

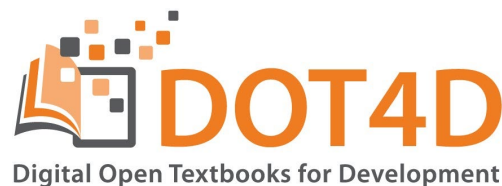
# Open textbooks as educational technology

By Bianca Masuku

Digital Open Textbooks for Development, Centre for Innovation in Learning and Teaching,

University of Cape Town

February 2024



UNESCO CHAIR  
IN OPEN EDUCATION  
AND SOCIAL JUSTICE



# Aims

- Establish a basic understanding of open textbooks as a technology.
  - Define what open textbooks are, their relevance, and why they matter in the higher education context, and in the UCT context
  - Cases of open textbook production at UCT
  - Benefits and challenges of open textbooks

# Digital Open Textbooks for Development (DOT4D)

Initiated as a three-year (2018–2021) research, advocacy and implementation project funded by the Canadian IDRC, following in wake of Research on Open Educational Resources for Development (ROER4D) and other CILT open education initiatives.

***Now an institutionally funded initiative.***



**Glenda Cox**  
Principal Investigator  
**Michelle Willmers**  
Publishing &  
Implementation  
Manager  
**Bianca Masuku**  
Researcher

**Best Open Practice**

2021

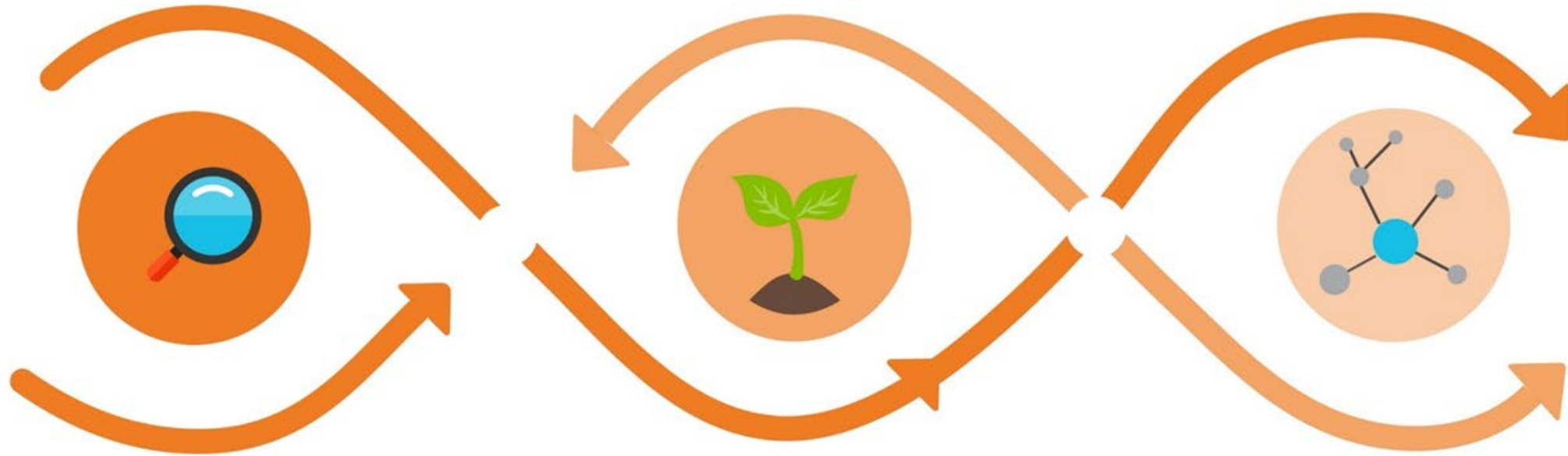
Glenda Cox for the **The Digital Open Textbooks for Development** (DOT4D) project.



## DOT4D objective

**To contribute to improving *inclusion* in South African higher education by addressing equitable access to relevant learning resources.**

**> Backdrop of widening inequity, exacerbating crisis in access and representation**



### Research

Identify optimal approaches to open textbook design and publishing.

### Grants

Support open textbook publishing at UCT that prioritises strategies for integrating student perspective, curriculum transformation and sustainability.

### Advocacy

Inform current open education policy initiatives at institutional and national levels.

# Social justice approach

## Social justice as a framework to understand the potential of open education



***“At the heart of the open educational resource movement is the intention to provide affordable access to culturally relevant education to all ... in a manner consistent with social justice.”***

(Hodgkinson-Williams & Trotter, 2018)

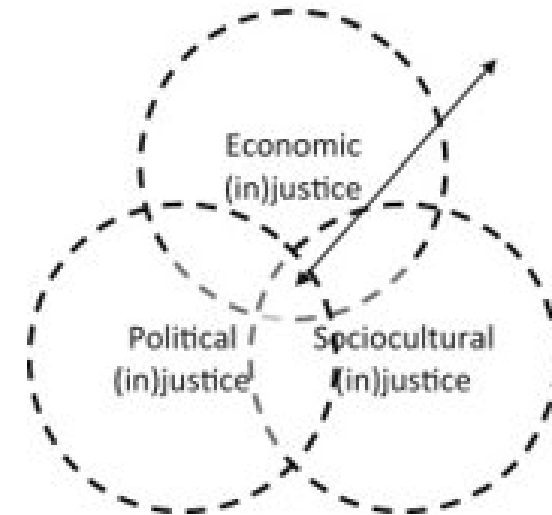


# What is social justice?

Nancy Fraser considers social justice as ‘**participatory parity**’ – economically, culturally and politically

*"Social justice is a concept that requires the organisation of social arrangements that make it possible for everyone to participate equally in society."*

*(Fraser, 2005)*



Cox, G., Masuku, B. & Willmers, M. 2020. Open Textbooks and Social Justice: Open Educational Practices to Address Economic, Cultural and Political Injustice at the University of Cape Town. *Journal of Interactive Media in Education*, 1 (2):pp. 1–10. Available at: <https://open.uct.ac.za/handle/11427/31887>

# Social justice as participatory parity (Fraser)

## Economic dimension

- Material resources
- Maldistribution and redistribution

## Cultural dimension

- Cultural attributes
- Misrecognition and recognition

## Political dimension

- Political voice
- Mis/representation, mis/framing

**Participatory parity looks at the *what*, *who* and *how* of social justice.**

Justice in each dimension can be remedied through **affirmative** or **transformative** responses.

