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An Experiential Exploration of a Quality-Based Framework for Knowledge Co-Production

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Abstract: This paper introduces a quality-based conceptual framework for planning and conducting research and developmental projects within the knowledge co-production continuum. This paper uses a longitudinal self-study methodology to analyze six case studies over a decade and identify comparative and cumulative trends. The analysis shows the importance of inputs, processes, and outputs in knowledge co-production and reveals intangible benefits such as deep engagement and capacity strengthening relationships. This paper also demonstrates how diverse teams can effectively convert tacit knowledge into explicit knowledge through knowledge co-production. This paper adopts an innovative approach of cross-linking cases along a timeline to provide insights into comparative and cumulative trends and suggests future research directions to explore the interconnections among the framework's components. This paper argues that the careful design of inputs and processes is essential for successful knowledge co-production outcomes and that the proposed framework can be applied to address complex developmental issues. This paper contributes a novel conceptual framework and a unique cross-linking approach, offering a comprehensive and practical tool for researchers and practitioners.

Keywords: knowledge co-production, conceptual framework, quality, sustainable development

1. Introduction

Knowledge production is a key factor in global competitiveness, leading to a strategic shift in innovation policies [1]. Policy frameworks now emphasize knowledge co-production, which involves engagement and interactions among multiple actors with diverse perspectives to generate new knowledge and actionable insights [2, 3]. Existing theories, such as distributed cognition (Hutchins [4], communities of practice [5], Wenger [6], and the transformative learning theory [7]), provide a valuable lens to understand knowledge co-production. However, there is a noticeable gap in the literature that conceptualizes and frames the knowledge co-production continuum, especially from an experiential standpoint.

To fill this gap, our paper uses a longitudinal self-study methodology to explore knowledge co-production through six case studies conducted over a 12-year period. The cases involve a diverse range of stakeholders offering perspectives from various global contexts, including policymakers, faculty, learners, emerging scholars, professionals, students, internally displaced communities, refugees with disabilities, their parents, guardians, and care providers. By examining these cases, the study provide insights into the knowledge co-production continuum and its experiential aspects.

2. From Theoretical Underpinnings to Conceptual Framework

This section presents the theoretical foundations and the conceptual framework of this study. The study draws on the distributed cognition theory, the communities of practice theory, the transformative learning theory, and the quality assurance theory to understand and explain the knowledge co-production process. The study also proposes a conceptual framework that consists of four key components: inputs, processes, outputs, and outcomes. The study uses a five-step approach to utilize the theoretical framework: descriptive, explanatory, predictive, prescriptive, and generative.

The distributed cognition theory [4] suggests that individuals can achieve more collectively than individually by working collaboratively and leveraging external resources. Cognition is defined as the process by which the mind gains knowledge through intuition, reasoning, and perception [8]. In this process, human researchers leverage various non-sentient resources to enhance their cognitive abilities across different times, places, and situations [9]. The knowledge production process is contextual and involves various stakeholders and environmental factors. Knowledge co-production is the collaborative conceptualization, implementation, and evaluation that combines the creative abilities, skills, and experiences of multiple individuals [10].

The communities of practice theory [5, 6] and the transformative learning theory [7] align with the distributed cognition theory, emphasizing the role of social interaction and external resources in learning and knowledge construction. The communities of practice

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theory posit that learning occurs through legitimate peripheral participation in communities, where novices gradually engage more fully over time. The transformative learning theory focuses on how individuals critically reflect on their assumptions, beliefs, and perspectives, leading to a transformation of their meaning frameworks. Transformative learning involves a shift in how individuals understand themselves, others, and the world.

The quality assurance theory [11] underscores that inputs and processes are critical in generating outputs of high quality. According to this theory, the quality of the outcome relies greatly on the quality of the inputs and the effectiveness of the employed processes. This perspective is consistent with related literature [12, 13].

