5. Research Philosophy and Methodology

When approaching a research study, "*your first question should not really be 'which methodology' but 'what do I need to know and why?"* [61, p.139-140].

5.1. Research Philosophy

Ontology is "*the study of the essence of phenomena and the nature of their existence*" [62] and it assumes that a certain reality exists [63].
We can assert "*a phenomenon has a truth to it* (a reality) *which is independent of what individuals perceive, and thus it can be proved through the use of quantitative methods*" [64, p.319].

This study assumes an ontological stance accepting a reality where motivation to learn technology can be measured and the influence of background factors can be explained. Thus, an epistemological realist position, as opposed to an idealist position, asserts that the *"social world external to individual cognition is a real world made up of hard, tangible and relatively immutable structures"* [65].

Epistemology is the basis of this pursuit of reality [66]. It is the assumptions made about knowledge and how it is obtained [67]. Epistemology is defined as *"the branch of philosophy concerned with the study of the criteria by which we determine what does and does not constitute warranted or valid knowledge"* [62]. Extant research of motivation to learn technology and the influence of background factors assumes an objective reality is "*waiting to be discovered and that this knowledge can be identified and communicated to others*" [68, p. 401]. Thus, this research adopts an objective realist epistemological perspective.

Axiology defines how a researcher explains, predicts, or interprets the world. A key description of the axiology of research philosophies and related data collection methods is outlined by [69].

Positivism *'seeks to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements'* [65]. Positivist research tests theory in quantitative terms to increase the predictive understanding of phenomena [70]. Positivist research is characterized by *'formal propositions, quantifiable measures of variables, hypothesis testing and the drawing of inferences about a phenomenon from a representative sample to a stated population'* [71]. Positivism contends the subject and method of inquiry can be objectively chosen, the observer is independent of observations, and fundamental laws explain the regularities in observable occurrences [63], [67]. Thus, positivism is the appropriate philosophical position for this study as the researcher:

- seeks to test theory in quantitative terms drawing inferences about a phenomenon from a representative sample,
- the researcher is independent of the observation,
- the research is structured using quantifiable measures with an emphasis on protocol and techniques,
- the deductive method follows a logical and rational process,
- and the research objective is observed and interpreted through a lens of extant theory and experience.

5.2. Research Methodology

Qualitative and quantitative research methods are founded on opposing paradigms and assumptions [62]. Qualitative research methods including action research, case studies, and ethnography were originally developed in the social sciences to enable researchers to study contextual social and cultural phenomena [62]. Qualitative research accentuates the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the contextual constraints shaping inquiry [72]. Qualitative research emphasizes the value-laden nature of inquiry, seeking answers to questions that explore how social experience is created and given meaning [72], [73].

Quantitative research originates from the natural sciences, and especially positivism, and are widely accepted in research [73]. Methods for conducting quantitative research include surveys. Quantitative research enables objective measurement and analysis. It is an appropriate method to generate knowledge of how background factors influence motivation to learn technology, acting as an impediment to the knowledge required to make an informed decision to enroll on a college degree programme in technology.

According to [61, 139-140], methods are "*chosen and selected because they will provide the data you need to produce a complete piece of research*", while also enabling you to "*design the tools (data collection instruments) to do the job"*. A review of the literature reveals that a number of different theoretical bases have been used to study student motivation factors and how they influence student enrolment in college technology programmes. These include the Theory of Reasoned Action (TRA) [4], the Theory of Planned Behavior (TPB) [74], Self-Determination Theory (SDT) [32], Social Cognitive Theory (SCT) [75], the Social Cognitive Career Theory (SCCT) [76], [77], the Reasoned Action Model (RAM) [4] and the Students' Continuing Motivation for Science Learning (SCMSL)[78]. Past quantitative studies have also created surveys using the Students' Motivation Towards Science Learning (SMTSL) [15], the Students' Adaptive Learning Engagement in

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Science (SALES) [79] and the Students' Continuing Motivation for Science Learning (SCMSL) [80].

However, over the past decade, the Science Motivation Questionnaire II (SMQ II) [14] has been proven to be the most reliable in this field. SMQ-II is widely used because of its simple language [3] and it is clear from the design, its validation, and reviews of its application that the SMQ II model is underpinned by SDT, SCT and SCCT. It is clear that the SMQ II motivational factors are very firmly grounded in the aforementioned theoretical models.

5.3. Research Objective and Questions

As previously stated, the formal study objective is '*to investigate how background and motivational factors influence student enrolment on a college technology programme'*. Two research questions were established to address this objective as follows:

Research Question 1

How do Background Factors Influence a Student's Motivation to Learn Technology?