# Global challenges in Higher Education

Increasing demand for education and insufficient institutions

Increasing cost of Higher education and text books

Increasing Competition

Variable quality in teaching

Asymmetries of power and wealth and curriculum from the Global North favoured over the Global south

*What are open textbooks?*

The how, what and where of open  
textbooks

# Activity: What is an open textbook?

What are its key features?

Where do we find them?

Who compiles them?

What does it look like?

What content does it carry?

Who are they for?

# Open textbook landscape survey

- imperative in order to gain a sense of current open textbook production and publication activity taking place within the university.
- aim was also to produce an openly licensed baseline dataset on open textbook activity
- utilised a desktop review approach, probed particular key features: type of resource; author(s) and author affiliation; by whom the resource was compiled; year; findability; peer review and quality assurance processes; inclusion of multimedia, etc.

Processing spreadsheet 2019:

[https://zivahub.uct.ac.za/articles/dataset/DOT4D\\_Open\\_Textbook\\_Landscape\\_Survey\\_UCT\\_1\\_2\\_/14798025](https://zivahub.uct.ac.za/articles/dataset/DOT4D_Open_Textbook_Landscape_Survey_UCT_1_2_/14798025)

Processing spreadsheet 2021:

[https://zivahub.uct.ac.za/articles/dataset/DOT4D\\_Open\\_Textbook\\_Landscape\\_Survey\\_UCT\\_2\\_2\\_/14797596](https://zivahub.uct.ac.za/articles/dataset/DOT4D_Open_Textbook_Landscape_Survey_UCT_2_2_/14797596)

# Landscape survey report

## Number of resources found



Centre for Higher Education Development: 7  
Commerce: 5  
Engineering and the Built Environment: 3  
Health Sciences: 11  
Humanities: 4  
Law: 3  
Science: 6

## Types of resources found



Atlas: 2  
Book: 4  
E-book: 2  
Lecture notes/outline: 3  
Manual: 6  
Monograph: 1  
Textbook: 21

## Creative Commons licensing



CC BY: 11  
CC BY-NC-SA: 9  
CC BY-NC: 7  
CC BY-NC-ND: 6  
CC BY-SA: 4  
CC BY-ND: 2

Landscape report:

[https://open.uct.ac.za/bitstream/handle/11427/33640/DOT4D\\_Landscape\\_Survey\\_Report.pdf?sequence=3&isAllowed=y](https://open.uct.ac.za/bitstream/handle/11427/33640/DOT4D_Landscape_Survey_Report.pdf?sequence=3&isAllowed=y)

## Evidence of quality assurance

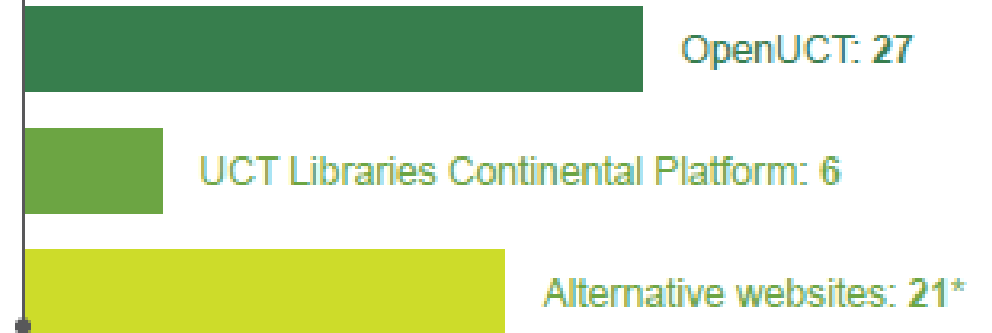


Peer review and quality assurance statements: 27

## Format



## Dissemination platforms



\* Resources duplicated on other platforms in addition to OpenUCT and UCT Libraries Continental Platform

# Defining open textbooks

- Digital, freely available collections of scaffolded teaching and learning content
- published under an open licence
- with affordances for integrated multimedia and third-party content
- published via platforms and in formats that provide affordances for content delivery on a range of devices, print and low bandwidth access strategies
- through **collaborative, inclusive authorship, quality assurance and publishing approaches**
- that can be leveraged in **sustainable models of open textbook production for social justice and transformation.**

