Sustainable open textbook models for social justice

Glenda Cox*, Michelle Willmers and Bianca Masuku

Centre for Innovation in Learning and Teaching, University of Cape Town, Cape Town, South Africa

Growing inequity continues to manifest within and between higher education institutions, highlighting the plight of the disadvantaged versus the advantaged. Against this backdrop, students' ability to access quality textbooks and educational resources with locally relevant content presents a critical equity issue. Open textbooks provide opportunities to address social justice in the classroom. Highlighting the injustices which motivated authors in the Digital Open Textbooks for Development (DOT4D) initiative at the University of Cape Town (UCT), this study uses Catherine Bovill's framework of inclusion to examine the processes of 11 open textbook initiatives at UCT in terms of their degrees of inclusivity, with a focus on student participation. The authors draw on the work of political philosopher Nancy Fraser and her central norm of "parity of participation" in order to analyze the cases in terms of their ability to provide affirmative or transformative remedies to injustice. The data presented in this study were derived from a mixed-methods research and implementation approach, in which a survey was administered to the lead authors of the 11 open textbook initiatives. The proposals submitted by ten of these initiatives in their application for a DOT4D grant and their grant reports were also an important data source. These data, combined with insights from two rounds of in-depth interviews with five authors from the study sample provides insight into the injustices academics were grappling with and the ways in which they endeavored to address them. This article articulates four open textbook models with varying degrees of colleague and student inclusion. Examining authorship, quality assurance and publishing activities as nodes of inclusivity, the article provides insight into the strategies open textbook authors at UCT adopt in order to address social injustice in the classroom related to access and representation. It also considers ways in which higher education institutions can address sustainability in order to support the endeavor.

KEYWORDS

co-creation, models, open education, open textbooks, social justice, sustainability

Introduction

Growing inequity continues to manifest within and between higher education institutions (HEIs) of the Global North and Global South, highlighting the plight of the disadvantaged versus the advantaged in the system (Hölscher and Bozalek, 2020). University fees are a barrier to access and even if students manage to find the money (on their own or with government support), the life of a student is expensive. Additional

challenges related to the cost and appropriateness of textbooks in higher education (HE) have been exacerbated by the COVID-19 pandemic and the widening inequality that has manifested as a result (Hargreaves, 2021; Williams and Werth, 2021).

Internationally, research has highlighted the importance of providing access to textbooks and online educational resources in order to maximize returns on remote learning necessitated by the pandemic, particularly in the context of unequal access to learning materials and curricula (Mishra et al., 2020; Reimers and Schleicher, 2020).

In South Africa, the Department of Higher Education and Training (DHET) *Access to and Use of Learning Materials: Survey Report 2020* shows a strong, ongoing reliance on the traditional prescribed textbook (Department of Higher Education and Training [DHET], 2020a). Of the 53 223 university students who participated in the DHET survey, 87% indicated that their modules made use of a prescribed textbook (Department of Higher Education and Training [DHET], 2020a).

Given this reliance on textbooks, students' ability to access these resources presents a critical equity issue. If students do not have equal access to textbooks on their first day of class (Rambow, 2021), they do not have full equal access to education. Similarly, if students do not equally relate culturally and politically to the context/content presented in the textbooks with which they are taught[1], they do not have equal epistemic representation. In this context, the lack of epistemic representation/justice relates to existing power asymmetries in knowledge production, "not solely with respect to dominant (Western) perspectives, concepts, and terminologies but also blind spots where existing knowledge is ignored, neglected, or even destroyed" (Mignolo, 2009 cited in Khoo et al., 2020, p. 55).

Around the world, the prevalence and use of open textbooks is gaining momentum[2]. Digital and freely available online, these scaffolded collections of teaching and learning content are published under Creative Commons licenses on platforms and in formats that allow for free access and legal reuse, as well as the integration of multimedia and content from other sources. Technical innovation and the use of more open, collaborative authorship, quality assurance and publishing approaches enable the integration of multiple voices and perspectives.

Proponents have highlighted how open textbooks allow for opportunities to disrupt and innovate in HE (Hilton and Wiley, 2011; Bliss et al., 2013). Much of the research on open textbooks has not only highlighted their value in terms of addressing issues around cost and utility, but has also worked to define these

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1 https://blog.oxford.co.za/five-factors-to-consider-when-prescribing-a-textbook/

2 https://www.unisa.ac.za/sites/corporate/default/News-&-Media/Articles/The-case-for-using-open-textbooks-in-HE-is-growing

resources, understand their production and show the impact of the use of these resources in various contexts (Frydenberg and Matkin, 2007; Pitt, 2015). At the University of Cape Town (UCT), the Digital Open Textbooks for Development (DOT4D) initiative is working with academics who are adopting collaborative approaches to open textbook production that are student-centered and aim to address social injustice in the classroom (Cox et al., 2020).

This article builds on previous DOT4D research on the role of open textbooks in addressing social injustice in the classroom at UCT (Cox et al., 2020). Expanding the analysis, it examines the production activities of 11 open textbook initiatives, some of which are completed while others are in progress or have been placed into incubation due to circumstance. Lessons can be learned from these successes and failures. The initiatives originate in a range of topics/disciplines; namely: abstract algebra, architecture, chemistry, complex numbers, computer science, construction management, general surgery, marketing, mechanical engineering, orthopedic surgery and statistics.

Conceived with an explicit social justice and intersectionality focus, the focus of the DOT4D project has been on investigating and supporting the interventions required to promote open textbook production that improve affordable access and support curriculum transformation efforts. In addition to research and advocacy components, the DOT4D project also ran a grants program aimed at building the capacity of open textbook authors through modest financial aid and support in designing, writing, editing and publishing these texts/materials in the period 2019–2021.

This article identifies drivers for open textbook production and articulates open textbook models with varying degrees of colleague and student inclusion. Examining authorship, quality assurance and publishing activities as nodes of inclusivity, the article provides insight into the different strategies open textbook authors at UCT adopt in order to address social injustice in the classroom related to access and representation. It also considers ways in which higher education institutions (HEIs) can address sustainability in order to support the endeavor.

The foundational hypothesis of this work is that inclusivity is a key dimension of both social justice and sustainability, in that multiple voices are required in order to achieve more equal epistemic representation. In order for open textbook activity to be sustainable, it needs to be "effective" (i.e., fit for purpose), making the efforts of the lecturer and students and the investment of the institution worthwhile. The sustainability factor therefore also relies on the extent to which students feel represented in the resource and the extent to which its development process addresses social (in)justice in the classroom. This resonates with the findings of Tlili et al. (2020), who state that collaboration, apart from being a characteristic of open educational resources (OER) production, can be a way to achieve cost advantage and economies of scale.

Social (in)justice in the classroom: Drivers for open textbook production

There are several social justice drivers for open textbook production. In this article, we focus on the injustices which motivated authors in the DOT4D initiative at UCT, namely: lack of affordable access to appropriate textbooks and the need for curriculum transformation and/or multilingualism.

