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Sustainable futures: a quality-focused model for inclusive knowledge co-production

Evelyn Garwe[1]

1 IBSUniversity

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Abstract

The paper uses a quality assurance-focused conceptual framework based on the distributed cognition theory to thread through a longitudinal study of six case studies, spanning over ten years to develop a cross-cutting model applicable for knowledge co-production policy and practise. The cases illuminate cumulative and deep engagement among diverse individuals and teams (inclusive of: policy makers, academics, early career researchers, professionals, students, internally displaced persons as well as disabled refugees and their parents) in different locations (all continents of the world) with a similar outcome – knowledge co-creation. The model stresses any fundable or implementable project should evidence learning as the basis for the futures.

Evelyn Chiyevo Garwe[1]

[1] *IBSUniversity, Mt Eriama Campus Port Moresby, Papua New Guinea.*

Email: garweec@gmail.com

ORCID: https://orcid.org/0000-0002-6111-8622

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Introduction

Knowledge co-generation/innovation has gained heft as the leading factor of production necessary for global competitiveness as well as sustainable and equitable futures. Recently, innovation policies have been strategically moved from the periphery (being part of economic or education) to the centre (standalone innovation policy) of national/regional policy frameworks. Accordingly, funding and development agencies now prioritise innovation projects that emphasise knowledge co-creation in their funding frameworks. However, evidence required to inform the development of an innovation policy or investment framework remains a pressing empirical question considering the tensions reflected in literature regarding the practicality of knowledge co-production, particularly in the Africa.

Since time immemorial, economic and development theorists across the globe have underscored the importance of education for socio-economic inclusion and development (Alexander, 2020; Findlay & Kierzkowski, 1983; Oyinlola and Adedeji, 2021); Singh, et. al., 2022). To that end, Kuang Tse 551-479 B.C. is quoted by Salgür (2013) to advise that education is the only way to plan for the future any other way is considered unsustainable. Education has moved full circle: from it being considered as enabling the manpower/labour factor of production through training for 'knowledge application'; to being considered as the producer of the brains behind other factors of production (technology and entrepreneurship); to its current position of being considered as the major factor of production through innovation and creativity - knowledge generation (Robertson, 2021).

Knowledge is grouped into two major categories, codified and tacit knowledge (Mitchell, Harvey, & Wood, 2022). Codified knowledge relates to knowledge/empirical evidence presented in written forms (e.g. journals or books) or situated within networks of people (e.g. Conference presentations (Latour 1988). Collins (2017), highlights that codified forms only become recognised as knowledge upon their acceptance within the scientific community as exemplified by rigorous peer review processes. Tacit knowledge on the other hand, refers to knowledge present in the mind that remains with the owner and is difficult to transfer/share with the wider community (Alves & Pinheiro, 2022). It comprises one's insights, experiences, skills, judgements, perceptions, behavior and intuitions (Miton & DeDeo, 2022). A good example of tacit knowledge is that of fisherman, subsistence farmer, herbalists and artisanal miners who amass and utilise uncodified knowledge in their work (Polanyi, 1966). The recent COVID-19 pandemic clearly demonstrated that tacit knowledge offers the future in changing environments and globalisation (Grundstein, 2022). Because tacit knowledge can be shared through person-to person interaction, analogies and stories (Miton & DeDeo, 2022), if harnessed and made transferrable, it has the capacity to increase productivity. As will be shown later, this paper takes the views by other economists, who argued that only effort, time and cost can prevent the codification of tacit knowledge (Ancori, Bureth & Cohendet, 2000).

Scholars assert that knowledge is ubiquitous, where there is life there is knowledge (Bijker et al. 1989; Edwards et al. 2013; Longino 2019). Knowledge production/generation can be partial, user-oriented and context (e.g. challenges, experiences, interest and culture) specific (Cepeda-Carrion, et. al., 2022; Kolawele 2012). However, the widespread acceptance of knowledge is affected by "power dynamics" relating to: who produces it; with whom; for what purpose; in what context; when and using which distribution platforms (Fritz, & Binder, (2020); Shapin 1994). This superiority/inferiority view of knowledge based on context, has driven many developing regions, notably Africa, to shun their indigenous knowledge and to wholesomely adopt, albeit uncritically, scholarly theories of foreign origin which could be inappropriate or do not address pertinent local challenges and imperatives (Kaya & Seleti 2013). This situation supports the cause for utilising collaborative ways such as knowledge co-production, which is the thrust of this paper.

