LEARNING TO GOVERN GHANA'S FORESTS RESPONSIBLY

RESPONSIVE CURRICULUM DESIGN AND ENACTMENT

Joana Akua Serwaa Ameyaw

Propositions

1. In Ghana, poor forest governance persist because foresters lack professional authority and autonomy.
   (this thesis)

2. An incremental approach to change works best for faculty-led curriculum innovation.
   (this thesis)

3. Without strictly enforced land use planning, the fight against deforestation outside protected areas in Ghana will remain an illusion.

4. Demanding democratic representation in multi-stakeholder processes without budgetary allocations for transaction costs, does not only result in mere rhetoric but also in deception.

5. Knowledge is not the key to life; wisdom is.

6. For an African wife and mother, resilience is a more important virtue for completing a PhD than intellectual prowess.

Propositions belonging to the thesis, entitled:

Learning to govern Ghana's forests responsibly: responsive curriculum design and enactment.

Joana Ameyaw

Wageningen, 1 May 2018

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Thesis committee

Promotors
Prof. Dr Bas J.M. Arts
Professor of Forest and Nature Conservation Policy
Wageningen University & Research

Prof. Dr Arjen E.J. Wals
Personal chair at Education and Learning Sciences
Wageningen University & Research

Co-Promotor
Prof. Dr Esther Turnhout
Personal chair at Forest and Nature Conservation Policy Group
Wageningen University & Research

Other members
Prof. Dr Arnold K. Bregt, Wageningen University & Research
Prof. Dr M. Rieckmann, University of Vechta, Germany
Dr Kyereh Boateng, Kwame Nkrumah University of Science and Technology, Ghana
Dr S. van Bommel, Wageningen University & Research

LEARNING TO GOVERN GHANA'S FORESTS RESPONSIBLY: RESPONSIVE CURRICULUM
DESIGN AND ENACTMENT

Joana A. S. Ameyaw

Thesis

submitted in fulfilment of the requirements for the degree of doctor

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Prof. Dr A.P.J. Mol,

in the presence of the

Thesis Committee appointed by the Academic Board

to be defended in public

on Tuesday 1 May 2018

at 4 p.m. in the Aula.

Dedicated to Emmanuel.

He gave my life a meaning!

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When I chose to undertake an interdisciplinary study and also to combine research with 'action', I had no idea of the enormity of the task ahead and how long it was going to take but many people supported me throughout the journey and made it possible!

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LIST OF ABBREVIATIONS AND ACRONYMS

C1	Cohort 1
C2	Cohort 2
CANR	College of Agriculture and Natural Resources
CDT	Curriculum Delivery Team
CIKOD	Centre for Indigenous Knowledge and Organizational Development
CoP	Community of Practice
CS	Civil Society
Dept.	Department
EU	European Union
FAO	Food and Agriculture Organisation
FC	Forestry Commission
FLEGT	Forest Law Enforcement Governance and Trade
FO	Forestry Official
FRNR	Faculty of Renewable Natural Resources
FSD	Forest Services Division
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GOG	Government of Ghana
HOD	Head of Department
Ind.	Industry
INRM	Integrated Natural Resource Management
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature and Natural Resources
KNUST	Kwame Nkrumah University of Science and Technology
LI	Legislative Instrument
MPhil.	Master of Philosophy
MSD	Multi Stakeholder Dialogue
MLF	Ministry of Lands and Forestry
NGO	Non-governmental Organization
NPT	Netherlands Programme for the Institutional Strengthening of Post-Secondary education and Training Capacity
NREG	Natural Resource and Environmental Governance
NUFFIC	Netherlands Universities Foundation for International Cooperation
PAR	Participatory Action Research
PCD	Participatory Curriculum Development
PhD	Doctor of Philosophy
PROFOR	The World Bank's Programme on Forests
RCD	Responsive Curriculum Development
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
RFG	Responsible Forest Governance
RQ	Research Question
SPSS	Statistical Package for Social Sciences
TCDT	Transdisciplinary Curriculum Development Team
TO	Technical Officer
TUC	Timber Utilization Contract
UNDESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
VPA	Voluntary Partnership Agreement

Chapter 1

General Introduction

"Foresters … have failed to deliver" has become a very common slogan
among NGOs. Over time, the professional esteem of
the forester is waning. (Temu et al., 2006 p123)

This thesis examines the creation of a university curriculum that responds to the dynamic needs of present day forestry professionals. Such a curriculum is referred to in this thesis as a responsive curriculum: an adaptive curriculum that bridges the gap between abstract theories on one hand and the more contextual, continuously changing and demanding realities of the professional environment on the other. It follows the journey of a Forestry Department at a university in Ghana towards creating such a curriculum. This chapter first presents an introduction of the changes in forestry globally and in Ghana particularly with special consideration of the roles of forestry professionals. It then elaborates on efforts by higher education institutions to address the changing needs of these professionals and points out the knowledge gaps leading to the research questions. This opening chapter explains the relevant concepts as well as the research design and methods used in exploring the research questions. The chapter ends with an outline of the thesis.

1.1 CHANGING DISCOURSES IN FORESTRY

Discourses on forests and forest management have changed over time (Arts and Buizer, 2009; Arts et al., 2010). First, narratives on the relevance of forests have changed (Bengston, 1994), as evidenced in the evolution of the central themes of forest policies and programmes across the world. Until the nineteenth century, forests were managed for consumptive use and timber was the main focus of forest policies. Today, although consumptive use remains important, many contemporary policies address conservation along with ecotourism, climate change mitigation, and other non-consumptive values of forests. In contemporary Ghana, for example, the current Forest and Wildlife policy (2012) emphasizes all ecosystem services from the forest environment, whereas its predecessor did not speak of ecosystem services (1994). Additionally, forest management has become intermingled with several 'wicked' problems facing the world today like biodiversity loss, climate change, poverty and food insecurity (Arnold et al., 2011; Millar et al., 2007; Persha et al., 2011; Pimentel et al., 1997). At present, forest management is expected to take these problems into consideration. This is seen in the growing number of initiatives like reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+) and forests for food security and nutrition, among others.

Second, discourses on who has the right to decision-making within forestry are also changing. Taking the example of Ghana, local people managed forest resources before the inception of formal forestry in the 1900s, but with the establishment of the then Forestry Department in 1909, government became the main actor steering forest management, putting non-state actors in a marginal position (Kotey et al., 1998). Such hierarchical approaches to management became unpopular, due to policy failures leading to deforestation and forest degradation, especially in developing countries (Ahenkan and Boon, 2010; Ascher, 1999). Consequently, from the 1980s there has been a shift from government regulation towards more interactive multi-level and multi-actor forest governance (Arts, 2006). Forest governance is no longer the sole domain of governments, but also of civil society and private actors (Arts, 2006; Arts et al., 2010; Bavinck et al., 2005; Lemos and Agrawal, 2006). Governance also tends to play out at multi-levels such that policies are increasingly designed, discussed and implemented at different levels of government simultaneously (Leroy and Arts, 2006). Thus, different actors are involved in varied roles in forestry decision-making at international, regional, national and local levels at the same time. Local forestry NGOs for example could be promoting climate change adaptation initiatives with landowning communities together with international partners, without necessarily engaging the national level.

Interactive forms of governance indeed have their weaknesses (Arnouts and Arts, 2009), but they are believed to be more legitimate than hierarchical steering by governments (Lindsay et al., 2002). They are therefore gaining popularity in international and national discussions, leading to several initiatives like forest certification, payment for ecosystem services and the Forest Law Enforcement, Governance and Trade (FLEGT). In Ghana, for example, since 2008, several donor organisations have teamed up to provide funding for policy review and development, institutional reform and capacity building under the Natural Resource and Environmental Governance (NREG) programme. These changes have implications for the role of the 21st century forestry professional. However, this thesis focuses more on the implications of the changes in forest governance.

1.2   DYNAMIC ROLES OF TODAY'S FORESTRY PROFESSIONAL

The role of today's forester is changing due to the increasingly dynamic professional environment. At the inception of formal forestry, government was the main employer of forestry professionals. A professional here refers to highly trained and self-responsible graduates (Boshuizen et al., 2004). These professionals acted in the interest of government and focused on the management of timber in accordance with the then prevailing forest policies (Kotey et al., 1998). Presently, however, a significant number of foresters find employment outside government, in non-governmental organizations or the private sector (Ackom, 2010). There, they play varied roles, which include scrutinizing policy implementation and sometimes advocating for a rethinking of the underlying approach to forest management.

Moreover, the changes in forest governance discussed in the previous section imply that, forestry professionals working in the government sector are not the sole and final authority on forestry issues. They need to engage effectively in and sometimes facilitate multi-stakeholder processes (Klaver, 2009), manage conflicts (Marfo, 2006; Klaver, 2009), create awareness, disseminate information, broker forest governance instruments, and negotiate international trade related partnerships (e.g. Voluntary Partnership Agreements (VPA)). These roles are significantly different from what was typically required of the forestry professional in the 1970s.

Further, the interactive governance paradigm has changed what is considered as good governance. Several criteria have been developed for assessing the quality of governance, including; resource use efficiency, equity, transparency, accountability and the extent to which countries achieve forest-related development goals (Lancaster and Montinola, 1997). Governance that does not meet these requirements results in losses in government revenue, employment, and environmental services (World bank, 2009), impacts that are considered undesirable. Thus, today's forester needs to share information and show evidence of quality governance not only to the custodians of the resource, but also to civil society and other national and international actors.

These changing roles require not only new knowledge about forestry practice, but also new skills, thinking capacities and mind-sets (Bodegom and Klaver, 2008). Temu et al., (2006) note that only few foresters are equipped with requisite skills to manage transformations in forest management. This is where universities and other higher education institutions have a responsibility and are expected to create space for alternative thinking and to develop dynamic qualities and competencies (Wals, 2006).

1.3   EDUCATING THE 21ST CENTURY FORESTRY PROFESSIONAL

Higher education is expected to provide knowledge and solutions to the challenges of today's world (Hoff 2009). However, because the forestry professional´s environment and indeed the world as a whole, is changing so rapidly, higher education curricula easily become obsolete, resulting in gaps between what is taught and what society and the world of work demand (Dar-es-Salaam Declaration, 2010; Narayanan, 2009). The conventional model of higher education that relies heavily on knowledge transfer and on the training of mainly cognitive skills is inadequate for addressing the complex challenges of the 21st century (Sibbel, 2009; Sterling, 2004). The forestry professional who was typically trained in the university to measure, tend trees and to undertake technical operations, is now required to carry out roles far removed from technical forestry. These new roles require

different sets of capabilities, making it crucial for universities to reform their curricula to remain relevant.

In response, many forestry, agricultural and life-science universities are changing their curricula to address emerging professional needs (Arevalo et al., 2014). One of the key proposals for change has been to broaden the scope of forestry education to include non-technical skills (Arevalo et al., 2010, Temu et al., 2006). However, the initial approach used in some cases, including in the Ghanaian context, was to "bolt-on" courses (Sterling, 2004) that address social perspectives especially when the idea of participatory forest management became popular in the 1990s. Considering the increasing complexity in the forest governance arena as well as the wicked nature of emerging forestry challenges, many universities now seek to develop responsive curricula that can comprehensively address current capability needs whilst remaining dynamic enough to prepare forestry professionals for the future. The research conducted in this thesis draws on existing knowledge about the character of responsive curricula and their development process, to contribute towards addressing outstanding knowledge gaps.

1.4   KNOWLEDGE GAPS IN EDUCATION FOR RESPONSIBLE GOVERNANCE

While considerable literature exists on forestry education generally, there is a dearth of knowledge on what kinds of education are needed for responsible governance and for facing the dynamics and complexities involved in current multi-actor and multi-level governance processes. The knowledge gaps that this thesis addresses are four-fold.

First, there has been no systematic and comprehensive assessment of emerging challenges to responsible forest governance (RFG) and the professional capacities needed in the Ghanaian context. Conducting a 'needs assessment' is widely known as an important starting point to curriculum development (Stoof, 2005) both in vocational education and training (Mulder and Gulikers, 2010; Wesselink et al., 2007) and in professional development (Albanese et al., 2010; McEvoy et al., 2005; Willard et al., 2010). In forestry, some have researched employers' expectations of today's graduates (Kammesheidt et al., 2007) and the required competencies for forestry graduates in general, (Arevalo et al., 2010; Arevalo et al., 2014) but there is still limited information available regarding the professional capabilities required for ensuring more RFG. Without this assessment, it would be difficult to systematically determine the content of a curriculum that adequately addresses capability needs. In a similar vein, Temu et al., (2006) emphasize the need to carry out such comprehensive surveys to establish the current knowledge and skills gaps particularly for African foresters (p.124). This thesis therefore identifies and prioritizes challenges to RFG in Ghana and uses it as the basis for determining emerging capability needs of professionals.

Second, there is little knowledge available that documents the process of creating and delivering a responsive curriculum. While there is a body of literature available on why these curricula are important and on how to improve teaching and learning (Wals and Jickling, 2002; Wals et al., 2009), only a few studies provide empirical descriptions of processes for developing such curricula in practice (da Cunha et al., 2000). Moreover, the studies that are available focus mostly on the global North (E.g. Davis and Jacobsen, 2014; Elliott et. al. 1993; Lenthall et al., 2009; McFadden et al., 2011; Paulsen and Peseau, 1992) with only a few studies from the African context (e.g. Kiguli-Malwadde et al., 2006). Several universities today find it difficult to bring about fundamental improvements in the

teaching and learning processes and relatively few universities have been able to demonstrate the ability to create responsive curricula (Chakeredza et al., 2008; Kibwika, 2006). Thus, the focus on understanding the design implications of responsive curriculum development (RCD) in Ghana is novel, timely and urgent.

Third, how to generate lasting teaching and learning innovations among teachers who were themselves taught with traditional methods is not well understood. Coleman (1984) points out that one of the limitations and obstacles that any university in a Third World country faces in trying to be developmental is the competence of the existing teaching staff – its members were never trained to think, act or teach development. Very little is likely to change unless staff members retool themselves. To expect institutional change to emerge from existing competences would lead to a case of the 'blind leading the blind'. RCD thus necessitates a change in the usual modus operandi of higher education institutions. This is challenging because these institutions are noted to be highly resistant to such change (Evans and Henrichsen, 2008). Thus, while it is often relatively clear what changes in the curriculum are necessary, insufficient attention is paid to the question of *how* to realize those changes. Traditionally, re-tooling teachers has been based on formal professional development programmes, but useful as these are, they are unable to generate adequate and lasting impetus for innovation in teaching and learning (Boud, 1999). This study investigates how teachers could develop innovations for teaching and learning in response to the changing needs of forestry professionals.

Fourth, students are central to all educational innovations; a responsive curriculum ensures that graduates function properly in the increasingly challenging and dynamic professional environment. The various innovations towards an integrated approach to education in the forms of either multi, inter or trans–disciplinary approaches in forestry education and other life science curricula have been assessed, (Ewel, 2001; Innes, 2005) but with little focus on the perspective of students who experience these curricula. Today's forestry graduates have varied career options available to them, which require diverse capabilities. Again, in the 21st century knowledge society, students are not passive recipients of university curriculum content. The content and process of responsive curriculum enactment should make the students knowledgeable and confident of meeting future career aspirations. The perspectives of students in debates on changes in forestry education are few (Arevalo et al., 2012; Kostilainena, 2005; Schmidt et al., 2008), especially in Africa (Popoola and Agbeja, 2008) and hardly provide detailed assessment of the interplay between curriculum content and enactment. This thesis thus probes the lived experiences of students with a responsive curriculum.

1.5   OBJECTIVES AND RESEARCH QUESTIONS

To address the aforementioned knowledge gaps and to contribute to scientific understanding of RCD, the main objectives of this study are two-fold: The first is to understand the context of forest governance in Ghana and what that means for the education of forestry professionals. The second is to examine the process of how to innovate curriculum design and enactment to provide new capabilities needed for RFG in Ghana. In pursuit of these broad objectives, the following research questions were formulated:

1. What are the key challenges for responsible forest governance in Ghana and which capabilities do forestry professionals need to address them?
2. What are the characteristics of a responsive curriculum development process and how are they demonstrated in the Ghanaian context?
3. How do interactions among lecturers and practitioners facilitate enactment of the responsive curriculum?
4. How does the integrated approach used in the responsive curriculum satisfy students' career aspirations?

Each research question is addressed in a separate chapter of this thesis, and also constitutes a peer reviewed research article. In these chapters, each research question is further operationalized into sub-questions.

1.6   THE CONTRIBUTION OF THIS STUDY

This study responds to the broad agenda in global sustainable development. The world's sustainable development goals do not just emphasize education, but quality education (UNESCO, 2016). This thesis contributes to improving the quality of education in forestry specifically and other life sciences as well. Second, the United Nations Agenda 21 emphasises the central role of education for proper management of forests and the United Nations report (2012) on "resilient people, resilient planet: a future worth choosing" emphasizes the necessity of training and mentoring a new generation of professionals who are able to think differently and create a sustainable future. This study responds to the call for in-depth study on the new knowledge, skills and thinking capacity needs of the African forester (Temu et al., 2006). It details the capability needs of forestry professionals for forest governance based on a comprehensive empirical study of challenges to improving forest governance in Ghana. This information is useful to organisations offering professional training in forestry and other life sciences as well as those providing continuing education and in-service training for mid-career professionals.

This study also benefits current initiatives to design and deliver responsive curricula. While it does not provide a blue print on RCD, the case study documented - offers a valuable example that can inspire future curriculum initiatives. Amongst others, the study provides evidence of the importance of the internally engineered learning-based interaction between teachers and practitioners in fostering and tailoring innovations to the local Ghanaian context, as well as the constraints and limitations that emerged in practice.

The study also contributes to existing scholarly literature on curriculum design and innovation in higher education by generating much needed insights into the actual creation and enactment of such a curriculum. By offering detailed empirical analyses of the needs and capabilities of future professionals, the processes involved in curriculum design, the

experiences of students, and the challenges and limitations that emerged in practice, this study contributes to our understanding of what it takes to innovate higher education. Beyond the field of curriculum studies, these insights are also relevant for related approaches in capacity development and transformative learning, including amongst others communities of practice, social learning and transdisciplinarity.

Finally, the contribution of this study goes beyond this thesis. It inspired the creation, enactment and continuous innovation of the two-year Master of Philosophy (MPhil.) programme in natural resource and environmental governance (NREG) at the Kwame Nkrumah University of Science and Technology in Ghana which has been running since 2013.

1.7   THEORETICAL AND CONCEPTUAL APPROACH

1.7.1 Responsible forest governance, professional capabilities and curriculum

The first research question seeks to understand the capabilities the 21st century forestry professional needs to govern forests responsibly, but this cannot be done without an understanding of the forest governance arena and emerging challenges to achieving responsible governance. Forest governance encompasses the set of processes, mechanisms, and formal and informal institutions by which different actors share their ideas and concerns, make their voices heard on issues, and influence actions and outcomes related to forests (Lemos and Agrawal, 2006; World bank, 2009). In this sense, governance includes what governments do as well as the various multi-actor and multi-level interactions between governments and other actors (Arts, 2006; Kjaer, 2004; Kooiman et al., 2008, Leroy and Arts 2006; Pierre and Peters, 2000).