Affordable access

The high cost of textbooks (Senack and Donoghue, 2016), surging inflation rates[3] and commercial publisher profiteering[4] are by now widely acknowledged as being at odds with the development agenda. As Williams and Werth (2021, p. 2) point out, "[t]he social justice dilemma created by requiring students to purchase publisher content goes against the liberatory potential of higher education."

This cost crisis is amplified in the context of COVID-19 and remote online teaching and the economic pressures which have accompanied this fundamental shift. "First [electricity], then devices, then connectivity, then good quality content supported by interactive learning interactions—these emerged as the basics" (Czerniewicz et al., 2020, p. 955).

Jenkins et al. (2020) draw attention to textbook affordability as a social justice issue and highlight the role of OER as a potential avenue for realizing a more socially just HE experience. Within this context, they highlight the affordances of OER to reach socially excluded students, increase participation among underrepresented groups and bridge the gap between formal and informal education.

Curriculum transformation

Research at UCT shows that even when students can afford to buy textbooks, the cases and examples they provide are often not relatable to lived experience, there is a lack of a recognizable voice and students are constrained in terms of engaging in learning with these materials (Cox et al., 2020).

In South Africa, 26% of students who participated in the 2020 DHET survey chose to forgo purchase of prescribed textbooks entirely due to issues of cost constraint and appropriateness (Department of Higher Education and Training [DHET], 2020a). The curriculum transformation and decolonization agenda in South African HE aims to address a range of systemic injustices related to accessibility and inclusivity (Mendy and Madiope, 2020). These include the need to address better inclusion of marginalized and disabled students, more democratic epistemic representation of students in curriculum articulation and an expanded approach toward

multilingualism (Heleta, 2016; Walton, 2018; Mendy and Madiope, 2020).

Textbooks and other learning resources are one of the primary means through which curriculum is captured and conveyed. As such, they comprise a key mechanism through which to address curriculum transformation and epistemological representation. A reframing of curriculum for a pluralist society includes an interrogation of whose cultural values are recognized and valued and how students can be included in "decision-making roles and procedures" (Luckett and Shay, 2017, p. 9).

Multilingualism

There is evidence of the dominance of the English language in HE globally. It has been argued that English "has become the tertiary education language par excellence and plays a key role as a commodity of globalization" (Doiz et al., 2013, p. 407).

In the Global North, countries have addressed multilingualism through developing strategies that promote the development of educational programs in languages other than English in HEIs (Gao and Zheng, 2019). There are also increasing debates around "language-related inequalities" as academics and practitioners grapple with ways in which to meaningfully engage with issues around multilingualism in a manner that reflects the sociolinguistic realities of local universities and local colonial histories (Shin and Sterzuk, 2019, p. 149).

In the South African HE context, multilingualism is considered to be pivotal in promoting equality of access and improved academic success for all students. It is also a central aspect of institutional transformation and changing the historical identities of HEIs (Mbulungeni, 2010). However, the country's revised Language Policy Framework for Public Higher Education Institutions (Department of Higher Education and Training [DHET], 2020b, p. 5) highlights "the challenges of the underdevelopment and underutilization of official African languages at higher education institutions while simultaneously sustaining the standard and utilization of languages that are already developed." The Language Policy Framework calls for HEIs to make greater investment in the development of official languages in the spheres of teaching and learning, scholarship and research; "[t]he alternative is to continue producing students who are detached from their own heritage, or detached from society generally because they remain in an unrealistic monolingual vacuum."[5]

In the context of this study, the production of open textbooks provides an opportunity to address affordability, curriculum transformation and multilingualism through inclusive approaches toward creating learning materials

3 https://www.nbcnews.com/business/business-news/students-are-still-saddled-soaring-textbook-costs-report-says-n516011

4 https://www.businessinsider.com/why-college-textbooks-expensive-textbook-publishing-2018-12?IR=T

5 https://theconversation.com/how-south-africas-universities-are-making-more-students-multilingual-116638

that are available without cost to the student and capture cultural-linguistic diversity.

Open textbook production activities as nodes of inclusivity and collaboration

Open textbook authors undertake a range of production activities, each of which themselves present opportunities to address injustice in the classroom. In this article, we focus on authorship, quality assurance and publishing, as these were the key activities in the DOT4D initiative in which different degrees of collaboration and inclusivity were manifest.

Authorship refers to the conceptualization, pedagogical planning and development of content, and is, as such, a key activity node in which issues of student voice and representation are manifest.

In this context, student voice is understood as the ability for students to express themselves and more meaningfully participate in their education (Könings et al., 2021). Könings et al. (2021) highlight the need to create a collaborative community and give students autonomy in order to create space for student voice. Without this opportunity, they are, as Fraser (2013) describes the experience of the alienated, "rendered passive, positioned as potential recipients of predefined services rather than as agents involved in interpreting their needs and shaping their life-conditions" (p. 71).

Co-creation and active learner involvement in the design and development of education is garnering growing attention in educational practice and research. Involving learners in the design of teaching and learning contributes to improvement in the quality of education by addressing perspectives of different stakeholders and stimulating teachers' growth. It also motivates learners by enhancing their feelings of engagement, ownership and empowerment (Cook-Sather et al., 2014 cited in Könings et al., 2021).

The level of learner involvement in the formulation and delivery processes of their education should be aligned with the purpose of the chosen educational design approach (Martens et al., 2019 cited in Könings et al., 2021). The academics in the DOT4D initiatives began their open textbook authorship processes from different starting points, in that some created (or aimed to create) a textbook from scratch, some adapted (or aimed to create) their already existing course materials or textbook, and some adapted (or aimed to create) a textbook that someone else had authored.

Quality assurance

As Roussouw (2015) points out, quality, along with social justice and accountability, are key requirements for successful school systems and societies. Roussouw (2015) also states that while quality is a "pivot element" in education, it remains "slippery" to define. This is largely due to the fact that perception and indicators of quality depend on whose perspective you adopt (Commonwealth Educational Media Centre for Asia [CEMCA], 2014).

In the context of OER, the concept of fitness for purpose is typically viewed as the dimension most relevant to quality, along with cost efficiency and potential for transformative learning (Commonwealth Educational Media Centre for Asia [CEMCA], 2014).

In the context of this study, quality assurance refers to the measures taken by authors to ensure resource efficacy and academic accountability in the context of its desired social justice purpose. Quality is also viewed as a central component in addressing sustainability, in that the extent to which a resource is fit for purpose is a critical aspect in determining its lifespan and ongoing evolution.

In this article, we identify the quality assurance processes undertaken by authors in the DOT4D study before commencement of a course, during a course and in the resource publishing process. These relate particularly to appropriateness of context, representation and voice, and a professional approach to design and publishing.

Publishing refers to the process of preparing, disseminating and marketing content that is deemed ready for public release.

The concept of individuals, units and institutions functioning as publishers is by now a well documented phenomena in HE[6,7] and is part of an attempt on the part of institutions and academics to wrest back power from profit-driven publishing companies controlling global knowledge production and dissemination.