**Open textbooks > Collaboration > Inclusion >  
Social justice > Sustainability**

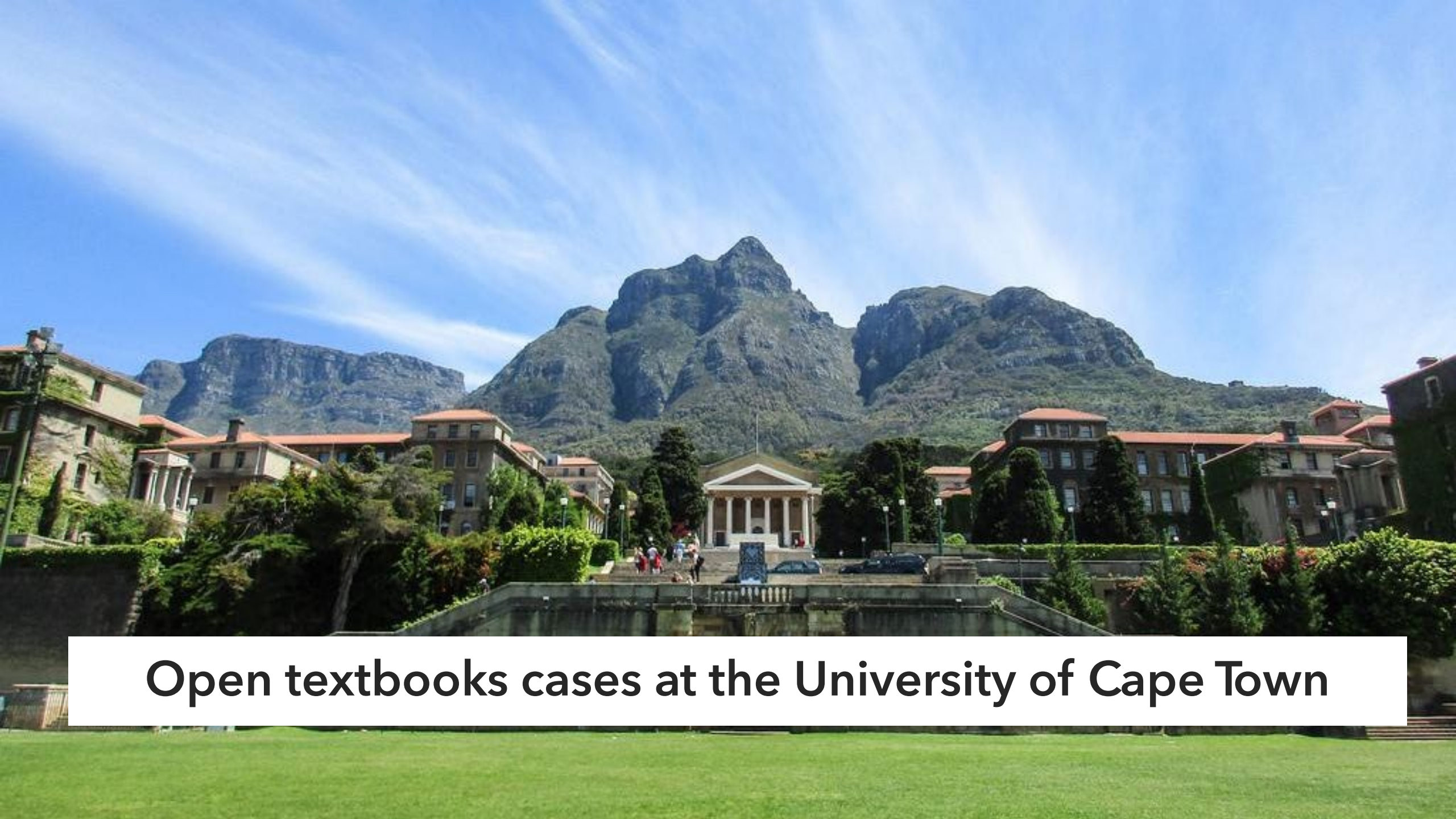
*The significance of open textbooks*

**Enhancing accessibility and  
inclusivity in education**

# Why do open textbooks matter?

- Need for **accessible** and **FREE** resources
- Don't have to re-invent the wheel - better use of time
- Need for **localised** materials, transforming the curriculum
- Encourages us to reconsider our teaching and learning





