Meeting the challenge of educating the digitally engaged student at a University of Technology in South Africa

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Abstract

This study argues against the common, simplistic model of the Digital Native and Digital Immigrant models which proposes a bilateral model between those who were born into and those who were not born into the digital realm. It proposes and explores a model that is contextually informed by operating within the undergraduate Information Technology Services Management programme at Cape Peninsula University of Technology (CPUT), within a developing country like South Africa. This educational environment of engagement is far more complex than in the developed world, consisting of educational disadvantage, technological disadvantage and social disadvantage that inform digital engagement in a very direct manner. The attributes of higher education students have changed radically with time and it is suggested that contemporary students are no longer the people our educational system was designed to teach. It is argued that the proliferation and ubiquitous nature of technology has meant that a "discontinuity" has taken place between the digitally engaged student and the educator. An uncompromising report released by the Council on Higher Education (CHE) which is a statutory body that advises the higher education minister of South Africa in August 2013, revealed that less than 5% of black African and coloured youth succeed at university, and more than half of all first-year entrants never graduate at all. It further stated that although "the level of dysfunction in primary and secondary schooling will not produce the numbers of well-prepared school leavers that higher education requires. A choice has to be made by the higher education sector: allowing the status quo to persist, or, undertaking to act on factors that are within its control to address the systemic conditions impeding student success." CPUT is particularly keen on developing its role with respect to technology skills development and research and innovation. It is specifically with regard to the latter, and in an attempt to act on factors that are within its control to address the systemic conditions impeding student success that this study was undertaken. The study seeks to address the challenge of educating the digitally engaged student at a University of Technology in South Africa in terms of – (a) understanding the digitally engaged student, (b) understanding the digitally engaged educator, (c) understanding the pedagogical challenge and (d) understanding the assessment challenge. Extensive use will be made of CHE and related resources to establish the parametric framework of analysis for this study. Scholarly articles elucidating the notions of "Digital Native, "Digital Immigrant" and "Digital Refugee" will also be accessed. The research framework will be bench-marked against international approaches for "higher education challenges" research with particular reference to Innovation Pedagogy. This will allow for comparative analysis at a later stage. The qualitative research component of the study will involve focus group discussions with students and educators respectively. The value proposition of the study is a report on the challenge of educating the digitally engaged student at a University of Technology in South Africa which would inform curriculum design, teaching-learning-assessment strategies and related policies to higher education decision makers.

Keywords: *Digital, student, education, native, immigrant, innovation, pedagogy, university, technology, South Africa.*

1. Introduction

It has been a conscious effort from the present South African government, to bring about a radical transformation of the colour and shape of its university graduates. [1] Unfortunately though, nearly two

decades into this transformation, it is apparent that increasing the numbers and colour of entrants into university does not necessarily equate to producing the same amount of graduates within reasonable time. Over and above the socio-economic factors that impact student performance, other challenges includes the readiness of the South African higher education system to respond to and embrace the advances in and impact of the digital revolution. [2] In light of the preceding views, this study argues against the common, simplistic model of the digital native and digital immigrant models which proposes a bilateral model between those 'born into and not born into' the digital space of a South African university. The focus of all of this is an attempt to address the poor student throughput rate at universities in South Africa.

2. Literature Review

In order for a literature review to be meaningful, it has to establish a golden thread of the core themes of the research project. The analysis of the extant literature must identify a gap which the research project attempts to fill. With this in mind this study will explore the digitally engaged student, what gave rise to this phenomenon, how universities might respond to this student, the challenges at universities and a case study of a programme at CPUT which aims to address the poor throughput rates at a university of technology in South Africa.