Weiner (1998, p. 2), in a discussion on the hegemonic practices of traditional publishers, draws attention to "the power of certain groups ('experts') to shape and confirm the production of certain kinds of knowledge." Publishing is thus a key element for consideration when addressing social (in)justice in textbook production.

Weiner further states that through the power/knowledge configurations established by traditional publishers, "'outsider' or unofficial knowledge may be disqualified and dismissed as non-rigorous, undisciplined, and unprofessional" (1998, p. 2). As such, publishers are typically viewed as gatekeepers in the dissemination process, in that they control not only *how* content is released, but also *what* content is released. Open publishing approaches allow individual authors to take control of the *what* and *how* of the publishing process and push back against the "corporatization or new managerialism where performance of academics is to a significant extent measured and evaluated on the basis of their record in publishing in the right places" (Meriläinen et al., 2008, p. 630).

Open publishing approaches enable a higher degree of agency on the part of both students and academics in terms of the power to shape content and influence diversity in epistemic

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6   https://www.insidehighered.com/news/2014/07/17/self-publishing-option-academics-periphery

7   https://oedb.org/ilibrarian/the-academics-guide-to-self-publishing/

perspective. Today, academics, students, academic departments, research units and institutions act as publishing entities on an array of different kinds of scholarly outputs. Open textbooks form part of this contribution.

In line with the rise of the institution as publisher (Slowe, 2018), institutional co-publishing arrangements (either within or between institutions) are a means through which to draw on internal expertise, resources and infrastructure, providing for greater sustainability than a solo self-publishing approach or reliance on commercially published materials (Barker, 2015).

As these new approaches to publishing take root, academics and other institutional stakeholders are challenged to get to grips with new roles and responsibilities. Institutions are also navigating the challenge of articulating sustainable production and publishing models, and trying to provide the skills development, technical infrastructure and recognition required to facilitate ongoing engagement of this kind.

Given the current austerity and inequality in global HE (Hargreaves, 2021), it is compelling to consider how open, innovative authorship, quality assurance and publishing approaches can be used to maximize efficiencies between colleagues and institutions in order that they may serve as a mechanism to promote social justice in digitally enabled education.

A social justice framework for inclusivity and parity of participation in open textbook production

Open textbooks and parity of participation

This article argues that open textbooks provide an opportunity to address injustice beyond cost saving and equity of access to materials. The relationship between OER, open educational practices (OEP) and open textbooks and social justice has been explored in recent literature (Hodgkinson-Williams and Trotter, 2018; Bali et al., 2020; Cox et al., 2020). These articles draw on the work of political philosopher Nancy Fraser who developed a multi-level theory of justice in which she describes three dimensions of social injustice: (1) economic maldistribution; (2) cultural misrecognition; and (3) political misframing. These "species" of injustice are objects that need to be dismantled (Fraser, 2005, p. 72).

Fraser aims to illuminate the injustices of gender inequality, racism, colonialism and neoliberalism. In this regard, her work provides a set of tools and principles that can be used to examine the injustices in HE.

The emphasis in this article is on carefully unpacking the underlying central norm of Fraser's theory: "parity of participation." This is a principle of "equal moral worth," in

that "justice requires social arrangements that permit all to participate as peers in social life" and overcoming injustice means "dismantling institutional obstacles that prevent some people from participating on a par with others" (Fraser, 2009, p. 16). This parity of participation can be both an *outcome* "where all relevant actors participate" and a *process* "in fair and open processes of deliberation" (Fraser, 2005, p. 84).

People are impeded from participation because of economic structures that deny them the resources to interact with peers, resulting in distributive injustice or maldistribution. This economic dimension is related to the class structure of society. The second dimension of cultural misrecognition is where "institutionalized hierarchies of cultural value that deny them [people in society] the requisite standing" (Fraser, 2005, p. 72). The problem here is the status order. The third dimension of justice is the political. "The political furnishes the stage on which struggles over distribution and recognition are played out" (2005, p. 73). The political dimension determines who counts as a member, and therefore who is included or excluded, highlighting the political constitution of society. The political dimension establishes social belonging and representation in society. All three dimensions are "inextricably interwoven" together (Fraser, 2005, p. 74). Fraser argues that "representation is always inherent in all claims for redistribution and recognition" (2005, p. 77).

Affirmative and transformative remedies to address injustice in the classroom

Fraser (2005) provides two "frames" or remedies for injustice (p. 78). An affirmative remedy may redraw boundaries, or even create new ones within the existing political frame and accepts the "who" of the current political community and it does therefore not challenge the underlying "deep grammar" of injustice (p. 79).

A transformative remedy challenges the underlying frame-setting or grammar which is "out of synch" and causes injustice (Fraser, 2005, p. 79). A transformative approach to misframing goes beyond changing the boundaries of *who* is included, to questioning *how* those boundaries are drawn. Fraser (2005, p. 81) suggests the "all-affected principle" as a frame to aspire to: "all those affected by a given social structure or institution have moral standing as subjects of justice in relation to it" (p. 80).

In summary, the distinction between the two is that affirmative remedies correct "inequitable outcomes of social arrangements," whereas transformative remedies correct "inequitable outcomes precisely by restructuring the underlying generative framework" (Fraser, 2008, p. 288). Fraser (2008) is critical of affirmative remedies, as they can promote group differentiation; while transformative remedies "tend to destabilize or blur it" (p. 292).

A study by Hodgkinson-Williams and Trotter (2018) reveals that OER provide an affirmative remedy by lowering costs

of materials production for the "student, educator, institution or funder" (p. 220). They also go some way to addressing cultural injustice when materials are translated and localized. The cases examined by Hodgkinson-Williams and Trotter do, however, not adequately address the political dimension, in that the main "political" challenge cited in their case studies was that intellectual property (IP) policy frameworks inhibited educators from sharing the course materials they had created. The authors argue that in their study, OER has fallen short of a transformative approach. For cultural injustice to be remedied, they coin a new term: "re-acculturation." This is identified as a pluralist approach and in the context of this article suggests the inclusion of multiple voices, specifically colleague and/or student collaborators. This term encourages the "re-mixing of OER critically to engage with and challenge hegemonic perspectives," to share those materials publicly and create new OER (p. 219). For political justice, the authors call for a re-framing of IP legislation to enable authors to share content and for the "creation of OER and engagement with OEP that balances power" (p. 219).

In a critical analysis of social justice implications of eight examples of process-focused OEP, Bali et al. (2020) outline a typology that includes content-, teacher-, and learner-centric OEP across a continuum. In this article, we are most concerned with Bali et al.'s (2020) description of "student-created OER/content" (p. 7), which can be an affirmative remedy if diverse identities and marginalized groups are represented and transformative if the power of decision-making over content and epistemological frameworks is shared with students. The authors conclude that OEP which empower learners can impact positively on social justice. They argue that OEP is not necessarily aligned with social justice, but suggest that open educators could realign their approaches to make them "deliberately orientated toward justice" (p. 12).

In the context of the role of open textbooks as a form of remedy for injustice, resources of this kind by their nature save students money, thereby enabling economic redistribution. Open textbooks also have the potential to provide the opportunity for recognition of multiple cultural values and enable representation of multiple voices (Cox et al., 2020). As Fraser (2005) argues, these remedies are entwined and the cultural and political dimensions enable a potential transformative response.