# Open textbooks cases at the University of Cape Town

# UCT open textbook authors in the DOT4D study



Kensleyrao  
Apajee  
**Mechanical  
Engineering**



Chris Barnett & Cesarina Edmonds-  
Smith  
**Chemistry**



Stella Papanicolaou  
**Architecture**



Dr Juan Klopper  
**Surgery**



A/Prof. Abimbola  
Windapo  
**Construction**



A/Prof Maria Keet,  
**Computer Science**



Jonathan Shock,  
**Mathematics**



Dr James  
Lappeman,  
**Marketing**



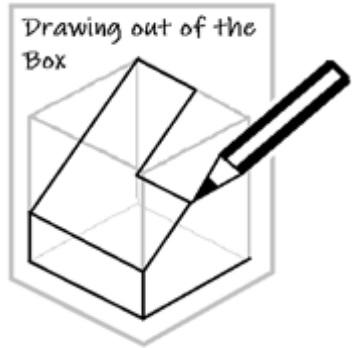
Tim Low,  
**Statistics**



Dr Michael Held,  
**Orthopaedic  
Surgery**

Dr Claire Blackman  
**Mathematics**

## Engineering and the Built Environment



First-Year  
Mechanical  
Engineering Drawing



Architecture of the  
Modern Movement  
in the Global South

## Science



Computer  
Science



Mathematics  
Textbooks for South  
Africa



First-year Chemistry  
in South African  
context

## Health Sciences



Learning Innovation  
through Orthopaedic  
Network



## Centre for Higher Education Development

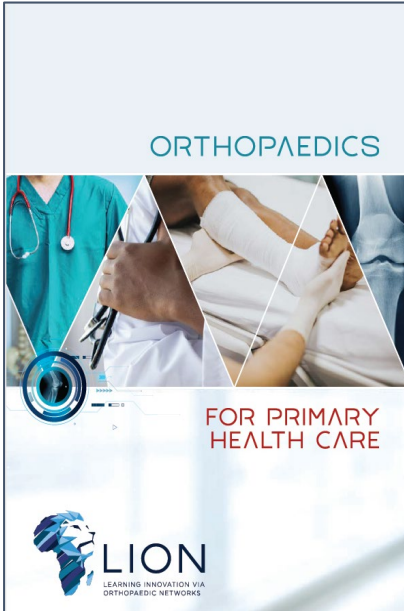


Statistics: Introduction to  
Probability in isiXhosa

## Commerce

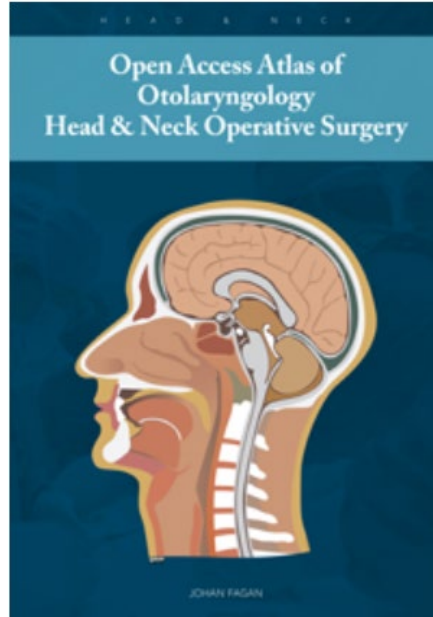


2021

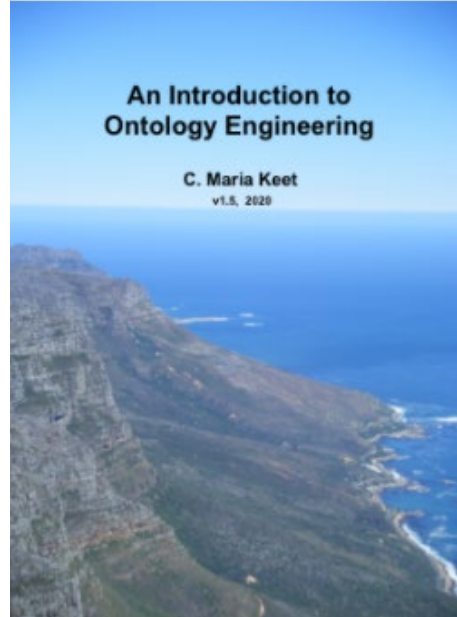


<https://openbooks.uct.ac.za/uct/catalog/book/36>

2022



<https://openbooks.uct.ac.za/uct/catalog/book/1>



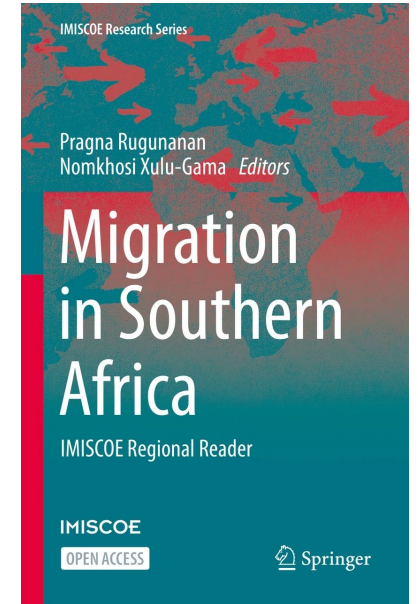
<https://people.cs.uct.ac.za/~mkeet/OEbook/>



2023



<https://openbooks.uct.ac.za/uct/catalog/book/42>



<https://link.springer.com/book/10.1007/978-3-030-92114-9?page=1#toc>

*The process*

**Imperatives, authorship and student  
involvement**

# Activity: what imperatives matter to you?

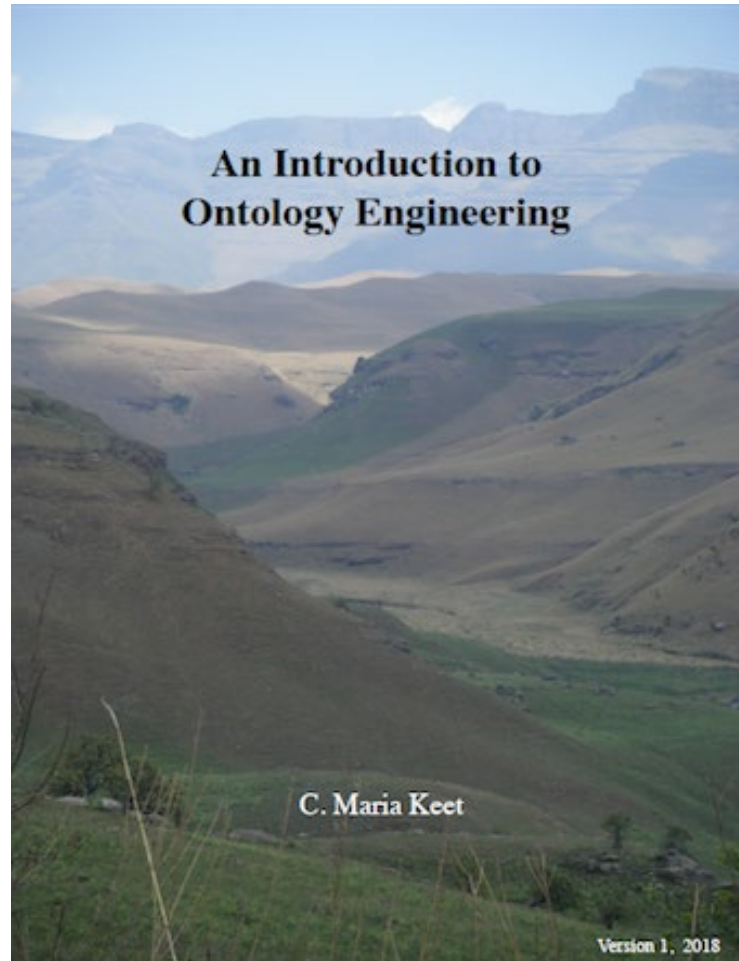
DOT4D grant proposals considered the following key aspects/ list of criteria:

- transformation of the curriculum,
- inclusion of marginalised voices,
- inclusion of student voices,
- relevance to local context,
- multilingualism,
- disability access,
- interdisciplinarity,
- strategies for the sustainability of the proposed open textbook
- materials produced under a Creative Commons Attribution (CC BY) licence.