Several indicators have been established to show the quality of governance. Though some of these were established as part of corporate management and public-sector reform, they also have been adapted and frequently used in forestry and other natural resource sectors (FAO-PROFOR, 2011; Lockwood et al., 2010). They are commonly called "good governance" indicators and include criteria such as inclusiveness, rule of law, control of corruption, accountability, and transparency. This concept of good forest governance is usually associated with international funding and monitoring organisations (FAO-PROFOR, 2011; World bank, 2009) and proposes an ideal situation where set indicators are strictly adhered. This thesis however recognizes that this is likely to be unrealistic in today's world. Thus, this thesis refers to the term responsible forest governance to mean improvement in attaining good forest governance indicators set to fit specific geographical contexts. RFG therefore creates room for re-thinking and re-adjusting existing practices, based on lessons learnt. This is the starting point for examining the capabilities new and mid-career forestry professionals need. Admittedly, professional capabilities are not the only requirements for addressing challenges and ensuring RFG. Other factors like institutional structures and economic resources (Roy and Tisdell, 1998) are also necessary, but this study limits itself to professional capabilities since its focus is on forestry education. Capabilities here refer to the combination of knowledge, skills, attitudes and mind-sets that enable forestry professionals to perform (govern forests) responsibly. Professionals are the focus of this study because of the central role they play in forest management (Innes and Ward, 2010; Temu et al., 2006). Subsequently, the identified professional capabilities form an input into the design of the responsive curriculum (Figure 1).

Traditionally, curricula have been seen as a matter of substance related to the content of courses with specified learning outcomes. Recent scholarship has asserted that curricula are more than that. They involve the process of becoming progressively more knowledgeable and of rebuilding the experience that enables the learner to grow in exercising intelligent control of subsequent knowledge (Tanner and Tanner, 2007). This conception of curricula is embraced in this thesis. Again, for curricula to be effective and produce the desired change, they must be flexible and easily adaptable as has been proposed by researchers on professional and career-oriented higher education (Kiguli-Malwadde et al., 2006; Paulsen and Peseau, 1992; Taylor 2000). A curriculum should have the possibility to adapt depending on the prevailing needs of the professional practice. It must be "able to take into account the capacity gap of practitioners and anticipate future trends" (Peters, 2000 P.12). This thesis therefore refers to a 'responsive curriculum' as one that is adaptive and that bridges the gap between abstract theories on one hand and the contextual, continuously changing and demanding realities of the professional environment on the other. In other words, understanding the changes in the practice of forest governance is required for identifying the capabilities that future forestry professionals need. This relationship between the governance context and the required capabilities is depicted as arrow 1 in figure 1. Once professionals obtain the required capabilities, the assumption is that they should be able to promote RFG (dotted arrow in figure 1). This is however yet to be established empirically and will be revisited in the discussion chapter of the thesis. Subsequently, an understanding of the required professional capabilities feeds into the development of the responsive curriculum. The conceptual approach used to examine and evaluate the curriculum will be discussed in the next section.
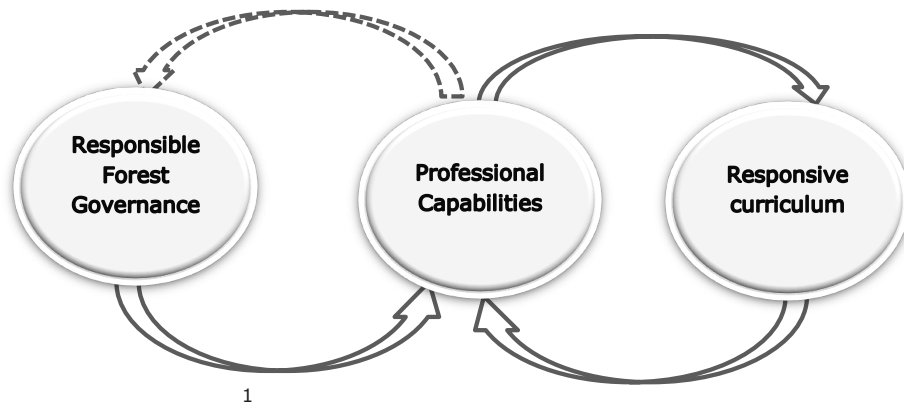
Figure 1.1 Interplay of responsible forest governance, professional capabilities and responsive curriculum

1.7.2 Curriculum attributes, Communities of Practice and Integrated approach to learning

In general terms, curriculum development can be conceptualized from either a narrow or a broad perspective. From a narrow perspective, curriculum development is the process of deciding what to teach and learn (Schubert, 1986) whereas from the broad perspective, it refers to the entire process of needs assessment, curriculum design and enactment as well as evaluation (Taylor, 2003). This thesis uses a broad perspective on curriculum development and looks beyond decisions on what to teach and learn and addresses the process of designing and delivering the curriculum. It has done so by using three different approaches: 1. Investigating the unique attributes of responsive curriculum design, enactment and evaluation, 2. Examining learning among teachers through interactions within a community of practice and 3. Exploring students' experiences and satisfaction with the integrated approach used in the curriculum.

First, to investigate the attributes of RCD, we used an existing framework on Participatory Curriculum Development (PCD) (Taylor, 2000; Taylor, 2003). This framework has been used in natural resource education in several parts of the world, including Africa. In some cases, it has been used in changing course contents (Leth et al., 2002; Leth and Sriskandarajah, 2004) and in other cases, in developing a complete curriculum (Taylor 2000). PCD encourages participation of all stakeholders, including those beyond academia (Narayanan, 2009; Taylor, 2000; Taylor, 2003; Tynjälä, 2009; Wals et al., 2004; Watson, 2010; Zietsman and Pretorius, 2006). Participation is a necessary condition for RCD, thus making it useful as a precursor for examining the attributes of RCD in this thesis. Other attributes of RCD process were also established from literature and used to understand and scrutinize the case studied.

Second, we have examined the process of delivering the curriculum, including the reflection and learning processes involved within the teaching staff. A crucial issue is how the teachers – faculty members (lecturers) and practitioners employed as part-time lecturers in the university – organize their teaching and learning experiences in a different way to stimulate new knowledge, thinking capacities and skills among students. Teachers may develop new skills in several ways. The typical strategy is building their capacity through teacher development programmes and formal policies for auditing, monitoring and evaluating the implementation of a higher educational curriculum. Deni et al., (2014) note that, useful as these formal strategies are, they do not assure quality teaching within classrooms nor do they guarantee that curricula are being delivered as intended. Therefore, this study has drawn on the concept of Community of Practice (CoP) (Lave and Wenger, 1991) to analyse the more informal exchanges and reflections taking place among teachers during curriculum enactment. The concept of CoP is a contribution to learning theory in general and social learning in particular. A community of practice is a group of people 'who share concern or a passion for something they do and learn how to do it better as they interact regularly' (Wenger, 2006 p1). This definition emphasizes the importance of interaction in practice as a condition for learning. We complemented our analysis with insights from deliberative theory and power in order to further analyse the content of the deliberations and reflections taking place within the CoP (Niemeyer and Dryzek, 2007, Mansbridge et al., 2010). The central assumption of deliberative approaches is that deliberations should be able to produce agreement on the relevant beliefs and values that ought to be taken into account in teaching and learning. Niemeyer and Dryzek (2007) proposed three kinds of consensus that could be produced in a deliberation – *normative* consensus which considers agreement on values, *epistemic* consensus which borders on

agreement about how actions affect values in cause and effect terms and *preference* consensus which deals with agreement on what should be done. This thesis thus examines the interactions among teachers of the responsive curriculum within the context of a community of practice, the kinds of outcomes their deliberations have produced and the role of power in doing this.

Third, we explored the experiences and satisfaction of students with two main innovative elements of the responsive curriculum: the extent and way in which the curriculum integrates different scientific disciplines and the extent and way in which it includes perspectives from practice and the world of work. Both elements have been identified in literature as important for educating and training students in addressing environmental and resource issues from an integrated perspective (Taylor, 2000; Temu and Kiwia, 2008; Wals et al., 2004). We have used the concept of transdisciplinarity to refer to the combination of these two elements (Balsiger, 2015). Transdisciplinarity refers to the interaction of two or more sets of disciplines with non-scientific expertise, which involves a comprehensive framework that organizes knowledge in a new way to address socially relevant issues in a non-reductionist manner (Ramadier, 2004; Pohl, 2011). An important characteristic of transdisciplinarity is the intentional combination of knowledge of professionals with the know-how of other stakeholders outside academia (Horlick-Jones and Sime, 2004; Klein, 2004). Thus, professionals within and outside academia learn from each other to equip themselves with skills, knowledge and ethical values above the level of technical perspectives (Aneas, 2015; Balsiger, 2004; Ciannelli et al., 2014; Klein, 1990).

Figure 2 depicts the structure of the thesis and links it to the four research questions. The relationship between RFG and professional capabilities (depicted as arrow 1) was investigated in research question 1. Arrows 2a and 2b form the focus of research question 2 which examines how the professional capabilities inform the design and enactment of the responsive curriculum as part of the unique attributes of RCD. In research question 3, the concept of community of practice, complemented by power and deliberative theory, is used to interrogate the interactions among teachers of the RCD (arrow 3) to understand how they facilitate enactment of curriculum innovations. Research question 4 evaluates how the integrated approach to learning used in the RCD meets students' career aspirations (arrow 4a) and how it is able to develop the required professional capabilities (arrow 4b). What remains to be established empirically is how professional capabilities developed would affect RFG (dotted arrow). This is a topic that will be revisited in chapter 6 of the thesis.
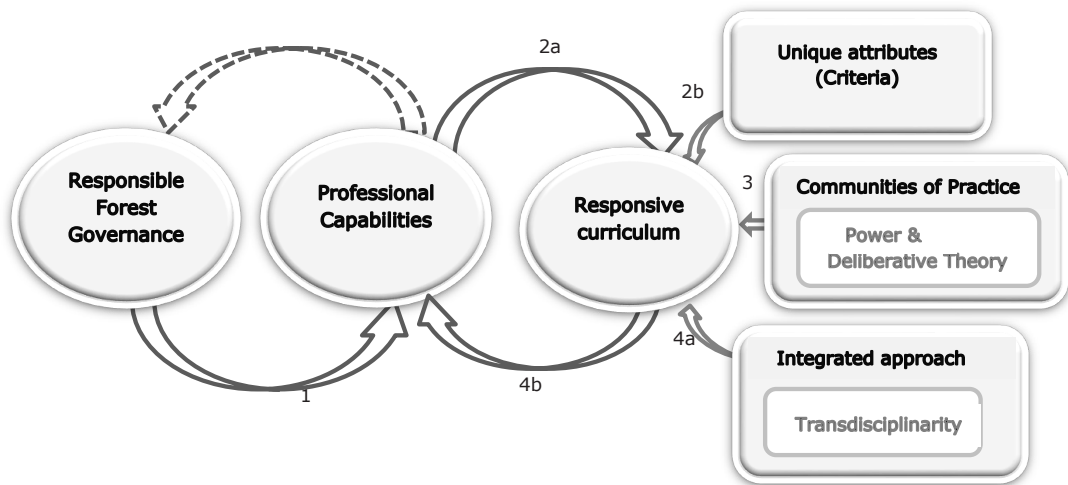
Figure 1.2 Inter-relations between key concepts of the thesis

1.8 METHODOLOGICAL APPROACH

1.8.1 The study context

The study was conducted in Ghana. Ghana's forests are dwindling at a fast rate (Oduro et al., 2014) and this may be attributed in part to poor governance practices. Professional forestry training at both the undergraduate and postgraduate levels within the country focused mainly on forest science and silviculture. Perspectives on managing forests with people were only minor additions to the curricula. In the early 2000s however, the need for improved governance of forests emerged on both the international and national agenda. Subsequently, in 2008, the Government of Ghana, together with a number of Development Partners, initiated the Natural Resource and Environmental Governance programme that aimed at policy and governance reforms to promote sustainable economic growth and environmental protection among others. This initiative involved several government sector agencies including the Ministry of Lands and Natural Resources, the Ministry of Environment Science and Technology and the Forestry Commission. These agencies, which happened to be the major employers of forestry professionals, soon realized that these professionals did not have adequate capacities for addressing governance challenges in the forest and other sectors. The initial response to this capacity gap was to send professionals abroad for training, but with time, there was a heightened call for capacity building in forest governance within the country through several workshops.

The Department of Silviculture and Forest Management of the Faculty of Renewable Natural Resources (FRNR) at the Kwame Nkrumah University of Science and Technology (KNUST), decided to take up the challenge and create capacity for forest governance. Typically, developing a new curriculum is part of the Department's regular mandate and if a conventional approach had been used, it would not have created much interest in studying and improving it. The Department conventionally would set a committee made up of its faculty members to draft the curriculum and circulate it to relevant stakeholders for their

input. However, this call for capacity building in forest governance had come at a time when the College (CANR) had partnered with a Dutch Consortium to institutionalize integrated natural resource management (INRM) within the college. This INRM process brought a deep realisation within the College that with the rapid changes in the world of work, a curriculum developed solely by higher education institutions *for* society would not serve its purpose. Thus, the Department wanted to develop the curriculum *with* relevant actors in professional practice. They wanted a curriculum that would not just award a degree, but would be responsive to the needs of the forest sector by developing students' capacities to function well within the rapidly changing forestry and natural resource management sector. This had several implications:

1. The area of governance entails more than just expertise in forestry, thus demanding cross-disciplinary engagement in curriculum development.

2. Though professional forestry training at the faculty included engagement with practitioners, collaborations had waned over several years and needed to be reinvigorated.

3. Usually education at the university is characterized by strong theoretical knowledge-based foundations and teachers at the university had mainly been trained with this tradition. Thus, taking the challenge of training the new professional was going to require change, learning and innovation on the part of the lecturers themselves.

These three challenges that were to be addressed in the proposed curriculum innovation were also considered worth studying in order to produce not just scholarly output but also opportunities for further reflection and improvement. Thus, the stage was set for action research. The study began with the initiation of the curriculum development process in 2009 and followed the process through its design and accreditation until the programme started in 2013. The programme that emerged from the process was a two-year Master of Philosophy programme in Natural Resource and Environmental Governance (NREG). The study also followed how teachers brought in innovation in teaching and learning for the first two student cohorts, who evaluated the integrated approach used in the responsive curriculum up to 2016.

1.8.2 Research methodology

The general methodological approach of the thesis has been informed by participatory action research (PAR), a research strategy in which researchers together with relevant actors engage in a joint process of reflection, problem identification, action, and knowledge generation (Anderson and Herr, 2005; McKernan, 1991; Swantz, 2008). PAR is widely used in educational research (Corey, 1953). Action research is the study of a social situation with a view of improving the quality of action within it and bringing about social change (Elliott, 1981). It relies on the premise that theories are not validated independently of practice and then applied to curriculum, but rather they are validated through practice (McKernan, 1991). The philosophical underpinnings of the study are situated within what is known as the critical educational research paradigm where the purpose of research is not merely to understand situations and phenomena, but also to change them (Cohen et al., 2007). This approach to research was considered appropriate because of its noted usefulness in the combination of curriculum research and curriculum design (Cohen et al., 2007; McKernan, 1991).

PAR also recognizes problem owners as being strategically positioned to address the problem and therefore as ideally placed to pursue their inquiries, by themselves and for themselves (Wadsworth, 1998). Being a faculty member myself, I[1] (the author of the thesis), was therefore well placed to facilitate the PAR process. This helped to make sure that during the research, the teachers, including myself, could proceed with RCD more or less without interruption and express their ideas freely (Wals and Alblas, 1997). All participants in the PAR were interested not just in creating a responsive curriculum, but also in better understanding their practice and the dynamics of making the curriculum responsive. Within this group of participants, I had an additional interest in understanding the theory of RCD, thus in problematizing existing theories on curriculum development, analysing curriculum development at the institution and confronting solutions generated with theory.

Finally, PAR as a research methodology also represents a form epistemological equity in the sense that equal weight is given to different ways of knowing (e.g. experiential and conceptual) and types of knowledge (e.g. local, indigenous and scientific). This also implies that the academic researcher must recognize and value knowledge that comes out of practice and look for ways to combine these different ways of knowing and types of knowledge in a meaningful way. Consequently, PAR itself, as a research methodology, must be responsive to these different inputs.

1.8.3 Methods for data collection and analysis

This thesis has different methods for data collection and analysis to examine the multiple dimensions and aspects of the phenomenon at hand. The general methods used were interviews, workshops, focus group discussions participant observations, desk study and questionnaires. These different methods were combined to allow meticulous and in-depth data collection. The different methods also allowed triangulation for validation. Below, we detail the methods that were used to address each of the research questions.

RQ 1: Governance challenges and professional capabilities

Preliminary data on governance challenges were first gathered at a Workshop with twenty-one participants from government agencies, civil society groups and forest industry. Workshops are useful as a research method in identifying barriers to governance related issues like negotiations in conflict (Fisher, 2004). Participants were systematically selected and invited from across the country. At this multi-stakeholder workshop, participants explored the challenges based on RFG indicators considered most relevant to Ghana (see 1.7.1). Challenges identified in the workshop became an input for a focus group discussion on professional capabilities for responsible governance. The focus group consisted of twelve forest governance experts including practitioners (plus prospective students), researchers and academics. My role in the workshop and the focus group discussion was to ensure the use of systematic procedures in participant selection and information gathering. I also co-ordinated the discussions within the sub-groups in the workshop.

Data obtained from the workshop and focus group discussions were validated through in-depth interviews (Rubin and Rubin, 2011). These interviews provided lived experiences of

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[1] Whenever 'I' is used, the author of the thesis distinguishes herself from the participatory action research team to explain her specific role.

respondents on governance challenges and gave credence to proposed professional capabilities identified. Forty-one (41) interviews were conducted with forestry officials from the Forest Services Division of the Forestry Commission and non-forestry officials from research, academia, civil society organisations and industry. Governance challenges and capabilities were finally prioritized in a survey with 103 forestry stakeholders, using a structured questionnaire.

RQ 2: Unique attributes of the RCD process

To address this research question, we carried out a desk study of published guides and case studies of curriculum development and review processes between 1990 and 2010 in the life sciences and other disciplines. This desk study resulted in the identification of a set of unique attributes of RCD. Over time, additional insights from studies published between 2010 and 2015 were added as theoretical input to the PAR. Subsequently, we used participant observation within the PAR and note taking to assess how these attributes were manifested in the curriculum process. In the PAR, I played a dual role. Being a lecturer myself, I fully participated in the RCD process but other participants were aware of my researcher role as well. I contributed to the RCD process by providing theoretical input into the process, analysing problems and jointly generating solutions. Participant observation allowed me to experience the phenomenon being studied directly; to get a first-hand impression of the activities, the people involved (Spradley, 1980) and the distinctive characteristics of the process. It was also useful for collecting authentic accounts and verification of ideas through empirical observations.