Co-creation and inclusion

Digital open textbooks enable collaboration and co-authoring with peers and students. In HE, activities with students have been labeled interchangeably as partnerships or co-creation activities (Bovill, 2020). Bovill (2020) proposes a framework that can be used to describe the range of activities and roles that colleagues and students take on.

The first term Bovill discusses is one of "*student engagement*" which can include a range of activities that lecturers use to motivate student interest. The time and effort that students give to these activities benefits their learning. Secondly, students as "*partners*" implies a much deeper involvement and agency, suggesting an equal partnership that is collaborative and reciprocal. The third term, "*co-creation*" refers to a new pedagogical idea that emphasizes "learner empowerment" (Bovill, 2020, p. 1,024). Bovill situates co-creation between student engagement and partnership, as it includes collaboration with staff and how both the learning process and resources are constructed together. The fourth term is "*participatory design*," which involves a collaboration of a group of stakeholders to develop and design course and course materials. These stakeholders are "testers" and do not have a high level of agency (Bovill, 2020, p. 1,024). This fourth term of inclusion ("*participatory design*") is situated above "*student engagement*" as both are broader terms with low levels of student involvement.

Co-creation can be divided into four roles (Bovill et al., 2016). A "*representative*" role is when a small group represents a large group, as in a sample group. A "*consultant*" is a selected colleague or student who is brought into the process with a specific focus and is paid or remunerated in some way. The "*co-researcher*" and "*co-designer*" roles can be a small group of colleagues and/or students or a whole class of students. A whole-class approach enhances inclusion and builds positive student–teacher relationships, although it comes with the challenges of time constraints, large participant/student numbers and sustainability issues, to name a few (Bovill, 2020).

This article will provide an overview of drivers for open textbook production and a framework which considers three main areas that future authors and institutions can consider, namely: authorship approaches, quality assurance and publishing. It also examines the role of institutional support in promoting and sustaining this work on an ongoing basis. Eleven different approaches to these activities are analyzed using this framework. Overlaps in aspects of the framework enable the formation of models for undertaking authorship, quality assurance and publishing. These models cluster around four modes of inclusion (how authors work with colleagues and students). The models are arranged and critically analyzed using social justice principles. Table 1 provides a summary of the models ranked from least to most inclusive.

Methodology

Digital open textbooks for development

The DOT4D initiative investigates the current ecosystem of open textbook publishing and provides implementation

TABLE 1 Bovill's (2020) terms of inclusion framework and roles within co-creation (adapted from original).

Terms of inclusion

Participatory design: 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.

Engagement: activities to motivate and interest students; can include engagement in teaching and learning.

Co-creation: contribute new pedagogical ideas; empowerment; meaningful engagement; students construct understanding and learning resources.

Roles within co-creation

Representative: elected role; small group representing whole group.

Consultant: students selected and paid to collaborate.

Co-researcher: collaborating meaningfully on teaching and learning research or subject-based research.

Co-designer: sharing responsibility for designing learning, teaching and assessment.

Partnership: collaborative; contribute equally; some pedagogical conceptualization and decision-making; implementation and analysis.

support in open textbook publishing activity at UCT. In its efforts to support the production of open textbooks and grow a community of practice, DOT4D partnered with 11 open textbook initiatives to various degrees, ten of which participated in the DOT4D grants program and received funding on the basis of their grant proposals in which they were required to address imperatives related to access, social justice in the classroom and sustainability.

The grants program ran from March 2019 to February 2020; however, DOT4D's relationships with the grantees extended beyond the formal grant period and, in some instances, included additional funding and consultation that extended into the year 2022. These interactions allowed DOT4D to develop a longitudinal research approach, in which it could track the initiatives over an extended period of time. As such, the work done with open textbook creators at UCT has enabled the articulation of the different approaches to open textbook production that are being employed by academics attempting to address social justice in the classroom through content creation.

The terms used to describe their processes are those of the DOT4D initiative and have been developed in order to make sense of various content development approaches from an overarching perspective.

Data collection

The data presented in this study were derived from a mixed-methods research and implementation approach, which was comprised of a range of data collection activities. These activities included a survey administered to the lead authors of the 11 initiatives, which examined their demographic profile and their use of technology, as well as providing an opportunity for personal reflection. As such, the survey consisted of a range

of questions exploring disciplinary background and teaching experience, student and course details, technology tools and skills, and reflections regarding teaching practices and personal motivations. The survey also included the Internal Conversation Indicator (ICONI), a tool developed by Margaret Archer (2007, 2008), which was designed to identify a person's dominant mode of reflexivity.

The grant proposals submitted by the ten grantees in application for the DOT4D grant and their final grant reports also constituted an important data source. Two rounds of in-depth interviews (of approximately 1.5 h each) were conducted with five UCT open textbook authors from the study sample of 11 initiatives. The interviews sought to further probe the injustices that academics were grappling with and the different ways in which they were endeavoring to address them. The interviews included questions relating to historical legacy, motivations for creating open textbooks, disciplinary norms, authors' content development approaches, and reflections around curriculum transformation and decolonization. These data collection activities were supported by the field notes of the DOT4D Publishing and Implementation Manager tracking interactions with the UCT open textbook community.

Data analysis

As part of the project's mixed-method approach, survey data were tabulated and analyzed according to the metrics of the ICONI tool. In addition to this, interviews were transcribed and the data were analyzed using NVivo software. Finally, the data from the field notes collected from the various interactions with grantees, the grant proposals and the grant reports that were submitted by grantees were captured and synthesized using Microsoft Excel spreadsheets. Data were analyzed by the DOT4D Principal Investigator and Researcher and the results of their analyzes were triangulated in order to ensure rigor in the analysis process (Cohen et al., 2007). Numerous themes were utilized in the coding process: social justice dimensions, production activities and terms of inclusion.

From this, the study identified the key activities or nodes of open textbook production which surfaced in the DOT4D process, namely: authorship, quality assurance and publishing. Each node was analyzed against Bovill's frameworks of inclusion in order to map the varied forms of collaboration employed. The data analysis process also explored whether collaboration took place before or during the course and whether it involved part of or the whole class.

The interview and survey data collection processes engaged academics who were selected on the strength of written proposals for funding to support open textbook initiatives with a social justice focus. This has resulted in selection bias. The views of the participants should therefore not be considered representative of all UCT academics, but rather a purposive sampling of academics identified as part of an innovative cohort

pioneering OEP and the production of open textbooks at UCT for social justice purposes.

Findings

This findings section presents the social justice imperatives behind open textbook initiatives at UCT and the associated production activities in the context of frameworks for collaboration and inclusion in order to articulate sustainable open textbook models and mechanisms for institutional support.

Social injustice in the classroom driving open textbook production

The academics in this study embarked on open textbook initiatives in response to a largely mutual set of social injustices they witnessed in their classrooms related to affordable access, curriculum transformation and multilingualism.