The realisation that knowledge creation begets economic development has led to the preoccupation of governments and development agencies with the development of innovation policies (Farny & Binder, 2021). This strategic policy approach to supporting innovation has become widespread, prompting the need for many countries without those policies to be guided accordingly (Edler, &, Fagerberg, 2017). Accordingly, Africa, reportedly producing only 2 percent of the world's publications, stands to gain from partaking in the knowledge economy. The region has an estimated 1.4 billion inhabitants,

exhibiting a rich mix of diverse geographical, cultural, language, religions, political, historical backgrounds, socio-economic statuses, skills and experiences. This paper will show that as long as the appropriate conditions are addressed, the diverse participants exchange both tacit and codified knowledge to co-create through distributed cognition.

Theoretical Framework

This paper used the Distributed Cognition Theory (DCT) to guide the development of a conceptual framework for the study. The DCT which was initially advanced by Hutchins (1995), asserts that when people work as a team, utilising their external affordances, they can achieve more than the sum total of their individual contributions. (Neisser (1967) described cognition as a process where the mind gets to know things by intuition, reasoning or perceiving them. According to Hollan, Hutchins, & Kirsh (2000) in the cognitive process, humans make use of non-human agents, for example their surroundings, to enhance their memory through a period of time, space, and location. It is important therefore to note that the knowledge production process occurs within a context, and draws upon various stakeholders as well as other features within the environs. Knowledge co-designing involves combining the creative abilities, skills and experiences of many people through collaborative conceptualization, implementation and evaluation (Mitchell et. al., 2015). The SDC framework allowed the writer to identify the challenge, consider the evidence relevant to the task, learn from experience through interacting with people and to consider all these during the process of data analytical and synthesis.

Bederson & Shneiderman (2003) propose five ways in which scholars can effectively utilise of a theoretical framework the namely: descriptive; explanatory; predictive; prescriptive and generative. The descriptive domain involves the identification of key concepts and the design of a conceptual framework. The explanatory domain explains processes and relationships that support the objective. The predictive phase involves using the data to make predictions for similar or different contexts. In the prescriptive stage, evidence is used to develop useful guidelines and risk pointers. Finally, the generative phase involves using the evidence to inform the future. The writer adopts the given approach, starting with the design of a conceptual framework based on the DCT framework. The methodology and the case descriptions will form the explanatory phase. The discussion of the findings speaks to the predictive stage whilst the suggested model for knowledge production will form the prescriptive stage and lastly the proposed way forward will define the generative stage.

Conceptual Framework

This paper designed a conceptual framework (Figure 1) by adapting the DCT (Hutchins, 1995) to incorporate aspects of the quality model (Shabani et al., 2014) as well as insights from the conceptual framework for social, behavioral, and environmental change developed by Eaton (2021). The quality assurance model stresses the importance of inputs and processes in developing good quality outputs.

