The implementation of a Decentralised Clinical Training Programme (DCTP) for health sciences' education at a selected University of Technology (UoT) in KwaZulu-Natal, South Africa: protocol for the DUT-FHS DCTP project

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Abstract

Background: The Durban University of Technology's Faculty of Health Sciences in KwaZulu-Natal, South Africa, is embarking on a project to implement a Decentralised Clinical Training Programme (DCTP). This is being actioned in response to the growing demands of students requiring clinical service placements as part of work integrated learning. The project is also geared toward responding to existing gaps in current practices related to the implementation of DCTP which has mainly been through traditional higher education institutions. In South Africa, DCTP is yet to be implemented within the context of a university of Technology, moreover, it is also yet to be implemented within health science faculties that offer undergraduate health science programmes in mainstream biomedicine and alternative and complementary disciplines.

Objective: To design, pilot and establish an effective Decentralised Clinical Training Programme (DCTP) at the Durban University of Technology in KwaZulu-Natal, South Africa.

Methods: A multi-method design will be used to conduct the study, using various stakeholders such as academic staff, students, key informants from universities presently utilising successfully established DCTPs, academic support staff, staff working in human resources, finance, procurement and accounting, and experts in other disciplines such as engineering and information systems. A multi-phase approach will be adopted to gather data and participatory action research will guide the development of the appropriate interventions to pilot and successfully implement DCTP at the Durban University of Technology.

Results: The project is being implemented as part of the University's strategic objective of devising innovative curricula to improve mastery, skill sets and competence of health science graduates, in line with the vision of producing graduates who are adaptive, innovative, and responsive to the needs of the country and region.

Conclusions: It is envisioned that this project will facilitate collaboration between the UoT, traditional university, ministry of health and private sector while facilitating Interprofessional education for health science students. The unique approach of how the study will be executed represents the novelty of this study which will subsequently lead to improved graduate competencies.

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The implementation of a Decentralised Clinical Training Programme (DCTP) for health sciences' education at a selected University of Technology (UoT) in KwaZulu-Natal, South Africa: protocol for the DUT-FHS DCTP project

Abstract

Background: The Durban University of Technology's (DUT) Faculty of Health Sciences (FHS) in KwaZulu-Natal, South Africa, is embarking on a project to implement a Decentralised Clinical Training Programme (DCTP). The DUT-FHS DCTP project is being conducted in response to the growing demands of students requiring clinical service placements as part of work integrated learning. The project is also geared toward responding to existing gaps in current practices related to the implementation of DCTP which has mainly been through traditional universities providing training to medical, optometry, occupational therapy and physiotherapy students. In South Africa, DCTP is yet to be implemented within the context of a University of Technology (UoT), moreover, it is also yet to be implemented within health science faculties that offer undergraduate health science programmes in mainstream biomedicine and alternative and complementary disciplines.

Objective: To design, pilot and establish an effective DCTP at the DUT FHS in KwaZulu-Natal, South Africa.

Methods: Participatory action research comprising of various designs namely appreciative enquiry, qualitative case study design, phenomenography and a descriptive qualitative study design will be used to conduct the study. Data will be collected using individual interviews, focus group discussions, nominal group technique, consensus methodology and narrative enquiry. Participants of the study will include various stakeholders that are internal and external to DUT namely; academic staff, students, key informants from universities presently utilising successfully established DCTPs, academic support staff, staff working in human resources, finance, procurement and accounting, and experts in other disciplines such as engineering and information systems. Four undergraduate health science programs, namely; Radiography, Medical orthotics and prosthetics, clinical Technology and Emergency Medical Care and Rescue are part of the pilot phase of the project. Findings from the pilot phase of the project will be used to inform scale-up in the other undergraduate programs in the DUT FHS.

Results: The project is being implemented as part of the University's strategic objective of devising innovative curricula and pedagogical practices to improve mastery, skill sets and competence of health science graduates, in line with the vision of producing graduates who are adaptive, innovative, and responsive to the needs of the country and region. Piloting, implementation and scale-up of the project remains subject to change due contextual factors related to implementation of DCTP within a UoT.

Conclusion: It is envisioned that this project will facilitate collaboration between the UoT, traditional university, ministry of health and private sector for clinical placement of undergraduate health science students in health establishments that are away from the university thereby exposing them to real-life experiences related to healthcare. This will facilitate authentic learning experiences that will contribute to improved competencies of graduates in relation to the health needs of society and the multiple realities of the South African health system.

Key Words: Decentralized Clinical Training Programs, curriculum, clinical education, Health Sciences education, University of Technology, Pedagogy, Transformative education, Teaching, Higher education, South Africa

Introduction

Decentralised Clinical Training Programmes (DCTPs) refer to learning platforms adopted in health science education which facilitate theoretical and clinical learning in remote decentralised health facilities that are often some distance away from traditional academic teaching health establishments [1]. Traditional DCTPs have predominantly been implemented with medical students through the use of community-based primary health care (PHC) facilities, community health centres and district

hospitals [2-4]. Facilitating successful implementation of DCTP for health science education requires a geographical shift in terms of clinical placement facilities used for work integrated learning of students. Moreover, a curriculum and pedagogical shift from the traditional teaching approach is also necessary to maximise the benefits of this strategy [5]. Initial implementation of DCTP in low- to middle-income countries like South Africa, predominantly involves a geographical shift, however developments in recent years have resulted in universities adopting both a geographical and pedagogical shift due to the many potential benefits of such a change. In facilitating the pedagogical shift, higher education institutions implementing DCTP have realigned health science curricula to place a strong emphasis on the primary health care approach [6, 7]. This thus serves to align health science education practices with the present evolving nexus of higher education and the changing landscape of health service delivery necessitated by developments in global and regional health policy [8, 9].