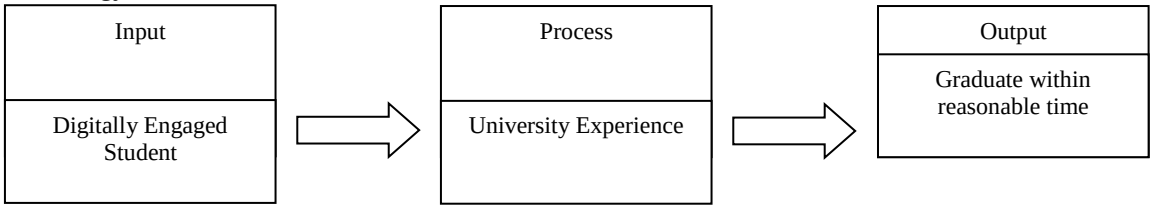

Figure 1. A simple process model of the literature review.

2.1. Defining the digitally engaged student

[3] suggests that digital engagement involves email, websites and social media and this thought is extended by [4] arguing that Kenya has become more connected through the proliferation of technology and that social media has become integral to election campaigns. Those who are engaged are active, young and ever-increasing citizens in the digital space. The mobile phone has become the most popular form of electronic communication for many people [5]. Nearly a decade later, [6] supports this view by suggesting that mobile communication has become such an integral part of people's lives that many feel peculiar without a mobile phone. [7] provides a philosophical perspective on what it means to be digitally engaged by suggesting that "It isn't about engaging with digital content. It's about engaging through digital content."

2.2. The ubiquitous and prolific nature of information communication technologies which have given rise to the digitally engaged student

Mobile subscribers constitute 5.9 billion or 87% of the world's population, of which China and India have nearly 1.8 billion subscriptions. The Global mobile statistics 2012 report indicates an increase in mobile devices since 2011 particularly in smartphones. There are 1.2 billion mobile Web users worldwide and mobile devices account for 8.49 percent of global Website hits. In the US, 25 percent of mobile Web users are mobile-only, i.e. they do not, or very rarely use a desktop, laptop or tablet to access the Web. US and European users prefer to text (up to 8 trillion text messages worldwide in 2011) and play more games on their mobiles. Most popular mobile destinations are news and information, weather reports, social networking, search and maps. [8] In their subsequent report there appears to have been continued and almost universal growth in Information Communication Technologies (ICT) uptake. Much of this enhanced connectivity is as a result of 40% rise in 2011 of mobile-broadband subscriptions, to the point where there are now twice as many mobile-broadband as fixed-broadband subscriptions. The surge in numbers of mobile-broadband subscriptions in developing countries has brought the Internet to a multitude of new users. [9]

The following table does not represent an exhaustive list of ICT evolution, but rather establishes the context for what will be referred to in this study as the era of digital engagement.

Table 1. The evolution of Information Communication Technologies since 1950 [10, 11].

Year	Milestone
1952	The first mass produced computer was made and sold by the IBM Company.
1976	The first "Apple" computer was invented by Steve Jobs and Steve Wozniak.
1981	The "Personal Computer" was released by the IBM Company.
1983	The "Apple Lisa" personal computer was released by the Apple Company.
1989	The "World Wide Web was invented by Tim Berners-Lee.
1995	With the launch of the Amazon Bookstore online shopping became popular.
1998	An internet-related services company is launched by Larry Page and Sergey Brin called Google.
2003	Electronic devices that send emails, access the web and could receive phone calls became commercial.
2004	An online social networking service called Facebook was founded by Mark Zuckerberg and associates.
2007	Apple upended the cellphone business with the iPhone.
2008	T-Mobile and Google released the G1, the first smartphone to use the Android operating system.
2008	More than 300,000 computers were shipped around the world.
2010	Apple launches a tablet computer called the iPad.
2012	1.2 billion mobile Web users worldwide.