RQ. 3 Interactions among lecturers and practitioners

To understand the interactions among lecturers and practitioners teaching the new curriculum as well as the implications of these interactions for the enactment of the curriculum, three sets of data were used. First were transcripts from deliberations among teachers between 2012 and 2016. This period covers the time of preparations for teaching to teaching and adjusting the curriculum in the first three years of the programme. Second were transcripts from six conversational interviews conducted with teachers to understand their interactions outside the organized meeting sessions and how they use shared repertoires from their interactions in teaching and learning. Conversational interviewing was used because of its flexibility in allowing the interviewer to clarify questions and seek additional meanings (Lavrakas, 2008). The third data set were notes on teacher interactions and experience sharing during field trips and tailor-made teacher training sessions. Four field trips and twelve tailor-made sessions were organized during the study period.

RQ4: Students perspectives on integrated approach to curriculum

To address this research question, we explored the perspectives of the first two cohorts of students - 48 students in total – using two sets of data. First, we used interviews and focus group discussions to elicit the opinion of students about the integrated approach that underpins the curriculum and whether they consider it as useful in responding to their career aspirations. Upon enrolment, interviews were conducted to understand students expectations and career aspirations and at the end of the academic year, another set of interviews were conducted on their impressions of the integrated approach used in teaching and learning. Focus group discussions (Kumar, 2014) were also organised for students with similar career aspirations to reach consensus on the usefulness of the integrated approach

to their career path. Second, we used a questionnaire in which students were asked to assess their capabilities before and after the programme. To develop the questionnaire, we used the capabilities identified earlier in research question 1.

Data analysis

Transcripts from interviews, workshops, focus group discussions and interactive meetings and observation notes were mainly subjected to thematic analysis. Thematic analysis identifies, analysis and reports patterns in data (Braun and Clarke, 2006). This approach is preferred because of the flexibility it gives for describing data in a rich and complex manner, while providing transparent structures for analysis (Vaismoradi et al., 2013). Theoretical concepts introduced in this chapter guided data collection and also the development of themes (George and Barnnett, 2005), but themes were also generated from the data. For example, data collection on challenges to responsible governance and professional capability needs were structured around RFG indicators but challenges identified were clustered into seven categories based on dominant themes that emerged from the data. Themes generated were validated with two or more colleagues to improve reliability and reduce subjectivity (Jonsen and Jehn, 2009).

Quantitative data generated in this study were mainly analysed using Microsoft Excel and the commonly used Statistical Package for the Social Sciences (SPSS). Differences in responses of different categories of respondents were usually tested using Mann-Whitney U test. Differences between two sets of phenomena (e.g. rankings assigned to two different capability needs or self-assessment of capabilities before and after the programme) were assessed using Wilcoxon signed rank test and where differences were being tested for more than two categories, Kruskal-Wallis test was used (Field, 2013). Detailed accounts of how data were analysed for each of the research questions are given in chapter 2 to 5.

1.9   ORGANISATION OF THE THESIS

This thesis is organized into six chapters. This first chapter has given a general introduction to the study, establishing changes in the forestry professional environment requiring that 21st century professionals develop new capabilities. It has explained the knowledge gaps motivating this study and given the objectives and research questions pursued. It has also provided the theoretical underpinnings of the study and methods used. The next four chapters contain empirical studies based on the research questions. Each of these chapters have been developed as an independent research paper for a peer-reviewed journal.

Chapter 2 addresses research question 1. It focuses on emerging challenges to RFG in Ghana and what that means for developing capabilities among future forestry professionals. It shows that the main challenges are not related to a lack of technical capacity to manage forests, but rather to a lack of authority and autonomy in defending professional decisions. It provides evidence supporting the need for an integrated approach to education and demonstrates that forestry professionals needed learning experiences that make them more analytical and critically reflexive in their thinking, that strengthen their ability to defend professional decisions, and that develop their capacity to bring about needed change and transformation.

Chapter 3 addresses research question 2. It discusses the way in which the curriculum developed and the way in which it responds to the new capability needs of professionals. It follows the journey of a forestry department in Ghana in leading an RCD process and

highlights the key characteristics of the process. It also illustrates how various contextual factors enabled or constrained the development of the curriculum.

Chapter 4 addresses research question 3. It examines the interactions between teachers involved in designing and delivering the responsive curriculum. This chapter situates their interactions in the contest of a community of practice and investigates whether and how interactions and deliberations within the community became a platform for new knowledge and skills for providing experiences for students to develop required capabilities.

Chapter 5 addresses research question 4. It offers an evaluation of the curriculum from the perspective of the first two cohorts of students who enrolled on the programme. It analyses the tenets of the integrated approach – transdisciplinarity - used in the curriculum based on a typology adapted from Balsiger (2015). It reveals the kind of transdisciplinarity exhibited in the programme and highlights areas requiring improvement. It also examines whether students believe they have acquired improved capabilities for RFG and how, overall, the curriculum approach meets their career aspirations.

Chapter 6 starts by presenting the conclusions and by answering the research questions. Subsequently, the findings of the study are situated in a broader context of forested landscape governance and theories of learning. The chapter concludes by reflecting on the theoretical and methodological underpinnings of the study and by giving future perspectives for research and the practice of curriculum development.

Chapter 2

Challenges to responsible forest governance in Ghana and its implications for professional education

ABSTRACT

As forestry transitions from hierarchical steering by governments to more multi-actor forms of governance, it has become necessary to understand key challenges to improve forest governance and its implications for educating forestry professionals. This chapter therefore investigates these challenges and explores capabilities forestry professionals require to overcome them. We employed mixed qualitative and quantitative methods. Data were collected through interviews, focus group discussions and a survey with forestry sector stakeholders. Qualitative data were analysed by clustering related issues into dominant themes and quantitative data by using Mann–Whitney U and Wilcoxon signed rank tests. Key challenges identified relate to political culture, particularly the power position of some elites in forest management and a culture of corruption. Non-compliance and poor enforcement of rules were also highlighted. To overcome these challenges, key capabilities forestry professionals require include leadership, authority and autonomy, alongside the capacity to initiate and manage change. We conclude that to improve forest governance in Ghana, beyond having state-of-the-art technical knowledge, professional education should place more emphasis on developing non-technical capabilities. We recommend an integrated approach to professional education that simultaneously develops knowledge, skills, attitudes and mind-sets necessary for producing graduates who can effectively address governance challenges.

Keywords: Forest governance, Forests, Forestry education, Forestry professionals, Ghana

2.1 INTRODUCTION

Discourses on forest management have changed over time, with implications for the role of forestry professionals. Before the 1980s, forest management was mainly steered by the government. Government employed professionals—highly trained and self-responsible graduates (Boshuizen et al., 2004) — to manage forests. These professionals took major decisions on behalf of government, without much input or scrutiny from non-state actors (Kotey et al., 1998; Western and Wright, 1994). This government-led hierarchical form of forest policy and management however became unpopular, due to policy failures leading to deforestation and forest degradation, especially in developing countries (Agyarko, 2001; Ahenkan and Boon, 2010; Ascher, 1999). Since the 1980s therefore, there has been a discursive shift towards more interactive multi-actor forest governance (Arts, 2006).

Though there are failures associated with the more interactive forms of governance (Arnouts and Arts, 2009), they are believed to be more (cost-) effective and legitimate than hierarchical steering by governments (Lindsay et al., 2002). To enhance the quality of governance generally and in forest management specifically, several criteria have been developed including the efficiency of resource use, sustainability, equity and the extent to which countries achieve forest-related development goals (Lancaster and Montinola, 1997). Governance that does not meet these requirements results in losses in government revenue, employment, and environmental services (World bank, 2009) and these are considered undesirable. Improving the quality of forest governance is however imbued with a number of challenges. Most research on improving quality of forest governance has focused on developing instruments/framework for monitoring and assessing governance with emphasis on strengths and weaknesses. Consequently, especially in developing countries, the weaknesses in forest governance are known but why these weaknesses persist, has been sparsely studied (Contreras-Hermosilla, 2011; Maletz and Tysiachniouk, 2009). This chapter therefore seeks to contribute to understanding the underlying challenges affecting the capacity to improve governance and achieve responsible forest governance (hereafter indicated as RFG). An important factor in understanding of the challenges to achieve RFG is the required capabilities of forestry professionals who play key roles in forest governance. Temu et al., (2006) note that only few foresters are equipped with requisite skills to manage transformations in forest management. Some have researched into employers' expectations of today's graduates (Kammesheidt et al., 2007) and competencies for forestry graduates in general (Arevalo et al., 2010; Arevalo et al., 2014) but there is still a dearth of information on professional capabilities required for ensuring more responsible forest governance. Temu et al., (2006) emphasize the need to carry out comprehensive surveys to establish the current knowledge and skills gaps of African foresters (p.124). The United Nations Agenda 21 emphasizes the central role of education for sustainable forest management. The United Nations report (2012) on "resilient people, resilient planet: a future worth choosing" emphasizes the necessity of training and mentoring a new generation of forestry professionals who are able to think differently and create a sustainable future.

This chapter therefore has a twofold objective: first, to identify and prioritize emerging challenges to responsible forest governance in Ghana and second, to explore professional capabilities required for addressing them. We studied the forest sector in Ghana for three reasons:
1) Forests in Ghana are dwindling at a fast rate (Oduro et al., 2014) partly due to poor governance practices; a situation requiring urgent informed intervention. 2) Training of

forestry professionals in Ghana is struggling to remain abreast with the changing needs of the forest sector. 3) The first author is involved in the training of forestry professionals and the development of a centre of excellence in training natural resource governance professionals in Ghana. The results we provide should be treated as a starting point for a more exhaustive assessment of specific capability needs of forestry professionals in order to realize (more) responsible forest governance.

In the next section, we give a brief description of professional forestry education in Ghana. We then discuss a theoretical framework for responsible forest governance. Subsequently, we present research methods, followed by the results and a discussion showing the implications of our findings for professional education and training. The last section offers a brief conclusion to the research.

2.2 PROFESSIONAL FORESTRY EDUCATION IN GHANA

Professional forestry training started in Ghana in 1982, through the joint effort of the government and the then University of Science and Technology. The aim was to train highly skilled personnel to manage the forest sector. A three-year Bachelor of Science programme in Natural Resource Management was developed with specialisation options in four areas: silviculture and forest management, fresh water fisheries and watershed management, wildlife and range management and wood science and technology. A fifth specialisation option in agroforestry was introduced later in 2005. Opportunities were also made available for Master of Science, Master of Philosophy and Doctor of Philosophy programmes. The focus of forest management at the time was timber production (Kotey et al., 1998). Consequently, the curriculum was largely based on forest science and silviculture. Government was the main employer of graduates and there was close collaboration between the university and the then Forestry Department. Students admitted to the programme had many opportunities for practical field training.

A number of changes occurred in the early 1990s, which affected professional forestry training. First, there were changes in international discourses on the role of forests, emphasizing the importance of people in forest management. This led to a review in the university's curriculum. Professional forestry training became a four-year programme with courses in "social forestry" introduced to address managing forests with people, though it formed a small percentage of the curriculum. Second, the number of both male and female students graduating as professional foresters increased beyond government's ability to employ. This resulted from changes in national educational policies and an increase in the number of public and private universities offering courses in forestry. Consequently, many graduates had to find employment outside the government sector. Non-governmental organisations and the private sector now employ a significant number of professional foresters (Ackom, 2010). Thus, the capability needs of these professionals are becoming diversified. Consequently, as is the case in Kenya (Arevalo et al., 2014),Malaysia (Ratnasingam et al., 2013) and other countries, universities seek to review and create new curriculum which addresses the fast changing capability needs of forestry professionals (Temu et al., 2006).

2.3 THEORETICAL FRAMEWORK: TOWARDS UNDERSTANDING RESPONSIBLE FOREST GOVERNANCE

Forest governance broadly refers to steering society towards sustainable forest management by whatever institution or set of institutions (Arts et al., 2012). Specifically, it is the set of processes, mechanisms and institutions (both formal and informal) through which multiple actors articulate their ideas, interests and values, make decisions and influence actions and outcomes related to forests (Lemos and Agrawal, 2006; World bank, 2009). Forest governance as conceptualised in this chapter does not refer to a loss of "authority" in forest management from government to non-state actors but rather the different modes of interactions between government and non-state actors.

The quality of forest governance is sometimes described as "good" or "poor" (World bank, 2009). "Good governance" emerged as advocacy for reform of the public sector and/or of corporate management in accordance with a number of criteria (Arts and Visseren-Hamakers, 2012). This concept has been operationalized within the forest sector too, to describe "good" forest governance based on a number of criteria. Some of the key criteria used in literature (Contreras-Hermosilla, 2011; FAO-PROFOR, 2011; Lockwood et al., 2010; World bank, 2009) to assess the quality of governance include: rule of law, inclusiveness, effectiveness and efficiency, control of corruption, transparency and accountability. Reflecting on these criteria, we align with scholars who argue that applying all these criteria to assess governance at once is too overwhelming for developing countries and therefore support the idea of "good enough" governance (Grindle, 2004). But without dwelling too much on these terms, we do recognise that the consequences of poor forest governance are both undeniable and undesirable (World bank, 2009) and that many developing countries seek to improve forest governance (Weiland and Dedeurwaerdere, 2010). In this chapter, we prefer the term 'responsible' forest governance (RFG) to the term 'good' forest governance for two reasons. First our notion of RFG avoids associations with organisations such as the World bank and FAO who have actively promoted 'good' governance. Second, it signifies our acknowledgement that we are not living in an ideal world and that criteria of good governance cannot simply be followed to the letter. Specifically, we expect trade-offs among these criteria when applied at once. For example more participation means longer time spent on decision making which may mean less time efficiency. Hence, our perspective of RFG is not necessarily one with excellent scores on all criteria but one that persistently shows signs of improvement in forest governance criteria considered crucial to a given country. Ideally, RFG creates room for rethinking, re-adjusting and re-designing existing practices, based on lessons learnt— thus, exhibiting triple loop learning (Medema et al., 2014).

There are challenges which militate against meeting RFG criteria, and these are context specific (FAO and ITTO, 2010). Addressing these challenges in order to meet RFG criteria depends on the availability of required capabilities (Lockwood et al., 2010). Here, capabilities refer to the combination of knowledge, experiences, skills, mind-sets and attitudes that enable individuals to perform responsibly. Specifically, we address capability needs of professionals. We do this because of the pivotal role professionals play in forest management (Innes and Ward, 2010; Temu et al., 2006). Their roles place them in a key position in addressing RFG challenges. Thus, moving towards RFG requires understanding challenges and capabilities for addressing them. As far as capabilities are concerned, we limit ourselves to those relevant to forestry education and forestry professionals.

Given the line of argument of the chapter so far, we address the following research questions: What are the main challenges to responsible forest governance in Ghana? Which of these challenges affect RFG most? Do the opinions of forestry officials and non-forestry officials differ on the extent to which these challenges affect RFG? And: What capabilities do professionals need to address RFG challenges?

2.4   METHODS

Mixed quantitative and qualitative methods (Creswell and Clark, 2011; Teddlie and Tashakkori, 2009) were used in the research. Table 2.1 summarizes the methods used and information obtained with each method.

Data were gathered in two phases. Qualitative data were collected in phase one and quantitative data in phase two. Data in phase one were gathered in three stages. First, a multi-stakeholder workshop was organised to discuss what stakeholders consider as forest governance challenges, without any predetermined framework. There were twenty-one (21) participants (including 7 females) from Ministry of Lands and Natural Resources, Forestry Commission, Forestry Research Institute of Ghana, College of Agriculture and Natural Resources, civil society organisations and forest industry. Second, the workshop was followed by a focus group discussion with twelve (12) forest governance experts (including 4 females) to identify capabilities for RFG based on challenges identified during the workshop. The focus group discussion method was used because it allows deliberations and consensus on specific subjects (Kumar, 2014). A four-column matrix labelled Challenges, Knowledge, Skills and Attitudes and mind-sets guided the discussion. The challenges column was already filled in with the preliminary RFG challenges identified during the workshop. Third, in-depth responsive interviews (Rubin and Rubin, 2011) were used to validate challenges and capability needs identified in stages one and two. This interview technique allows respondents to freely share their experiences and to recount stories from their practice to support their convictions and perceptions. It also allows much probing, cross-questioning based on earlier answers and cross-checking of information from other respondents, without being limited by a rigid interview structure. The interviews were conducted between February – May 2013. Some of the key questions asked include the following: What are some of the challenges you face in detecting and apprehending offenders in forest-related crime? How do you ensure that all categories of offenders are sanctioned? Is there a separate apparatus within the judiciary that addresses forestry issues? How does the existence or otherwise of such apparatus affect forest law enforcement? How do you ensure active key stakeholder participation in forest management initiatives? What are the challenges with ensuring the participation of key stakeholders in forest management processes and decision-making? What capabilities (knowledge, skills, attitudes and mind-sets) are needed for addressing these challenges? During the interviews, we also cross-checked information provided by other respondents without disclosing their identity. A total of forty-one (41) interviews were conducted. Respondents were selected using stratified purposive sampling (Patton, 2002; Suri, 2011), particularly for forestry officials. The stratification was based on the management structure of the Forest Services Division, which distinguishes forest management at range, district, regional and corporate levels. Respondents at the range level have oversight responsibility over a particular forest range. Those at the district level supervise a number of ranges and those at the regional level supervise a number of districts. Respondents at the corporate level supervise or give input to the work of all the regions. Non-forestry officials were selected from research and training, civil society and industry, using strategic sampling

based on respondents' involvement in forest governance issues. The same researcher conducted all interviews. Interviews lasted between 45 min and 2 h. With the exception of an interview with an arrested illegal chainsaw operator, all interviews were recorded with an MP3 Voice Tracer and transcribed. Transcripts were analysed by clustering related challenges and capabilities into dominant themes. Seven (7) dominant themes of challenges and seven capability themes were distinguished. The clustering of themes was validated with two colleagues, to reduce subjectivity (Jonsen and Jehn, 2009).

In phase two, a survey was conducted between April and June 2014 to gather quantitative data. The survey aimed at prioritizing identified challenges and capability needs, to indicate to policy, management and education which of those need to be addressed first and foremost. The survey targeted two broad categories of respondents. Category 1 consisted of forestry officials (FO) with direct oversight responsibility over forests, mainly Forest Services Division (FSD) staff (n = 84). These were further divided into two sub-categories: range supervisors and district managers as one sub-category and regional managers and corporate staff as another. Quota sampling was then used for the subcategories. The larger quota (n=56) was assigned to range and district staff and the smaller quota (n = 28) to regional and corporate staff, based on staff numbers. Within the sub-categories, convenience sampling (based on availability) was used to select individual respondents (Bernard, 2011). Category 2 consisted of non-forestry officials [non-FO (n = 46)] from research/training, civil society and industry Forestry research and training institutions were selected and within these institutions, respondents with expertise in forest governance were identified. Forest-related civil society organisations were randomly selected from a list obtained from Tropenbos International Ghana whereas forest industries were randomly selected from a list obtained from the Working Group on Forest Certification Ghana. Officers in charge of forestry operations within these organisations were selected for the survey. One hundred and thirty (130) respondents (including 22 females) participated in the survey, out of 170 persons contacted. Those who could not respond (26%) were mainly industry and NGO field staff, who were out-of-office.