DCTPs are considered to be transformative approaches to health science education adopted by higher education institutions in response to the growing demand for clinical service placement owing to the increasing number of students being registered for medical and health disciplines [10, 11]. Research further suggests that the benefits of DCTPs include fostering a sense of social accountability through clinical placement of students in community-based settings and rural health facilities [12]. This process also exposes undergraduate students to the multiple realities of the health systems and the varying social determinants of health. Training students through DCTP produces successful graduates who are more fit-for-purpose in terms of community needs and the regional landscape of health service delivery [13].

Research conducted on existing implementation models of DCTPs, particularly in South Africa, has suggested that this approach to health science education has predominantly been implemented in traditional universities. In recent years, students taught through DCTP have been expanded from medicine to include undergraduate students in the multidisciplinary biomedical system of health care which encompasses nursing, occupational therapy, physiotherapy and optometry, to name but a few. Anecdotal evidence on students' experiences of and perspectives on DCTP indicates overall positive learning experiences reported by students who are taught using this approach [14, 15]. Moreover, students have also perceived education through DCTP as strengthening their responsiveness, preparedness and relevance as graduates. Similar studies on educators' experiences of DCTP have also reported positive perspectives concerning the value of teaching and learning using this platform [16]. Additional studies on perspectives on DCTP have also been elicited from other stakeholders such as service providers and public health service managers. A study to explore public health sector optometrists' perspectives regarding DCTP in KwaZulu-Natal, South Africa, revealed that, while DCTP was generally supported by the optometrists, challenges were, however, reported in relation to the resources required for comprehensive optometric assessments. Despite the challenges cited, the study highlighted DCTP as an important strategy for improving eye care service capacity in KwaZulu-Natal, South Africa [17].

In South Africa, health services are rendered through a re-engineered primary health care approach using the district health system as a vehicle to drive primary health care services [18, 19]. Moreover, the newly adopted National Health Insurance (NHI) bill serves to further propel the agenda of universal health coverage in line with the sustainable development goals. The current National Health Insurance bill makes provision for public and private health collaborations to ensure optimum service delivery for all, irrespective of socio-economic status. This change in health policy reform thus requires health care workers who are adequately prepared in terms of the length and breadth of the health system. The nature of teaching and learning using DCTP is thus instrumental in facilitating realisation of this prepared state using health science education [20]. Moreover, the globalisation of health care calls for the adoption of such innovative approaches in curriculum and pedagogy, so that graduates are equipped to deal with the multitude of health demands arising from policy and health practice changes.

The benefits of DCTP as an adaptive methodology to teaching and learning within health sciences cannot be over-emphasised. There is thus increasing advocacy for the adoption of DCTP in health science education, moreover, there is growing evidence concerning the models to facilitate implementation of DCTP, particularly within the South African higher education institutions offering medical and related health qualifications that form part of mainstream biomedicine. Despite growing evidence in support for DCTP by various categories of stakeholders, namely students, health educationists and global policy development experts, gaps persist in the practice of implementing DCTP in higher education institutions in South Africa. Moreover, the full complement of health science disciplines has yet to implement this teaching approach at higher education institutions.

In South Africa, DCTP implementation is presently limited to certain traditional universities who have implemented DCTP in specified health science disciplines such as medicine, occupational therapy, optometry and physiotherapy [12, 21]. Universities of Technology (UoT's) are yet to implement DCTP within health science disciplines offered within such institutions. Principally, UoT's are a new classification of technikons that previously offered diploma qualifications. Harnessing technological advancement and partnerships with society and industry to solve community problems [22]. UoT's differ from traditional universities in that their primary focus is vocational and technical whilst responding to a social responsibility of promoting access, redress and equity. UoT's remain driven by market forces and entrepreneurialism whilst traditional universities purpose is motivated by ideation and liberalism [23]. In the context of implementing DCTP within a UoT, which will be a first in South African higher education history, the key areas of differences will be in the overarching objective of producing graduates that are responsive to the health needs of communities and society in the South African region. This will be facilitated through the learning that will allow health science students to be exposed to diversity real-life health related experiences and challenges in their natural context. Another key difference will be the exposure to diverse health conditions and scenarios during the clinical placement that is not limited to a specific type of health setting. In this regard, students will be placed in health facilities that encompass the broad range of spheres within the national health system. Students' clinical exposure will encompass to private and public health facilities across all levels commencing from community based health care to regional or tertiary level health services. The envisaged partnership between the UoT, traditional universities, private health sector and public health sector will be facilitated through strategic high level engagement with relevant authorities and will be operationalized through a documented memorandum of understanding between the institutions.