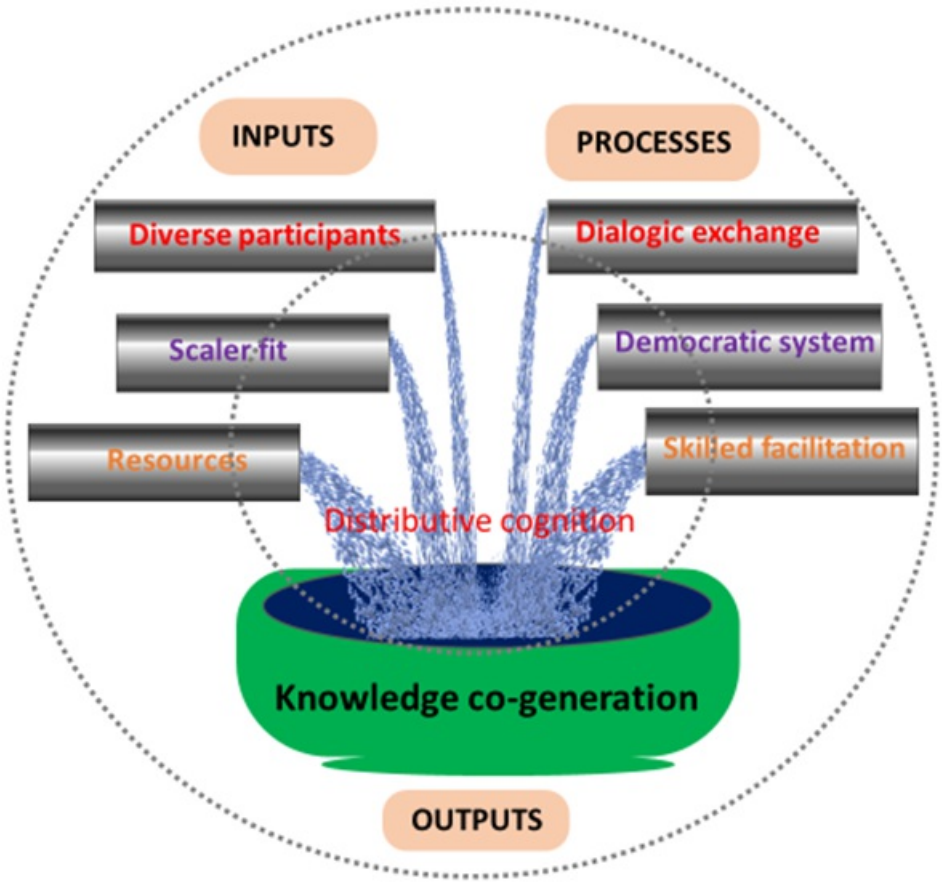

Figure 1. Quality-oriented distributed cognitive conceptual framework for knowledge co-creation

Inputs

The inputs required for quality knowledge co-generation in the context of the DCT include participants, scalar fit and resources. Depending on the goal, the participants involved should necessarily be diverse enough to cover different demographic profiles such as age, gender, cultural background, race, epistemic orientation, discipline of expertise/study, geographical location/origin, years of experience, social status etc. This systematic and deliberate consideration ensures inclusivity that enables success. Reed et al. (2018) opinions that it is through such diversity that policy makers and researchers can overcome “blind spots” in inventions and avoid the “trial and error” approaches to decision making that result in time and resource wastage. Notice here that the term participant is used instead of actors. This stance takes into cognisance the voices of scientists who draw a line between diversity for the sake of ticking a box and inclusion (Sherbin & Rashid, 2017; Stewart & Valian, 2018).

Knowledge co-production should take scale or scope into consideration to reflect the magnitude of the solutions being sought (Reed et al. 2018). The scale can be seen from a geographical, contextual, disciplinary, duration or intensity point of view. For example, when dealing with issues that affect learners then there is need for including a critical mass of students to adequately capture their voice. Scale also speaks to the extent to which the outputs of a project can be applicable to different contexts and to reach a wider audience. Inputs in the form of external resources such as policies, funding, specific skills or experience, institutions, technology, facilities and amenities, need to be provided (Palmer,

Kramer, Boyd, & Hawthorne, 2016; Schuttenberg & Guth, 2015).

Processes

The process dimension of the conceptual framework speaks to the conducive arrangements necessary to ensure quality knowledge generation whilst recognising that each participant posesses both explicit and tacit knowledge (Tsoukas & Vladimirous, 2001). These conditions including dialogue, democratic system and skilled facilitation ensure a shared purpose, common understanding, and collective co-creation among diverse participants. Whilst some scholars argue that these conditions are generally difficult to put in place, many agree that they are critical for success (Gerlak et al. 2019). Through dialogue, participants can interact, exchange views and learn from one another under informal and formal settings (Rapanta & Felton, 2022). Furthermore, scholars have drawn attention to the tensions and barriers to diverse participation that include: dynamics of power; marginalisation; bad experiences in the past; varying levels of skill; trust issues and fear of the unknown (Grindstaff, 2022; Treffny & Beilin 2011). The differences in backgrounds, exposure, worldviews and perspectives is a possible explanation for such challenges. Some scholars suggest that this tension lays fertile ground for co-production through reconciling participants and allowing them to work together creatively (Lukasiewicz & Baldwin 2017). For that reason, skilled facilitators and use of democratic approaches can assist participants to develop deep engagement skills as well as ensuring stakeholder commitment (Barlow, et al., 2020; Kaner 2014). As Koontz (2014) argues, the extent to which participants feel ‘included’ enhances their commitment to achieving the set goals.

Outputs

The key output from the conceptual framework is knowledge co-generation which is reflected by usable tangible and intangible products. This way knowledge is contextualised and converted into accessible formats such as publications, policies, artefacts amongst others. These formats are considered usable and practical because of the inclusion of relevant participants in developing the theory of change depending on the desired outcomes.