Respondents were asked to rank the seven dominant themes of challenges and capabilities identified in phase 1 of the study in order of importance to RFG in Ghana. As most of the themes were composite variables encompassing a number of items, each theme was operationalized in the questionnaire to show the various items contained under the theme (as given in the first two columns of Tables 2.2 and 2.5). Respondents were to rank challenges and capabilities from 1 to 7, with '1' being the most important challenge affecting RFG in Ghana or the most important capability required by professionals to ensure RFG, and '7' being the least important. Rankings were based on respondents' experience with Ghana's forest sector (over 65% had more than 10 years of experience). Questionnaires were administered using face-to-face interviewing. Questionnaires were however left for some respondents who were not at post and picked up later.

During data analysis, mean of the ranks for various challenges and capabilities were presented with their corresponding standard deviation. A Shapiro–Wilk test of normality showed that data were not normally distributed. We therefore tested differences between the responses of forestry officials and non-forestry officials for a given challenge or capability with Mann–Whitney U test. Differences between the responses for any two given set of challenges or capabilities were tested with Wilcoxon signed rank test (Field, 2013). Data were analysed in Microsoft Excel and the commonly used Statistical Package for the Social Sciences (SPSS).

Table 2.1 Data collection methods

Method	No. of participants[*]	Output
Workshop	21	• Preliminary RFG challenges
Focus Group Discussion	12	• Preliminary capability needs of forestry professionals
Interviews	41	• Validation of preliminary RFG challenges and capability needs
		• Field evidence of challenges and capability needs
Survey	130	• Ranking of RFG challenges and capabilities

*Some participants engaged with more than one method

2.5   RESULTS

2.5.1 Challenges to responsible forest governance
We identified seven categories of challenges, which are the day-to-day difficulties faced in the practice of forest governance. These are challenges related to: 1. Political culture, 2. Non-compliance and poor enforcement, 3. Incentive structure, 4. Legal framework, 5. Bureaucracy, 6. Resources, and 7. Disposition of forestry officials. Table 2.2 explains these challenges.

Beyond its identification, respondents also prioritized challenges in order of importance to RFG in Ghana. Rankings of forestry officials were distinguished from those of non-forestry officials to determine whether their perspectives on the importance of these challenges differ. Mann–Whitney U test results showed no statistically significant difference between the rankings of forestry officials and non-forestry officials (Table 2.3). Challenges related to political culture were considered the most important ones to RFG, followed by issues of non-compliance and poor enforcement (Table 2.3). Wilcoxon signed rank test shows a significant difference in the ranking of these two challenges (z=9.01; p b 0.001). The difference in ranking between non-compliance and poor enforcement (ranking 2) on one hand and incentive structure (ranking 3) on the other is also statistically significant.

Table 2.2 Summary of challenges to responsible forest governance in Ghana

Challenge	Issues	Explanation
Political culture	Elite power position of politicians, traditional authority and timber industry	Elite power position over prosecution of offender, review of stumpage fees, etc.
	Culture of corruption	Willingness to pay bribes to: 1. Cover up for offenses, 2. Avoid stringent sanctions; Willingness of forestry officials, Police and Judiciary to accept bribes
Legal framework	Inadequate and unrealistic (impractical) laws	Some forest rules have leeway which allows timber industry for instance to accumulate debts; certain rules are impractical to implement
Non-compliance/ poor enforcement	Weak structures for detection and sanctioning	Inadequate corruption monitoring, detection and sanctioning structures, example for ineffective revenue collection (timber industry owes huge debts
Bureaucracy	Prolonged and bureaucratic processes	Procedure for: 1. obtaining services (e.g. permits/timber rights), 2. making and reviewing rules considered long and bureaucratic
Resources	Ignorance and lack of information	About: certain forest rules, rights to information, accountability and participation; right to compensation for farmers off-reserve
	Lack of knowledge and skills	On: effective multi-stakeholder engagement and building trust; prosecution of forest-related crime by some officers of the police and judiciary in spite of trainings given by FC,
	Lack of staff and logistics	Forestry Commission has inadequate field staff and logistics (cars, equipment) for monitoring compliance with rules, lack of funds for organizing participatory meetings
Incentive structure	Benefits to local communities	No clear directives on the use of royalties consequently local people do not recognize its direct impact
	Basis for benefit sharing	Inadequate scientific information to guide decision-making especially off-reserve;
	Motivation for forestry officials	Low income, poor remuneration, no additional incentives for taking risks in arresting offenders
Disposition of forestry officials	Lack of authority and autonomy	Inability to take professional decisions (e.g. review stumpage fees) either due to pressure from politicians or willingness to keep favour with the powerful
	Minimal engagement	Narrow range of professionals engaged in law making and review processes adversely affecting implementation of rules
	Lack of commitment	Reluctance in changing existing structures (e.g. instituting deterrent sanctions); Paying only lip service to participation,

Even though challenges with incentive structure and legal framework were ranked third and fourth by the respondents respectively (Table 2.3), the difference in ranking is not statistically significant (Table 2.4) Likewise, the differences in the rankings of the other challenges are not statistically significant either (Table 2.4), meaning that the level of importance assigned to rankings 3 to 7 is statistically similar.

Below, we elaborate upon the two most relevant challenges ranked first and second (statistically significant) and upon the top-3 of the others (as qualitatively ranked by the respondents; statistically insignificant, however). Because of space limits, we cannot go into all seven challenges in-depth and therefore decided to elaborate those only.

1. Political culture

Two main issues were raised about political culture: 1. Elite power position of politicians, traditional authorities and timber industry and 2. Culture of corruption.

Elite power position

Forestry officials at various management levels, emphasized that politicians, traditional authorities and timber industry interfere with RFG in Ghana. They interfere especially with resource allocation, review of stumpage fees and sanctioning of offenders. They complained:

"*The political influence is so much in our system, when illegal operators are caught, you receive calls from the politicians to leave them meanwhile these same politicians are making the laws*" (Interview- FO-R3).

Civil society respondents also shared these concerns:
"*…timber industry is still very powerful that they can get their way around because they think they can do everything with money*" (Interview-Non-FO-CS3).

These powerful actors allegedly interfere with forest governance either directly or through top management officials, who in turn instruct their subordinates to take actions contrary to RFG.

Culture of corruption

Elite power position persists because of a culture of corruption. These powerful actors are willing to pay bribes to: shorten long and bureaucratic processes, have decisions made in their favour or avoid punishment for offences committed by people working in their interest. Some industry respondents see this corruption as a necessary part of doing business, though they frame it as a blame on forestry officials:

"*There is a challenge with the attitude of the (forestry) officers. For some people, you have to give them money before they will be at your service so if you are unable to provide that you will not get the service*" (Interview-Non-FO-Ind. 1).

This culture of corruption among the powerful actors thrives, because forestry officials are perceived as corrupt and willing to accept bribes. Some respondents even believe that forestry officials do not take steps to address corruption or elite power positions because they benefit from it.

"*I mean, they stand to benefit…the Commission itself…so once you talk about any major reforms within the sector they begin to oppose it*" (Interview-Non-FO-CS 5).

Some forestry officials also mentioned that it is possible for some staff who seem to be too vocal against corrupt practices to be victimized or transferred. Consequently, they fear to expose corrupt practices. This culture of corruption is however not limited to forestry officials. Some in civil society, media and police, are also perceived to be corrupt.

Interviewer: *What is your assessment of the role of anti-corruption organisations like the civil society-NGOs, the media and the police?*

Respondent: *They are not doing anything serious. They are no force to reckon with. They easily compromise (Interview-FO-D3)*.

With such perceptions about anti-corruption organisations, the culture of corruption thrives with impunity.

2. Non-compliance and poor enforcement

The key issue raised here was that structures for detecting and sanctioning non-compliance are weak. This problem is closely linked with two other challenges: political culture and lack of resources. Most cases of non-compliance go undetected because forestry officials do not have adequate staff and logistics for effective monitoring. Where non-compliance is detected, sanctions are either completely evaded or are not deterrent enough. This happens because some forestry officials allegedly condone with offenders. For example, an illegal chainsaw operator arrested and brought to a district forestry office intimated that about 8 out of 10 illegal chainsaw operations go undetected. We confirmed this information from other respondents involved in the timber trade:

"*One problem with FC is that they are understaffed; …again, forest guards and TOs (Technical Officers) connive with the chainsaw people, take money and allow them to go with their lumber. Sometimes forestry officials negotiate with the chainsaw people to allow them to be arrested so that it will show that they are doing their work. The introduction of military men did not bring any improvements*
since they are all conniving and involved in the corruption" (Interview-Non-FO-Ind. 6).

When arrests are made, the police and judiciary allegedly treat cases as trivial after taking bribes from offenders. Though some respondents indicated that law enforcement agencies lack adequate knowledge on prosecuting forestry cases (Table 2.2), others also believe they do not appreciate the severity of forest offences. They need to be coerced to treat forest offence cases passionately. A forestry official shared his experience:

"*At a district court, I had to see the magistrate, beg him and find some money for him because apparently if nothing was done I would have been in serious trouble. I had to assure him of giving him some of the wood that had been confiscated so that he could jail the people involved for it to be on records and he actually jailed the people*." (Interview-FO-R2).

Having to coerce law enforcement agencies to act further aggravates the problem of non-compliance.

Table 2.3 Ranking of challenges to responsible forest governance
(1-7 scale of importance)

CHALLENGE	Forest Sector (A+B)			Forestry officials (A) n=84			Non-Forestry officials (B) n=46			Mann-Whitney test	
	Mean	S.D	Rank	Mean	S.D	Rank	Mean	S.D	Rank	U test statistic	p-value
Political culture	1.97	1.58	1	2.00	1.60	1	1.91	1.53	1	1861.5	.70
Non-compliance/ poor enforcement	3.98	1.76	2	4.18	1.72	3	3.61	1.78	2	1555.0	.06
Incentive structure	4.13	1.84	3	4.35	1.87	5	3.74	1.72	3	1562.5	.07
Legal framework	4.23	2.10	4	4.05	2.07	2	4.57	2.13	5	1668.5	.19
Bureaucracy	4.39	1.97	5	4.33	2.03	4	4.50	1.89	4	1847.5	.68
Resources	4.58	1.66	6	4.52	1.65	7	4.67	1.69	6	1850.0	.68
Disposition of forestry officials	4.65	1.77	7	4.50	1.81	6	4.91	1.67	7	1686.0	.23

Table 2.4 Wilcoxon signed rank test results for pairs of challenges

CHALLENGES*	Wilcoxon signed rank test	
	Z test statistic	p-value
Incentive structure – Legal framework	0.65	0.54
Legal framework – Bureaucracy	1.88	0.06
Bureaucracy – Resources	1.76	0.08
Resources – Disposition of forestry professionals	0.44	0.66

*Pairs of challenges shown are those with no significant difference in ranking (P value >0.05)

3. Incentive structure

Issues raised about incentive structure were from two perspectives; 1. Incentives for communities to be actively engaged in RFG and 2. Incentives for forestry officials.

Incentives for local communities:

We found that existing benefit sharing schemes for local communities are not serving their purposes effectively. Under existing schemes, traditional authorities and district assemblies are to represent the interest of local people but there are no structures ensuring accountability to them. Consequently, local communities hardly recognise any direct benefits from royalties. This problem is further exacerbated by lack of information and ignorance of locals about their rights (Table 2.2). Again, the existing benefit sharing scheme has no clear basis for royalty allocation. It allows Forestry Commission (FC) and the Administrator of Stool Lands to take out management and administrative charges from royalties paid annually, and the remaining amount divided among district assemblies (55%), stool landowners (25%) and traditional authorities (20%). There are complaints of dissatisfaction from various stakeholders about this scheme. Some respondents from civil society complained about FC's share.

"…we don't understand why FC, for every stumpage, will just take a whopping 50% and say this is management fee. Management for what? What basis do they have to charge that amount?" (Interview-Non-FO-CS 4).

Other civil society respondents working closely with traditional authorities intimated that traditional authorities and stool landowners complain about the share of royalties to district assemblies. They propose to have a bigger share because they claim to be closer to the local people and know their needs better than the district assemblies. This dissatisfaction among different stakeholder groups is becoming a disincentive to RFG.

Incentives for forestry officials:

We noted that FC field staff does not have adequate incentives, commensurate with the level of risk associated with their work. First, at the time of the interviews, there was no clear career development outlook. Some respondents intimated that for more than a decade, they had remained at the same career position with the same salary scale. Though interview with Forest Services Division (FSD) human resource management hinted of plans in place to change this situation, respondents considered it discouraging and a disincentive to hard and honest work. Second, field staff at district and range levels complained that their activities, especially monitoring illegal logging operations, are risky and physically tasking. They cited recent cases of field staff murdered during illegal logging monitoring operations and bemoaned that in spite of risks involved, there are no incentives commensurate with their work.

4. Legal framework

Respondents identified three main problems with existing policies, laws and legislation for forest management: i) incomplete laws to cover all relevant aspects of forest management. For example, unlike the case of timber, there are no laws devoted to the development of non-timber forest products. Also, though stakeholder participation is clearly enshrined in the 2012 forest and wildlife policy, there are no directives or guidelines on costs of stakeholder participation. ii) Leeway in existing laws, resulting in poor enforcement. For example the Timber Resources Management Regulations (MLF, 1998) regulation 25 Section 1 allows holders of Timber Utilization Contracts to pay stumpage fees 30 days after billing, instead of an upfront payment. These Timber Utilization Contract (TUC) holders therefore take undue advantage of this provision to delay payment of stumpage fees. iii) Some laws are impractical to implement. For example, the Forest Protection (Amendment) Act (GOG, 2002) makes it an offence in Article 1(h) to collect or remove any forest produce without written consent from a competent forest authority. In practice, this is difficult to enforce considering that many locals may need medicinal products for example in an emergency but the forestry official may be living far away from that particular community.

5. Bureaucracy

The research indicated that procedures for obtaining services like timber rights and renewal of permits are unduly bureaucratic. Also, making new laws and policies or reviewing existing ones requires a lengthy process. A respondent conversant with the process explained:

"*We wanted to have a legislation for resource allocation off reserve…but the process is stalled at parliament. We have applied to parliament, there were some concerns raised by civil society, we addressed that and sent the law to them (parliament) but for almost 2*

years now, the law has not been passed. Even this is a simple LI which is supposed to take about 21 days before it becomes a law" (Interview-FO-C3).

Sometimes, law making and review processes are stalled for political reasons. A respondent intimated:

"*When FC takes the draft to the minister, the question is who reviews it especially when the period for voting is near, who should review the stumpage fees so that he loses?*" (Interview-FO-R1).

Consequently, while waiting for changes in the legal framework, forestry officials use their own discretion in governance.

2.5.2 Professional capabilities for addressing governance challenges

Based on these challenges, we explored capabilities forestry professionals need to navigate towards more responsible forest governance. Responses were clustered into seven key capabilities. These are: 1. Leadership, authority and autonomy, 2. Change initiation and management, 3. Analytical and critical reflection, 4. Effective communication and networking, 5. Trust building and stakeholder relationships, 6. Resource mobilisation and acquisition and 7. New ethics. These capabilities are further described in Table 2.5.

Table 2.5 Professional capabilities for addressing governance challenges in Ghana

Capability	Respondent description of capability
Leadership, authority and autonomy	Ability to make and defend professional decisions
	Ability to enforce existing rules without partiality
Change initiation and management	Ability to propose innovative (but realistic) options for addressing challenges
	Ability to influence processes
	Ability to manage changes within the forest sector
Analytical and critical reflection	Ability to analyse and critically reflect on the situation of the forest sector
Trust building and stakeholder relationships	Ability to initiate and continually engage relevant stakeholders in a social learning process (instead of one off consultation meetings)
	Ability to build trustful relationships with stakeholders
Effective communication and networking	Ability to package and convey accurate information in a form relevant and understandable to specific stakeholders
	Ability to openly share information and justify decisions
	Ability to create efficient internal and external networks with related organisations
Resource mobilisation and acquisition	Ability to source relevant human and material resources
	Ability to optimize human and material resources
New ethics	Professional esteem, "forestry/environmental diplomacy" (Negotiation, lobbying, advocacy skills)

To determine which ones are most important for professional education and training, survey respondents were asked to rank the capabilities shown in Table 2.5. Three ranking patterns emerged based upon the Wilcoxon signed rank test. First, capabilities for leadership, authority and autonomy were ranked first (see Table 2.6) and its ranking is also statistically significant compared to the secondly ranked capability, namely change initiation and management ($z = 3.69$; p b 0.001). Second, the differences in ranking between the next five capabilities (ranks 2–6 in Table 2.6) are not statistically significant (see Table 2.7), meaning that they are to be considered similar in importance. Third, new ethics was considered least relevant by the respondents, with its ranking significantly different from resource mobilisation and acquisition ($z = 4.62$; p b 0.001). Mann–Witney U test (Table 2.6) showed no significant difference between rankings of forestry officials and non-forestry officials, except for the case of new ethics ($p=0.04$). Both categories however believe that new ethics is the least important capability professionals need for RFG, hence, this difference is not considered very relevant by us. Below, we elaborate upon the most relevant capability ranked first (statistically significant) and upon the top-3 of the others (as qualitatively ranked by the respondents; statistically insignificant, however). Again, because of space limits, we cannot go into all seven capabilities in-depth and therefore decided to elaborate those only.