In previous studies, a two-part (A and B) online procedure was adopted [3]. Typically, Part A asks students about factors such as socioeconomics, gender, age and academic background factors [3]. A "*two-part (A and B) online procedure"* was used by [14]. In Part A, [14] asked about individual differences (e.g. socioeconomics, gender, age, parent's income, etc.) and academic background (e.g. GPA), promoting candid responses by assuring confidentiality of student identities. In tech vs non-tech programme choice studies, first year Business Students are often the focus [8], [9], [43], [81]. First year business students were surveyed when trying to establish "*why are students not majoring in Information Systems*" [8]. This survey [8] was also used by [43] and [81]. Similarly, a mandatory first year IT class for both IS Majors and Non-IS Majors in a Business School was the subject of a survey to explore high school graduates' understanding of technology careers and the reasons they choose not to major in technology fields [9]. These studies [8], [9] provide some excellent questions measuring student background factors. Thus, Part A of this study asks questions related to background factors extracted from previous studies [8], [9], [14] outlined previously in Table 1 to answer Research Question 1 by measuring how background factors influence motivation to learn technology.

Research Question 2

How Does Motivation to Learn Technology Influence Student Enrolment in a College Technology Programme?

Although, SMQ-II was validated with science majors and non-science majors in core-curriculum college courses [14], a review of the literature reveals that both SMQ and SMQ-II have been adapted by many researchers in numerous STEM studies around the world [3], [14], [15], [16], [17], [18], [19], [20], [26], [27], [28], [29], [30], including in disciplines such as chemistry, biology, engineering, mathematics.

SMQ-II is recognized as being a robust and valid framework to examine student motivation to learn STEM across all disciplines [20]. Hence, the SMQ II framework [14] is adapted for this study to measure the motivational factors, replacing science with technology.

In Part B of previous studies students are typically asked to respond to the 25 items SMQ-II [14]. Similarly, Part B of this study adopts the same approach as outlined Figure 3. Five-point Likert scales are adopted to analyse responses.

5.4. Research Sampling and Deployment

Extant studies of motivation and background factors use comparative studies of students classified as tech specialists and non-tech specialists [8], [9], [14]. This study proposes purposive sampling with a group of first year technology students and a group of first year business students. All SMQ II based studies deploy quantitative survey instruments as testing theory in quantitative terms increases the predictive understanding of phenomena [81]. The author is proposing a quantitative method reflective of previous SMQ II studies [8], [9], [14]. This study will use an online survey hosted on Survey Monkey. The researcher considered it more appropriate in the survey design to ask questions related to the background factors first as these questions were more typical of what they would normally be asked in a student survey.

6. Conclusion

This paper explores how background and motivational factors influence student enrolment on a college technology programme. The paper adapts the SMQ II questionnaire, to study motivation to learn technology.

As per SMQ II and in the context of technology, Intrinsic Motivation refers to a student's interest in learning technology. Self-Determination refers to a student's self-regulation in learning technology. Self-Efficacy is used to describe students' confidence in performing well in technology learning. In the short term, students are driven by Grade Motivation to get into a college programme. By contrast, Career Motivation is a long-term goal and a key positive predictor of a student's career success. Thus, unlike Intrinsic Motivation, Self-Determination and Self-Efficacy which are internally generated, Career

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In order to better understand what you think and how you feel about Technology subjects, please respond to each of the following statements from the perspective of "when I am in Technology course..."					
Statements	**Never 0**	**Rarely 1**	**Sometimes 2**	**Often 3**	**Always 4**
Intrinsic Motivation					
Learning Technology is interesting					
I am curious about discoveries in Technology					
The Technology I learn is relevant to my life					
Learning Technology makes my life more meaningful					
I enjoy learning Technology					
Career Motivation					
Learning Technology will help me get a good job					
Understanding Technology will benefit me in my career					
Knowing Technology will give me a career advantage					
I will use Technology problem-solving skills in my career					
My career will involve Technology					
Self-Determination					
I study hard to learn Technology					
I prepare well for Technology tests and labs					
I put enough effort into learning Technology					
I spend a lot of time learning Technology					
I use strategies to learn Technology well					
Self-Efficacy					
I believe I can earn a grade of "A" in Technology					
I am confident I will do well on Technology tests					
I believe I can master Technology knowledge and skills					
I am sure I can understand Technology					
I am confident I will do well on Technology labs and projects					
Grade Motivation					
Scoring high on Technology tests and labs matters to me					
It is important that I get an "A" in Technology					
I think about the grade I will get in Technology					
Getting a good Technology grade is important to me					
I like to do better than other students on Technology tests					

Figure 3 : Science Motivation Questionnaire (SMQ) II for the Technology Subject [14]

Motivation and Grade Motivation are motivational constructs that are externally generated (extrinsic).

The paper proposes that motivation to learn technology is potentially influenced by background factors including gender, grades, parental education, socioeconomics, a relative working in the profession, familiarity with the profession, awareness of careers and salaries, prestige of the profession, job security, faculty, alumni, subjects, information on TV, radio, internet, and college websites, participation in related extra-curricular activities, open days, brochures, and job listings.

The paper concludes that the SMQ II is an established model by which to measure motivation to learn technology. The paper also concludes that the background factors established by [8], [9] and [14] are compatible with this study reflective of research methods established in literature.

Future research will focus on the deployment of this study.

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