Methodology

The case study methodology suited the study best wherein the researcher explored emerging patterns on acquisition of deep knowledge through engagement with various tacit knowledge “owners.” Qualitative analysis was used to reveal the in-depth findings related a series of multi-faceted cases which was threaded from experiences of stand-alone studies/projects during the period 2012 to 2022. The cases included in this study were selected purposefully to reflect the diversity of participants, contexts, approaches and activities – all leading to knowledge co-production. Taking into cognisance the importance of resources as a key cog in the conceptual framework, funding and use of skilled experts are the key defining threads in the all six cases. All the six cases were implemented within a transformative framework wherein effecting and supporting change was the cross-cutting goal. All the cases involved a brokered and structured

participatory process. The cases are presented in the narrative format, an approach to theoretical framing that was intimated to work best in exploring the researcher's findings (McCance et al., 2001).

The cases

The first case (C1), represents three learning reflections of the three (two national and one regional) projects undertaken from 2016 to 2022 to co-develop policies and standards. In the two national projects, the writer was the lead for the competent authority for quality assurance in higher education in Zimbabwe. The author partnered a university in the United Kingdom, leveraging the University's expertise in internationalisation of higher education (IHE). The partnership resulted the process of co-design of the Zimbabwe IHE and doctoral training policies.. The IHE implementation Framework was approved by the Zimbabwean Government in January 2020 whilst the doctoral training policy was adopted in September 2022 for implementation by universities. The paper explores the conceptualisations, knowledge and skills gained and shared by each player in the development, approval and operationalisation of these policies. The regional project, Harmonisation of African Higher Education, Quality Assurance and Accreditation (HAQAA) trained African quality assurance practitioners on how to evaluate (through use of common standards) and strengthen quality through harmonising their institutional, national and regional quality assurance and accreditation systems like the Pan-African Quality Assurance and Accreditation Framework (PAQAF). The major output of the HAQAA project was the development of the African Standards and Guidelines for Quality Assurance in Higher Education (ASG-QA). The writer and her fellow HAQAA ambassadors built upon this project by working on harmonising the Southern African Development Community (SADC) Credit accumulation and transfer system.

Case number two (C2) relates the writer's involvement in three knowledge production projects/studies with academics at a national, regional and global scale. The national Research and Intellectual Outputs Expo was an initiative by the government, the quality assurance body, industry and commerce to showcase creativity in all the higher and tertiary institutions in the country. The writer was the convenor and secretary for the Organising Committee for the event which ran annually from 2010 to 2016. As one of its mandates, the RIO Expo published two Journals from the peer reviewed crème de la crème of the research articles namely: Journal of Zimbabwe Studies: Arts, Humanities and Education and Journal of Zimbabwe Studies: Science, Technology and Health. The artefacts and prototypes exhibited at the Expo were adjudicated by experts from industry and those showing potential for commercialisation were identified for funding and further developed under a Memorandum of Understanding with the Industrial Development Corporation. The regional study was a multi-country endeavour aimed at improving Organisational Research Cultures in African Universities (ORCA) to which the writer led her country chapter and interacted with 22 academics in African countries exploring more than 100 African HEIs. In the global writing project, the writer was involved in conceptualising and co-editing a ground-breaking Handbook of the Internationalisation of Higher Education in the Global South with five other Editors and 42 contributors from different countries in the five continents. In doing this, the writer gets to understand and share deep knowledge and skills resident in different worldviews, experiences and contexts.

Case number three (C3) is the writer's engagement with experts and Editors of leading journals from the Global North and

Global South to train early career researchers (ECRs) from across Africa on how to produce and disseminate knowledge. The project was sponsored by the British Academy as a way to advance the agenda by African countries to improve knowledge production as a means to achieving sustainable development goals. The project drew inspiration from the underrepresentation of Africa in the global knowledge production arena accounting for a mere to percentage units as highlighted in literature. A workshop was organised to encourage research publication and impact, by supporting and enriching the partnership between academics in the Global North and South and fostering linkages between academics and publishers. After the workshop, the writer followed up on the effect of the workshop and ongoing mentoring of the ECRs on their knowledge creation contributions over a three-year period.