According to Bederson and Shneiderman [14], researchers can leverage a theoretical framework to illuminate and guide their study in five ways. Firstly, descriptive framing paints a vivid picture to define core concepts. Explanatory power then illuminates why phenomena occur. With careful observation, predictive prowess forecast how behaviors may change over time. Prescriptive value provides keen guidance for applied solutions. Finally, the generative nature sparks brand new questions and avenues for further exploration. This study adopted this approach by following these steps: First, it designed a conceptual framework that consists of four key components: inputs, processes, outputs, and outcomes. Second, it utilized a longitudinal self-study approach to examine six case studies over a decade and explain how these components interacted in each case. Third, it utilized the insights gathered from the case studies to forecast outcomes for contexts that are either similar or dissimilar and to pinpoint both comparative and accumulative patterns. Fourth, it suggested a framework for knowledge co-production that offers effective practices for navigating the knowledge co-production continuum. Fifth, it proposed a way forward for future research to explore the interconnections among the framework's components and enhance understanding.

The theories of distributed cognition, communities of practice, and transformative learning pinpoint the challenge, contemplate the evidence pertinent to the task, and harness experience via interpersonal interactions for data analysis and synthesis. The study's conceptual framework was constructed from an amalgamation of these theories and the quality assurance theory [11], Figure 1 presents the quality-focused conceptual framework for knowledge co-production that guided the study.

Figure 1
Quality-focused conceptual framework for knowledge co-production

2.1. Inputs

Effective knowledge co-production requires diverse participants, suitable scaling, resources, and tacit knowledge. These are the four main inputs that influence the quality of the knowledge co-production process.

The individuals involved should represent a wide range of demographic characteristics, including gender, origin, age, epistemic stance, field of expertise/study, years of experience, and social standing. This consideration for diversity is imperative for meaningful impact. Each participant contributes their unique tacit knowledge, which can be disseminated during the interaction process. Reed et al. [15] propose that such a diverse group allows researchers and policymakers to avoid blind spots in their innovations and making costly decisions based on trial and error. It is crucial to distinguish between diversity for its own sake and diversity aimed at accomplishing specific goals.

The scaling of the knowledge co-production process should align with the specific contexts and aims of the project. Scaling can be at national, regional, or global levels, depending on the scope and impact of the project. Scaling can also involve various disciplines, countries, and cultural backgrounds, depending on the complexity and diversity of the project. Scaling should be carefully planned and managed to ensure coherence, coordination, and collaboration among participants [2].

The resources required for knowledge co-production include funding, expertise, data access, infrastructure support, and collaboration. These resources can come from various sources, such as governments, international organizations, universities, NGOs, and private sector. These resources can facilitate the conceptualization, implementation, and evaluation of the project [3]. However, resources can also pose challenges and constraints, such as ethical issues, power imbalances, and conflicting interests. Therefore, resources should be used wisely and transparently to ensure quality and accountability.

Tacit knowledge is the knowledge that is embedded in individuals' experiences, perspectives, and insights. It is often difficult to articulate and formalize, but it can be valuable for knowledge co-production. Tacit knowledge can be shared and converted into explicit knowledge through social interaction and externalization [16]. Tacit knowledge can enrich the knowledge co-production process by providing context-specific and practical information that can complement the existing literature and data.

2.2. Processes

Tsoukas and Vladimirous [17] assert that the process dimension involves the measures that guarantee the production of quality knowledge, recognizing that every participant possesses both explicit and tacit knowledge. These measures encompass dialogue, a democratic system, skilled facilitation, and the transfer of knowledge and skills. These elements foster shared purpose and collaboration among participants.

Dialogue enables open and respectful communication, allowing participants to express their perspectives, challenge assumptions, and engage in critical reflection [7, 15].

A democratic system ensures equal participation and decision-making power among all participants, while addressing power imbalances and promoting inclusivity [6]. This system may vary depending on the context and the goal of the project.

Skilled facilitation guides the process, manages conflicts, and creates a supportive environment that is sensitive to the diverse needs and perspectives of the participants [15]. Facilitators should

use techniques that promote active listening, encourage equal participation, and foster trust and respect.