## CASE STUDY PROCESS

- Examine how academics involved in open textbook authoring and publication activity at UCT plan, implement and reflect on their activities.
- In-depth conversation with 5 key OT authors from our cohort
- Process was a reflexive exercise for authors to think deeply about their motivations and drivers, addressing particular injustices in classroom, and strategies that they use
- OTs are being understood and used as very important tools in the classroom to address a range of issues experienced by students
- Authors are trying to democratise not only the teaching and learning process but also the creation and production of knowledge

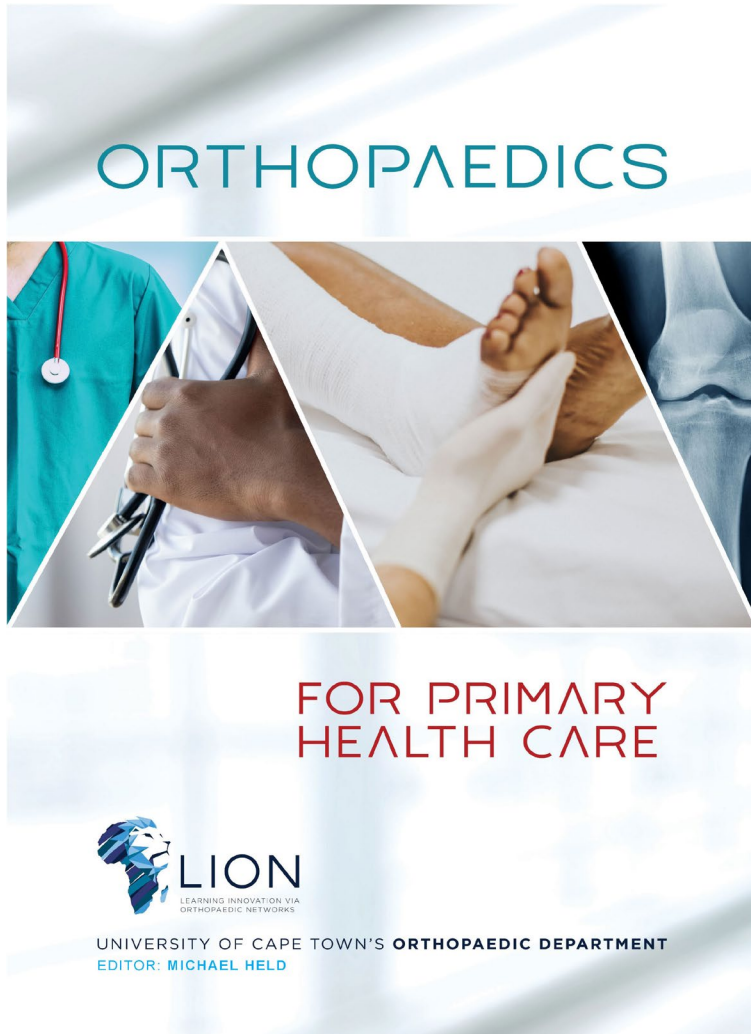
# Cost: *An Introduction to Ontology Engineering*



- Associate Professor
- based in the Department of Computer Science at UCT
- recognised that there was a gap in educational material for ontology engineering** in the world and that this was compounded by the **issue of cost as a barrier for students** being able to access commercially published textbooks within this field
- her initiative **aimed to update and enhance her original 'Introduction to Ontology Engineering' work into an online textbook package with more educationally relevant software, exercises and tutorials**, that would be openly accessible to all through the use of a Creative Commons licence
- her process involved working as a solo author in the production of her open textbook but collaborating with colleagues and students in certain aspects
- through her initiative, she emphasized that **knowledge should be available free of charge so that it can increase possibilities for further new research**, scholarship and application and open education resources play an important role in this cost-saving endeavour

Collaboration and curriculum transformation:

# *Orthopaedics for Primary Health Care*



-Director of the Orthopaedic Research Unit

-Faculty of Health Sciences

-recognised that **current orthopaedic learning resources were mainly based on guidelines and textbooks from the Global North and that there was a severe lack of African learning materials which were tailored to local pathology** and local circumstances, and written by local experts.

-initiative aimed to provide an interactive educational platform for medical students and primary care providers that would **provide accessible learning material that is practical and relevant to undergraduate** medical students in Southern Africa

-his **process involved a multi-authorship approach to content development, involving students, academics and practitioners, with himself in the role of author and editor**, with his content development intrinsically linked to the curriculum transformation process for the undergraduate orthopaedics course.

-in his work, he believed in “the power of a networked approach towards building a curriculum that is appropriate for the SA context”

Pedagogical change:

## *Architecture of the Modern Movement in the Global South*



-Senior Lecturer

-School of Architecture Planning and Geomatics in the Faculty of Engineering and the Built Environment at the UCT

-**recognised that modern buildings from the global north dominated the publications** referenced by architecture students and professionals

-open textbook initiative aimed to contribute towards a knowledge base for modern architecture from a global south perspective

-her process involved contributions from students in her class who assisted with gathering information for the open textbook

-believed that her open textbook process was “making her think more critically around her teaching...”