Taking cognisance of this gap in practice, and the reported benefits of DCTP in terms of health science graduates' competencies and preparedness for the world of work, the Durban University of Technology (DUT) seeks to design, pilot and evaluate a model to facilitate the successful establishment of a DCTP within the dimensions of contextual factors influencing teaching and learning at a UoT. In their position paper on the implementation of DCTP at a UoT, the institution seeks to use a pilot of selected health disciplines to inform the design, piloting, and establishment of DCTP, which will eventually be rolled out to the Faculty of Health Sciences (FHS), based on the outcomes of the pilot phase of this project [24]. While the implementation of DCTP within the UoT will be a first in South African higher education practices of implementing DCTP, many challenges are anticipated in relation to piloting and implementation. These challenges relate to the availability of resources such as financial capital, human resources and physical infrastructure. Other anticipated challenges relate to student and staff perceptions and existing challenges that are associated with clinical practice in remote areas, particularly those that are under resourced. It is for this reason that the UoT plans to establish collaborations with existing universities that are implementing DCTP and engage with various categories of stakeholders' prior piloting and implementation and scale-up of the project. An iterative process of data generation facilitated by multi-stakeholder engagement will be carried out throughout all phases of the project as part of monitoring and evaluation to ensure success of the project at all stages.

The DUT presently consists of six faculties which include the FHS. The FHS offers undergraduate and postgraduate qualifications in health sciences that lead to the professional development of graduates as health professionals in different fields of health sciences. The faculty presently has the following academic departments: Biomedical and Clinical Technology, Community Health Studies, Chiropractic, Dental Sciences, Emergency Medical Care and Rescue, Medical Orthotics and Prosthetics, Nursing, Radiography and Somatology. The faculty offers a range of courses within these departments which lead to the development of health professionals for mainstream and alternative health care. For the purpose of design and testing, the undergraduate academic departments that will form part of the pilot are Radiography, Emergency Medical Care and Rescue, Clinical Technology and Medical Orthotics and Prosthetics. While the envisaged methodology is discussed further in this paper, the execution of the project remains relatively subject to change, given the diversity of the courses included in the pilot and the nature of teaching and learning within a University of Technology. The project will nonetheless be valuable, as the institution's FHS will be the first UoT to pilot and implement DCTP within the context of health science education which encompasses biomedical and alternative health care disciplines. The findings of the proposed project have implications for research, education and practice related to DCTP from both a broad higher education perspective, and within contextual factors related to Universities of Technology.

Aim

To design, pilot, evaluate and establish an effective Decentralised Clinical Training Programme (DCTP) at a selected University of Technology (UoT) in KwaZulu-Natal, South Africa.

Objectives

1. To critically analyse the current practice of implementing a DCTP at selected higher education institutions in South Africa.
2. To explore stakeholders' Perceptions', regarding the range of factors to be considered to design, pilot and establish a successful a DCTP at a selected UoT in KwaZulu-Natal, South Africa.
3. To design, pilot and establish systems to aid the implementation of a DCTP at a selected UoT in KwaZulu-Natal, South Africa.
4. To propose a relevant model for the successful establishment of a DCTP at a selected UoT in KwaZulu-Natal, South Africa.

Research questions

In relation to objective 1:

1.1. What is the current practice of implementing DCTP at selected higher education institutions in South Africa?

In relation to objective 2:

2.1. What are stakeholders' perceptions regarding the range of factors to be considered in designing, piloting, evaluating and establishing a successful DCTP at a selected UoT in KwaZulu-Natal, South Africa?

2.2. What are stakeholders' perceptions regarding the infrastructure, pedagogical, curriculum, human resource and implementation factors related to the successful establishment of DCTP at a selected UoT in KwaZulu-Natal, South Africa?

In relation to objective 3:

3.1. What approach or model can be designed or adopted to pilot, evaluate, and establish a successful DCTP at a selected UoT in KwaZulu-Natal, South Africa?

3.2. What are the range of information technology systems required to be designed, piloted, and established to support successful testing, evaluation, and establishment of a DCTP at a selected UoT in KwaZulu-Natal, South Africa?

3.3. What are the range of Human Resource and Financial systems required to be designed, piloted, and established to support the successful testing, evaluation, and establishment of a DCTP at a selected UoT in KwaZulu-Natal, South Africa?
3.4. What are the range of infrastructure systems which need to be designed, piloted and established to support successful testing, evaluation and establishment of DCTP at a selected UoT in KwaZulu-Natal, South Africa?
3.5. What are the curriculum and pedagogical systems required to be designed, piloted, and established to support the successful testing, evaluation, and establishment of a DCTP at a selected UoT in KwaZulu-Natal, South Africa?
3.6. What are the range of stakeholders' experiences, understanding and perceptions regarding the design, testing and establishment of a DCTP at a selected UoT in KwaZulu-Natal, South Africa?

In relation to objective 4

4.1. What intervention model may be proposed to establish a successful DCTP at a selected UoT in KwaZulu-Natal, South Africa?

Context of the study

The study is located within the KwaZulu-Natal province of South Africa. The Durban University of Technology forms part of the primary data collection sites since this where the DCTP will be designed, piloted and evaluated for successful establishment. This design process will be informed by a multi-stakeholder engagement process which includes consultation with individuals internal and external to the UoT. Since the University of KwaZulu-Natal has already successfully established several decentralised clinical platforms in KwaZulu-Natal, the university and personnel affiliated to these platforms will be key informants in this project. The Durban University of Technology thus plans to formalise a partnership with the University of KwaZulu-Natal for the purpose of executing this project.