Knowledge and skills transfer occurs through the exchange of explicit and tacit knowledge among participants, enabling mutual learning and capacity building [5]. This transfer should recognize and value the unique contributions and expertise of each participant, creating opportunities for collaboration and co-creation of knowledge.

2.3. Outputs

The outputs of knowledge co-production include tangible and intangible outcomes that address the identified challenge. Tangible outputs are concrete products that result from the collaborative effort, such as policy recommendations, technological innovations, and educational materials [15].

Intangible outputs are changes in participants' knowledge, attitudes, and behaviors that result from the collaborative process. These changes may include increased awareness, enhanced understanding, new perspectives, and improved skills [7].

Feedback and evaluation are essential components of the knowledge co-production process [2]. They ensure ongoing communication, reflection, assessment, and improvement. Feedback mechanisms allow participants to provide input, assess progress, and adjust the process as needed [15].

Evaluation involves systematic assessment of the process, outputs, and outcomes of knowledge co-production. It helps determine the effectiveness, relevance, and impact of the collaborative effort, guiding future iterations and improvements.

The proposed conceptual framework offers a holistic view of knowledge co-production, integrating theories and concepts from distributed cognition, communities of practice, transformative learning, and quality assurance. It emphasizes the importance of diverse inputs, effective processes, and meaningful outputs in achieving high-quality knowledge co-production. The framework also stresses the need for ongoing feedback and evaluation to enhance the collaborative process and ensure continuous learning and improvement. By adopting this framework, researchers, practitioners, and policymakers can enhance the design and implementation of knowledge co-production initiatives to address complex challenges effectively.

3. Methodology

3.1. Research design

The study utilized a qualitative longitudinal research design that included six self-study cases conducted between 2010 and 2022. This design allowed the researcher, who is from the Global South, to reflect and integrate their understanding, aligning with the principles of self-study research [18–20]. The case study methodology was utilized to provide an in-depth and systematic framework for analyzing and interpreting the findings within a transformative framework to support change.

The selection of the cases was carefully considered to align with the research objectives while also considering the availability of data and the richness of insights provided by each case. It was necessary to strike a balance between the depth and breadth of exploration, capturing diverse participants, contexts, approaches, and activities to obtain a nuanced understanding of knowledge co-production practices and identify emerging patterns.

Thematic analysis was employed to categorize the findings from the cases in line with the conceptual framework.

Regarding the nature of the relationships and power dynamics, it is essential to acknowledge that all six cases were conducted within a North–South context. As a researcher from the Global South writing about knowledge co-production, it is crucial to recognize the positionalities and limitations of this research. The power relations between the North and South can influence the co-production process, potentially leading to imbalances and asymmetries in decision-making, resource distribution, and knowledge production. These power dynamics should be critically examined and addressed to ensure an equitable and inclusive co-production process.

3.2. The cases

Case 1: The author spearheaded three reflective learning sessions on projects that were initiated to collaboratively formulate policies and standards in national and regional higher education systems. These projects culminated in the co-creation of the Zimbabwe IHE and doctoral training policies, with the IHE implementation framework receiving approval in 2020 and the doctoral education policy being adopted in 2022.

Case 2: The author participated in three projects aimed at producing knowledge at the national, regional, and international levels. The Research and Intellectual Outputs (RIO) Expo was a national project initiated by the government, coordinated by the quality assurance agency, involving industry partners in showcasing creativity and innovation in higher and tertiary education institutions. The author served as the secretary and convener of the RIO Expo Organizing Committee, and the peer-reviewed articles from the Expo were published in two journals.

Case 3: Details a collaborative endeavor bringing together different voices to cultivate the next generation of African thought leaders. Under the guidance of experienced academics and editors from both the Global North and South, early career scholars across the continent received training and mentorship in knowledge production and circulation. Funded through a grant bestowed by the British Academy, the goal centered on empowering African nations to achieve sustainable prosperity by nurturing indigenous innovation. These cross-cultural partnerships touch on the profound power of uniting varying strengths toward a shared purpose of justice, progress, and humanity.