Case number four (C4) relates to a longitudinal study carried out from 2012 to 2015 to engage students in higher education and get to understand their voice. This became necessary as a response to the increasing student protests in many countries that resulted in extensive destruction to infrastructure and endangering of human life. Drawing on existing literature on student activism. The study was borne from a conviction that if that positive student energy used in activism was turned to good use, a lot of creativity would ensue. The chapter and the value of student voice to inform the development of a model for incorporating the “student voice” as a way of harnessing the positive aspects of student activism.

Case number five (C5) is a research project aimed at exploring the inclusion and visibility of disabled refugee children in education in African countries. This stemmed from the perceived persistent violations to their right to education. For example, UNESCO (2019) estimated that globally, in excess of 262 million children are not in school and the situation is worse for disabled refugee children who often account for 10-15% of the refugee population. The writer participated in the Disabled Refugee students Included and Visible in Education (DRIVE) two-year multi-disciplinary, multi-country project aimed at undertaking an in-depth exploration of the dynamics of educational inclusion and exclusion to inform policy and practice. Three countries in Africa were the selected sites of study based on their representation of countries with historical backgrounds, contexts and approaches to refugee settlements. The study adopted the social ecosystem theoretical model that positions activities and practices in a conceptual space impacted on by vertical facilitatory mechanisms (e.g. international, national and local policies and regulations, resource allocation) and the horizontal networks, interactions and relationships between local actors. The practices of inclusion or exclusion and how various actors (schools, NGOs, local officials, refugees, local communities) are positioned in relation to this emerges in this ecosystem.

Case number six (C6) is an interdisciplinary, and impact-oriented project that the writer participated with in partnership with five universities in Africa and UK as well as one Non-Governmental Organisation. The project was aimed at intervening in a crisis caused by the COVID-19 pandemic to endanger the lives of internally displaced persons (IDPs) residing in informal settlements. The term IDPs is used in reference to people who are forced by circumstances/disruptions (of a natural or human-induced nature) to vacate their residences (Ndhlovu, 2020). IDPs reside in closely-knit usually illegal spaces that make them unable to observe social distance (Refugees International 2020) thereby increasing their vulnerability to the spread of the COVID-19 virus. Moreover, IDPs are often far removed from centres offering primary healthcare. The project was able to co-adapt existing COVID-19 innovations to suit the IDPs

conditions as well as co-create and co-produce appropriate and Transformative Public Health Education (TPHE) messages and interventions. IDPs were trained on how to make personal protective equipment like masks, aprons gloves and detergents.

Findings and discussion

This section presents and discusses the emerging themes from the six cases. Table 1 shows the scope of the projects and the participants involved. It can be seen from table 1 that all the cases included a wide array of participants depending on the nature of the project. Table 2 shows the outputs from the six cases. The overarching finding is that underlying all the outputs was one outcome - knowledge co-production. The section further discusses the conditions under which co-production occurs, according to the conceptual framework, the necessary inputs and processes are discussed. From these findings, an appropriate model for knowledge production is proposed.

Table 1. Scope of the projects and the participants involved

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Scope (Geographic)	*Regional*	*Regional*	*International*	*National*	*National*	*Regional*
Scope (Discipline)	*Education*	*All*	*Sciences, Arts*	*All*	*Migration*	*Heath*
Participants						
Policy makers	X	X			X	X
Institutional leaders	X	X			X	X
Academics	X	X	X	X	X	X
Industry	X	X			X	X
Students	X	X		X	X	
Editors	X	X	X			X
Community					X	X

Table 2. Outputs from the six cases

Case	Outputs					
	Policy	**Policy brief**	**Innovations**	**Publications**	**Standards**	**Networks**
1	**X**			X	X	X
2			X	X	X	X
3				X		X
4				X		X
5		X		X		X
6		X	X	X		X

Knowledge Co-production

Knowledge co-production emerged as the unifying outcome of all the six cases. The outputs include policy documents, policy briefs, innovations, publications, standards and networks at national, regional and international levels. This type of knowledge can be readily used and transferred for impact within and outside the contextual domain. In addition to creating knowledge, the participants within the cases reported that they gained new skills through the engagement and relationship building process that may not necessarily relate to the project at hand but that could be useful for future knowledge creation. To this end, co-production allowed for exchanges of not only of codified knowledge but also of tacit knowledge, a feat that had been hitherto considered impossible. The finding resonates with other economists, who argued that only effort, time and cost can prevent the codification of tacit knowledge (Ancori, Bureth & Cohendet, 2000; Lee and Jung 2017).