Table 2.6 Ranking of professional capabilities for responsible forest governance (1-7 scale of importance)

PROFESSIONAL CAPABILITIES	Forest Sector (A+B) n=130			Forestry officials (A) n=84			Non-Forestry officials (B) n=46			Mann-Whitney test	
	Mean	S.D	Rank	Mean	S.D	Rank	Mean	S.D	Rank	U test statistic	p-value
Leadership, authority and autonomy	2.65	1.93	1	2.69	2.02	1	2.57	1.77	1	1930.0	.99
Change initiation and management	3.56	1.84	2	3.45	1.66	2	3.76	2.14	3	1811.0	.55
Analytical and critical reflection	3.85	1.95	3	3.75	1.94	3	4.02	1.98	4	1777.0	.44
Trust building and stakeholder relationships	3.89	1.69	4	4.00	1.78	4	3.70	1.50	2	1761.0	.40
Effective communication and networking	4.21	1.80	5	4.20	1.83	6	4.22	1.78	5	1928.0	.98
Resource mobilisation and acquisition	4.39	1.76	6	4.18	1.72	5	4.78	1.79	6	1545.5	.06
New ethics	5.45	1.92	7	5.73	1.75	7	4.96	2.12	7	1529.5	.04*

Table 2.7 Wilcoxon signed rank test results for pairs of capabilities
*Pairs of capabilities shown are those with no significant difference in ranking (P value >0.05)

PROFESSIONAL CAPABILITIES*	Wilcoxon signed rank test	
	Z test statistic	p-value
Change initiation and management - Analytical and critical reflection	1.09	0.28
Change initiation and management - Trust building and stakeSholder relationships	1.46	0.15
Analytical and critical reflection - Trust building and stakeholder relationships	0.20	0.84
Analytical and critical reflection - Effective communication and networking	1.38	0.17
Trust building and stakeholder relationships - Effective communication and networking	1.39	0.17
Effective communication and networking - Resource mobilisation and acquisition	0.98	0.33

1. Leadership, authority and autonomy

The in-depth interviews highlighted that for RFG, forestry professionals need to have sound "technical" knowledge in forest management. However, they pointed out that sound technical knowledge is not the main problem for forestry professionals in Ghana. The challenge however is that forestry officials seem pressured to take decisions that are not professionally sound. A respondent from civil society laments:

"*So why can't professionals insist on the rules and stick to it? …Those managing the resource are not working as professionals. They are not interested in the resource and if that continues, we will not have good forest governance*" (Interview-Non-FO-CS5).

Hence, professionals need the ability to overcome such pressures and to act professionally, without fear or favour. Knowledge areas interview respondents considered relevant to achieving leadership, authority and autonomy include: 1. analysis of forest law, policy and politics, 2. legal knowledge for understanding rule making and review processes, and 3. theories of agency and power articulation. 4. Leadership styles and implications for RFG. Relevant skills identified include: Negotiation skills and diplomacy in dealing with powerful elites, Building and harnessing professional networks for effective forest governance, and decision-making tools and strategies for enhancing autonomy and authority in forestry practice. Attitudes and mind-sets emphasized include professional passion, assertiveness and interest in improving the image of one's organisation. These were considered lacking among contemporary forestry professionals.

2. Change initiation and management

This capability encompasses four main abilities (see Table 2.5) that would enable professionals to actively bring about change. Results from the in-depth interviews revealed that most professionals in the forest sector are aware of and even displeased with the state of forest governance. They however only lament about them with seeming helplessness. How to bring about the needed change seem to have eluded them. A respondent explained: "*now there are some in the forestry sector who are dissatisfied with the system because of the harm it is causing. These are linking up with other progressive forces to bring change.*

The inertia is still very strong so in terms of change, one may not see much" (Interview-Non-FC-CS 7).

Change initiation and management is meant to equip professionals to bring up innovative ideas for change and also inspire change. We identified five key knowledge areas to be explored here: 1. Analysis of contemporary innovations in forest governance 2. Implications of various theories of change, agency and power 3. Dynamics of influencing change processes and 4. Human resource management. Skills to be developed include: Team building, influencing high-ranking actors through negotiation, lobbying and advocacy skills. These skills may be developed along with attitude/mind-sets of pro-activeness, willingness to try new things, open-mindedness to criticism, and tenacity. With such capabilities, respondents believed professionals are more likely to be inspired to explore innovative ways of for example motivating field staff to reduce tendency for corruption.

3. Analytical and critical reflection

The core ability this capability seeks to address is being able to analyse and critically reflect on how things are done within the forest sector. This includes being able to understand forest rules and rule-making processes, being able to analyse economic costs and benefits in relation to benefit sharing schemes and also being able to assess the effectiveness and efficiency of processes. This capability was considered relevant to responsible forest governance because interview respondents highlighted how forestry officials sometimes embrace certain innovations based on donor prescriptions or instructions from superiors without being convinced of its relevance. An example was given as the introduction of customer service offices at pilot forest districts. This innovation failed at the pilot stage because forestry officials felt though well intended, the concept was ill-introduced. They could however not adequately debate and negotiate for its amendments or joint redesign to suit the Ghanaian context. We found that to develop this capability the following knowledge background are necessary: 1. Analysis of forest law, policy and politics, 2. political economy, and 3. forest economics and valuation. Skills identified include: 1. Critical thinking that allows professionals to critique the status quo and also "think outside the box and without the box", and 2. Systems thinking that shows connectivity between different forest related systems. The important attitude/mind-set here is objectivity.

4. Trust building and stakeholder relationships

This capability comprises being able to organise and steer long term multi-stakeholder interactions and also ensure open engagement based on trust. Respondents considered this capability necessary because of the mistrust among the different stakeholders. Civil society expressed doubts about the commitment of forestry officials to sustainable management of forests, alleging that officials work for their personal interest. Forestry officials on the other hand doubted the intentions of civil society in seeking to participate in forest management decision-making. This mistrust may probably be a result of ineffective communication but has affected the ability of the forest sector to harness its strengths for addressing challenges with the political culture, poor enforcement and lack of resources. Forestry officials, especially those not actively involved in piloting community engagement programmes, also mentioned that stakeholder engagement is challenging:
"*Sometimes it is not easy engaging them(stakeholders) because you receive a lot of resistance because that (the forest) is their source of livelihood…sometimes people (in local communities) even come (to meetings) drunk and cause lots of problems. Other people*

come with their own issues they have with FC, other than what is on the agenda and would like to discuss it at the meeting" (Interview-FOR 1).

The key knowledge element identified for trust building and effective stakeholder engagement were 1. Principles of trust building, 2. Power dynamics in multi-actor processes and 3. Principles and dynamics of stakeholder engagement. Skills in stakeholder analysis, facilitation, team building and consensus building were considered key. Respect for the rights and interests of others, empathy and willingness to be accountable were seen as important attitudinal disposition for building trust.

2.6 DISCUSSION

This study shows that issues related to political culture are a major challenge to responsible forest governance. This is not unexpected. Many researchers confirm the persistent power position of various elites in forest management (Baird, 2010; Bond et al., 2009; Hansen and Lund, 2011; Kotey et al., 1998; Trevin and Nasi, 2009). While some view the role of these powerful actors as a form of corruption, others see it as patron-client relations (Baird, 2010). Whichever way this elite power position is viewed, it weakens enforcement and perpetuates non-compliance. Hansen (2011) notes that in Ghana certain laws are not appropriately enforced when the consequences of enforcement are considered politically costly. This dominance of elite power also reduces forest revenue and exacerbates other existing challenges like lack of resources, inadequate benefits to resource owners and lack of incentives for forestry officials. Subsequently, the ability of forestry officials to deal with elite power is further weakened. Opoku (2006) observes that poorly resourced forestry officials may find it difficult to assert authority on wealthy and politically influential industry clients. Elite power position in forest management therefore creates a cycle that eventually ridicules professionalism in forestry. The study shows that the disposition of forestry officials (including their lack of authority and autonomy) is not considered a major challenge to RFG. We however argue that once the negative role of elite power persists and forestry officials seem helpless in curbing this, it points to lack of authority and autonomy.

The endemic nature of the culture of corruption described in this research concurs with the work of several researchers (Baird, 2010; Sola, 2011; Teye, 2013; Trevin and Nasi, 2009). Forestry officials did not however highlight most of our findings on corruption. It confirms the observations by FAO and ITTO (2010) that of nine West African countries studied, Ghana was one of two countries that did not report corruption as a problem in forestry. Incentives are a determinate factor of whether forestry officials will engage in illegal and corrupt activities or not. Forestry officials are enticed into increasing their salaries by illegal means (FAO and ITTO, 2010; Kubo, 2010; Sola, 2011). Attractive compensation packages and good prospects for promotion and professional development can serve as a good incentive and even improve performance (FAO-PROFOR, 2011). Also, FAO (2005) lauds the role of independent bodies and third-party monitoring in addressing corruption in some African countries. However, our work suggests that in Ghana, there is a perception (at least among some forestry officials) that civil society is not a strong force to reckon with in dealing with the problem of corruption. Though not adequately substantiated, this perception may weaken the effectiveness of the role of civil society as watchdogs in the forest sector.

Several research papers and reports (FAO and ITTO, 2010; Hansen, 2011; Ramcilovic-Suominen and Hansen, 2012; Sola, 2011) point out that non-compliance/poor law enforcement in forestry is linked to other governance challenges. An earlier World bank (2006) report showed that non-compliance exists because of broader governance failures and that strengthening law enforcement alone will not work unless the laws and the processes or institutions influencing forest use, are also improved. Insufficient enforcement capacity, deficiencies in coordination between forest-law-enforcement and judicial bodies and absence of alternative economic opportunities for local people, also contribute to poor enforcement and non-compliance (FAO and ITTO, 2010; Sola, 2011).

Thus, adequate resources are key to addressing most of the challenges identified. 'Lack of resources' was however not considered a major challenge. This finding resonates with reports that Ghana neither acknowledged a lack of resources or lack of information as a challenge to forest governance (FAO and ITTO, 2010). In this study, its relatively low ranking could also be explained by the survey instrument's aggregation of all categories of resources (knowledge, skills, information, staff and logistics). Probably if lack of staff and logistics had been separately ranked, it would have been given higher priority. This is because forestry officials believed they had been educating and providing information to stakeholders. Addressing challenges with resources is likely to have positive repercussions on a number of other challenges like noncompliance and poor enforcement (FAO, 2005), political culture and incentive structure (Opoku, 2006).

This study shows that to move towards more responsible forest governance, forestry professionals need diverse range of capabilities that go beyond the well-known technical forestry fields. This concurs with research on forestry education calling for changes in forestry education curricula towards incorporation of meta-disciplinary skills and attitudes (Alao, 2010; Arevalo et al., 2010; Kammesheidt et al., 2007; Temu et al., 2006). The main difference is that previous research (Arevalo et al., 2010; Arevalo et al., 2014; Vanclay, 2007) has focused on individual generic skills like negotiation, critical thinking and business skills and not aggregated them into composite capabilities. Table 2.8 summarizes the key recommendations for professional education and training that can be derived from our study. With these recommendations, universities and other training centres for forestry professionals seem to have an important task ahead in creating curricula with learning experiences that can address the key capability needs of professionals.

It is not surprising that capabilities for leadership, authority and autonomy are considered most crucial to RFG in Ghana. This is because a number of the problems researchers have identified with forest governance in Africa (Carlsen and Hansen, 2013; Sola, 2011) can be linked to lack of professional authority and autonomy. We however did not interview politicians and traditional authorities to ascertain their views on forestry professionals developing these capabilities. Though these capabilities are discussed in professions like education and nursing (Simkins, 2005) they are hardly raised in forestry until recently when leadership skills has been emphasized (Arevalo et al., 2014; Vanclay 2007). The need for capabilities for initiating and managing change highlighted in this study could also possibly be seen as enshrined in these researchers' general call for incorporation of leadership skills. It is however important to emphasize the dimensions of general leadership relevant to today's forestry professionals. It is also not surprising that capabilities for analytical and critical reflection are rated high. This is because the need for reflexivity and critical thinking has been much emphasized across many professional endeavours including forestry (Arevalo et al., 2010; Arevalo et al., 2014). These

capabilities are also the basis for developing other capabilities identified in this research. Unlike the general emphasis on communication skills in most research, effective communication indicated in this research was not about presentation skills and report writing. Though these are also important, the focus was on being able to effectively address the information needs of specific stakeholders to enhance participation, transparency and accountability.

Table 2.8 Implications of research findings for professional forestry education and training

Implications	Clarification
Technical knowledge in forestry remains essential	Forestry education should continue to provide state-of-the-art technical knowledge in forestry (Kammesheidt et al., 2007). However, professionals need to acquire additional capabilities to address the demands of a rapidly changing forestry practice.
Additional space for non-technical knowledge is needed	Forestry curricula, especially at the graduate level and in tailor-made programmes for mid-career professionals need to create space for non-technical capabilities like leadership, authority and autonomy. Capabilities provided should however follow country-specific needs (Arevalo et al., 2012)
Simultaneous development of knowledge, skills, attitudes and mind-sets is crucial	An integrated approach (Alao, 2010; Kammesheidt et al., 2007) which simultaneously develops not only the knowledge but also skills, attitudes and mind-sets dimensions of specific capabilities is crucial. This is preferred to a "bolt-on" (Sterling, 2004) of isolated "soft skills" or "interpersonal skills" to existing technical courses.
Space for more outside classroom experiences is required	Regular classroom lectures cannot adequately inspire most of the capabilities identified in this research. Developing these capabilities require field experience sharing among small groups (Miagostovich, 2004), case studies of forest governance issues in related countries and scenario analysis (Mayers et al., 2013).

The level of importance attached to effective communication and networking agrees with the notion expressed among respondents that ignorance and lack of information is not a major problem in the forest sector. However, the work of CIKOD and Global Witness (2013) suggests that there is still much to be done in educating locals to empower them to contribute meaningfully to responsible governance.

Though statistically comparable to others, capabilities for resource mobilisation and acquisition were relatively assigned minimal importance, commensurate with the relatively low importance assigned to lack of resources as a challenge. This may possibly stem from the mentality of forest sector reliance on central government or donors for resources (Mustalahti and Lund, 2009). Again, the development of new ethics was also given minimal importance. This could be a reflection of the traditional notion that ethics is beyond education or training. Temu and Kiwia (2008) have however suggested the need for ethics in forestry education. Certain challenges, like the endemic culture of corruption, can probably not be addressed effectively without new ethics. New ethics could therefore be interwoven into various courses and training programmes.

2.7 CONCLUSIONS

This chapter addressed the quest to move towards more responsible forest governance and its implications on the capabilities of forestry professionals. It identified and prioritized emerging challenges to RFG in Ghana as a basis for exploring capability needs of forestry professionals. Forestry sector actors concur on the most important challenge to RFG as bordering on issues of political culture, especially the power position of some elites in forest governance. Though some doubt the willingness of forestry professionals to address these elite power positions, there was consensus that the capabilities forestry professionals need most are those that make them better able to defend and follow through their decisions with authority and autonomy.

To equip professionals to better respond to changing discourses towards RFG, their training should enable them to be analytical and critically reflexive in their thinking, strengthen their ability to defend professional decisions and develop their capacity to bring about change and transformation when and where necessary. Consequently, apart from providing state-of-the-art technical knowledge in forestry, professional education and training should create space for developing nontechnical capabilities or so-called 'soft skills' (Kibwika, 2006). To develop these capabilities, graduate programmes or refresher courses for mid-career professionals may need to take an integrated approach. This means simultaneously developing knowledge, skills, attitudes and mind-sets which link up with performance of professionals in practice, rather than the current bolt-on of few "soft-skills" components in curricula.

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Chapter 3

Creating a responsive curriculum for postgraduates: lessons from a case in Ghana

ABSTRACT

A responsive curriculum addresses the changing needs of students, bridging the gap between universal knowledge and theories on one hand and contextual, continuously changing realities of everyday life and the world of work, on the other. Though several higher education institutions appreciate the value of making curriculum responsive, how to do this remains a challenge. This Chapter first identified unique attributes of responsive curriculum development based on literature and assessed their manifestation in the creation of a new Masters curriculum in natural resource and environmental governance in Ghana. The role of actors within and outside academia and its implications, were also investigated. The study was designed as participatory action research. Key process attributes identified include, among others, iteration, built-in learning within the curriculum development process, and the contribution of actors from outside academia to curriculum design and implementation. The study also shows the important role of the so-called champion of the process and the expert facilitators. The chapter does not seek to provide a blue-print but rather provides a valuable example for future initiatives at creating curriculum that better responds to current needs of students.

3.1 INTRODUCTION

The world looks to higher education for knowledge, wisdom and solutions to the myriad of challenges it is confronted with (Hoff, 2009). However, because the world is changing so rapidly, higher education curricula easily become obsolete, resulting in gaps between what is taught and the realities in society and the world of work (Dar-es-Salaam Declaration, 2010). Thus, it is crucially important for universities to reform their curricula to avoid becoming mere certificate awarding bodies, without true relevance.

In response to this widespread call for reform, many universities seek ways of changing curricula. In Ghana for example, universities offering professional programmes like accounting, education and natural resource management are researching the emerging needs of the profession (Ameyaw et al., 2016; Awayiga et al., 2010) and are also reviewing or creating new curricula in response to the changing knowledge and skills requirements of employers (Kouwenhoven, 2009). Some universities have introduced innovations aimed at enhancing interdisciplinarity in their curricula (Smith-Sebasto and Shebitz, 2013), using teaching and learning methods that are linked with problems in society and the world of work (Kiguli-Malwadde et al., 2006; Lenthall et al., 2009) and that allow students to take greater responsibility for their own learning process (Cremers et al., 2014). These innovations all aim to make these curricula more responsive to emerging societal needs. We therefore term them as responsive curricula.

Creating such responsive curricula requires a change in the usual modus operandi of higher education institutions. In Ghana, like other African countries, these institutions tend to collaborate closely with international partners in curriculum development (Arevalo et al., 2014; Gervedink Nijhuis et al, 2012, , Kouwenhoven 2009) However, changing the usual approach to curriculum development is challenging because higher education institutions are noted to be highly resistant to such change (Evans and Henrichsen, 2008). This is not to say that universities do not engage in curriculum development; they do. However, responsive curriculum requires a re-thinking of the nature of the curriculum, particularly of the relationship between the curriculum, everyday life and the world of work. The reframing of this relationship has profound consequences for teaching and learning, the competences of all actors involved and the type of learning that is privileged. Thus, Morris (2007) posits that while it is often relatively clear what changes in the curriculum are necessary, insufficient attention is paid to the question of *how* to realise those changes. Although the literature about curriculum development provides useful information on the requirements of responsive curricula, few studies provide empirical description of processes for developing such curricula in practice (da Cunha et al., 2000). Moreover, most of these studies are from the global North (Davis and Jacobsen, 2014; McFadden et al., 2011; Paulsen and Peseau, 1992) with only few studies from the African context (e.g. Kiguli-Malwadde et al., 2006). In fact, relatively few universities have been able to demonstrate the ability to create responsive curricula (Chakeredza et al., 2008). Thus, there is a need for rigorous research on curriculum development processes and the development of responsive curricula in particular (Xu and Morris, 2007).

In this article, we first give an overview of the attributes of responsive curricula that we derived from literature. Subsequently, we offer an analysis of the process of developing a Master of Philosophy programme in Natural Resource and Environmental Governance (NREG) at a university in Ghana. We highlight the characteristics of the process, the role of different actors, and the way in which contextual factors enabled or constrained the

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development of the responsive curriculum. In doing so, the chapter contributes to a growing body of literature aimed to enhance transformative learning. An empirical case from Ghana provides a useful example of curriculum innovation in the African context, which is relevant for future initiatives to innovate curricula.