Case 4: A longitudinal study examined the student voice in higher education in a bid to understand the increasing student protests and their impact on infrastructure and human life. The study delved deep to uncover protestors' true motivations and how administrators may better serve youthful visionaries. With care and nuance, the author analyzed current scholarship on constructive rebellion – and tapping enthusiasm's potential rather than seeing turbulence alone. Through opening receptive ears to the "student voice," the project explored how leaders and learners can forge futures far brighter through frank dialogue and mutual respect.

Case 5: The author was involved in a global research initiative that examined the integration and representation of disabled refugee children in educational systems across three African nations with collaborators from United Kingdom universities. The project's objective was to address the ongoing infringements of their educational rights. According to UNESCO, there are over 262 million children worldwide who are not attending school, with disabled refugee children comprising 10–15% of the refugee population.

Case 6: The author co-led an urgent initiative involving partnerships across disciplines and borders. Five universities, three in Africa and two in the UK, joined forces with a humanitarian organization to confront a dilemma exacerbated by COVID-19's spread. Internally displaced people crammed into cramped informal

settlements faced heightened vulnerability. The collaborative team tailor-made messages and adapted existing pandemic solutions to safeguard these at-risk communities. Drawing from varied backgrounds, they customized care and prevention strategies to fit on-the-ground realities. Where formal systems fell short, grassroots ingenuity prevailed through cooperative spirit and local insights and ownership of solutions. Their culturally sensitive, locally led efforts exemplify how tackling crises demand bringing diverse talents together in empathy, respect, and solidarity.

4. Findings

The findings from the six cases were analyzed against the conceptual framework, and the emerging themes were organized into input, process, and output elements.

Tables 1, 2, and 3 illustrate how the six cases studied for knowledge co-production involved diverse inputs, followed key processes, and produced important outputs. The inputs (Table 1) included participants from different backgrounds, sectors, and perspectives to ensure inclusivity. The scale of each project was also tailored to the specific contexts and aims, involving various levels from national to global. Sufficient resources like funding, expertise, and infrastructure support were obtained from various sources to enable the work. Moreover, the different participants shared their unique tacit knowledge gained from experiences in different settings. This diversity of inputs enriched the knowledge co-production process by providing a range of worldviews and perspectives to draw from.

The processes (Table 2) emphasized dialogue to allow open discussion of different ideas. Democratic systems were in place to ensure equal participation and decision-making power. Skilled facilitators guided the engagements and knowledge sharing. Importantly, knowledge and skills were transferred between participants through collaborative learning. This nurtured shared understanding while mutually building capacity. The processes promoted participation, reflection, and consensus building needed for successful collaboration.

The outputs (Table 3) included tangible products, learning, and improved understanding for all involved. Capacities were strengthened within individuals and organizations to apply their enhanced skills. Enduring relationships developed through the interactions will foster future partnerships. Most significantly, new knowledge was co-created by bringing together the varying expertise, experiences, and insights shared. This co-produced knowledge addressed the objectives of each case and will contribute to progress in the respective fields.

By capturing these factors systematically, the tables demonstrate how the proposed conceptual framework aligned well with and supported the knowledge co-production process in all the diverse cases studied over time. The findings validate the framework's emphasis on inputs, processes, and outputs as well as its flexibility to be adapted to different contexts.

The findings reveal that the proposed framework aligned with the conceptual framework in all six cases, supporting the growing body of knowledge across multiple disciplines that position knowledge co-production as central to sustainable development. This aligns to studies that have argued that knowledge co-production is essential for addressing the complex and interconnected challenges facing the world today, such as climate change, poverty, and inequality [21–23].

These studies highlight the need for a more inclusive and participatory approach to knowledge creation and sharing and propose a new agenda for sustainable development that prioritizes knowledge co-production.

The qualitative analysis revealed valuable insights related to structures of power. It highlighted the importance of acknowledging and addressing power imbalances within co-production processes. The findings emphasized the need for inclusive and participatory approaches that actively engage and empower marginalized voices and communities. The analysis also sheds light on the potential limitations of co-production and co-learning with respect to power relations, underscoring the importance of ongoing reflection, critical dialogue, and the redistribution of power within knowledge production processes.