Theoretical and conceptual underpinnings

Theories of health science education practice and concepts related to DCTP implementation as identified by the literature will be refined and operationalised to guide the present study. Moreover, existing policies related to curriculum and pedagogy, as governed by the UoT strategic objectives, guidelines and related polices, will form part of the conceptual map to guide the study. The conceptual framework and theories to be used are in the process of being refined and have been used to develop research objectives and questions. These will subsequently guide the enquiry process of this study.

METHODS

A multi-method design encompassing quantitative and qualitative research approaches, using different research designs underpinned by participatory action research, will be used to conduct the study. This design will allow for the use of multiple forms of quantitative and qualitative approaches to collect data from various sources through different forms of data collection (surveys, individual in-depth interviews, focus group discussions, consensus-building sessions, implementation science processes). The multi-method design will be underpinned by participatory action research, since the broad aim of the research relates to intervention design, testing and evaluation. The study will be executed in various phases namely; (1) Situational analysis, (2) Empirical phase (piloting and preliminary testing), (3) Evaluation and refining, (4) Establishment and continuous monitoring; as underpinned by the aforementioned design. The phases of execution for the proposed project are discussed as follows:

Phase1: Situational analysis

Objective: The purpose of the enquiry phase is to develop a conceptual framework and understanding to guide the process of developing, piloting, evaluating and establishing an effective DCTP at a selected University of Technology in KwaZulu-Natal, South Africa. The conceptual model will then inform the development of a logic model with a set of activities to operationalise key

elements in the conceptual framework that is focused upon the broader aim of piloting and implementing the DCTP. The enquiry phase will also comprise high level engagement with key informants so as to determine the primary factors for consideration when piloting, implementing, and evaluating the DCTP at the selected UoT. The following methods and related approaches will thus form part of phase 1:

Step1: Desktop review – This will encompass the review of existing literature and research on the models and reported experiences of implementing DCTPs in higher education, with the review of best practices, international perspectives, and evidence from low- to middle-income countries. The review will be conducted using systematic scoping, narrative review and integrative methods. The desktop review will also include a review of relevant policies and guidelines related to teaching and learning, higher education practices and related phenomena.

Step2: Stakeholder engagement and benchmarking – This step will be underpinned by participatory action research design, wherein various categories of key informants will be consulted to conceptualise the strategy of designing, piloting and implementing DCTP. In this step, engagement sessions will be facilitated through workshop sessions to obtain buy-in from executive level stakeholders, with training and evaluation embedded within each session. A combination of focus group discussions and individual in-depth interviews will be used to collect data during the stakeholder engagement sessions. Based on the emerging findings from individual interviews and focus group discussions, consensus methodology will be used to triangulate the data that will respond to key questions of the research project and inform emerging phases of the project. For this purpose, a combination of qualitative research designs will be used namely, descriptive qualitative design, case study design and appreciative inquiry as part of the participatory action research design. The stakeholder engagement workshop sessions will also be designed using appreciative inquiry to stimulate discussion around key factors to be considered in the design, pilot, implementation, and evaluation of DCTP, with emphasis on the context of the selected UoT. This stakeholder engagement will thus comprise: (1) University academic executive management with representation from health sciences and envisioned collaborating faculties, such as engineering, accounting and information systems, (2) Key informants from Universities with existing DCTPs, namely the University of KwaZulu-Natal and the University of Stellenbosch, (3) External stakeholders from public and private sector health organisations with experiences of hosting DCTPs in their health establishments, (4) Senior members of the student representative council for the Faculty of Health Sciences and (5) Heads of academic departments identified for the pilot phase of DCTP. Collectively, the stakeholders will provide valuable insights on the methods and approaches that will inform the piloting and establishment of DCTP within the context of a UoT, particularly since such an initiative is novel within the context of the South African higher education sector. Evidence suggest that the implementing DCTP requires consideration of numerous factors among them being curriculum and pedagogy, various forms of resources including human, infrastructure and financial resources, all of which have an impact of the sustainability of this transformative learning approach [1]. In the context of the DUT FHS the existing practices and related sustainability elements are a product of collaborative engagement with various stakeholders from both the academic and non-academic sector that ensure availability, scalability and maintenance of necessary faculty and university systems and processes that are required for teaching and learning. The combination of stakeholders is thus crucial for providing foundational insights on practices and establishment of processes that will successfully piloting and establishing DCTP beyond pilot and initial implementation at the DUT FHS.

Step3: Act and observe – Following the stakeholder engagement workshops, a situational analysis of the university, in relation to existing resources available, infrastructure, curriculum, teaching and learning and pedagogical needs will be conducted, encompassing a multi-disciplinary and multi-stakeholder involvement, while a narrative reporting process will be used to document findings, possible avenues of opportunity, recommendations and identification of possible communities,

organisations and health establishments which will form part of the sites to provide the decentralised clinical training. The stakeholders identified in step 2 will also form part of this phase, which will extend to the clinical placement facilities that will be identified as potential sites for the DCTP at the selected UoT.

Step4: Reflection – This step will entail a consolidation of data obtained from steps one to three in order to inform the development of a conceptual framework to guide the development, pilot, evaluation, and establishment of the DCTP. In this step, the data generated for consolidation will be triangulated using a combination of theoretical models related to higher education pedagogy, teaching and learning practice frameworks, quality norms and standards related to teaching, learning and assessment practices, and theories of programme planning and implementation in health science education.