Similar to other scholars (Schneider, 2019), the cases in this paper reveal that collective/interactive approaches involving diverse participants acknowledge is critical for quality co-production as it allows for distributed cognition. The cases show that the participants bring with them different types of knowledge and exposure for example: technical; disciplinary; indigenous/traditional; and practitioner. As conceded by Polk, (2015) the constant dialogue and interaction between the various participants removes any initial hesitation. Case one reveals the power of interaction through what this paper coins as “cross-cutting complementarity.” The publisher for one of the books written under C1 wanted the editors to do our own indexing. When all the other four co-editors said they couldn’t do it, another one smiled and said: “I know how to do it just watch me so that you can also learn.” Learning is an outcome of knowledge co-production as it directly speaks to skill development for future knowledge production. Learning is a by-product of continuous engagement and dialogue and should be viewed as a cumulative process and not a single event. Learning also occurs through joint reflection.

The cases revealed that buy-in by participants was critical for successful engagement and co-creation of knowledge. For example, C1 showed the power of the theory of change methodology in rallying stakeholders together as well as the need for enough time for participants to further engage with the constituencies they represented. Enough time is also needed to allow participants to deal with other competing demands for their time. Case six revealed the utility of using transformative approaches to development where-in innovations were designed together with the community to adequately address their challenges as well as ensuring post-project sustainability.

The inputs proposed by the conceptual framework: diverse participants, scalar fit and resources were found to be applicable in all the six cases. The scalar dimensions cutting across the cases show the possibility of knowledge and skill transfer which has positive implications to both theory and practice in socio-economic development. The ability to connect capabilities and extract tacit knowledge at individual and group levels leads to learning necessary to confront complex developmental issues. Investments in leadership, commitment and funding emerged as other key considerations that aided success in all the cases. The resultant co-produced outputs were not only relevant to each situation/location-based scale, but it was possible to make comparisons and formulate predictions for future occurrences. A case in point was that of C5 were the multi-country research findings although based on different contexts, they were used to formulate a predictive decision framework applicable at the international policy formulation scale. Similarly, the processes include

dialogue, democracy and skilled participation. A focus on the outcomes in relation to context, was also found to aid knowledge co-production.

These findings support the increasing body of knowledge from multiple disciplines that position knowledge co-production at the centre of evidence-based policy making (Cooke et al. 2020; Howarth and Monasterolo 2017; Norström et al. 2020). The term, which originated from the work of an economist, Eleanor Ostrom (1996), resonates well with the concept of distributed cognition that anchored this study because of its significance to inclusive futures (Giatti, 2022; Melnikovas, 2018; Pollio et al., 2021). Co-production highlights the compensatory gains in knowledge obtained from reciprocal exchange and 'cognitive inclusion' amongst diverse participants rallying behind a common purpose. In addition, this study propounds that co-production is key to the futures because of its quality orientation and its ability to provide solutions to emerging challenges problems.

Sustainability Approach to Knowledge Co-production

The interactions of participants with various demographic profiles (age, gender, experience, races, cultures, geographic locations, social standing etc.) through dialogues and metalogues were transformative. In addition to co-production of knowledge outputs, deep learning for all participants was considered critical for the futures. Whilst such approaches to sustainability can vary according to disciplines or agendas, the common thread is that each participant learns something valuable for the future and that empowerment helps them to bring out their best in co-developing appropriate solutions, policies and operational frameworks (Zvavahera, 2021). There is an emerging body of literature that has coined such learning as "sustainable learning" to describe a philosophy where people learn to learn, learning is transferrable and retained after initial exposure to it (Hays, & Reinders, 2020; Tractenberg et al. 2016). Learning becomes sustainable in the sense that it becomes responsive, purposeful and proactive enabling the leaners to develop and accumulate adaptive knowledge and skills. Ssustainability in economics, development, politics and indeed all other disciplines has become a critical skill for the futures and it features in national and international agendas (Skene and Murray 2017).

Equipping participants with sustainable learning behaviours will help to tap the huge potential that exists in the form of tacit knowledge which is necessary for a successful future at the individual, national and global levels. The model suggested in Figure 2 links the distributed theory (Hutchins, 1995) with the quality model (Shabani et al., 2014), the conceptual framework by Eaton (2021) and the current study's findings. This model is appropriate for big picture, long-term and sustainable planning. In itself the model is testimony to the fact that knowledge and learning are cumulative concepts that adapt with time. A key implication of the model is that quality orientation is key to sustainable futures.