5. Discussion and Argument for Adoption

This study proposes a quality-based conceptual framework for knowledge co-production that consists of four key components: inputs, processes, outputs, and outcomes. The framework is based on the theoretical foundations of distributed cognition, communities of practice, transformative learning, and quality assurance. The framework is also supported by the empirical evidence from six longitudinal case studies that cover different sectors and contexts. The framework provides a structured and collaborative approach to knowledge co-production that emphasizes the importance of diversity, inclusivity, participation, and capacity strengthening. The framework also offers a flexible and adaptable tool that can be tailored to specific needs and challenges. Adopting this framework can help organizations and individuals enhance the design and implementation of knowledge co-production initiatives to address complex challenges effectively.

The framework aligns with the existing literature on knowledge co-production in several ways. First, the framework recognizes the importance of diverse inputs, such as participants, scalability, resources, and tacit knowledge, as the foundation for effective knowledge co-production [24]. Second, the framework outlines effective processes, such as dialogue, democratic systems, skilled facilitation, and knowledge and skill sharing, that foster productive collaboration and exchange of ideas among participants [13]. Third, the framework identifies meaningful outputs, such as learning, improved capacity, relationships, and explicit knowledge, that demonstrate the tangible benefits and outcomes achieved through knowledge co-production [25, 26]. Fourth, the framework ensures that all necessary elements are considered and accounted for, enhancing the efficiency and effectiveness of knowledge co-production efforts [27].

The framework also demonstrates its adaptability in the diverse cases presented in the longitudinal study. The cases involve different sectors, such as higher education policy development, knowledge production, research publication, student activism, inclusive education, and crisis management. In each case, the framework facilitated successful outcomes and contributed to positive societal impact intervention. The cases show the potential of the framework to be tailored to specific needs and challenges, as suggested by Olsson et al. [28].

The framework promotes inclusivity and participation, which are common themes in the literature [6], by emphasizing dialogue, democratic systems, and skilled facilitation. These elements encourage the active involvement of all relevant stakeholders, fostering diverse perspectives, expertise, and experiences. This inclusivity leads to more comprehensive and robust outcomes, as supported by Trencher et al. [13]. The collaborative nature of the framework also strengthens relationships among participants,

Table 1
The inputs from the six cases

Case	Diverse participants	Scale fit	Resources	Tacit knowledge
1	Stakeholders from different sectors involved in quality assurance, policy making, academic research, and professional practice	National and regional levels of higher education internationalization, aligning with the specific contexts and aims of the project	Partnership arrangement with funding from Global North institution, the Government, and participating universities	Co-development of policies and standards through collective input from participants, based on their knowledge, experiences, and perspectives
2	Quality assurance experts from external quality assurance bodies, development partners from international organizations, and academics from various universities	National, regional, and global scales of quality assurance development and implementation, aligning with the specific contexts and aims of the project	Funding from the from diverse sources, such as the International Network for Quality Assurance Agencies in Higher Education and the African Quality Assurance Network	Knowledge and experiences from different countries and contexts shared by participants, fostering an inclusive and participatory approach to knowledge co-production
3	Quality assurance agencies, government ministries of education, academics from various universities, industry and commerce representatives from private sector organizations, and a commercialization development institution	National, regional, and international scales of internationalization of higher education research, involving various disciplines, countries, and cultural backgrounds	Funding from the Government, expertise from various universities and organizations, and infrastructure support from the Industrial Development Corporation	Knowledge production based on collective knowledge and experiences of participants, gained from different worldviews, experiences, and contexts
4	Higher education students from various backgrounds and perspectives, ensuring the inclusion of diverse voices and experiences in student activism research	National scope of student activism research with potential implications for different countries and educational contexts	Funding from the ZIMCHE, access to data from various universities and student organizations, and academic expertise from various universities	Insights from student voice on the positive aspects of student activism, such as motivation, empowerment, and contribution to positive change
5	Disabled refugee children as the main beneficiaries of the project, schools as the main sites for data collection and intervention implementation, NGOs as the main partners for collaboration and support, local officials as the main stakeholders for policy influence and advocacy, refugees and local communities as the main informants	Global issue of educational inclusion and exclusion of disabled refugee children addressed through focusing on African countries (Uganda, South Africa, and Zimbabwe) as representative sites for in-depth study	Funding from the Economic and Social Research Council-Department for International Development Joint Fund for Poverty Alleviation, research expertise from various universities in Africa and the UK, access to data and collaboration with various stakeholders in Africa	Understanding of challenges, needs, and potential solutions for disabled refugee children's visibility and inclusivity in education, based on the exchange of ideas, experiences, and perspectives among researchers, stakeholders, and policymakers
6	Universities in Africa (Zimbabwe) and the UK as the main sources of research expertise and innovation development, Non-Governmental Organization (Practical Action) as the main partner for collaboration and support, Ministry of Health as the main stakeholder for policy influence and advocacy	National (Zimbabwe) and regional (Africa) levels of health intervention for internally displaced persons (IDPs) in informal settlements, addressing the COVID-19 pandemic	Funding from the Global Challenges Research Fund, university expertise from various disciplines such as public health, community engagement, education, design, and communication, NGO collaboration with various stakeholders in Zimbabwe such as IDPs, local officials, and health workers	Co-adaptation of COVID-19 innovations, such as personal protective equipment (PPE) production using locally available materials, hygiene practices using locally appropriate methods, etc., relevant messages, skills, and context-specific interventions co-created with IDPs based on their perspectives and experiences