Step 5: Revised plan – Based on the conceptual framework and policy documents emanating from step 4, strategic and operational systems related to the pilot phase of the DCTP will be formulated, with guidelines and operating procedures and standards to govern teaching and learning practices, finance, procurement and related operational activities essential for the existence of the pilot phase of the project.

Phase 2: Empirical phase

This phase will encompass a research and implementation science process which will include the collection of primary data using multiple research designs and approaches to data collection. The multiple research designs will include qualitative case study design, descriptive qualitative design, phenomenography, narrative enquiry and appreciative inquiry. The combination of individual interviews and focus group discussions will be used to collect data from participants through self-developed semi-structured interview guides and open ended questions. The design and implementation of interventions, systems and processes for the piloting and implementation of DCTP within the DUT FHS, will be an integral part of this phase. Through ongoing consultation with relevant participants and stakeholders' design, development and establishment the necessary infrastructure, human resources, pedagogical, financial and related sustainability systems will be facilitated. Technological innovation for teaching and learning through biomedical engineering systems, telemedicine and e-health will also form part of this phase and outcomes of this will be evaluated through the exploration of students and stakeholders' experiences of using such technological applications in the context of teaching and learning within the DCTP at the DUT.

Phase 3: Evaluation and refining

This phase encompasses an implementation science research approach underpinned by action research and other research designs to facilitate testing and evaluation of the DCTP within selected pilot academic programmes, namely Clinical Technology, Radiography and Emergency Medical Care at the selected UoT in KwaZulu-Natal, South Africa. This phase will also entail primary data collection from stakeholders in relation to the outcomes of piloting the DCTP at the selected UoT, and assessment of established systems and processes to support the pilot phase of the DCTP as part of the testing and evaluation phase of the project. A combination of evaluation frameworks will be triangulated to guide the evaluation process using empirical research and implementation science approaches. These frameworks include models on continuous quality improvement in line with participatory action research and other impact evaluation frameworks.

3.1. Evaluation framework

The RE-AIM framework will be used to guide evaluation of the pilot phase of the DCTP and its establishment at the selected UoT for primary data collection (See figure1). The acronym, which represents the domains of ***Reach, Efficacy, Adoption, Implementation, and Maintenance,*** has been used in various contexts, ranging from clinical interventions to community programmes, corporate settings, and in multiple project phases from planning through to implementation and summative evaluations [25]. The RE-AIM planning and evaluation framework is a tool for implementation and

can be applied to assist in estimating the public impact of programmes and interventions. It thus provides a structure to systematically evaluate programme impact. It entails an explicit focus on issues relating to the design, dissemination, and implementation process of programmes that can facilitate or impede success in achieving broad and equitable population-based impact. The framework also allows the use of both quantitative and qualitative methods to understand why and how results were obtained on different RE-AIM dimensions. Thus, it will allow for the triangulation of different data sources and methods, which will both enhance the validity of the evaluation, and allow for a better description of the generative mechanisms of the programme. Multiple stakeholders will be included in data gathering, drawing from qualitative and quantitative methods, using primary and secondary data. Accordingly, the evaluation will be conducted using non-sequential mixed methods, with equal weight attributed to the respective quantitative and qualitative components.

3.2. Application of the RE-AIM evaluation framework

The RE-AIM evaluation framework was selected to guide the evaluation process as it allows for comprehensive data gathering using participatory mixed methods approaches to provide information of project outcomes. The envisaged multi-pronged approaches to facilitating piloting, implementation and long terms sustainability of DCTP at the DUT FHS will be placed within this framework. The elements of the RE-AIM framework namely: (1) REACH, (2) Effectiveness, (3) Adoption, (4) Implementation and (5) Maintenance will be used as informed by their original theoretical definitions (see figure1) to guide the formulation of questions that will form part of quantitative and qualitative data collection tools that will be use to generate routine data on the outcomes of DCTP based on the overarching objectives of this research project. The data generated from the evaluation process will inform interventions to ensure continuous quality improvement of the project so as to ensure sustainability of the project. The precise questions that will be formulated as part of this process are yet to be developed however they relate to outcomes of the project in terms of original intent, consistency and standards of implementation, effectiveness and long-term sustainability as aligned to the research objectives and elements of the framework.

Phase 4: Establishment and continuous monitoring

This phase will encompass implementation of DCTP throughout all departments in the Faculty of Health Sciences, as informed by the collective results of phases one to three of the study. Primary data will be collected empirically from all identified stakeholders who would have been participants since phase one of the study. Quantitative and qualitative approaches will be used to gather data during this process on the outcomes of implementing DCTP as informed by various lived experiences, perceptions, and understanding of the phenomenon. Observational data will also be collected by conducting continuous assessments on the implementation processes in relation to specified standards, as guided by the conceptual and theoretical underpinnings informing the study. The quantitative and qualitative data will be triangulated by other sources of routine data as informed by the university and faculty standards and guidelines. This will subsequently inform practices related to continuous quality improvement and monitoring and evaluation. Additionally, routine data will also be collected on academic success indicators such as pass rates, graduation rates and throughput rate. Consultative engagements will be facilitated with various industry personnel to determine the skills and graduate attributes of students that are trained in the through the DUT-FHS DCTP project, this will be done as part of the pilot, initial implementation phase and continuous monitoring during the eventual scale-up and sustainability of the project.