In the DOT4D study, the starting point for all authors in their open textbook development processes was the recognition of the classroom injustice(s) they intended to address (Cox et al., in press). The acknowledgment and articulation of these injustices – combined with the nature of the classroom context as relates to discipline, degree level and class size – led authors to adopt different authorship, quality assurance and publishing approaches with varying degrees of inclusivity as relates to colleague and student participation.

All 11 of the academics in this study indicated that they were driven by imperatives relating to curriculum transformation, with three having a specific focus on multilingualism (in chemistry, statistics, and computer science). Curriculum transformation in this context included embedding local examples and case studies in the content (in marketing, architecture, and construction management). Several authors (in chemistry, computer science, and statistics) also recognized how important it was for students to have key concepts and terms translated into languages other than English.

Eight of the authors indicated that they were motivated by issues related to cost and access and mentioned the high cost of prescribed textbooks (in abstract algebra, complex numbers, computer science, construction management, general surgery, marketing, mechanical engineering, and orthopedic surgery).

Authorship

Authorship refers to the conceptualization and writing of content. In the DOT4D context, we can differentiate between *solo authorship*, in which an author works entirely alone in conceptualizing and producing the resource, and the role of *lead author as editor-in-chief with colleague co-authors*, in which an editor-in-chief plays a coordinating function and the responsibility for conceptualizing and writing content is shared with colleagues. In some instances, collaboration also takes place with *institutional intermediaries*, such as library staff or learning designers.

In instances where student participation was sought in order to better address issues of representation and inclusivity, lead academics in the DOT4D context operated as an *editor-in-chief with student co-authors* or a *content development facilitator with student authors*. In the latter instance, students were given full authorship responsibility and the content development facilitator provided expert guidance and coordination rather than producing content.

These approaches allow for varying degrees of inclusivity in the content development process.

In the DOT4D cohort, three authors (in abstract algebra, construction management and mechanical engineering) adopted a solo approach with some colleague and student engagement and partnership. Two of these initiatives drew on colleagues' expertise. In one case, the author in mechanical engineering engaged a member of the DOT4D project who acted as an institutional intermediary in providing editorial and resource design support; while in the other case, the author in computer science partnered with a colleague to write a chapter in order to develop aspects of the textbook in a more collaborative manner.

All four of the solo authors solicited assistance from students. In the case of abstract algebra, mechanical engineering and general surgery, students reviewed textbook content through a process of engagement. In the construction management process, students assisted in the production of graphics and figures as co-creators.

The most popular approach was to adopt the role of editor-in-chief with colleagues and/or student co-authors (used in architecture, complex numbers, marketing, general surgery, and orthopedic surgery). Within this approach, there were a range of co-creation activities. These included a process where the academic in orthopedic surgery acted as an editor-in-chief and brought consultant/co-researchers in practice and academia into the open textbook development process to collaboratively scope and author content.

There were five instances (in architecture, chemistry, complex numbers, marketing, and orthopedic surgery) in which editors-in-chief extended their processes and drew students into co-creation, in that they were provided with an opportunity to co-author content. In the complex numbers initiative, students collaborated as co-creators and co-researchers in authoring content, consultants in pedagogical approach and representatives in providing classroom feedback. In the orthopedic surgery initiative, students participated as representatives of the class in providing insight into new, key curriculum elements and as co-designers in the production of

content. The marketing initiative also worked with students as co-designers of content, while in architecture and chemistry they functioned as co-researchers. In the general surgery initiative, it was envisioned that students would be brought on board in a participatory process, in which they would contribute to scoping and design of course material, including curriculum. In a similar process, the academic in marketing brought colleagues on board in a co-creation and co-design process, in which co-authors had a high level of input and degree of autonomy in the content authorship process. In the architecture textbook development process, students were co-researchers producing pages as part of a classroom assignment.

There were two instances (in statistics and chemistry) in which academics acted as centralized content development facilitators and worked with colleagues and/or students who authored content. This was done with consultant/co-researcher colleagues and a student who were brought in to translate a chapter from an existing English first-year statistics textbook into isiXhosa. Students and colleagues were also involved in a chemistry open textbook initiative, in which they were co-researchers and collaboratively developed content.

The particular collaborative approach utilized in chemistry was adopted in order to foster a team effort around the content development work that was being undertaken. As such, the content for the textbook was developed in consultation with the teams of students who would convene to discuss the work. Various methods such as surveys and focus group discussions were used to capture input and feedback from the students. Throughout their authorship processes, the authors saw themselves as facilitating the collaborative process and had a keen interest in highlighting the voices of participating students.

Three authors (in chemistry, complex numbers, and computer science) partnered with colleagues and included students as co-creators. The author in computer science chose to extend the student role to facilitate their participation as co-creation consultants, whereby they were given the opportunity to independently author some of the content for their textbook. In these processes, students were acknowledged for their contributions and, in some instances, financially compensated for their work. The involvement of students was seen as a key feature in recognizing different perspectives on the content being created and, in one instance, was also considered to be an opportunity for mentorship.

In line with the variable approach adopted toward authorship, it is important to note that the entry point to the content development process for these authors varied. Of the 11 authors profiled, seven (in architecture, chemistry, complex numbers, marketing, mechanical engineering, orthopedic surgery and general surgery) created (or aimed to create) their own content from scratch using the funding received as part of their DOT4D grant. Three (in abstract algebra, computer science, and construction) revised their own already existing course materials and one (in

statistics) adapted an already existing textbook which was published as an OER.

Quality assurance

Quality is important to all academics, particularly in the context of sustainability. In the DOT4D study, quality assurance was both a process and an outcome. Dynamic, innovative, collaborative approaches toward quality assurance enabled academics to bring multiple perspectives into their resource production and review processes.

In the DOT4D sample, quality assurance processes took place prior to the course being developed, during the period in which the course was delivered and in the textbook production process (which took place concurrently with or after the course was delivered).

In addressing quality assurance prior to the development of a course, one important aspect of quality identified in the DOT4D context was the appropriateness of the curriculum for context.

The orthopedic surgery textbook development process aimed to improve learning and teaching in orthopedics in Southern Africa and to provide much needed, locally authored learning materials that are tailored to local pathology and circumstances. In order to identify the topics which needed to be integrated, the editor-in-chief led a process in which students and practitioners engaged in a Delphi consensus study in order to identify key aspects for incorporation into the textbook and the undergraduate teaching curriculum. Within this process, students were invited into the textbook development process in order to identify experts' blind spots in the authoring of content and to provide feedback and edit chapters as part of their coursework.

Quality assurance processes also took place in the course; that is, while the course materials were being developed and used in the classroom. Textbooks that are designed to integrate multiple voices and epistemologies and address social (in)justice in the classroom rely on multiple stakeholders participating in the review process. In the DOT4D context, different levels of review activity took place with colleagues and students.