2.3. The different categories of the digitally engaged at university

Within the context of this study most students entering university have been born soon before Google was launched in this digital era, while educators date back to the first mass produced IBM computer. This distinction has given rise to different categories of the digitally engaged, viz. the "Digital Native", "Digital Immigrant" and "Digital Refugee". [12]-[16]

[12] asserts that the university world is changing with the arrival of "Digital Natives". These students seem to be permanently communicating with others through social media sites via computers and phones. This change is a shift from "page-based" students to "screen-based", where students are reading and writing more on screens of digital devices. This indulgence involves viewing not just print communication, but visual art, video, sound and even advertising. [13] argues that one of the main causes for the decline of US education is the fact that students have changed radically as a result of the proliferation of computer games, mobile phones, email, the Internet and instant messaging. These students have not simply changed in the clothing they wear, they way they speak or any other generational deviation that the educational has come to expect. The rapid dissemination of twentieth century technology has meant that present students are no longer the people the educational system was designed to teach which has resulted in a big discontinuity, mainly as a result of these students' thinking patterns.

The author continues to say that contemporary students have spent their entire lives surrounded by and using computers, videogames, digital music players, video cameras, cell phones, and all the other toys and tools of the digital age. As a result of this over-exposure to technology, the average student has spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). This has meant that students have evolved into beings who think and process information fundamentally differently from their predecessors, a fact that transcends beyond the understanding or realization of many educators. Different kinds of experiences lead to different brain structures, and it is very likely that our students' brains have physically changed and are different from ours as a result of how they grew up. [13]

This view is further extended by [14] by way of the fact that "Digital Native" students are involved in a world of social learning where students are using groups on Facebook in conjunction with other technologies, to learn outside of the classroom. It appears that these students are findings ways around educators, instructors, educational technologists, anyone employed on the instructional or administrative sides of education to take control of their own learning.

A warning is spelled out by [14] when the author suggests that while these digital natives have grown up using all of these technologies, most of them are not technologically literate. The fact that these students can access information does not mean that they know how to apply critical thinking skills in such a way that they can derive maximum value from the data. These students furthermore, do not know how to use technologies well for organizing and disseminating their research. A practical aspect of this is when students have to prepare for presentations and they immediately begin organizing a PowerPoint presentation. It is clear that they know the technology of PowerPoint but are not literate enough to understand that they cannot design a presentation until they know what they want to present.

[13] compares these digital natives to those who were not born into the digital era but have, at some later point become ensnared by and adopted many of the new technologies as "Digital Immigrants". The problem is that the digital immigrant has one foot in the past and one in the present, unlike the digital native who only knows the present. This situation sketches the very problem facing education today which is that our digital immigrant educators, who extensively represent this category of the digitally engaged community, are battling to teach students who speak an entirely new language and operate in a completely different manner.

[16] introduces a third category within the digital world which is the "Digital Refugee". This person reluctantly uses technology because they are forced to. The refugee prefers hard copies, does not trust electronic resources and seeks assistance with most electronic tools. Interestingly, this person may have grown up with technology or adopted it as an adult.

2.4. Possible adaptations to teaching the digitally engaged

[13] states that with regard to teaching methodology educators may have to learn to communicate in the language and style of their students. This doesn't mean changing the meaning of what is important, or of good thinking skills. What it might mean is going faster, less step-by step or procedural, more in parallel, with more random access, among other things.

[15] suggests that Edmodo available at www.edmodo.com is a free, user-friendly social learning network and secure learning platform, which enables a digital immigrant teacher to set up and run online classes, including a workshop for other teachers. When surveyed about their engagement with this, students strongly agreed that they liked and enjoyed working in an online class via Edmodo.

[13] further states that there are now two kinds of content, namely "Legacy" content and "Future" content. "Legacy" content includes reading, writing, arithmetic, logical thinking, understanding the writings and ideas of the past, etc which represented the "traditional" curriculum. While this is still important, it is from a different era. Some of it like logical thinking will continue to be important, but some like Euclidean geometry for example, will become less so, as did Classical European Languages.
"Future" content is to a large extent digital and technological but not only aspects of software, hardware, robotics, nanotechnology, genomics, etc. This "Future" content is extremely relevant to today's students. This content represents the ethics, politics, sociology, languages and other things that go with information communication technologies. The author recommends that educators need to be thinking about how to teach both Legacy and Future content in the language of the Digital Natives. The first involves a major translation and change of methodology; the second involves new content and thinking. Educators would have to invent and/or adapt teaching materials to the language of Digital Natives. In its most extreme, this could mean inventing computer games and edutainment for the most serious content, formats which the digital native is extremely familiar with.