DATA ANALYSIS

Qualitative data

Data analysis involves a systematic application of a process or processes of managing and organising

qualitative data, which brings order, structure and meaning to the mass of data collected. Qualitative data analysis is an active process whereby the researcher must carefully and deliberately scrutinise data that s/he has gathered, often reading data repeatedly until meaning, or deeper understanding of data, is achieved [26]. Analysis of qualitative data involves categorising data into segments, with symbols or abbreviations used to classify words or phrases. This is known as coding [27, 28] . In qualitative research studies, data analysis is done concurrently with data collection and is conducted throughout the study [27]. Qualitative analysis techniques make use of words rather than numbers as a basis, and this strategy is contextual in nature. Analytical reasoning skills are required when conducting content analysis. In this study, data will be analysed using Tesch's method of data analysis for qualitative research [28] . Tesch's steps that will be followed comprise: • Reading through all transcripts carefully to get a sense of what was contained in them. • Picking one transcript randomly. Going through it and asking oneself "what is it about?" Thinking about the underlying meaning of the interview • Jotting down thoughts in the margin. • Repeating this process with all the transcripts and making a list of all topics. Clustering similar topics together into columns which consist of themes and sub-themes. • Taking this list of topics and going back to the transcripts. Abbreviating the topics as codes next to the appropriate segments of the text and observing the organisation of data to check if new codes emerge.

Quantitative data

The data collected will be evaluated and analysed using descriptive and inferential statistical methods in consultation with a statistician, using SPSS version 26.0. Descriptive statistical analysis for categorical data and continuous data will be presented as frequencies, percentages, and range. The descriptive statistics will be summarised in graphs and charts.

All electronic data will be stored in password protected files, while hard copy data will be stored in a locked cupboard that the researcher has access to. Once the mandatory five-year period after the study has passed, all electronic files will be deleted and all hardcopy data will be shredded.

RELIABILITY AND VALIDITY

A pilot study will be conducted to test the feasibility of the survey questionnaire that will be developed as part of the quantitative data collection tools of the study. A statistician will be consulted to calculate the estimated study sample size for the quantitative data to be collected during the study, and logistic regression analysis will be used to ensure the reliability of quantitative data.

TRUSTWORTHINESS

Trustworthiness of the study will be operationalised through several methods to ensure rigour and robustness of the qualitative data to be collected. In keeping with a social constructivist paradigm, the researcher will strive for the triangulation of data to ensure that multiple perspectives are captured. The researcher will accomplish data source triangulation by gathering data from various categories of stakeholders using multiple qualitative designs and data collection processes. Data method triangulation will be achieved by using different methods to collect data, namely focus groups, semi-structured interviews and document review. Additional strategies include peer-debriefing and true member checking. To operationalise peer-debriefing, the researcher will review the codes and themes with the research co-investigators which will allow for reflexivity and ensure that all the data are included. True-member checking will entail summarising key points at the end of the focus groups/ interviews and asking participants to verify the accuracy of the data. These strategies will ensure credibility of the data. Dependability of the data will be achieved using an audit trail. The researcher will keep field notes from the participant interviews.

ETHICAL CONSIDERATIONS

The basic principles of the Declaration of Helsinki will be adhered to throughout this research process. These include basic principles of respect, the right to self-determination and the right to make informed decisions. All participants will sign an informed consent after reading about the

procedure of the study, indicating a willingness to participate in the study. The consent form highlights the benefits and risks of the study and requests permission to use audio-recording in cases where interviews will be used to collect data. The right to withdraw at any stage of the research process will also be emphasised to participants. Beneficence will be ensured by supporting the well-being of participants during the study process. Research will be conducted by suitably trained persons using an approved protocol which will receive full approval from the research ethics' committee. The study protocol will be reviewed for ethical clearance by the DUT institutional research ethics' committee. Gatekeeper permission will be sought to access participants from the selected UoT and external universities identified for data collection. Moreover, gatekeeper permission will also be obtained from the KZN Department of Health, respective health facilities and private sector health establishments which will be identified for data collection. Informed consent from individual participants will also be obtained prior to data collection.

Results

The study has presently commenced with the situational analysis consisting of engagement with external stakeholders implementing DCTP in KwaZulu-Natal and other regions of South Africa. The preliminary results of the situational analysis are anticipated to be used for publication in 2024. Ethical approval to conduct the study is facilitated by the Durban University of Technology's Institutional Research Ethics' committee and the relevant gatekeeper permission and informed consent is sought from institutions of key informants and participants of the study. The project is also to be piloted and implemented in collaboration with the University of KwaZulu-Natal (UKZN), a traditional university that has successfully implemented DCTP and will provide valuable insights in terms of lessons and approaches that can be adopted by the DUT FHS. It is also envisaged that undergraduate students within the DUT FHS from the four selected pilot departments will be placed in remote clinical facilities where the UKZN also place their students so as to facilitate Interprofessional education. Moreover, students from the various departments at the DUT FHS will also be placed collectively in instances where they do not share facilities with students from universities that are already implementing DCTP.