# OPEN TEXTBOOK PRODUCTION

- Aim to surface and articulate the open textbook production and publishing models that are being employed at UCT
- Utilised a combination of qualitative and quantitative research activities.
- Identified key production activities
- Exploration of textbook publishing landscape and the individuals who participate in it.

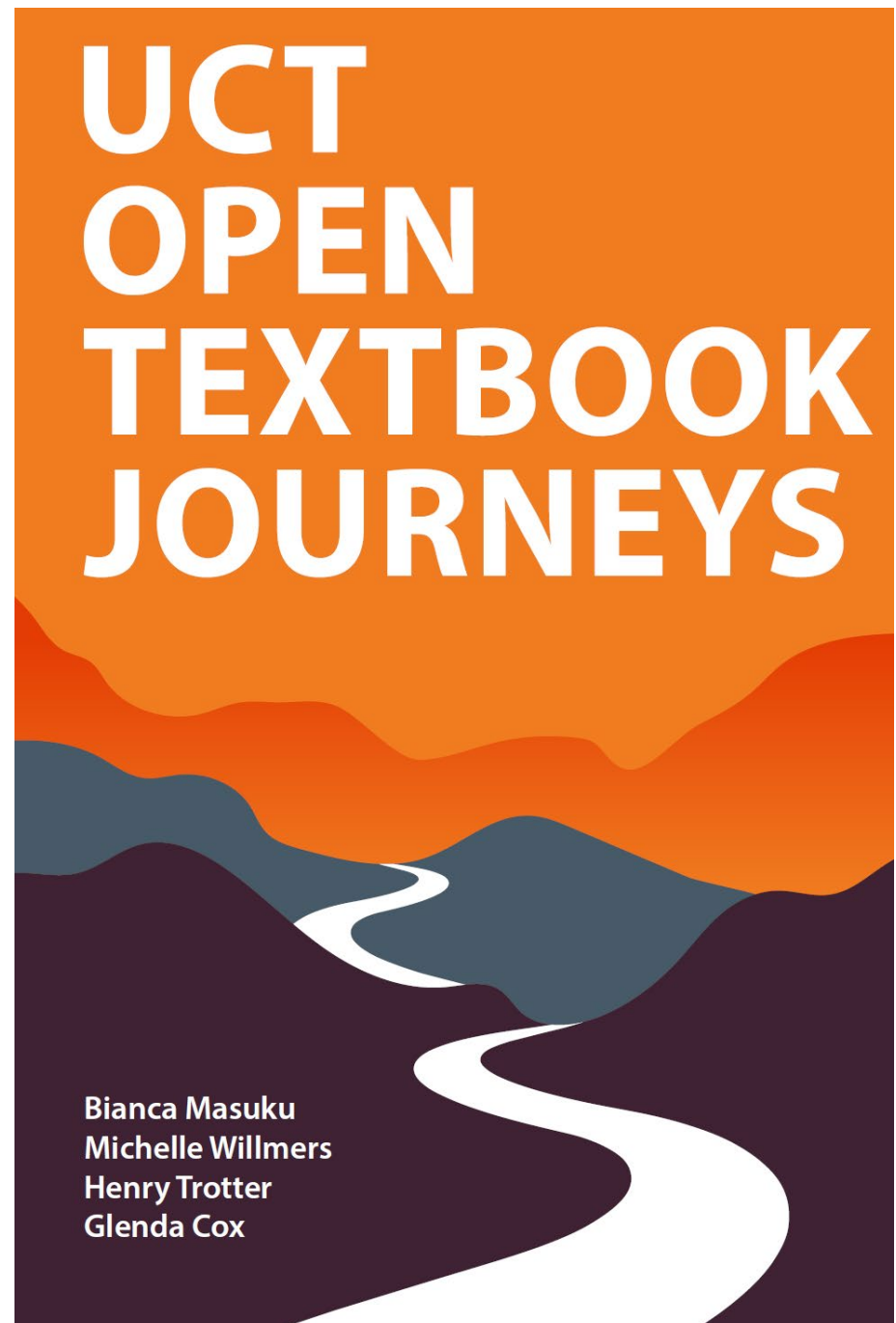
Grantee	Grant initiative	Output	Discipline
<a href="#">Dr Cesarina Edmonds-Smith &amp; Dr Chris Bamett</a>	<a href="#">Inqoxo</a>	Online discussion forum on first-year chemistry concepts (with focus on IsiXhosa translation). 'Living textbook' still in 'closed' (classroom-only) prototyping and content development phase.	Chemistry
<a href="#">Dr James Lappeman &amp; Dr Paul Egan</a>	<a href="#">Marketing to South African Consumers</a>	Open textbook comprised of 21 chapters co-published online in PDF, HTML and EPUB formats and in print by the Liberty Institute of Strategic Marketing and UCT Libraries.	Marketing
<a href="#">Dr Michael Held &amp; Learning Innovation through Orthopaedic Networks (LION)</a>	<a href="#">Orthopaedics for Primary Health Care</a>	Open textbook comprised of 52 chapters co-published with UCT Libraries and made available on their open access Continental Platform.	Orthopaedics
<a href="#">Assoc. Prof. Maria Keet</a>	<a href="#">An Introduction to Ontology Engineering</a>	Open textbook comprising new edition of world's first textbook for computer scientists in this subfield (first published 2018), including new chapter co-written with former student and focus on multilingual approach.	Computer Science
<a href="#">Tim Low</a>	Introduction to Probability (IsiXhosa version)	Two chapters translated from existing Introstat (2013) open textbook as proof-of-concept collaboration between author, students and linguist academics. Translations in the process of being finalised for release in line with faculty transformation and multilingual efforts.	Statistics
<a href="#">Stella Papanicolaou and team</a>	<a href="#">Modern Architectures: Cape Town</a>	Open textbook profiling Modern Movement architecture of Cape Town in the context of the decolonial gaze. Part of a series of outputs and activities in the Modern Architectures in the Global South Initiative. Student content also shared on <a href="#">uctma.gs</a> <a href="#">Instagram</a> page.	Architecture
<a href="#">Dr Jonathan Shock</a>	<a href="#">Introduction to Complex Numbers</a>	First prototype chapter for the Introduction to University Level Mathematics for a South African Audience open textbook, which is being designed to replace the prescribed work for first-year mathematics students in line with faculty transformation efforts.	Mathematics
<a href="#">Assoc. Prof. Abimbola Windapo</a>	<a href="#">Fundamentals of Construction Management</a>	Freely available textbook addressing construction management from Global South perspective.	Engineering
<a href="#">Dr Claire Blackman</a>	Mathematics Textbooks for South Africa	Open textbook addressing high cost of current textbook, localisation and techniques for thinking about and writing mathematics. Process in incubation.	Mathematics
<a href="#">Kensleyrao Apajee</a>	First-Year Mechanical Engineering Drawing	Undergraduate guide to engineering drawing tailored to the local context and structured to adequately support student learning. Process in incubation.	Mechanical Engineering
<a href="#">Dr Juan Klopper</a>	<a href="#">The Open Surgery Textbook</a>	Project engaging young doctors and domain experts to identify and collaboratively author content in video tutorial format for delivery via Instagram. Process in incubation.	Surgery