2.5. The performance of students at universities in South Africa

An uncompromising report released by the CHE in August 2013, revealed that less than 5% of black African and coloured youth succeed at university, and more than half of all first-year entrants never graduate at all. The overriding academic factor to this poor performance is blamed on inadequate schooling and preparation from basic education. The reality is that this poor schooling system is not going

to improve in the near future and that adequately prepared grade twelve or school leavers that higher education requires is going to improve. The following summarizes performance in higher education:

- "25% of students graduate in regulation or minimum time;
- "35% of the total intake of students at all types of universities graduate within five years";
- "48% of students at contact (non correspondence) universities graduate within five years";
- "When allowance is made for students taking longer than five years to graduate or returning to the system after dropping out, it is estimated that some 55% of the intake will never graduate";
- "Access, success and completion rates continue to be racially skewed, with white completion rates being on average 50% higher than African rates"; and
- "The net result of the disparities in access and success is that under 5% of African and coloured youth are succeeding in any form of higher education."

The CHE suggests that "the level of dysfunction in primary and secondary schooling will not produce the numbers of well-prepared school leavers that higher education requires. A choice has to be made by the higher education sector: allowing the status quo to persist, or, undertaking to act on factors that are within its control to address the systemic conditions impeding student success." Two key themes are recommended to improve this dire state, namely "duration" and "flexibility" of the curriculum structure. Depending on the academic preparedness of the student, the formal time should either be extended by an additional year or alternatively allow those who are able, to complete in less than normal time. [2]

In comparison, universities in Belgium can experience drop-out rates of up to 50% on popular courses.[18] On the other hand, Oxford University has one of the lowest drop-out rates in the United Kingdom of only 1.6% compared with the national average of 8.6%. [19]. 60% of students at applied universities in Finland, obtain their degrees in 5 years compared to 25% at traditional universities. 70 % of Finnish students complete their studies but it takes more than 5 years.

2.6. Innovation Pedagogy as applied by Turku University in Finland

[20] suggest that education should evolve towards a system where working life and the educational institution are integrated. Furthermore, that students graduating from universities today would have to be innovative in order to adapt to the demands of future organizations. Graduate programmes should focus on the achievement of knowledge, skills and attitudes in order to facilitate the smoother transition of the graduate from university into the world of work.

The premise of Innovation Pedagogy is based on the fact that the graduate must have the technical understanding of his/her own filed. Over and above this, however, the graduate must also have the knowledge, skills and attitudes in order to produce something new. The ultimate aim is to transform the graduate into an expert who can add value to the field through innovative thinking and actions. The success of Innovation Pedagogy lies in the fostering of networking and collaboration skills. The authors propose that innovation is promoted when diverse individuals from different backgrounds and fields of study, collaborate to solve a problem. In addition to the acquisition of simple theoretical knowledge, practical know-how and the ability to identify and solve problems should be core to university programmes. Innovation Pedagogy establishes a solid and interactive whole between teaching, research & development and the world of work, within the universities of applied sciences in Finland. [20]

2.7. A means of addressing student throughput via the Higher Certificate in ICT at CPUT

[17] presents the context and design of a new Higher Certificate in ICT qualification focused on Information Technology Services Management (ITSM) to be offered collaboratively by the CPUT in 2014 and the Further Education and Training (FET) sectors in Cape Town, South Africa in 2015.