Discussion

The DUT's FHS functions with operational guidance underpinned by the institution's ENVISION 2030 strategy, and is also guided by the evolving landscape of higher education which is governed by local and international guidelines and best practices. The envisaged implementation of DCTP at the UoT is in response to the existing gaps in implementation of DCTP at higher education institutions in South Africa. These gaps relate to the type of undergraduate health science students that are presently predominately trained through DCTP, type of higher education institutions and clinical placement facilities that are used for the practice of DCTP. Research suggests that training through DCTP has largely been through traditional universities that offer mainstream biomedical health science disciplines in the field of medicine, nursing, optometry, occupational therapy and physio therapy. Health science disciplines such as medical orthotics and prosthetics, emergency medical care and rescue, radiography, dentistry, dietetics and complementary health science disciplines remain neglected.

Literature also reveals that clinical placement facilities have largely been from the public health sector with the use of community based centres, primary healthcare facilities and district hospitals as decentralized sites for learning. This subsequently represents a gap in practice in that the South African health system comprises of public and private health care. In the context of the present implementation models of DCTP, the use of remote private health facilities has not been reported in practice. The aforementioned gaps in existing practices of DCTP and the nature of the UoT in terms of teaching, learning and assessment practices that differ from a traditional university, prompted this study. Moreover, the growing demand for clinical service placement, due to the increasing admissions of undergraduate health science students within the faculty, also necessitates the addition of new clinical placement facilities due to a growing demand for such services in urban areas.

Through the DUT-FHS DCTP project, the growing demand for clinical service placement will be addressed through partnership with the ministry of health and private sector to increase the number of accredited health establishments that will allow for clinical service placement for students as part of their work integrated learning and teaching practice of DCTP, in this regard an increasing number of health distant health facilities will be sought through collaboration and cooperation will relevant authorities of these health establishments.

The reported benefits of DCTP relate to the training outcomes of graduates concerning the mastery and skills required for the job as a health professional. In this regard, it is hoped that graduates within the UoT's FHS will be better prepared for the current demands of the health system by virtue of the benefits of DCTP in relation to learning experiences. This subsequently aligns with the university's strategic objectives of producing creative, innovative and adaptive graduates who will be able to make changes that lead to positive outcomes in the country and region. The DUT's FHS remains anchored to its ENVISION 2030 strategy which is founded upon four strategic perspectives, namely: (1) stewardship, (2) systems and processes, (3) sustainability and (4) society with the overarching vision of creativity, innovation, entrepreneurship and production of adaptive graduates as outline in the university's statement of intent [29]. Since DCTP will facilitate authentic learning experiences through exposure to the real world life experiences in varying clinical placement facilities, it will allow for the development of innovative and adaptive graduates as outlined in the university and faculty's strategic objectives.

The changing landscape of service delivery brought about by policy changes related to the globalisation of health and the adoption of the principles of universal health coverage, also require health science graduates who are responsive to local needs within a global view of health. Since DCTP creates learning opportunities that expose students to multiple realities of the health system, the implementation of DCTP will thus contribute to producing more fit-for-purpose graduates who are able to better respond to the diverse health needs of communities based on varying geographic and socio-cultural contexts. This will be realised through clinical placement of students in diverse healthcare facilities that are located away from the university, thereby allowing for exposure to real-life experiences that are form part of the learning process. This thus contributes to the knowledge and skills set required for health graduates to provide optimal healthcare services based on the needs of communities. DCTP thus contributes to improved competencies and skill set of graduates in this manner. The exposure to different health establishments that are distant from the university, encompassing private and public health facilities will create exposure to the differences in health systems functioning and establishment and will enhance learning by virtue of the inherent diversity thus contributing to adaptive graduates who are more informed about the varying complexities of the South African national health system that is underpinned by the principles of universal health coverage.

Another major gap identified in the current practice of DCTP is the lack of integration between private and public sector health facilities during the training of students. The new National Health Insurance Policy will require graduates who will be able to adapt easily to the demands of both private and public sectors, since an integral part of the policy involves partnership with the private sector to facilitate optimum standards of health service delivery for all. The design, piloting, evaluation, and establishment of DCTP at the Durban University of Technology will thus include the element of private and public sector collaboration. The outcomes of this will be improved skill sets for health science graduates and they will be exposed to dynamics of the private and public health sector since clinical placement will done in health establishments in the private sector and public health sector. This may contribute to more well-rounded health professional in terms of operational health systems functioning of the two sectors. Moreover, students will be exposed to more diverse clinical health situations which will form part of their learning process.

Partnership with the KwaZulu-Natal Department of Health, the private sector, and the University of KwaZulu-Natal are foundational elements for the successful implementation of this project. The

collaboration between these entities is novel, due to the distinct differences in organisational structure and strategic mandate. The differences in primary purpose, policy orientation and operations of the DUT, UKZN, private health sector and public health sector is one of the many key factors that are anticipated to pose as challenges to the successful scale up and establishment of DCTP at the DUT FHS. These organisational differences may hinder the teaching practices that may be adopted to facilitate learning for undergraduate health science student among the many interruptions that may occur. Ongoing engagement and communication with all stakeholders at various levels within the four establishments is planned as one to the key strategies to mitigating possible challenges that may arise. The development of an institutional DCTP steering committee with representatives from all four establishments is also planned as an approach to mitigating anticipated challenges. The formalisation of collaboration with DUT, UKZN, the private sector and public sector will also be formalized through a documented, joint memorandum of agreement which will be signed by all relevant parties for legal and ethical purposes as well as part of mitigating the reported anticipated challenges. Despite the distinct differences and anticipated challenges of such a partnership, this collaboration will generate new insights on how institutions with historically diverse philosophies can cooperate with each other for the purpose of transforming health science education, fostering Interprofessional and collaborative practice, and improving health service delivery.

