbana, IL, University of Illinois Press.*

Sirsat, S. (2016) A Validation of the Delone and Mclean Model On the Educational Information System of the Maharashtra State (India) *International Journal of Education and Learning Systems* <http://iaras.org/iaras/journals/ijels>.

Stufflebeam, D. (2001). Evaluation Models. *New Directions for Evaluation*, 89, 7-98.

Sue, F and Abdinnour, H. *Using the End-User Computing Satisfaction (EUCS) Instrument to Measure Satisfaction with a Web Site, 2005. Department of Decision Sciences, W. Frank Barton School of Business, Wichita State University, Wichita, KS 67260-0077.*

Suki, N. M., & Ramayah, T. (2010). User acceptance of the e-government services in Malaysia: structural equation modelling approach. *Interdisciplinary Journal of Information, Knowledge and Management*, 5(1), 395-413.

Teo, T.S.H., and Wong. P.K. (1998). *An empirical study of the performance impact of computerization in the retail industry. (1998). 611-621.*

The Technical Colleges Act 104 of 1981.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Venkatesh, V. and Davis, F. (2000), A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, *Management Science*, Vol. 46, No. 2 (Feb., 2000), pp. 186-204.

Welman, J.C. and Kruger, S. J. 2000. *Research methodology for the business and administrative sciences*. Cape town: Oxford university press Southern Africa.

Wixom, B.H., & Tood, P.A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information System Research*, 16(1),85-102.

Yin R. K, 1994. *Case Study Research: Design and Methods*. Sage: Thousand Oakes.

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

APPENDIX - QUESTIONNAIRE



28 Dibo Mews
Mckinley Road
Kenilworth
Cape Town

Dear Sir/Madam

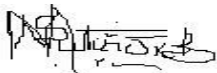
QUESTIONNAIRE ON AN EVALUATION OF A COLLEGE BASED COMPUTER INFORMATION SYSTEM IN TECHNICAL VOCATIONAL EDUCATION AND TRAINING LEARNING INSTITUTIONS: A SOUTH AFRICAN CASE STUDY

Your kind co-operation as part of a sample survey is sought for the completion of the questionnaire which is part of a survey to EVALUATE A COLLEGE BASED COMPUTER INFORMATION SYSTEM IN TECHNICAL VOCATIONAL EDUCATION AND TRAINING LEARNING INSTITUTIONS: A SOUTH AFRICAN CASE STUDY.

Your willingness to complete the questionnaire will be much appreciated as the information obtained will assist the researcher to complete his Master's - Information Technology at Cape Peninsula University of Technology.

The information you are going to provide will be treated with the highest degree of confidentiality. It will be used only for academic research purposes.

Any questions or enquiries about this questionnaire or the research project may be directed to the researcher.



Mutiro Newton Sly
Researcher

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An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

Tel. Work: 021 3613430 Mobile: 0738951515

Please take some time to complete this questionnaire

PART A - DEMOGRAPHICS							
	Department (Optional)						
	Position (Optional)						
	Gender	Male			Female		
	Number of years working with any Education Management (information) System	1 day - 3yrs	4-6yrs	7-10yrs	>10yrs		
	Number of years working with Integrated Tertiary Software (ITS)	1 day - 2yrs	3-4yrs	Since its inception with Falsebay TVET	Never		
	Management level	Lower	Middle	Top	Knowledge staff	Not Management	
PART B – GENERAL SNAPSHOT OF THE INFORMATION SYSTEM							
	Generally how do you rate your information system in terms of accuracy	Poor	Moderate	High	Very high		
	Rate the general level of user-friendliness of your system	Highly	Good	Moderate	Poor	Very poor	N/A
	Rate your level of training on the information system	Expert level	Moderate	Poor	Very poor	No formal training at all	
	How often do you use the information system	Everyday	Once a week	Once in a fortnight	Once a month	Only at the end of the term	
	How often do the system experience system error	Daily	Once a week	More than once a week	Rarely	Often	
PART C – DETAILED EVALUATION OF THE SIX DIMENSION							
C1- INFORMATION QUALITY – (based on Bailey and Pearson’s (1983) and modification from the author.							
Rate the quality of information on the information system							
	Importance	Very poor	Poor	Neutral	Good	Very good	
	Availability	Very poor	Poor	Neutral	good	Very good	
	Usability	Very poor	Poor	Neutral	Good	Very good	

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

	Accuracy	Very poor	Poor	Neutral	Good	Very good
	Timeliness	Very poor	Poor	Neutral	Good	Very good
	Relevance	Very poor	Poor	Neutral	Good	Very good
	Format	Very poor	Poor	Neutral	Good	Very good

C2 – SYSYEM QUALITY – (Based on Seddon and Kiew (1994: 101) and modification from the author

How do you rate the system quality of the information system in terms of the following:

	Flexibility:	Not flexible	Neutral	Fairly flexible	Very flexible	Extremely flexible
	Stability:	Not stable	Neutral	Fairly stable	Very stable	Extremely stable
	Reliability	Not reliable	Neutral	Fairly reliable	Very reliable	Extremely reliable
	Usefulness	Not useful	Neutral	useful	Very useful	Extremely useful
	User-friendly interface	Not friendly	Neutral	Fair	Very friendly	Extremely friendly
	Ease of use	Not easy to use	Neutral	Fairly easy to use	Very easy to use	Extremely easy
	Response time	Very slow	Neutral	Fast	Very fast	Extremely fast

C3 – USER SATISFACTION (US) –Based on Chorng-Shyong Ong a, Min-Yuh Day a, b; Azzah Al-Maskari and Mark Sanderson and modification from the author.

Rate user satisfaction of your information systems in terms of the following

	System Effectiveness	Not effective	neutral	Fairly effective	Very effective
	User Effort	Very bad	bad	Good	Very good
	User Effectiveness	Not effective	neutral	Fairly effective	Very effective
	Ease of use	Not easy to use (very difficult)	neutral	Fairly easy to use	Very easy to use
	Information quality	Very poor	Poor	Good	Very good
	Service quality	Very poor	Poor	Good	Very good
	Usefulness	Very poor	Poor	Good	Very good

C4 – INDIVIDUAL IMPACT (II) based on Doll and Torkzadeh (1988a) and modification from the author.

Rate the individual impact of your information system in terms of the following

	Task productivity	Very poor	Poor	Good	Very good
	Task innovation	Very poor	Poor	Good	Very good
	Customer satisfaction	Very poor	Poor	Good	Very good

An evaluation of a computer information system in Technical Vocational Education and Training (TVET) colleges.

	Management control	Very poor	Poor	Good	Very good		
37							
C5 – SYSTEM USE (SU)							
Briefly explain how you judge the performance and suitability of the system in terms of its usages. Detail any other information you deem important not covered by the questions above.							
C6 – ORGANISATIONAL IMPACT (OI) – Based on Sabherwal (1999) Mahmood and Soon (1986) and modification from the author							
	To what extend did the information system reduced administrative costs(approximate)	0-4%	5-10%	11-15%	16 - 20%	21-25%	Custom %
	Improvement of organization image	Very poor	Poor	Good	Very good		
	Customer satisfaction	Very poor	Poor	Good	Very good		
	Enhancement of internal operations	Very poor	Poor	Good	Very good		