facilitating future collaborations and knowledge sharing, as emphasized by Reed et al. [26].

The framework facilitates capacity strengthening and learning in knowledge co-production by explicitly focusing on learning as an output [29]. This encourages continuous improvement and knowledge development among participants. The sharing and transferring of knowledge and skills within the co-production process contribute to the professional growth of individuals and organizations involved, as demonstrated by Robins et al. [30]. This capacity strengthening enhances the long-term sustainability and impact of knowledge co-production initiatives, as highlighted by Cash et al. [25].

Table 2
The inputs from the six cases

Case	Dialogue	Democratic system	Skilled facilitation	Knowledge and skills transfer
1	Diverse stakeholder collaboration and dialogue	Theory of change methodology	Lead communication and collaboration	Expertise, knowledge, and skills sharing
2	Inclusive and participatory knowledge co-production	Stakeholder perspective decision-making	Skilled facilitator communication, coordination, and collaboration	Research, methodologies, technical issues, and cultural insights
3	Quality assurance, government, academia, industry, and commerce involvement	Various disciplines, countries, and cultures scales	Funding, expertise, and infrastructure support	Collective knowledge and experiences sharing
4	Student engagement through participatory methods	Empowered stakeholder expression	Researcher expression of student thoughts	Student voice insights and researcher expertise
5	Ideas, experiences, and perspectives exchange	Diverse voices and democratic decision-making processes	Effective facilitation techniques for discussion, participation, and knowledge sharing	Disabled refugee children experiences, challenges, approaches, and decision-making
6	Discussions and exchanges of ideas for IDPs needs and challenges	IDPs perspectives and experiences for TPHE messages and interventions co-creation and co-production	Expert guidance for discussions, knowledge sharing, and skills training	PPE production and hygiene practices implementation by IDPs