3.2   CONCEPTUALISING RESPONSIVE CURRICULUM DEVELOPMENT

Curricula have been conceptualised from several perspectives. Traditional conceptions view it as subject matter, a programme of planned activities, and intended learning outcomes (see Schubert, 1986). In these conceptions, the focus is on the content of the curriculum, with little attention for the learning process. Although traditional conceptions remain influential to date (Tanner and Tanner, 2007), progressive educational perspectives are emerging. These perspectives recognise that teaching is not about treating students as empty vessels that can be filled with information and takes into account the non-linear character of both learning and teaching. Consequently, curricula are re-conceptualised as modes of thought, guided experience, and as the reconstruction of knowledge and experience that 'enables the learner to grow in exercising intelligent control of subsequent knowledge and experience' (Tanner and Tanner, 2007, p.122). This means that curricula should be able to prepare learners for future situations, which they might not have necessarily encountered in school. This is echoed by Schubert (1986) who raises the need for curricula to fit specific contexts and that consequently, curricula are always in the process of being created and reconstructed to fit changing circumstances. In a similar vein, Peters (2000) emphasises the importance of flexibility arguing that a: curriculum must no longer be made uniform and fixed for long periods, but be variable and adaptable to current needs for example in professional life. It must be related not only to individual learning requirements, but also take account of the challenges and demands of practitioners and anticipate future trends (p. 12).

In other words, these authors suggest that curricula need to be 'relevant, flexible, diverse, and integrated' (Taylor, 2000) to provide what today's graduates need to address future challenges. In this article, we use the term 'responsive curriculum' to refer to a flexible and adaptive curriculum that bridges the gap between abstract theories on education, learning and universal knowledge on one hand and the more contextual, continuously changing and demanding realities of everyday life and the world of work on the other.

Literature on responsive curriculum development (RCD) emphasises different requirements for responding to changing graduate needs, including interdisciplinarity (e.g. McFadden et al., 2011), the need to base teaching and learning on problems in the field (e.g. Kiguli-Malwadde et al., 2006), and the importance of simultaneously developing learners' competences to perform tasks required of graduates in real-life (e.g. Kouwenhoven, 2009). Other parts of the literature emphasise the processes relevant for making curriculum responsive. Here, some address the need to involve relevant stakeholders, even beyond the university, at all stages of curriculum development (e.g. Taylor, 2000); others suggest that curriculum development starts with a *tabula rasa,* identifying current needs of the professional field as a basis for assessing existing curricula (Paulsen and Peseau, 1992). Some also emphasise the centrality of faculty in the curriculum development process and the need for expert support (e.g. Wolf and Hughes, 2007). Literature that pulls together various attributes for creating a responsive curriculum and specifically, how the development process can guarantee that the curriculum meets the requirements associated with RCD is scanty, particularly in the Ghanaian context. We therefore

contribute to filling this gap. Using the literature discussed above, we have identified a number of unique attributes of responsive curriculum development. These include attributes related to the design, implementation and evaluation of the curriculum.

First, generally, the processes are iterative and defy the usual linear progression from one stage to the other (Toohey, 1999). They involve extensive deliberations and reflection on appropriate curriculum content and delivery methods (Wolf and Hughes, 2007) in which previous decisions are revisited and revised (McFadden et al., 2011). These iterations, deliberations and reflections can make such processes lengthy. While traditional curriculum design is often completed within three to six months (Khan and Law, 2015), RCD processes generally require much longer. Second, developing a responsive curriculum is in itself a learning process for curriculum developers because it requires a departure from 'business as usual'. Consequently, the design process requires a built-in mechanism for learning. Third, curriculum evaluation is improvement-oriented rather than judgement-oriented (Paulsen and Peseau, 1992). Due to the increasing pace of change in the skills needed by graduates of professional or career-oriented Programmes, the review cycle tends to be shorter than the normal five-year cycle that is used in traditional curricula (Smith-Sebasto and Shebitz, 2013; Wolf and Hughes, 2007).

Fourth, the RCD processes involve relevant actors outside the host department. One such actor can be an educational expert who is not a faculty member to guide curriculum development (McFadden et al., 2011; Smith-Sebasto and Shebitz, 2013; Taylor, 2000; Wolf and Hughes, 2007). Actors outside academia, such as alumni, practitioners, and employers are also involved to ensure curriculum connects with the world of work (Barradell and Peseta, 2016; Taylor, 2000). The purpose and extent of involvement of these external actors varies. Often, they are consulted as a source of information during needs assessment (McFadden et al., 2011; Smith-Sebasto and Shebitz, 2013). Other times they review (draft) curricula (Smith-Sebasto and Shebitz, 2013). Occasionally, they are made part of RCD teams, where they participate in decision-making on curriculum content (e.g. Lenthall et al., 2009; Paulsen and Peseau, 1992). Fifth, within a responsive curriculum, courses are rarely taught by individual faculty members. Instead, a team of teachers work together to deliver a course and this includes the involvement of external actors in order to link learning to the real-world (Kiguli-Malwadde et al., 2006; McFadden et al., 2011). Linking learning to the world of work is the sixth unique attribute identified. Real-life examples may be brought to the classroom by using case assignments, interactive or role playing-games, or by inviting practitioners to give lectures. Students may also engage with real-life cases during internships, clinical sessions or community work.

Finally, although all processes of curriculum development require commitment of a team leader to guide the process, RCD requires a 'champion' who is highly motivated about ensuring the responsive character of the curriculum by facilitating the engagement of other faculty, sometimes from different disciplines (Patterson Jr, 2007; Paulsen and Peseau, 1992; Smith-Sebasto and Shebitz, 2013; Wolf and Hughes, 2007). Champions are usually college Presidents, Provosts, Deans or Heads of Department.

As Binns (2015) clearly shows in her work, in practice design of such responsive curriculum is 'not set in stone'. Curriculum designers hardly follow prescriptive guidelines. We therefore describe and analyse the case in Ghana with an interest in understanding how the unique attributes of RCD manifest themselves in practice.

In the next section, we first give a general description of the educational context of the institution studied, followed by the settings that necessitated the design of the curriculum. The section ends with the research design and data collection methods.

3.3 STUDY CONTEXT AND METHODS

3.3.1. Study context

The study was at the College of Agriculture and Natural Resources (CANR) of a public university in Ghana. As is the case in many developing countries (Hayward, 2012; World Bank, 2000), the university's major challenge to exploring innovation in curriculum is funding due to the low budgets for higher education (Addae-Mensah, 2002). In spite of these, Ghana is named as one of the countries in Africa capable of delivering high-quality graduate education (Hayward, 2012).

In the late 2000s, CANR started exploring new programmes that would respond to the needs of the agricultural and natural resource sectors. One of such needs was for professionals with new capabilities for responding to governance challenges in natural resource management (Ameyaw et al., 2016). Subsequently, the Department of Silviculture and Forest Management under the College decided to set up a committee to develop a curriculum for a Master programme in natural resource and environmental governance. Initially the Department took a traditional approach to this curriculum development task. They soon realised, however, that the traditional approach was not appropriate for the kind of programme envisaged for two reasons. First, the scope of the envisaged programme goes beyond forestry and forest management and therefore requires crossing disciplinary boundaries. Second, a process taking place at the College on institutionalising Integrated Natural Resource Management into higher education had brought an awareness to faculty members that with the rapid changes in the world of work, a curriculum developed solely by academics *for* society does not serve its purpose. Thus, the Department wanted to develop the curriculum *with* relevant actors in professional practice. Subsequently the process of RCD was started.

3.3.2. Methodological approach

The research was conducted between 2009 and 2015. This was to allow the study of RCD from the conception of the idea through its implementation and preliminary evaluation by pioneer students. The research approach used was participatory action research (PAR): an approach in which researchers together with relevant actors engage in a joint process of reflection, problem identification, action, and knowledge generation (McKernan, 1991; Swantz, 2008). Action research is widely used in educational research (Corey, 1953). Faculty members had chosen to use a non-traditional curriculum development approach, without any prescriptions or guidebooks, thus having some flexibility to make choices they consider appropriate for their vision and context. Researching such a case requires an approach that will not distort their communication and interaction but allows the teachers to proceed with curriculum development more or less without interruption (Wals and Alblas, 1997). PAR adequately serves this purpose for two reasons: 1. It recognises problem owners as being strategically positioned to address the problem and therefore are central to pursuing their inquiries, by themselves and for themselves (Wadsworth, 1998). 2. The essence of the research was to bring about change or improvement in the situation being studied (Cohen et al., 2007).

Participants in the research were the curriculum developers, consisting of lecturers and practitioners who later served as part-time lecturers. Three categories of researchers are distinguished in this research; the first category consisted of the lecturers (including the part-time practitioners) whose main interest was to better understand their practice. They were interested in creating a responsive curriculum but beyond that, they were reflexive lecturers who wanted to better understand what unique attributes were important for RCD. Their research path is shown on the right side of Figure 3.1. The second category was the first author, who is also a lecturer at the institution but at the same time an academic researcher on curriculum, with an interest in both the theory and practice of curriculum development. In the PAR process, this author's interest was first to understand the theory of RCD, thus, problematizing existing theories on curriculum development, analysing curriculum development at the institution and confronting solutions generated with theory, thus, taking the research path at the left side of Figure 3.1. These two categories of researchers were immersed in the curriculum development. The third category is made up of the co-authors of This chapter, who had more distance from the curriculum development process and acted as outsiders whose interests were in the theory of curriculum development and the interpretation of research findings.
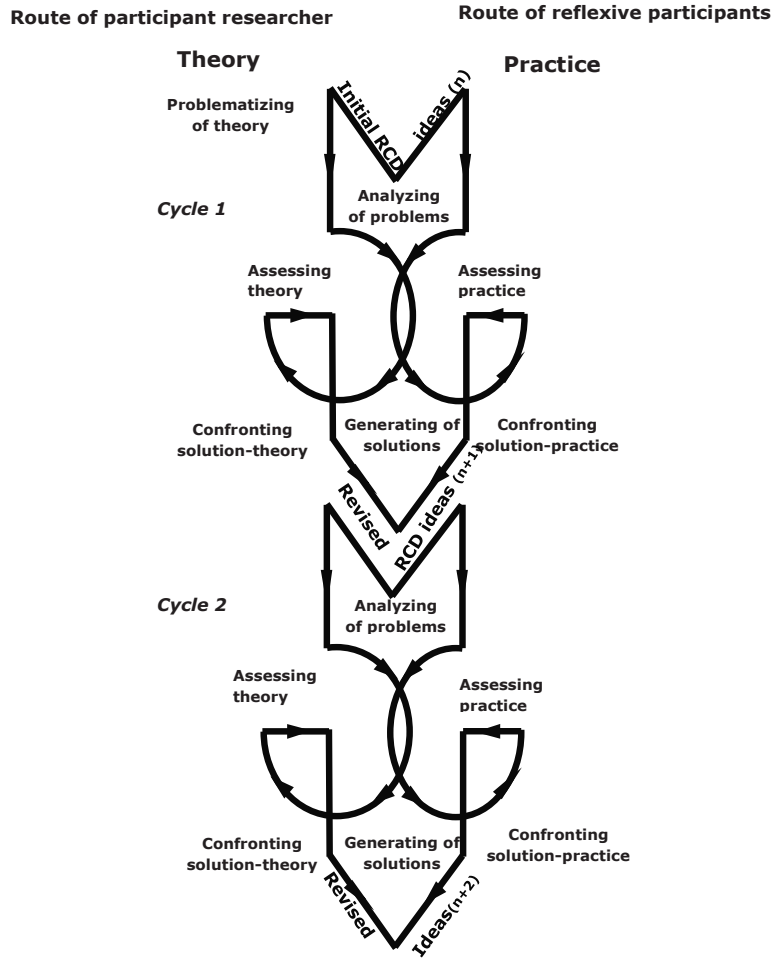
Figure 3.1 Participatory Action Research model with the different roles of involved actors and the interactions between them (Adapted from Wals and Alblas, 1997)

Two categories of data were generated for the study. The first category was data on the process and actors involved. This data-set were generated by participant observation as described above. Detailed notes were taken to document the processes, the involvement of stakeholders, and the constraining and enabling factors to the process (McKernan, 1991). An MP3 voice tracer was used to record meetings and curriculum development team reflections and then transcribed. Recordings were made with the informed consent of participants. The second category of data were on manifestation of unique attributes of RCD. These were obtained mainly through participant observation and focus group discussions. The focus group discussions were conducted with the eleven-member curriculum delivery team that implemented the curriculum (Table 3.1). Where individuals raised issues during the RCD that were unclear to the researchers, unstructured interviews were conducted as follow-up. Seven such interviews were conducted during the study. Focus group discussions and interviews were conducted with the pioneer students on what needs to be improved in the programme, as part of the formative curriculum evaluation. Summary of findings of this research were discussed with the curriculum development team for their feedback, four times - at the end of each phase (Table 3.1). The essence of this was to ensure resonance among all participants in the research (Wadsworth, 1998) and also improve reliability.

In the next sections, we first summarise the curriculum development process chronologically and then describe how the unique attributes of RCD manifested in the process. We follow it up with an analysis explaining how various contextual factors affected the process and actors.

3.4 RESPONSIVE CURRICULUM DEVELOPMENT AT THE INSTITUTION

3.4.1. The process

The curriculum development process was in four major phases. Phase one (2009 −2010; Table 3.1: 1−10) details the preliminary activities of the initial three-member team from the host department. Once this team realised a new approach other than the traditional was necessary to make the curriculum responsive, they negotiated for funding and expert support from the Dutch consortium already facilitating institutional change at the university. With the availability of funds and expert support, the three-member team was expanded to a six-member transdisciplinary curriculum development team (TCDT) consisting of the initial three-member team, two faculty members of different departments and a practitioner. This team spearheaded the process (Table 3.1: 6−12) until a draft curriculum was presented for institutional review.

While the curriculum was being reviewed, prospective lecturers from both within and outside academia formed a Curriculum Delivery Team (CDT) to review courses in the draft curriculum and also to prepare for the enactment of the curriculum (Table 3.1: 13−20). The programme was advertised on the university's website and in other media. Applicants were interviewed and successful candidates were admitted to the programme. The first student cohort was admitted in 2013 and the second cohort in 2014.

Table 3.1: RCD process map

Process	Actors involved
Phase 1: Commissioning of RCD and needs assessment	
1. Three Faculty members from same department selected to develop curriculum	Head of Department, Faculty members
2. Brainstorm on possible student needs and NREG related Programmes in other universities	Three-member team
3. Develop concept note to show the Programme vision	Three-member team
4. Negotiation for funding for RCD	Leader of three-member team (Champion)
5. Six-member Transdisciplinary Curriculum Development Team (TCDT) formed to lead RCD	Three-member team, faculty members, Dutch consortium members
6. TCDT build consensus on RCD and how it should differ from traditional curriculum development	TCDT including educational facilitator
7. Review concept note	TCDT
8. Prepare instruments and identify stakeholders to involve in needs assessment	TCDT
9. Assess challenges in NREG, and review concept note	Policy makers, practitioners, alumni, prospective students, Faculty heads and members, TCDT
10. Identify capability (Knowledge, skills, attitudes, mind-sets) needs of NREG professionals	TCDT, Policy makers, practitioners, researchers
Phase 2: Course design and preparations for curriculum implementation	
11. Develop course content through several periodic meetings	TCDT, faculty members
12. Finalize draft curriculum for institutional review process	TCDT leader (Champion)
13. Create Curriculum Delivery Team (CDT) consisting of faculty members and practitioners scheduled to teach in Programme	TCDT
14. Review courses in draft curriculum	CDT
15. Update draft curriculum based on input from CDT	TCDT
16. Review of draft curriculum based on comments from institutional review process	TCDT leader (Champion)
17. Stakeholders validate curriculum content with capability needs identified	Policy makers, practitioners, alumni, prospective students, Faculty heads and members, TCDT
18. Develop format for documenting teaching methods	CDT
19. Decide on curriculum delivery options (Semester/Modular/weekend Programme)	CDT
20. Prepare teaching and learning materials	CDT
21. Advertise Programme	Institution's administration, alumni, practitioners, CDT
22. Interview applicants to the Programme	Available CDT members,
23. Admit students into Programme	Institution's administration
Phase 3: curriculum implementation	
24. Deliver courses	CDT, students
25. End of semester community engagement project	Students, CDT
26. Lecturer coaching Programme	Capacity building experts, CDT
Phase 4: curriculum evaluation	
27. End of semester evaluation for first and second student cohorts	CDT, students

3.4.2 The actors

Two broad categories of actors were involved in RCD; those within academia and those outside academia (Table 3.2). These actors are distinguished into those directly involved in the curriculum development and those who were not part of the RCD team but provided input periodically (non-RCD). The Head of Department (H.O.D) provided championship to the processes. His role is described in detail below. The Provost and Dean mainly motivated the TCDT by sometimes visiting their meetings, getting updated and expressing appreciation for the team effort. They also reviewed the curriculum as part of the institution's review board. The team (TCDT) did much of the planning and preparatory work (synthesising previous decisions, providing drafts for discussion) and this facilitated the process. Non- RCD team members within academia had the opportunity to review draft curriculum at Departmental, College and Academic Boards.

3.4.3. The curriculum

The final curriculum is a two-year Master of Philosophy programme in Natural Resource and Environmental Governance (NREG). The first year entails the enactment of 14 courses (Table 3.1: 24). Four of these are so-called foundational courses focusing on creating a solid knowledge base. These are given in the first semester along with three other courses that introduce students to more meta-disciplinary skills. One of these three courses is unique in that it does not relate directly to knowledge and skills in NREG but aims at enhancing students' ability to work in teams and engage stakeholders. At the end of the semester, students visit a local community or organisation to explore relevant problems (Table 3.1: 25). The other seven courses given in the second semester allow students to explore tools and skills for the analysis of concepts and cases. In the second year, students conduct independent research projects with mentorship from lecturers. They also give two seminars and a colloquium where students choose a peer-reviewed journal article, discuss findings and critique research approaches used. Taken together, the curriculum is a transdisciplinary programme that aims to build students' capabilities to bring about the much-needed change in the natural resource and environmental sectors. It is transdisciplinary because apart from integrating several disciplines, it emphasises learning beyond academia and linkage with the world of work.

Table 3.2: Actors roles in RCD

Actors	Championship	Motivation	Planning	Preparing Input documents	Experience sharing (Input data)	Facilitation	Decision-making on: Content	Decision-making on: Delivery methods	Decision-making on: RCD process	Documentation	Draft validation	Curriculum review	Provision of funding	Logistics	Teach courses	Support courses	Curriculum evaluation
Academia – Administrators – HOD		▓	▓			▓	▓	▓	▓			▓			▓		▓
Academia – Administrators – Dean & Provost			▓										▓	▓			
Academia – Faculty – Host Dept. – RCD		▓	▓			▓	▓	▓	▓						▓		▓
Academia – Faculty – Host Dept. – Non-RCD												▓					
Academia – Faculty – Within College – RCD			▓	▓		▓	▓	▓	▓						▓		▓
Academia – Faculty – Within College – Non-RCD												▓					
Academia – Faculty – Within Institution – RCD						▓	▓	▓	▓						▓		▓
Academia – Faculty – Within Institution – Non-RCD												▓					
Academia – Support staff										▓							
Outside Academia – Practitioners – RCD				▓			▓	▓	▓						▓		▓
Outside Academia – Practitioners – Non-RCD					▓							▓					
Outside Academia – Policy makers					▓							▓					▓
Outside Academia – Donors													▓				
Outside Academia – Capacity building organisations					▓												
Outside Academia – Alumni					▓							▓					
Outside Academia – (Prospective) students					▓							▓					▓

3.5 UNIQUE ATTRIBUTES OF THE RCD PROCESS

Beyond the summary of the process offered in the previous section, we show how the unique attributes described in Section 2 were experienced.