All authors made use of some form of colleague review. In five initiatives (abstract algebra, construction management, marketing, mechanical engineering, and general surgery) academics adopted a participatory design approach, in which colleagues who were academic experts and industry leaders were called on by authors to proofread chapters and provide feedback on content. In three instances, authors in complex numbers, computer science and chemistry partnered with colleagues in an ongoing process to oversee the quality of the content as it was being produced. In two cases, authors in architecture and orthopedic healthcare engaged colleagues to check quality and provide comments on and corrections to the content and material being developed.

In one last case, the author in statistics adopted a co-creation approach, in which colleagues played consultative and co-researcher roles in the textbook's collaborative quality assurance process.

In all eleven instances, authors included student review as part of their quality assurance processes. Four authors (complex numbers, construction management, mechanical engineering, and general surgery) established a participatory design approach, in which students provided input and feedback about the efficacy and appropriateness of the material developed and informed the content development process. This was done through surveys and other ways of soliciting student insights as they tested the material.

In four other initiatives that utilized student review, authors in architecture, complex numbers, computer science and marketing engaged students in an ongoing process to provide feedback about gaps students identified in the material produced as they made use of it in the classroom. In one instance, the author in statistics employed a co-creation approach, in which the collaborating student participated in the quality assurance process as a consultant co-researcher with the colleagues involved. As such, the process became a brokered conversation between all individuals involved, reflecting both academic rigor and the student perspective. In another instance, authors in chemistry also co-created with students in their authorship process and included them in a representative manner where they would provide feedback on content and concepts within the material being produced.

There were additional elements of quality assurance which took place in the textbook production and publishing process.

A professional approach to resource design and production were seen as critical quality elements that influence students' ability to engage with the resource. They were also seen as a key factor for consideration when other academics consider using your textbook. In the DOT4D context, three academics (in architecture, marketing, and mechanical engineering) drew on the expertise of members of the DOT4D project team. This entailed providing expertise in areas such as resource design and cohesion, project management, proofreading and copy-editing, editorial style sheet articulation, author publication agreements, and issues related to copyright and licensing.

In some cases, academics made use of institutional intermediary editorial support as part of their quality assurance processes, in which they solicited assistance from institutional partners for various editorial aspects of their work. Two authors (in marketing and mechanical engineering) employed a participatory design approach, working with a member of the DOT4D team who provided editorial guidance. The author in architecture chose to employ the services of graduate students as assistants in a co-creation relationship, in which they consulted on the quality of the textbook through developing a formatting guideline, a matrix and a checklist for students to follow in the production of content.

In addition to editorial support, the two academics in marketing and architecture also sought publishing support from a DOT4D team member who provided strategic guidance. In one instance, the relationship was consultative in terms of co-creation, while in the other it was through participatory design.

In one instance, the author in marketing, in collaboration with DOT4D, also fostered a co-publishing partnership with UCT Libraries, which provided access to a team of content publishing professionals who participated in the design of the textbook through formatting content for delivery across a range of devices according to international best practice. In the latter instance of library co-publishing, the relationship was one of co-creation: consultant.

Drawing on external editorial expertise was also seen as an important element of quality assurance in three of the initiatives (abstract algebra, construction management, and marketing), where authors sought out professional editing and proofreading as part of their textbook development process. One of these authors (in mathematics), although they did not complete their textbook development process, had envisioned that they would engage the services of a professional proofreader when the content of her textbook had reached an appropriate stage of maturity. The other authors in construction management and marketing sought out the support of external editors and proofreaders in a participatory design approach, whereby these stakeholders contributed to the design and further development of the textbook.

Three authors (in architecture, construction management and marketing) also explored professional layout and design as an extension of their quality assurance process. In the case of marketing and construction management, the authors adopted a participatory design approach. In one other instance, the author in architecture co-created and made use of colleague layout and design support with an external graphic designer who worked as a consultant in the textbook process for the production of the book's cover and layout, establishing a professional look and feel.

Only one author (in construction management) chose the route of publisher peer review and within it extended their quality assurance process by drawing on the services and expertise provided by the publisher in a participatory design approach, whereby comments from reviewers could be addressed prior to publication.

Publishing

Providing students with free access to up-to-date, locally relevant resources entails a dynamic approach to creating and updating content, which poses difficult questions in terms of knowing when a resource is "finalized" and ready for publishing – that is, the online release of openly licensed content on a website, repository or other publishing

platform for classroom and public consumption, as opposed to "closed" classroom interaction with the resource via a learning management system or other restricted-access portal.

The publishing process, in which content is prepared for public dissemination, whether in the context of a formal, professional production process or reaching the point where a cohesive, internally produced version of the content can be released online, can be viewed as a "last mile" process in which the textbook creation process is "completed." DOT4D research does, however, suggest that there are a range of subsidiary activities involved in the publishing process, many of which are ongoing with protracted timeframes. These activities include the establishment of mechanisms for ongoing review and student feedback after publishing, marketing of the resource, gathering usage data and general ongoing "maintenance" of content in terms of ensuring multimedia and external links function correctly, refining accessibility and the user experience, and the general process of evolving the resource so that it is "fit for purpose."

The DOT4D implementation process suggests that the whole idea of publishing is so new to many academics that it is especially difficult to navigate this process because they "don't know what they don't know," and therefore find it difficult to articulate processes or explicitly identify resourcing and capacity requirements. The question of who or what entity is regarded as the official publisher of a work is often unexamined in open textbook production until the question of how to cite a resource is raised, there are formal considerations such as logo design and placement on a cover, and legal documents such as publication agreements to be signed.

The general set of uncertainties experienced by academics around publishing also appears to compound the difficulty of how to bring students into this process, as is demonstrated by the fact that no authors in this study collaborated with students in any aspect of the publishing process.

In the DOT4D context, six authors chose to adopt an "author as self-publisher" approach. Two authors in computer science and complex numbers adopted a participatory design approach with colleagues, whereby they published their work themselves but also made use of departmental, institutional, and external partners to further disseminate their resources. Four of these authors (in mechanical engineering, statistics, general surgery, and abstract algebra) envisioned collaborating with colleagues in some way in the publishing of their textbooks, but were unable to complete their textbook development processes within the period of the DOT4D study.

In the case of architecture, chemistry and orthopedic surgery, the publishing process was done under the auspices of a broader initiative extending beyond the textbook production process. In these instances, an "initiative as publisher" approach was adopted, in that decision-making around branding, design, and dissemination was strongly influenced by the ethos of the overarching initiatives out of which they emerged. In all of these instances, the initiative was also seen as an overarching entity under which a more distributed content development and publishing processes would continue to take place. In these contexts, the lead academics saw themselves as facilitators of the process rather than being the publisher entities.

The author in orthopedic surgery engaged and co-created with colleagues in a consultative process, wherein the author operated in the role of editor-in-chief on behalf of the textbook initiative and was responsible for content, quality control and publishing. He made use of the department's website and the institutional learning management system in the dissemination of the textbook content in order to maintain a level of control over the publishing process. The author in architecture chose a similar approach, acting in the role of editor-in-chief. In this instance, the author worked with colleagues and a graphic designer in a participatory manner with regards to editing, publishing and proofreading textbook content.