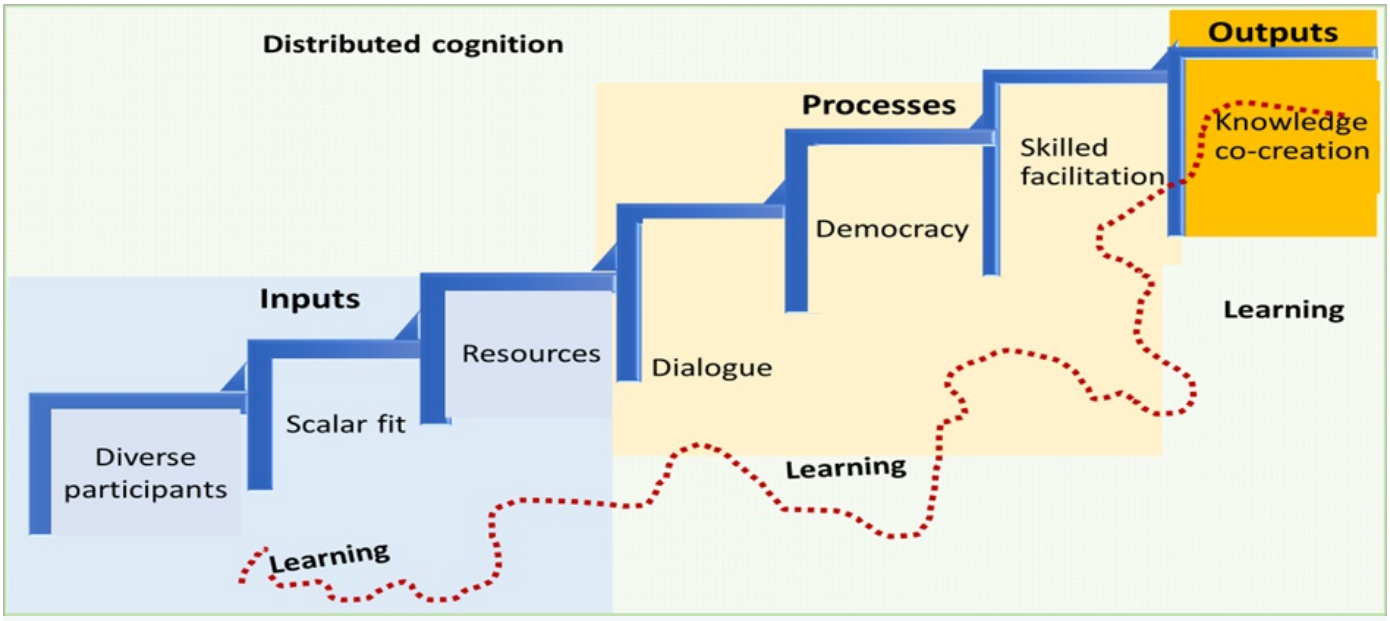

Figure 2. Quality-focused model of knowledge co-creation

Conclusion

Addressing sustainability and developmental issues in calls for collaborative co-creation of context-specific and scalable knowledge. The participatory futures methodology as was shown in this paper, is a powerful tool for obtaining both tacit and codified knowledge as well as for continuous learning in the process. The model proposed can be applied to solve emergent and complex developmental issues as well as to predict the future.

The longitudinal approach to studying cases of knowledge co-development helped in shaping a model to guide futures planning from the perspective of any developmental project in any discipline. Inputs and processes are key considerations to ensure quality outcomes. Encouraging participation through inclusive engagement of stakeholders is key to learning. Although the learning outcome may take time to surface, it is key in predicting the future. Future studies should focus on further exploring the linkages across the components of the model. The new method used in this paper of cross-linking different cases along a timeline may help to unearth comparative and cumulative trends. The limitations and risks of focusing on findings of stand-alone cases (projectification) for futures research was discussed before (Allan 2012). The argument is that the short-term nature of such studies does not give the researchers enough time to engage in learning which necessarily needs time and space (Turnhout et al. 2020).

A final word of caution from a quality assurance perspective is that the inputs and processes are critical for successful outputs and should be designed carefully, with context and scale in mind.

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