3.5.1. Iteration

There was evidence of iteration in the RCD process at the institution. First, concept notes were developed and reviewed three times (Table 2.1: 3, 7, 9). The initial version developed by the three-member team was revised by the Transdisciplinary Curriculum Development Team. The aim was to ensure that the concept note adequately incorporates the idea of responsiveness. The revised concept note was again presented to a wider group of stakeholders (Table 3.1: 9) to make an input its submission for institutional approval and accreditation. Second, after the draft curriculum had been presented for approval, the curriculum design process continued. Content of courses had been developed without input from all prospective lecturers who were to enact the curriculum. The team of lecturers (teachers) therefore revisited the draft content and adjusted them as necessary. The adjustments were however not ones that warranted a recall of the submitted curriculum. Third, though the draft curriculum presented met the minimum requirements for accreditation, the TCDT could still not prove that it was responsive as it had not been validated by relevant stakeholders. Thus, the draft curriculum was returned to these stakeholders in a workshop, to review it in the light of capability needs of NREG professionals. These iterations took place because of the learning and capacity building incorporated into the process.

3.5.2. Built-in learning

Three main components of the RCD process ensured learning and capacity building for curriculum developers. The first was the use of consistent and systematic reflections. Each TCDT working session began with a reflection on what had been done so far, the actors involved and how actions taken would enhance responsiveness of the curriculum. These reflections were crucial because curriculum developers had no guidebooks or training on developing a responsive curriculum.

The second component was the process on integrated natural resource management running at CANR during the initial stages of curriculum development. This process had helped its participants appreciate the importance of inclusiveness and stakeholder engagement in ensuring the College remains relevant. All members of the TCDT were part of this process. The third component was a tailor-made training for lecturers in the Curriculum Delivery Team (Table 3.1: 26). The team proactively sought for funding for this training because they realised they needed more skills on teaching and assessing students' so-called soft skills.

3.5.3. Team teaching

The TCDT worked together since its constitution but not much with team teaching. Most courses in the curriculum were implemented by individual lecturers. One course was, however designed to be enacted by the team of lecturers. This is the unique course mentioned in the previous section which aims at enhancing students' ability to work in teams and engage stakeholders during field projects. The practical enactment of this course is however still a challenge since only few lecturers were able to join. In part, this is because the course facilitators have not built up enough cases and networks to support student field projects. Consequently, the scheduling of projects under the course are ad hoc, which made it difficult for lecturers with heavy workloads to make time for the project.

3.5.4. Linkage to the world of work

The curriculum had several strategies to ensure adequate engagement with the world of work. First, midcareer professionals in NREG fields were encouraged to enrol in the programme, alongside students without such practical experience. The essence was for them to bring their rich experiences to bear during class discussions, group work and field projects. Second, the programme employed practitioners as part-time lecturers. These practitioners also had the requisite qualifications for lecturing in the institution. Their added value was to engage students on emerging discussions in the profession. Third, students went to organisations and local communities to study problems relevant for NREG. Students have, however, indicated that the opportunities given them to work with real-life cases are not enough.

Linkage to the world of work also required the use of innovative student-centred teaching methods. One factor that has, however, hindered the effective use of these teaching methods is that they require much preparation and are time consuming but the reward system of the institution does not directly recognise this extra input. Faculty members involved in RCD still had to teach the same number of courses and carry out the same level of responsibilities they would have had without being involved. However, with regular follow-up and encouragement from the champion and educational facilitator based on positive feedback from students, these methods are becoming more appreciated.

Chapter 3

3.5.5 Formative improvement–centred evaluation

At the institution, curricula are reviewed every five to ten years. These reviews are formal processes that potentially lead to major changes in curricula. In contrast, the RCD process involved a formative and informal evaluation already within the first two-years, resulting in changes to the curriculum. During the evaluation, students indicated that although the written curriculum does not show overlap in courses, they experienced significant overlap in the course delivery. As an example, a student explained

'*...in the course on livelihoods, we looked at the sustainable livelihoods framework but we still repeated the same framework with Dr. XXX in the sustainable development course in the same semester. This was a bit boring you know....'*

Reflecting on this feedback, CDT decided to form sub-teams of lecturers with related courses to discuss their teaching and learning materials to avoid excessive overlaps.

Despite this example of improvements, there were also limits to making the curriculum responsive. Currently, curriculum approval requirements only demand that teaching and learning methods be summarised into the number of hours of 'theory' and 'practical'. Assessment methods are also simply summarised into the percentage allotted to continuous assessment and to end of semester examinations, without detailed descriptions. These detailed descriptions are necessary for distinguishing a responsive curriculum from the traditional. In the existing structure, much is left to the discretion of the course lecturer. Presently, students are not complaining about teaching and learning methods used, possibly because all lecturers have been part of the curriculum development and understand the innovations the curriculum seeks to introduce. However, this is risky because when the lecturing team changes, the essence of the responsive curriculum could be lost. To minimise this risk the team set out to document teaching and learning methods being used. In practice, only a few lecturers have actually done so in the past two years.

3.5.6. The Champion

The leader of the TCDT, provided championship to the responsive curriculum development. At the commissioning of the curriculum development, he was a former head of the department. He became a head of department a year later. The champion negotiated for funds to make the shift to RCD. Along with the funding came an opportunity to use a new learning centre with facilities available for some of the new teaching and learning methods RCD wanted to explore.

The role of the 'champion' was key to ensuring that the process remained on track. This was important because the process was very time consuming. The champion tackled this by persistent follow-up and encouragement to enhance engagement and to sustain the interest of team members. The champion also had competence and experience with handling multi-actor processes. He ensured all members were given mutual respect and were listened to. A member of the team commented

'*If you work with this person, you feel motivated because he is committed and he follows up on our recommendations'.*

The competence of the champion could not be overemphasised because of experiences with another team within the College which was developing a responsive curriculum. The team started their work two years before this case study but the curriculum has not become a reality yet for several reasons, including lack of championship.

The champion's role did not end after curriculum design. Together with the Curriculum Delivery Team, the champion continued to support and oversee curriculum implementation and evaluation. For example, he contributed to the development of real-life study cases and field experiences. He also supported efforts at building the capacity of lecturers to use student-centred teaching and learning methods.

3.5.7. Expert facilitators

Two categories of facilitators were involved in the RCD process. Experts from the Dutch Consortium and an educational facilitator, who was the lecturer-academic researcher in the TCDT. The Dutch Consortium members had expertise in guiding institutional change in higher education. They visited the College periodically and guided the process through reflection on what the team wants to achieve and on the actions taken. They were instrumental in the decision to expand the three-member committee to TCDT. They also assisted the team to create their own plan on how to develop the curriculum. They were part of the process until the creation of the curriculum delivery team (Table 3.1: 14). Whenever the consortium experts were away, the educational facilitator guided the process.

The educational facilitator provided the TCDT with different theories and experiences from other institutions creating responsive curricula. This was followed by a discussion resulting in consensus on what RCD means for the specific context and how it should be different from traditional curriculum development (Table 3.1: 6). When curriculum implementation started, the host department decided to make the educational facilitator the programme coordinator. The educational facilitator coordinated the end of semester evaluations and the curriculum development team meetings to brainstorm on improvements required. To conclude, the consortium experts and educational facilitators played key roles in the various iterations, learning and continuous improvements involved in RCD. Again, we can use the experience of the other responsive curriculum development process at the College which has not yet resulted in a programme as an example. That RCD process had the support of consortium experts but did not have an educational facilitator and this stalled the process.

3.5.8. Outsiders to academia

As discussed above, a wide range of actors outside academia played a role in the RCD process. They helped in understanding emerging challenges, systematically identified graduate capability needs and evaluated the draft curriculum (Table 3.2). With a practitioner being a TCDT member, actors from academia were forced to make objective decisions without insisting on the university's traditions. A lecturer admitted "*actually it is good Mr XXX is here; we would have overlooked the possibility of bringing in people from the field to give guest lectures. Most of these guys are our former students so it should not be too difficult to get them.*"

Some actor groups were however not involved in the RCD process. These were actors from the National Council for Tertiary Education, the Ministry of Education and the National Accreditation Board. By not involving these actors, the process missed an opportunity to

share its innovations, and initiate relationships, which could possibly affect future requirements for curriculum accreditation.

The input of actors outside academia did not end with curriculum design. One third of the lecturers (teachers) on the programme were from outside academia. They satisfy all academic requirements for lecturing and were deliberately engaged to ensure the connection of the programme to the world of work. This arrangement was made possible because of the institution's policy, which allows departments to engage part-time lecturers on their Programme. Actors outside academia also provide mentorship for students' thesis writing. Practitioners who are not teaching on the programme also support teaching and learning as guest lecturers or student coaches during fieldwork.

3.6 DISCUSSION

The analysis has shown that all unique attributes we identified earlier were manifested in the RCD process studied, but to varying degrees as shown in Table 3.3. The table shows iteration together with built-in learning and capacity building were strongly manifested. Team teaching and formative improvement-oriented evaluation, though recognisable, were not yet well-exemplified. The iteration identified in the analysis resulted in a shared ownership of the curriculum and a better chance of ensuring that the curriculum is enacted as intended by its designers (Doyle and Rosemartin, 2012; Kiguli-Malwadde et al., 2006; Taylor, 2000). Built-in learning was done mainly by reflection, while capacity building was tailor-made, driven by the needs of lecturers in the Curriculum Delivery Team. In terms of linking to the world of work, the process studied had a well-thought-out strategy specifically, its recruitment of mid-career professionals as students and the engagement of qualified practitioners as part-time lecturers. However, financial and time constraints limited possibilities for providing real-world learning environments for students. Though various innovative ways exist for mimicking the real-world in the classroom (Balsiger, 2015) and some are being explored, students still needed more opportunities to learn in the real-world.

The mixed results with respect to these unique attributes of RCD are related with the institutional context in which the process took place. In general, there was insufficient attention for these aspects in national and institutional policies as well as insufficient incentives and support. Such contextual factors determine the trade-offs faculty members make regarding time investments and have a potentially large effect on the success of the processes. It could be argued that where an entire institutional system has not been changed to adequately accommodate all the unique attributes necessary for RCD, it may be advisable to use an incremental rather than drastic approach.

Table 3.3 Overview of extent of manifestation of unique RCD attributes in RCD at the institution

	Unique RCD attributes	Extent of manifestation in RCD case		
		Strong	Moderate	Weak
Process	Iteration	√		
	Built-in learning and capacity development	√		
	Team teaching			√
	Linkage to world of work		√	
	Formative improvement-oriented evaluation		√	
Actors	Champion	√		
	Expert facilitator	√		
	Outsiders to academia	√		

√ - indicates how a particular attribute is manifested. Strong signifies all aspects of attribute demonstrated; Moderate signifies some aspects of attribute demonstrated but with limitations; Weak signifies only slight demonstration of attribute

In spite of the institutional challenges, there were two factors that contributed positively to the RCD process. Firstly, there was strong evidence of the importance of a champion. This resonates with the findings of several researchers (McFadden et al., 2011; Paulsen and Peseau, 1992; Wolf and Hughes, 2007) who all conclude that such championship was indispensable to facilitating the team process and keeping the RCD process on track. However, the importance of such a single person should also not be exaggerated as his role is crucially dependent on the commitment of the team (da Cunha, et al., 2000; Patterson Jr, 2007). A second positive contribution was made by the expert facilitators. The analysis identified two categories of expert facilitators – an external facilitator on capacity building and an internal facilitator on education. As in the case of several curriculum development processes (Kiguli-Malwadde et al., 2006; Taylor, 2000; Wolf and Hughes, 2007), external facilitators inevitably leave the curriculum development process at some point, usually at the end of a project while the internal facilitator support the RCD for a longer time. Where this expertise does not exist in the institution or Department, it may be necessary to identify and mentor someone to play this role, early in the curriculum development.

Several researchers confirm the role of actors outside academia as a source of data for RCD (McFadden et al., 2011; Wolf and Hughes, 2007) and sometimes as reviewers of draft curriculum (Paulsen and Peseau, 1992; Taylor, 2000). The analysis reveals that the process under study was successful in involving actors outside academia. This was facilitated by the institution's existing networks with these outsiders and by institutional policies that allowed part-time engagement of qualified practitioners outside academia. Outsiders were not just consulted for the needs assessment; they were also involved in the decision-making during the design process and the enactment of the curriculum as part-time lecturers. This is important because it ensures that higher education institutions actually follow through on the results of the needs assessment and the diverse views reflected in the assessment. The idea of outsiders to academia being part of curriculum decision-making and enactment may sound far-fetched for some institutions but its usefulness for RCD and curriculum innovation more generally is worth exploring.

Below (Figure 3.2), we show the interlinkages between the unique attributes identified. Specifically, we argue that design, implementation and evaluation have to be closely connected and executed by a diverse team that includes all the actors deemed relevant for responsive curriculum development (lecturers, champions, expert facilitators and actors outside academia). These engage in continuous and iterative learning, and jointly works to innovate teaching, for example by teaching in teams and using student-centred methods, in order to ensure that the curriculum links to the world of work and build required capabilities. This is visualised in Figure 3.2.

The participatory action research approach (PAR) used in this study was important in the RCD process and our analysis. Specifically, the process was similar to PAR in a number of ways. First, as is typical of PAR, the process was characterised by reflection. Second, the continuous cycles of reflection, learning and improvement associated with PAR could also be identified in the process. Thus, a group committed to a PAR approach could make significant progress in RCD even without explicit knowledge of its unique characteristics. Using a PAR approach also has implications for the continued use of RCD. In PAR, curriculum developers question their own practice and seek ways of improving it. Indeed in the case studied, curriculum developers received external support from experts but not in the form of 'training' but rather 'guided reflection' on what needs to change and how. The added value here is that the team gained a sense of control and ownership of both product and process. Curriculum developers therefore feel responsible for the outcome of the curriculum and are motivated to ensure its quality and continuity.

RCD at the institution studied confirms the assertion that successful curriculum change occurs when strategies are aligned with organisational culture (Merton et al., 2009). The RCD studied had to navigate change amidst existing institutional structures and culture, which had not completely changed to accommodate responsiveness. The incremental rather than dramatic approach that was taken made optimal use of available opportunities and resources and could be considered appropriate given that in other cases dramatic changes ended up being short-lived (Patterson Jr, 2007). Institutions seeking to develop responsive curriculum especially in low resourced countries need to be proactive in seeking funding and collaboration with the understanding that where curriculum produces more employable and dynamic graduates, funds spent on RCD becomes worthwhile. The responsive curriculum at the institution studied has just taken off and it will be interesting to know how its innovations will be sustained.
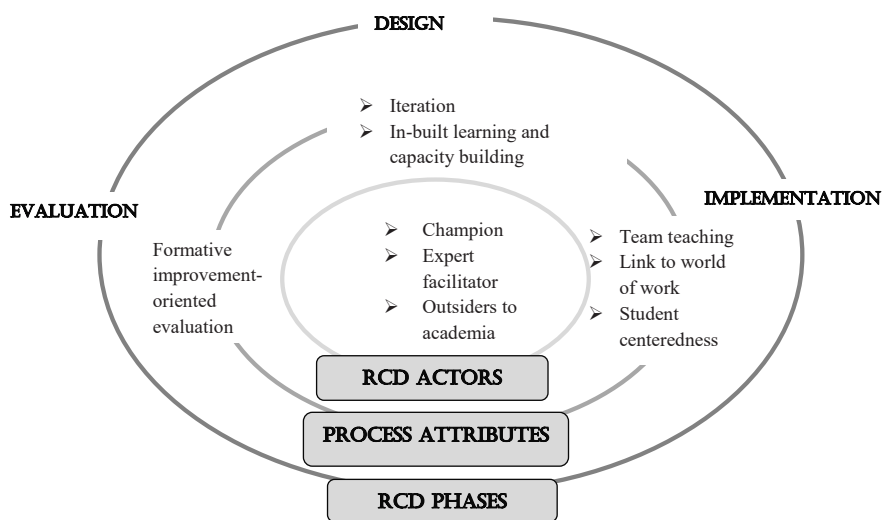
Figure 3.2: Conceptual model for RCD processes

3.7   CONCLUSIONS

In an era where most universities are seeking ways of creating curricula that are better able to respond to the dynamic needs of graduates, This Chapter contributes to understanding how such curricula could be created. We identified a number of unique attributes of such responsive curriculum development (RCD) as seen in literature and applied them to a specific case in Ghana. We found that all attributes could be recognised, but in varying degrees which related to the institutional context in which the RCD process took place. Specifically, the strong networks of the institution facilitated the involvement of actors outside academia, but limited resources and incentives constrained the implementation of team teaching and the development and use of innovative student-centred teaching methods necessary for linking the curriculum to the world of work. Finally, we saw that the champion and the expert facilitators were instrumental in navigating the institutional context, making optimal use of the opportunities while mitigating the constraints. Consequently, the involvement of these two categories of actors is indispensable in the development of responsive curricula in higher education.

Our analysis has resulted in a conceptual framework for RCD processes which shows the links between the unique attributes identified in literature. Though it was limited to a single case, our analysis covers a six-year period and includes curriculum design, implementation and formative evaluation. As such, we believe that our analysis of the role of the institutional context, and the lessons learnt in the case we presented contribute to our understanding of RCD processes and will offer guidance for future research into responsive curriculum development. For the future, the conceptual framework we propose will need to be tested in other institutions developing responsive curricular in varying professional field in order to validate the unique attributes of RCD.

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Chapter 4

The role of a community of practice in enacting curriculum innovations: A case from Ghana

ABSTRACT

Since long, educators and critical theorists have critiqued conventional approaches to education as being informed by a problematic and linear understanding of teaching as the transmission of knowledge and of students as passive receivers of that knowledge. They have proposed several educational approaches that are capable of enhancing critical thinking capacities and generating the knowledge and skills required for 21st century professionals. However, delivering those innovations in the practice of education has been challenging since it is not just students that need to learn different things differently, but also the teachers involved; they themselves also need to become 21st century professionals. In this study, we document how interactions among teachers enhanced the enactment of an innovated university curriculum for natural resource and environmental governance in Ghana, focusing particularly on the learning processes that took place. We draw on the concepts of Community of Practice, deliberation and power to analyse how the group of teachers facilitated the enactment of the innovated curriculum, how, in doing so, it functioned as a platform for learning among the teachers, and how its functioning was restricted by the institutional context in which it was embedded.