The author in marketing adopted an "institutional co-publishing" approach in their process in a participatory manner, whereby the academic department in which the work was produced formed a partnership with UCT Libraries, with DOT4D functioning as a facilitating institutional intermediary. Within this approach, the department and UCT Libraries operated as co-publishing entities, the former as primary driver and owner of the content development process and the latter as the publisher. This allowed for all parties to focus on a combined effort to support transformation in teaching and learning at UCT and promote visibility of African scholarship. Included in this publishing approach was also the assistance of a graphic designer who was responsible for the design of the textbook cover and pages as well as the typesetting of the book. The textbook's publishing process later also extended to include the services of a South African open access publisher and academic publishing service provider which was commissioned to produce a print version of the textbook and explore print-on-demand options.

The expansive approach toward publishing adopted by academics in the DOT4D context extended beyond the institution in the case of construction management, in which the author chose to adopt an "external commercial publishing" approach. In this process, the author worked with an overseas online publisher in a participatory manner, in which the publisher provided the professional editorial and layout services which were seen as an important factor that would contribute to the textbook's professionalism for student use and its impact on industry. The author chose to work with the publisher based on its "open access" approach, which allows students to access and link to its textbooks free of charge. The content could not, however, be considered to be authentically, legally "open" because the published resource was not openly licensed.

Mechanisms of institutional support

The DOT4D was an external grant-funded project from 2018 to 2021, but in 2022 the team was recognized for their efforts and are now salaried UCT staff members. The DOT4D initiative is now a feature of the UCT landscape and can continue its research, implementation and advocacy work with institutional support.

The timing of this open textbook project and support from the UCT Deputy Vice-Chancellor (DVC) for Teaching and Learning has created a tipping point and although this work is on a small scale, further hard work on advocacy and awareness-raising will enable the production of more open textbooks. The DVC Teaching and Learning Open Textbook Award[8], which is focused on social justice principles and carries a small monetary prize, has been an important incentive mechanism, giving authors recognition and reward for their efforts.

In terms of the sustainability and scalability of open textbook publishing at institutional level, the cases presented here suggest that the time commitment entailed in authorship and quality assurance may prove too intensive for some authors to make it as far as the publishing process, or that the timeframes involved in doing so will be lengthy and a challenge to sustain.

Discussion

The main objective of this article is to provide open textbook creators with sustainable models of production that manifest "parity of participation" as the just end point of social justice. Guided by Fraser's approach of frame-setting, these models include consideration not only *who* is involved but also *how* they are involved. The models are evaluated and positioned as affirmative or transformative remedies.

All forms of open textbook production – creation, revision and adaptation – represent the spirit of "open" and could be placed on a continuum that differentiates which production form has the most potential for parity of participation. In this study, there are examples of different degrees of inclusion of colleagues and students in authoring, quality assurance and publishing of the work. The degree of inclusion was not necessarily informed by whether the resource was created, a revision of the author's own already existing content, or the adaptation of a published open textbook or other third-party resource. In this Discussion, these three starting points will be discussed with the four inclusion types suggested by Bovill (2020): partnership, co-creation, participatory design and engagement. Inclusion strategies of particular initiatives varied across authoring, quality assurance and publishing activities.

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8 http://www.cilt.uct.ac.za/cilt/open/otaward

TABLE 2 Social injustice remedy continuum.

	Affirmative remedy		Transformative remedy	
None	Participatory design	Engagement	Co-creation	Partnership

In order to rate the extent of the "remedy" using the affirmative and transformative frames of Fraser (2008, p. 291), a color-coded heat map was introduced to illustrate the positioning of models on the "conceptual spectrum." Colors blue and orange indicate affirmative remedies and yellow and pink are transformative (Table 2). Fraser provides these two options, but because of the complexity of these examples a more nuanced approach to discussing and evaluating each remedy was required. The inclusion of colleagues and students was considered across all aspects of textbook production. Models are chosen because of the dominance of certain inclusion strategies across activities and in some cases model formulation overlaps. The heat map (Table 3) enables the clustering of approaches into models according to remedy strength based on the level of inclusion (participatory design, engagement, and co-creation and partnership); participatory design being the least inclusive and partnership being the most.

The heat map approach enables a clustering of degrees of inclusivity through which four models can be distinguished: the Participatory/Engagement Model, the Participatory/Engagement and Co-Creation Model, the Co-Creation Model, and the Co-Creation/Partnership Model.

The participatory/engagement model

Four initiatives in this study adopted the Participatory/Engagement Model (abstract algebra, construction management, general surgery, and mechanical engineering). These authors set out with the intention of transforming the curriculum and increasing their students' access to materials. The mechanical engineering and general surgery authors created materials from scratch, whereas abstract algebra and construction authors set out to revise their own materials. The four examples represented in this model do not have exactly the same inclusion categories for their textbook development activities (Table 3). They follow either *solo authorship*, or *lead author as editor-in-chief with colleague co-authors* approaches. These authors have very little collaboration with colleagues and some engagement and participation with students in authorship. Engagement was the most frequent process used to include students. Colleague participation featured most often in publishing. This model is positioned as affirmative with less inclusion and collaboration with colleagues and students than the other models. The abstract algebra, mechanical engineering, and general surgery

TABLE 3   Heat map ranking initiatives in terms of degree of social justice remedy (least to most, colleague versus student).

	Terms of inclusion: colleagues			Terms of inclusion: students			Model
	Authorship	**Quality assurance**	**Publishing**	**Authorship**	**Quality assurance**	**Publishing**	
Mechanical engineering	Engagement	Participatory design	None	Engagement	Participatory design	None	Participatory design/engagement model
General surgery	Participatory design	Participatory design	None	Participatory design	Participatory design	None	
Abstract algebra	None	Engagement	None	Engagement	Engagement	None	
Construction management	None	Participatory design	Participatory design	Engagement	Participatory design	None	
Marketing	Co-creation: co-design	Participatory design	Participatory design	Co-creation: co-design	[Ongoing: engagement]	None	Participatory/engagement and co-creation model
Orthopedic surgery	Co-creation: co-design	Engagement	Engagement/co-creation	Co-creation: co-designer/representative	Engagement	None	
Architecture	None	Co-creation: consultant	Participatory design	Co-creation: co-researcher	[Ongoing: engagement]	None	
Statistics	Co-creation: consultant/co-researcher	Co-creation: consultant/co-researcher	None	Co-creation: consultant/co-researcher	Co-creation: consultant/co-researcher	None	Co-creation model
Complex numbers	Partnership	Partnership	Participatory design	Co-creation: co-researcher. Co-designer, representative, consultant	Participatory design	None	Co-creation/partnership model
Computer science	Partnership	Partnership	Participatory design	Engagement. Co-creation: consultant.	[Ongoing engagement]	None	
Chemistry	Partnership	Partnership	Participatory design	Co-creation: co-researcher	Co-creation: representative	None	

textbook development processes were the only three of the 11 initiatives profiled here which were not completed.