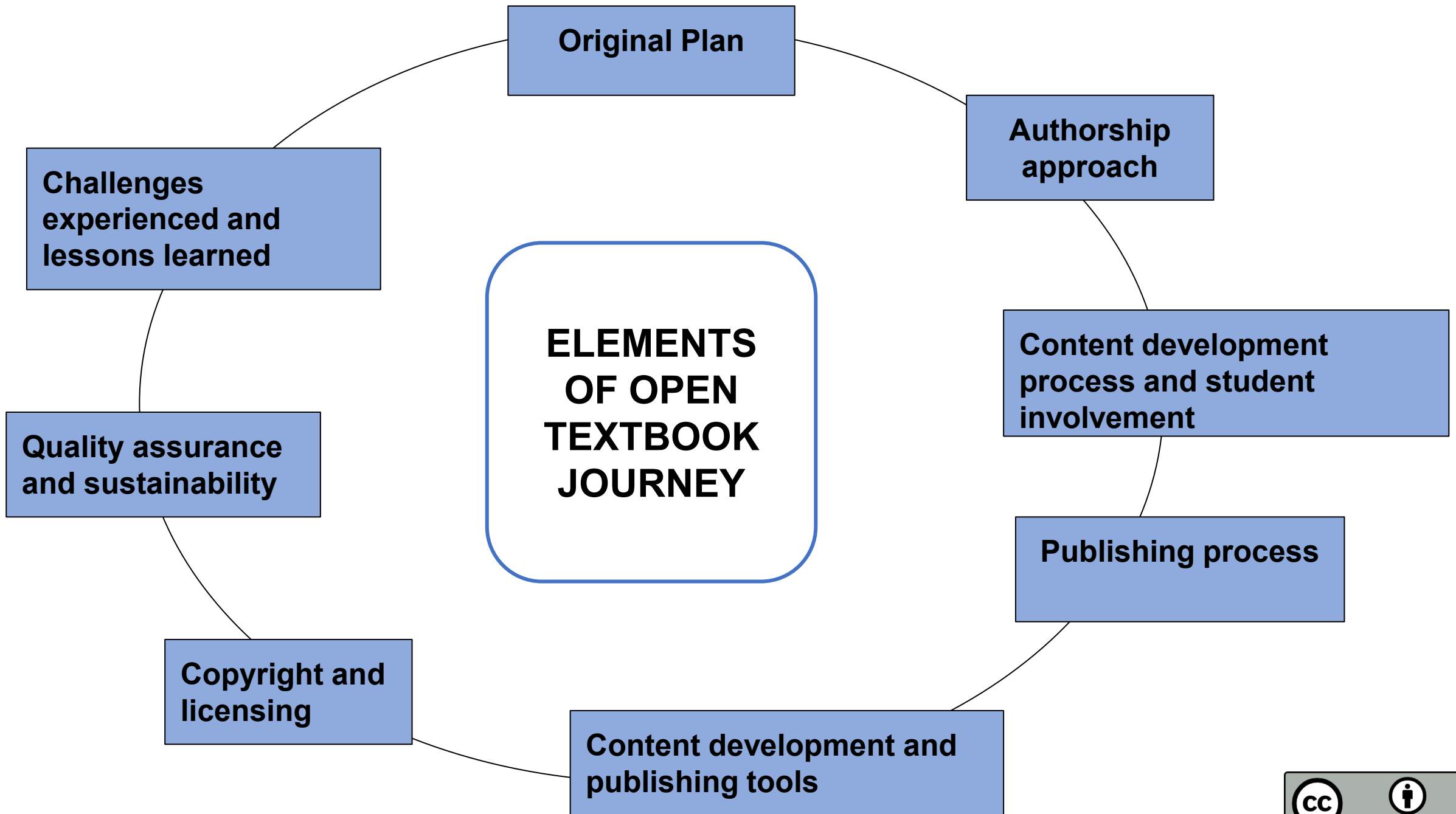
# Open textbook journeys

- OT activity at UCT is fragmented and expertise developed around open textbook production is confined to small pockets within the institution
- It is imperative that the stories of the academics who are undertaking this work are profiled and shared.
- The concept of 'journeys' emerged from exploring the various aspects and components involved in UCT authors' conceptualisation, production and publishing of open textbooks
- Aim to capture the varied experiences in a collection of narratives
- Efforts of the academics undertaking this work with limited funding or other forms of institutional support is testament to their desire to improve the learning experience for students