Table 3
The outputs from the six cases

Case	Learning	Improved capacity	Relationships	Knowledge co-production
1	Conceptualizations, knowledge, and skills for policy and standard development, approval, and operation	Harmonized standards, frameworks, and guidelines for quality improvement	Enhanced stakeholder cooperation and knowledge exchange	IHE policy framework, doctoral training framework, and harmonized credit system
2	Knowledge from experienced academics from different parts of the globe	Quality assurance tools and processes development and implementation	Lasting relationships between different disciplines and countries	New programs, graduates, and research outputs
3	Insights and abilities derived from diverse perspectives, experiences, and settings	Research quality, visibility, and impact enhancement for individuals, institutions, and regions	Cooperation and networking beyond the program	Peer-reviewed articles and handbook of the internationalization of higher education in the Global South
4	Deeper understanding of student activism, motivations, and potential for student voice harnessing	Active contribution to positive change in educational institutions by students	Lasting partnership and mutual respect between students and institutions	Model for student voice incorporation in higher education
5	Dynamics, challenges, and potential solutions understanding for researchers, stakeholders, and policymakers	Practices and policies enhancement on disabled refugee children's visibility and inclusivity in education	Trust-based relationships with shared goals among stakeholders	Policy brief on disabled refugee children inclusion and visibility
6	IDPs context insights for appropriate interventions development	COVID-19 protection capacity through PPE production and hygiene practices by IDPs	Trust-based relationships with shared goals to improve IDPs welfare	Co-adapted COVID-19 innovations and co-created TPHE messages

The study recognizes the importance of addressing power dynamics in knowledge co-production, which is a common theme in the literature [31]. The authors recommend critical reflection on power relations among participants and stakeholders, as well as strategies to mitigate power imbalances and promote equity and justice in knowledge co-production.

Overall, this study contributes a quality-based conceptual framework for knowledge co-production that consists of four key components: inputs, processes, outputs, and outcomes. The framework is based on theoretical foundations and empirical evidence from six longitudinal case studies. The framework provides a structured and collaborative approach to knowledge co-

production that emphasizes diversity, inclusivity, participation, and capacity strengthening. The framework also offers a flexible and adaptable tool that can be tailored to specific needs and challenges. Adopting this framework can help organizations and individuals enhance the design and implementation of knowledge co-production initiatives to address complex challenges effectively.

6. Conclusion

This study introduces a novel conceptual framework for knowledge co-production that emphasizes collaboration between diverse stakeholders. When applied to education, this framework has the potential to guide initiatives in research, curriculum development, policymaking, and designing professional development.

For example, the framework could support participatory action research projects conducted jointly by teachers, students, and community members. A group of teachers may use the framework to study how to improve math outcomes at their school. They could bring together parents, school administrators, and local business owners to share knowledge and ideas. Through effective dialogue and mutually reinforcing relationships, they might collectively address challenges like inadequate resources or lack of real-world applications. For example, a school may use the framework to study the impact of overcrowded classrooms on learning through collaborative research teams.

The framework could also foster transdisciplinary curriculum development between university professors. Educators and experts from different disciplines can apply the framework when developing new transdisciplinary curriculum on global challenges like climate change or public health. For instance, a university program addressed sustainability through co-creating interlinked courses across sciences, humanities, and professional fields. Furthermore, education and engineering faculty could collaborate on a sustainability course touching on topics like green infrastructure, ethics, and community engagement. By including varied perspectives and leveraging diverse skills, they may develop richer learning opportunities for students.

The framework provides a structure for policymakers to systematically gather input from diverse stakeholders, including marginalized voices, when developing new education policies and programs. For example, a ministry of education employed the framework to draft inclusive special needs education guidelines with inputs from disability rights groups. For policy formulation around inclusive education, representatives may convene stakeholders from schools, parent communities, and disabled students' organizations. Using processes of democratic participation, knowledge sharing, and relationship-building, they could holistically understand local needs. This may lead to policies that better promote equal access to quality learning for all.

Teacher training institutions may utilize the framework to design participatory professional development modules that leverage the expertise of master teachers, mentors, subject experts, and student teachers. For instance, a professional development course on science, technology engineering, and mathematics (STEM) education was co-designed by in-service teachers, teacher educators, and academic researchers.

By adopting this framework through specific initiatives, education systems can foster greater collaboration, enrich learning experiences, make research more socially impactful, and promote more equitable and participatory approaches to knowledge development. The framework is a valuable tool to strengthen various functions of education systems through collaborative problem-solving.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by the author.

Conflicts of Interest

The author declares that she has no conflicts of interest to this work.

Data Availability Statement

The data that support this work are available upon reasonable request to the corresponding author.

Author Contribution Statement

Evelyn Chiyevo Garwe: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data Curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

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