Presently, no formal collaboration exists between the UoT, the UKZN, the Department of Health and the private sector, however, due to the availability of existing data on the implementation of a DCTP at UKZN, the possibility of a successful rollout with a UoT is a notion that is not far-fetched. Formal guidelines to operationalise the processes and guide the execution of the project are currently unavailable and are thus necessary in light of the unique dimensions within which the project will be implemented. The following recommendations thus provide foundational principles for operationalizing the DCTP at DUT and will guide project execution:

- Ongoing multi-level stakeholder engagement and collaboration – This will allow generation of comprehensive primary data to inform findings related to the research process which will ultimately be holistically integrated into data that will inform operationalization of the DCTP during pilot, implementation and eventual scale-up.
- Resource allocation – In order for piloting, implementation and scalability of the project to be achieved, provision of financial, human and other types of physical resources will have to be made. The allocation of financial resources is most critical as it will ensure that the necessary infrastructure, personnel and process are instituted to enable success of the project.
- Relevant policy and systems review, development and re-alignment – Since one of the foundational elements of this project is collaboration with different stakeholders and entities, the review of existing policies and guidelines governing organisations operational process will be necessary so as to ensure that seamless integration of the DUT with identified partner organisations.
- Curriculum review and re-alignment – Existing practices elated to teaching and learning within the undergraduate health science programs at the DUT FHS will have to be reviewed and findings of the review process will inform re-alignment of the curriculum to dynamics within the clinical placement facilities thereby producing graduates that are adaptive and responsive to health needs of communities as society as informed by experiences that are encountered in the decentralized clinical placement facilities.
- Continuous professional development and mentorship – Academic and other relevant stakeholders within the FHS and DUT should receive training, mentorship and support on recommended teaching, learning and assessment practices to be adopted within the context of DCTP. This is to be aligned with the relevant institutional policy together and appropriate local and international best practices. This may facilitate buy-in from the stakeholders that will be responsible for implementation thereby ensuring success of the project.
- Availability of monitoring, evaluation and continuous quality assurance processes – This

maybe in the form of one or more tools such as guidelines, standard operating procedures, audit tools, monitoring and evaluation framework and routine data collection instruments that monitor progress of the project at pilot implementation and scale-up phase to ensure its's success in terms of the overarching objectives. Facilitating ongoing scholarship related to DCTP implementation within a UoT and its operational process will be an integral part of the broad project and the monitoring, evaluation process to ensure continuous quality improvement as supported by empirical evidence.

- Facilitating technological innovation – A key aspect of implementation of DCTP within the DUT FHS is technological innovation for teaching and learning which will have to be embedded within the teaching practices. In this regard information technology systems, infrastructure and applications will have to be developed, sourced and continuously updated to ensure compliance with innovative teaching practices. In this regard, an integral part of the implementation process is the development of systems rooted in biomedical engineering, telemedicine and e-health technologies.

The adoption of recommended foundational principles for the operationalization and execution of the DUT-FHS DCTP project has implications for pilot, scale-up and sustainability of the project beyond implementation. Moreover, the long term sustainability of the project will also be ensured through the development of a clear road-map for DCTP that provides short-term, intermediate and long term guidance on execution of the project. The project is also embedded into the DUT FHS long-term strategic and operational plans as part of its flagship project so as to ensure availability of financial, human and physical resources to ensure sustainability of the project beyond the pilot and initial implementation phases. The FHS strategic operational plan with the DCTP project embedded will subsequently form part of the institutional strategic plan thus further ensuring long term sustainability.

Conclusion

It is envisioned that the DUT-FHS DCTP project will facilitate collaboration between the UoT, traditional university, ministry of health and private sector for clinical placement of undergraduate health science students in health establishments that are away from the university thereby exposing them to real-life experiences related to healthcare. This will facilitate authentic learning experiences that will contribute to improved competencies of graduates in relation to the health needs of society and the multiple realities of the South African health system.

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Abbreviations

DOH: Department of Health
DUT-FHS: Durban University of Technology, Faculty of Health Sciences
DCTP: Decentralized Clinical Training Programme
DUT: Durban University of Technology
FHS: Faculty of Health Sciences
KZN: KwaZulu-Natal
NHI: National Health Insurance
PHC: Primary Health Care
RE-AIM: Reach, Efficacy, Adoption, Implementation, Maintenance
UKZN: University of KwaZulu-Natal
UoT: University of Technology

Data availability

Data sharing is not applicable to this article as no data sets were generated or analysed during this

study. Relevant literature used to inform all arguments have been cited in text and reference list provided.

Declaration

The authors declare no competing or conflict interest

No generative AI was used on any portion of the manuscript

All authors contributed and agreed to the submission of this manuscript

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Figure1. Elements of RE-AIM framework

Supplementary Files

Figures

Figur1. of depicting RE-AIM evaluation framework.