Journeys case study series

<http://www.dot4d.uct.ac.za/outputs-2>





*The process*

**Collaborative production models and  
emerging technologies**

# Collaborative open textbook production models

Bovill (2019) terms of inclusion (adapted by Cox et al. 2022)

<b>Participatory design</b>	Stakeholders contribute to the design and development of initiatives, including curriculum; students are “testers or informants” and don’t have a high level of agency
<b>Engagement</b>	Activities to motivate and interest students; can include engagement in teaching and learning

<b>Co-creation</b>	Contribute new pedagogical ideas; empowerment; meaningful engagement; students construct understanding and learning resources
<b>Representative</b>	Elected role, small group representing whole group
<b>Consultant</b>	Students selected and paid to collaborate
<b>Co-researcher</b>	Collaborating meaningfully on teaching and learning research or subject based research
<b>Co-designer</b>	Sharing responsibility for designing learning, teaching and assessment
<b>Partnership</b>	Collaborative; contribute equally; some pedagogical conceptualisation and decision-making; implementation and analysis

# Collaborative open textbook production models

Aim: Provide open textbook creators with sustainable models of production that manifest “parity of participation” as the just end point of social justice

DOT4D context: Four models of open textbook production reflecting varying levels of students and colleague collaboration

(adapted from Bovill (2020) framework of inclusion)

- **Participatory/Engagement Model**
- **Participatory/Engagement and Co-Creation Model**
- **Co-Creation Model**
- **Co-Creation/Partnership Model**

	AFFIRMATIVE REMEDY		TRANSFORMATIVE REMEDY	
None	Participatory design	Engagement	Co-creation	Partnership



# Student roles and collaboration activities in open textbook co-creation initiatives at UCT

Author

Co-editor

Translator

Propose

Propose relevant material to be used in the textbook

Test

Test content to make the textbook more understandable and accessible

Review

Review to eliminate expert blind spots

Design

Design quizzes and multiple-choice questions

Design book concept and approach to layout

Typeset

Typeset pages for the textbook

Proofread

Proofread text to ensure consistency, correct grammatical errors and format references

Assist

Assist with editorial, technical, curatorial and administrative aspects

Collaborate

Collaborate with staff and peers to bring their culture into the content

## Next steps: Student co-creation of open textbooks

- **Author 1: Two "excellent"** students: one worked on designing questions/quizzes for open chapter and another worked on a technical platform (students were **paid** for this work as consultants)
- **Author 2: Whole class participation** developing textbook content as part of coursework (student contributions were **acknowledged** in textbook and **graded**)
- **Author 3: Students** made videos as part of an assignment and the whole class was invited to write chapters, but not all participated (student contributions were **acknowledged** in textbook)
- **Current research focus:** Interviews with open textbook student collaborators and users and researching the co-creation experience from student perspectives.



# *Student co-creation paper*

Learning along the way: A case study on a pedagogically innovative approach to engage medical students in the creation of open educational resources using ChatGPT

[Mousaion: South African Journal of Information Studies](https://unisapressjournals.co.za/index.php/LIS/article/view/15331)

<https://unisapressjournals.co.za/index.php/LIS/article/view/15331>

# First approach to DOT4D

*"I would like to use ChatGPT to create initial chapters, then have students review and also add images to it.*

*I would like to generate 5 to 10 MCQs and re-write each chapter with the ChatGPT/student combination.*

*May I ask you, if you have advice on how to reference this and if this is legit reg open access licence? I don't want us to get in trouble later with copyright, etc."*

## ORTHOPAEDICS



FOR PRIMARY  
HEALTH CARE



UNIVERSITY OF CAPE TOWN'S ORTHOPAEDIC DEPARTMENT  
EDITOR: MICHAEL HELD

# Benefits of open textbooks

- Open textbooks save money
- Open textbooks allow for curriculum change through tailored content and assessment
  - A number of respondents indicated that having the assurance that students are able to access the required text enables them to ask more questions that integrate deeply with course content and to ask different kinds of assessment questions which acquire closer reading and engagement with the text.
- Open textbooks are openly licensed, therefore can be used, re-used, shared, re-mixed in various ways according to needs and context
- Open textbooks allow for collaboration and co-creation
  - Open textbook authorship models are providing avenues to explore innovative, student-centred pedagogical approaches, shift power dynamics and build confidence in terms of students' ability to contribute.

# Challenges of open textbooks

- Time is a significant cost to the academic in open textbook production
  - time required to produce and publish open textbooks is a significant cost and the most substantial barrier to open textbook creation. As one author stated: “Honestly, the biggest problem is time. It takes time to produce a really good book and get it written and checked ... there needs to be support for people to have time to just write.”
  - Strategies that the authors employed politically challenge the status quo, shift power dynamics, and counter existing publishing models.
  - Collaboration with students or colleagues is always challenging
    - “any time that they spend working on something like this is time taken away from their actual studies.”
    - Time pressures on students
- Disciplinary divergence
- Varying levels of technical proficiency (staff and students)
- Avoid straight-jacketing creative practice