The HC in ICT (ITSM) comprises a progressive curriculum model for ICT programmes aimed at realising a differentiated curriculum focus towards the attainment of a broad set of "academic literacies". It specifically wishes to address the call from CHEC for universities to respond to the dire situation relating to poor student performance. The curriculum is intended to support basic and specialised competencies

and knowledge skills relevant to the ICT industry. It also engages students in an open and elective knowledge approach in order to cater for individual academic needs. The programme supports the personal and professional development of students through a suite of fundamental courses. The subjects uphold the pedagogical theories of moving from the 'known to the unknown'; 'whole to the part' and 'deconstruction'. For example, students do not learn to programme in the traditional way, but rather learn how to "hack" functional programmes and to make minor adjustments within these. In keeping with the advice of [13] the HC will also implement a service management simulator, which is a hands-on simulation game. Players (in this case the students) are given first-hand experience of running a fictional organization which is faced with business and IT challenges that need to be resolved. The game reinforces the position of service management as a fundamental basis for most organizations.

The qualification features a common first year of the diploma to provide students with an opportunity to engage and take informed decisions about various specialising options. Access and articulation between the HC and Diploma is a key design feature of the new and progressive curriculum model. The intention is to provide each student with a tablet PC on which course content will reside and which can be used to facilitate the teaching and learning situation. The design of the new HC curriculum considers the digitally engaged student and represents a rich curriculum offering exposing students to technology, and personal and professional development opportunities which represents "skills and skilfulness" training.

Articulation between the new HC and the new Diploma is catered for by 50% of the credits of the HC are transferable to the Diploma qualification. The curriculum model also offers a suite of industry-referenced certification opportunities that are mapped directly to the content of the learning programme which will no doubt improve the employability of students. This is in support of the views of [20] who promote the idea of bringing the educational system closer to the world of work. The aim of the programme is to deliver an increased number of suitably prepared students for enrolment to Diploma in ICT programmes at University of Technologies (UoT) which consequently will improve throughput rates and access opportunities, at the UoT.

3. Research Methodology

This explorative research project consisted of a literature analysis making use of databases like Emerald, EBSCOhost and Google Scholar. These were the preferred means of searching for accredited journal articles, conference papers, white papers, associated journals and other academic sources in order to produce a comprehensive overview of the relevant themes. Within this complex digitally engaged community at CPUT, two focus groups were also conducted. One focus group specifically focused on the lecturers consisting of younger lecturers who in all probability are digital natives and older lectures who are digital immigrants. Similarly a focus group was conducted of students consisting of digital natives and digital refugees. The methodology to the focus group analysis is from a critical interpretivist approach. The benefit of critical interpretivism is that it supports a relativistic view with no real absolutes so those in the focus groups would talk from their own perspectives. Critical interpretivism has less of a requirement for structuring an environment but more about exploring an experience. It does not support an objective thing but more a relativist view which is the aim of this study. The basis of the theoretical under pinning of this study would include basic didactic theories as well as theories around the digital native, immigrant and refugee.

3.1 Objectives

This study argues against the common, simplistic model of the digital native and digital immigrant models which proposes a bilateral model between the 'born into and not born into' the digital space of a South African university. The study explores the possibility of designing the educational experience that caters for best interests of the various categories of the digitally engaged student at a university of technology in South Africa. The focus of all of this is an attempt to address the poor student throughput rate at universities in South Africa.

3.2 Proposition

The study proposes and explores a model that is contextually informed by operating within the ITSM programme at CPUT which is an access institution operating within a developing country. This environment of engagement is far more complex consisting of educational disadvantage and social disadvantage that inform digital engagement in a very direct fashion. The aim of the study is to achieve a revised and extended model of the digital world within which CPUT students operate.

4. Discussion

Other than references to digital engagement and how this digital engagement has come about, it appears that the extant literature does not clearly define what the term "digitally engaged" is. This definition is important to this research study, as it would in all likelihood define the contemporary university entrant.

The study, therefore, believed that it was important to establish a succinct definition for this term not only for the basis of this project but for any other future related research.

The lexical definition for "Digital" is as follows:

- representing data as a series of numerical values [21]
- Computers are digital machines because they can only read information as on or off -- 1 or 0. This method of computation, also known as the binary system, may seem rather simplistic, but can be used to represent incredible amounts of data. [22]

The lexical definition for "Engage" is as follows:

- to involve (a person or his attention) intensely; engross; occupy [23]

Based on the afore-mentioned definitions, as well as the references to "digitally engaged" in the extant literature [3]-[7], this study therefore postulates that the term be defined as *"one who is engrossed with digital devices such as computers and related information communication technologies, due to the prolific and ubiquitous nature thereof".*

Based on the feedback from the two focus groups, there is an appreciation that there has been a generational shift in the way in which the youth socialize, which is the dominant culture that our students bring into the teaching and learning environment at CPUT.