The participatory/engagement and co-creation model

Three initiatives utilized the Participatory/Engagement and Co-Creation Design Model, in which they all created content from scratch (architecture, marketing, and orthopedic surgery). All three took on *editor-in-chief with colleagues and/or student co-authors approaches*. They collaborated with colleagues and included students as co-creators of content. The example from architecture is unique in comparison to all the other initiatives, in that all students in a second-year class created the first draft of the open textbook. This inclusive approach was intended to offer all students in the class a sense of accomplishment in terms of being part of the process, thereby disrupting the traditional power balance in the classroom where the teacher creates all the content. The pedagogical strategy of bringing the whole class into the process has the potential to be more inclusive, building positive relationships between staff and students (Bovill, 2020). This kind of whole-class co-creation strategy responds to Fraser's principle that social justice is only achieved if the "all affected" principle is applied. In marketing, the students received attribution for their roles in contributing local content. Thorough quality assurance mechanisms were put in place with participation from colleagues and students. This model straddles the affirmative and transformative remedies. The aspects of co-creation move this model toward a rethinking and restructuring of how textbooks can be created.

The co-creation model

There is one example of a Co-Creation Model, in which colleagues and students had consultant and co-researcher roles across authorship and quality assurance processes (statistics). In this example, the authors translated a chapter of a first-year statistics open textbook into isiXhosa. The author took on the role of a content development facilitator and worked with colleagues and students who authored content. This model moves toward an equitable outcome where colleagues and students engage in meaningful collaboration. This co-creation approach is considered transformative, in that the voices of colleagues and students construct knowledge.

The co-creation/partnership model

The transformative Co-Creation/Partnership Model sees authors including colleagues and students in innovative ways (complex numbers, computer science, and chemistry). The

complex numbers author created chapters from scratch that will eventually form part of a new first-year mathematics open textbook. The author took on the *editor-in-chief with colleagues and/or student co-authors approach*, partnering with colleagues in authoring and quality assurance processes. In this initiative, students took on all four co-creation roles: co-researcher, co-designer, representative, and consultant. The computer science textbook was a revised and updated version of the lecturer's already existing textbook. This author used an *editor-in-chief with colleagues and/or student co-authors approach* and also partnered with a colleague to write a new chapter and engaged students as consultants. The third example of this Co-Creation/Partnership Model includes partnering with colleagues as well as co-creation with students. In this example from chemistry, the authors used a *content development facilitator role and worked with colleagues and students who authored content*. The authors used more inclusive methods such as surveys and focus group discussions in order to include the voice of students in the content. All three initiatives partnered with colleagues in both authorship and quality assurance processes where colleagues were in a "participatory design" role in the publishing of the open textbooks. This Partnership/Co-Creation Model is the most transformative model, in that it promotes "re-acculturation" (cultural recognition), in which multiple voices represent local knowledge, creating relevant materials and nullifying the need to rely on traditional hegemonic perspectives (Hodgkinson-Williams and Trotter, 2018, p. 220; Khoo et al., 2020). This model also remedies political misrepresentation/misframing by "re-framing" the balance of power in the authoring of textbooks (Hodgkinson-Williams and Trotter, 2018, p. 220).

The models presented engage students at varying levels and to varying degrees.

Student inclusion in open textbook authoring, quality assurance, and publishing

The national and international calls for the inclusion of students in the development of educational materials are heeded in the open textbook cases presented here (Cook-Sather et al., 2014; Martens et al., 2019; Könings et al., 2021). In seven initiatives, students took on various co-creation roles in authorship and in three they were co-creators in quality assurance processes. These authors found ways in which to not only capture students' lived realities in the published end product, but also to include their feedback into the quality assurance of their resources. Students were not involved in any of the publishing processes.

Student participation is a critical aspect of the institutional transformation agenda, in that it addresses social justice and inequity in the classroom.

Institutional support and sustainability

Three of the open textbook initiatives were not completed. The authoring journeys suggest that there were complex, often personal, reasons for this and all three authors have subsequently left UCT (Masuku et al., 2021). Even with funding, authoring and editing support from DOT4D, this work could not be completed. Considering these complex personal stories, it is difficult to argue convincingly that the downfall of these projects was because they were solo-authored with very little collaboration (in that they all used the Participatory/Engagement Model). It is possible though that if there was more colleague and/or student involvement, the projects would have progressed differently.

Institutional support is necessary to grow and sustain open textbooks. The implementation grants administered by the DOT4D initiative sparked innovation and this seed money enabled academics to progress on their journeys as open educators (Masuku et al., 2021). DOT4D author support continued beyond the 1-year grant period and there is ongoing work and further discussion around content development with a number of these authors.

The UCT Open Textbook Award introduced in 2020 was a breakthrough event in raising awareness and recognition of the importance of this work institutionally. In addition, the technical infrastructure provided by UCT Libraries has proved essential for authors to complete their authoring processes, from recognition of drivers and the problem at hand to authorship, quality assurance and finally to publishing. Institutional support should ideally include grants for authors, some form of institutional recognition, such as a prize or acknowledgment in promotion criteria, and publishing infrastructure.

Conclusion

This article offers models of open textbook authoring, quality assurance and publishing that follow affirmative or transformative remedies for social justice. The models are positioned on a continuum with the co-creation and partnership/co-creation models moving toward the social justice aspiration of parity of participation.

The models have emerged as a result of open textbook authors grappling with the dynamics of open textbook production (many of them for the first time) and are all useful possible pathways for future authors. The degree of colleague and student inclusion of future initiatives should depend on the purpose of the materials that are being designed. If the goals of social justice – which include economic redistribution, cultural recognition

and political representation – are being pursued, then inclusion in the form of partnership and co-creation where participants contribute equally in all open textbook production activities is required.

The lecturer from architecture also expressed that while she currently adopted a certain content creation model, her ideal was to evolve to a more distributed approach in terms of giving her students more authorial voice in future textbook development processes. This suggests that authors are not fixed on a particular approach, but can instead adapt (or aim to adapt) their production activities based on the context they find themselves operating in.

The four models discussed here suggest that collaboration may be an important aspect of sustainability.

The issue of institutional support and recognition is relevant in the context of sustainable authorship models – particularly in light of the fact that institutions do typically not recognize this work in formal promotion. Fraser (2005, p. 92) argues that "overcoming injustice means dismantling institutionalized obstacles" and some of these institutional measures at UCT (such as grants, the award and library publishing infrastructure) are providing authors with space and creativity not previously possible in traditional textbooks authoring in order to be more inclusive in their content creation processes.

Future research should/will include further investigation into the process of collaboration with colleagues and students to surface finer detail relating to the student experience, collaboration with colleagues and the extent of their different roles "in" the course or "of" the course. Interviews with academics, student co-creators and students who use these open textbooks can potentially set out a way forward that will transform the creation of course materials and address social injustice in the classroom.

Data availability statement

The raw data supporting the conclusions of this article cannot be shared for ethical and privacy restrictions, in accordance with the ethical consent provided by participants on the use of confidential/identifiable human data.

Ethics statement

The studies involving human participants were reviewed and approved by Centre for Higher Education Development Research and Ethics Committee, University of Cape Town. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication

of any potentially identifiable images or data included in this article.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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