Further analysis of the focus groups reveals that within the South African context this is informed by various aspects:

1. At the broad socio-political front it is that South Africa is now a democracy. Within the last 20 years of the democracy there has been much more freedoms afforded to people in terms of their self-conception. There are no shackles to externally implied governance structures and there is freedom of the conception of the self within this group of students.
2. This freedom of thinking and movement is further enhanced by the global phenomenon sponsored by the proliferation of the internet via the concept of the global village where users are engaged not only in their local environment but in a far broader virtual space.
3. There has been a surprising dominance of cellphone technology. The figures show that there is an increasing number of smartphone users. What this does indicate is that this is a changing world dynamic at a social and education level. There is a clear tension between what universities should and could be. This tension revolves around the requirements for comfortable engagements between students and staff.

There appears to be underperformance amongst specific groups between black and white, which in turn can be mapped to economic enablement of these communities. This would suggest that environmental conditions inform the ability of a student to engage in the digital world. There is a general preference for young people to operate in digital rather than real-world. The difficulty lies in the radically diverse student population at CPUT. Most students want to work in cyberspace but some have limited access to this digital world. The digitally enabled student's world at CPUT is in fact a multi-layered social, education and technology condition. It is not a simplistic argument between the digital native and the digital immigrant. There is in actual fact a racial implication. As the CHEC report suggests, black students are socially and educationally disadvantaged.

Figure 2. A multi-layered model of the digitally engaged student at university.

5. Conclusion

The study explores the possibility of designing the educational experience that caters for best interests of the various categories of the digitally engaged student by way of the HC in ITSM at CPUT in South Africa. The focus of all of this is an attempt to address the poor student throughput rate at universities in South Africa.

It is evident that tension arises from the digitally engaged students' satisfaction within the university environment because it is very contradictory to their life experience. This student's reality is about open connectivity and engagement compared to the conservatism in education.

There are certain salient aspects in terms of curriculum provision in environment, curriculum content, didactic approach and teaching methodology that can promote deeper engagement of students in the learning equation. This is achieved by interrogating the models that are currently proposed such as models of the digital divide and model of the digital world, digital natives and digital immigrants.

The study argues that a new model should recognize this diverse set up as many lecturers have come from the digital era as well as before the digital era. Many students have participated within the digital world and many of them, although born in the era, have been excluded from this world. This model acknowledges lecturers as digital natives where most commonly the model presents the lecturers as digital immigrants. There are lecturers who are digital natives, lecturers who are digital immigrants and there are students who are digital natives as well as students who can be regarded as digital refugees because of the environment that they come from.

The study suggests that a digital native is not necessarily someone who has been born in the digital era, but that there has to be an engagement aspect to that. Owning a smartphone does not necessarily make the student a digital native. This in its own presents an opportunity for further research.

The conclusions drawn are very narrow. A new HC in ITSM has been introduced at CPUT as a means of addressing the CHE's concerns and recommendations along with many authors' advice that universities need to be cognisant of the digitally enabled entrant. The study wants to derive benefits specifically about redirecting or confirming the position of the new ITSM qualification at CPUT. Some of the findings are generalizable and while this is a limited research engagement, the possibilities exist for this whole research study to be expanded.

The unanswered question from this present research project is, "Would disadvantaged students not perform worse in the digital world at university, as opposed to the traditional 'face-to-face' contact model?" Perhaps the socially, educationally and technologically disadvantaged student would want the "sage on the stage" as opposed to the "guide on the side". These students might benefit from 'face-to-face' because their life experience is of personal engagement and not technology engagement. This too presents further opportunity for research.

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