Keywords: Community of practice, Teaching, Curriculum, Curriculum innovation, 21st century professionals, Higher education, Ghana

4.1   INTRODUCTION

Conventional education is based on a problematic linear model, where education is thought of as being fundamentally transmissive (Jickling and Wals, 2008). Learning is consequently a unidirectional flow of information, skills and values from knowledgeable teachers to students. This model has however been widely criticized.   Some educators and critical theorist for example have argued that learners come in with prior (tacit) knowledge developed from their life experiences, cultural and racial contexts among others (Freire, 1970; O'Sullivan, 2002). Learners are thus, not 'empty vessels' to be filled with knowledge but they are capable of co-creating knowledge. Thus, more transformative learning modes of education have emerged which propose greater opportunities for learners to be more active and self-directed in the learning process. Education is thus, expected to raise learners to become critically aware citizens (Jickling and Wals, 2008) rather than encultured into hegemonic social structures and discourses. Parallel to these criticisms on the mode of education is the argument for education to become more responsive to the new skills and thinking capacities necessary for addressing complex and dynamic challenges of the 21st century (Biggs et al., 2009; Sibbel 2009; Sterling, 2004).

In response to these new debates, many higher education institutions are introducing several innovations in their curricula to produce graduates with appropriate knowledge, skills and thinking capacities to address emerging challenges. These new curricula propose alternative modes of teaching towards critical pedagogy and transformative learning (Freire, 1970; Kincheloe, 2008) with the aim of creating 21st century graduates. While these new modes of teaching and learning have gained some traction, their implementation lags behind (Estes, 2004). The main challenge has been to establish congruence between the normative theories and classroom practice (Argyris and Schön, 1974; Breunig, 2005; McLaren, 2002). Even where these theories have been well conceptualised in an espoused (written) curriculum, a gap still exists in its enactment, that is, the actual 'classroom' practice; the things that are taught and learnt through interactions between teachers, stakeholders outside academia and students)   (Breunig, 2005; Doyle and Rosemartin, 2012).

This gap between the espoused and enacted curriculum may exist for several reasons including lack of funds or support from the school system. Sometimes, it may also be that teachers are not engaged in curriculum development or review and consequently, their interpretation of the espoused curriculum differs from the intentions of the curriculum developers or teachers may simply continue along paths that are familiar. At other times, teachers may have varied opinions and may not accept the espoused curriculum, thereby widening this gap (Doyle and Rosemartin, 2012). Teachers' professional capability for implementing innovations introduced into the curriculum is also a key factor. Where innovations are new to teachers, the gap may become even wider since innovations do not necessarily change the thinking and practices of teachers (Jackson, 2010). Teachers who were themselves taught with out-dated methods cannot effectively explore curriculum innovations without first learning to develop new capabilities themselves. This chapter therefore focuses on teacher learning, to understand how to deal with the gap between espoused theories of innovated curricula and their enactment. This focus on teacher learning is crucial because for successful curriculum innovations, teachers themselves must become 21st century professionals.

Conventionally, teacher development programmes and formal policies for auditing and monitoring have been used for ensuring the effective enactment of curriculum innovations.

Deni et al., (2014) however note that, useful as these formal strategies are, they do not assure quality teaching within classrooms nor do they guarantee congruence between the enacted and espoused innovations. Again, valuable as well-designed teacher development programmes within higher education institutions may be, they are not sufficient for internalization of new practice (Boud, 1999) and may also not be the best pedagogical model for learning when it comes to addressing complex multifaceted problems (Finger and Verlaan, 1995). Instead, innovation and change require deep forms of learning that do not only correct errors from routines (single-loop learning) but also examine, question and alter underlying values and ways of working (double-loop learning) (Argyris, 1999; 2002) and possibly generate a rethinking of norms and protocols that govern an entire system (Armitage et al., 2008). While a lot of work has been done on these different forms of learning amongst others in the fields of organisational management, participatory and deliberative planning demonstrating the learning processes among practitioners (Argyris, 1982; Leeuwis and Pyburn, 2002; Wenger et al., 2002), it is less well known how the teachers that are meant to train future practitioners learn how to do this.

Such learning may take place within so-called Communities of Practice (CoP). The concept of CoP has emerged within some universities to promote learning and the sharing of teaching experiences and dilemmas (Deni et al., 2014). A community of practice is a group of people "who share concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006 P.1). This definition emphasizes the importance of interaction in practice as a condition for learning. As such, it could be an effective approach to bridging the gap between ideas and action, in our case between the espoused and the enacted curriculum innovations. Communities of practice in higher education have been explored as a means of professional learning, creating identity and enculturation for new faculty members. Only few studies (e.g. Lawrence and Sankey, 2008) have however explored and documented its potential for bringing change in higher education. Also, while indeed many studies have documented positive outcomes related to CoPs, less is known about the inner workings and dynamics of CoPs in practice.

This chapter is based on a four-year study of a CoP consisting of lecturers and practitioners learning to enact an innovated Master of Philosophy (MPhil) curriculum on natural resource and environmental governance at a university in Ghana. Moving away from the conventional transmissive mode of teaching lecturers together with relevant stakeholders had developed a new curriculum (see Ameyaw et al., 2017a) which seeks not only to promote a transdisciplinary approach to education but also to empower students with relevant skills, attitudes and mind-sets for responsible governance. The community of practice was established among teachers to support enactment of the new curriculum. In this study, we use the concepts of Community of Practice, deliberation and power to analyse how the group of teachers facilitated the enactment of the innovated curriculum, how, in doing so, it functioned as a platform for learning among the teachers, and how its functioning was restricted by the institutional context in which it was embedded.

In the next section, we give the theoretical underpinnings of the study. We then elaborate the context of the study and give the methods used. We follow it up with the key findings, discussing the implications of these for enacting curriculum innovations in higher education.

4.2   COMMUNITIES OF PRACTICE AND LEARNING TO MAKE CHANGE

The concept of Community of Practice was first proposed by Lave and Wenger (1991) as a contribution to learning theory. Dissatisfied with hitherto dominant, largely cognition

oriented, ideas about education and learning, Lave and Wenger (1991), and later Wenger (2000) emphasized the situated character of learning and put practice central. The concept has become very popular in varied domains and fields of study including participatory planning, organizations (Wenger and Snyder 2000; Snyder and Briggs 2003), and also in higher education (Ryan, 2015; Sheehy et al., 2015). In this sense, the concept of CoP has been used in combination with theories of participation and social learning (Wenger, 2000). Since its inception, the concept has been used and interpreted in many different ways, which, according to Ryan (2015) has resulted in conceptual confusion. Despite this variety, the following three characteristics are crucial to the functioning of a CoP (Snyder and Briggs, 2003; Wenger, 2000): 1. Domain, which refers to the shared area of interest that holds the group together; 2. Community, referring to the group, its members and the interactions between them; and 3. Practice which refers to the shared repertoire and frameworks. In well-functioning CoPs, these three components work in concert. There is a strong sense of what the shared interest is among the group members. The composition of the group reflects the main viewpoints of actors involved, and their interactions sustain mutual engagement and foster situated learning (Wenger, 2000). When this can be recognized, CoPs can be effective as vehicles for change.

The concept of CoP is a contribution to learning theory in general and social learning in particular. Social learning is seen as the learning that takes place when divergent interests, norms, values and constructions of reality meet in an environment that is conductive to learning (Wals and van der Leij, 2007). Social learning is seen as a form of 'communicative learning' through which people construct an inter-subjective understanding of a situation with others (van der Veen, 2000). In our context, teachers may re (construct) a new frame not only of how to enact the curriculum but also their own capabilities for doing this. Through discussions and reflections in a group, it is believed that ideas and strategies are generated which individual members of the group may not have hitherto considered (Johnson and Johnson, 2000). This form of learning is sometimes linked to Argyris and Schön's (1978) double loop learning (van der Veen 2000) and the conceptually diversely defined triple loop learning (see Tosey et al., 2011). Double-loop learning challenges dominant worldviews and values underlying practices. Wilner et al., (2012) argue that such deep forms of learning are grounded on critical reflection on processes and premise on which action is based. Such critical reflection may benefit from these three interconnected questions; are we doing things right, are we doing the right things, and is rightness buttressed by mightiness and/or mightiness buttressed by rightness? (Flood and Romm, 1996).

These deep forms of learning are believed to result in fundamental changes among learners or group members (Armitage et al., 2008) and have been linked to theories of transformative learning (Mezirow, 1995 in Armitage et al., 2008; van der Veen 2000). Transformative learning is a process where learners gradually change their views of the world and of themselves (Muro and Jefferey, 2008) and this usually occurs when critical thinking and reflection are triggered by disorienting dilemmas (van der Veen, 2000) or by other frames of reference that cause them to change and become more open to other perspectives (Wilner et al., 2012). Transformative learning does not only occur in individuals but also in groups (Armitage et al., 2008; Wilner et al., 2012). When transformative learning occurs in a group setting, as in a CoP, it allows critical reflection on problems, creates room for innovation, and enables a better match between action and underlying values (Wilner et al., 2012).

However, there are two challenges associated with the concept of CoP and related social and collective learning. The first is that this view of CoPs is very idealistic. In practice, as has been established for many documented cases of CoPs (Ryan, 2015), social learning (van Bommel et al., 2009), and participation (Turnhout et al., 2010), it is unlikely that conditions for learning and transformative change will be met in full. The second challenge is methodological. How can we empirically assess and evaluate the functioning of the CoP? This is particularly relevant for the third, practice, component of CoPs. As many studies have attested, process of learning are very difficult to assess and document (van der Veen 2000; Wilner et al., 2012). While in traditional educational settings, learning is assessed by means of a test or exam, this is problematic for the kinds of situated learning, which are non-linear and go beyond cognition only, that are expected to happen in CoPs.

In view of these challenges, we complement our analysis of the functioning of the CoP with insights from deliberative theory to understand the content and quality of deliberations. This is important because leaning in groups does not just happen. It requires a 'learning climate' that fosters open discussion encourages participants to speak freely, reduces competition, and allows for critique on the functioning of the group without negative sanctions or mistaken remarks (van der Veen, 2000, p. 18). Deliberation is considered to hold promise to overcoming barriers to collaboration and learning (Pellizzoni, 2003). The concept of deliberation stems from Habermas' (1984, 1987) ideas about ideal speech, communicative rationality, and the importance of deliberation in democracy. Instead of the representation of interests, which often result in suboptimal compromises, he believed that democracy was better served by the strength of the best argument. He postulated that problems can be solved through deliberation, and that consensus can be achieved by co-operation and agreement about the shared definition of a situation. As such, deliberation becomes vital for better decisions and for democracies to flourish (Dryzek, 1990). These ideas have been taken up in a wide variety of domains, most notably in policy analysis (Hendriks et al., 2007; Niemeyer and Dryzek, 2007). They also underlie many participatory approaches and social learning initiatives. Thus, they are useful for the analysis of the functioning of CoPs. Niemeyer and Dryzek (2007) posit three kinds of consensus that could be produced through deliberation: 1. *normative* consensus, which considers agreement on values; 2. *epistemic* consensus, which focuses on the effects of specific actions; and 3 *preference* consensus, which deals with agreement on what should be done. We will use these three different deliberative outcomes as a lens to analyse the community of practice under study in this article.

Additionally, the role of power in collective learning environments like the CoPs is also important in understanding their functioning (Armitage et al., 2008). A CoP cannot be assumed to be a homogeneous entity. Each member differs in terms of ability as well as willingness and capacity to experiment and learn (Armitage et al., 2008), apart from their diversity in terms of gender, class and values. These d create room for power differences that need to be taken into consideration. We thus, augment our analysis with consideration of the role of power in the CoP and in implementing changes necessary to enhance curriculum enactment in practice. Here we draw specifically on Mansbridge et al., (2010) who suggest that while productive forms of power – where power enables deliberative outcomes to materialize are vital in deliberation, coercive power – where treat of sanctions or use of force causes members to do what they would otherwise not have done – should be absent as much as possible. They however consider that this ideal is not only impossible to achieve but also hard to envision. Thus, they recognize a spectrum of that runs from minimal to greater role of particularly coercive power.

We apply these insights to analyse the functioning of the CoP that was initiated in our case study to enact an innovative curriculum for Natural Resource and Environmental Governance in Ghana. We address the following interlinked research questions: 1. How do interactions among teachers (lecturers and practitioners) in a community of practice facilitate the enactment of curriculum innovations and 2. What is the role of power and deliberative agreement in the community of practice?

4.3   STUDY CONTEXT AND METHODS

4.3.1 Context of the study

The College of Agriculture and Natural Resources (CANR) of the Kwame Nkrumah University of Science and Technology in Ghana engaged with Dutch partners in the late 2000s to re-think its educational programmes as part of a process for institutionalizing integrated natural resource management principles in the College. This process led to a realization of the need for the College to enhance its relevance to society by aligning its programmes with emerging needs of the agriculture and natural resource sectors they support. Consequently, the Department of Silviculture and Forest Management, which is under CANR chose to lead the process of creating a new curriculum to address emerging challenges to responsible forest governance (see Ameyaw et al., 2016). This curriculum was however not created in a 'business as usual' manner. The curriculum development involved extensive engagement of academics from different disciplines, researchers, policy makers, practitioners and prospective students in an iterative process (see Ameyaw et al., 2017a), which resulted in the establishment of a two-year Master of Philosophy programme in natural resource and environmental governance. The curriculum for this programme was founded on a transdisciplinary approach to education which integrates different disciplines and includes the knowledge and experience of practitioners in teaching (See Ameyaw et al., 2017b).

This new curriculum envisioned several innovations with three ambitions: 1) giving students an interdisciplinary perspective; 2) creating a strong link between academic training and professional practice; and 3) empowering students with not only knowledge but also skills, attitudes and mind-sets for addressing contemporary challenges in natural resource and environmental governance. The strategy for delivering these innovations were however not clearly documented and much was left to the discretion of the teachers in the programme. The teachers had to find ways of enacting the innovations of the new curriculum and also needed to engender sufficient support from the university to accomplish the innovation. The teachers, consisting of lecturers and practitioners outside academia, interacted often in a context we conceptualize as a community of practice (CoP). This CoP became a platform to support the enactment of the curriculum and to ensure that it would live up to its ambitions.

The CoP had eleven members, seven from different Departments within academia and four researchers and practitioners from outside academia (Table 4.1). The members started meeting one year before the start of the programme, to prepare for curriculum enactment. Once the programme started in 2013, the teachers met each semester for the first three years, to deliberate on teaching and learning methods, to discuss their experiences with curriculum enactment, and to address feedback from students' formative evaluations. CoP meetings were usually face-to-face but decisions were also followed up through electronic

means (mainly emails and phone calls). These kinds of interactions among teachers were not a formal part of the university's structure; they were established mainly to support the enactment of the new curriculum. In addition to the regular semester meetings, teachers also interacted and shared their experiences during a tailor made training they proactively requested for. The teachers identified areas where they lacked adequate skills and sought grants to partner with a Dutch organization for this training. The training was designed as an experience sharing, practice and coaching sessions for only teachers of the new curriculum. Interactions among teachers during this training further enhanced their practice.

Table 4.1 Description of community of practice members

Total number	11
Age*	36-57
Gender	8 males; 3 Females
Academic Background (Discipline/specialization)	Political Science (1); Communication (1); Social Science and Agroforestry (1); Forestry and law (1); Natural Resource conflicts (1); Natural Resource Policy and livelihoods (1) Natural Resource Economics (1); Rural Development (1) Forest Ecology (1), Natural Resource Policy and Education (1) Integrated Natural Resource Management (1)
Academic qualifications	PhD holders (7); non-PhD holders (4)
Sector of Employment	Academia (7); Civil Society (1); Research (2); Forestry Commission (1)

*Age in 2016

4.3.2 Methods

This study took place in the context of a participatory action research (PAR), set up to create a responsive curriculum for natural resource and environmental governance and also to study the processes and dynamics of making curriculum responsive. In the PAR, researchers together with teachers sought to improve curriculum design and enactment by jointly reflecting, identifying problems, and taking necessary actions while generating knowledge (Elliott, 1981, McKernan, 1991; Swantz, 2008). The broader curriculum development context is documented in Ameyaw et al., (2017a). This chapter focuses on the interactions within the CoP among teachers and how that supported the enactment of the curriculum innovations. The first author played a dual role in this study as both the primary researcher and a teacher of the new curriculum, thus, a complete participant (Spradley, 1980) in the CoP. That the researcher was also a teacher allowed the interaction among teachers to flow naturally without distortion or too much interruption (Wals and Alblas, 1997).

The study was conducted between 2012 and 2016, covering the period of preparation for curriculum enactment and the first three years of the programme. Data was collected through three main methods. First, discussions at CoP meetings, lasting between one hour twenty minutes and two hours thirty minutes were recorded using an MP3 voice recorder and transcribed. A total of seven transcripts were generated. Second, six conversational interviews with a flexible structure (Lavrakas, 2008) were conducted with teachers in June 2016 to understand their interactions outside the organized meeting sessions and to gain insight into how they use shared information and tools from their interactions in teaching

and learning. Third, notes were taken during the twelve tailor-made training sessions with teachers over a one year period. This tailor-made training was seen as an important component of the community of practice because it was not a regular capacity building session where an expert taught teachers how to enact the new curriculum. It was designed to facilitate learning among the teachers themselves. Notes were also taken on teacher interactions when a team of teachers took students out for field trips to various local communities and organizations. Four such field trips were organized during the study period.

Data from the transcripts and notes were analysed using thematic analysis. Thematic analysis identifies, analyses and reports patterns in data (Braun and Clarke, 2006). We used this method of analysis because of the flexibility it gives for describing data in a rich and complex manner (Vaismoradi et al., 2013). The analysis was conducted at two stages. First, we used an open approach to seek how the CoP played a role in the enactment of the new curriculum. Three key themes emerged, that described the three main roles of the CoP. The second stage of analysis then sought to identify evidence of key concepts in the data. For example, strategies used by the community like 'experience sharing', 'reflection' and 'self-critique' as well as evidence of coercive power, and deliberative agreements were labelled as such and related with the three key themes identified in the first stage of analysis. To improve reliability and reduce subjectivity, the themes were validated with two colleagues (Jonsen and Jehn, 2009).

In the next sections, we give the results of the study, explaining the three key roles the CoP played and the strategies that enabled its functioning. We then discuss the implications of these to the enactment of curriculum innovations.

4.4   RESULTS

As introduced above, the CoP under investigation was concerned with the innovation of a curriculum for natural resource and environmental governance at a university in Ghana. Without detailed strategy on how to enact the curriculum or much skills for being a 21st century professional, a Community of Practice among the teachers (lecturers and practitioners of the new curriculum) became a platform for facilitating curriculum enactment and ensuring that it lives up to its ambitions. In this section, we present our analysis of the interactions and learning processes in the CoP. We first discuss the three main roles the CoP played: 1. Rethinking the espoused curriculum, 2. Enhancing congruence between the design and enactment of the curriculum and 3. Navigating difficult institutional barriers. Subsequently, we focus our analysis on the learning and deliberation that took place within the CoP as well as the role of power.

4.4.1 Roles of the CoP

Rethinking the curriculum

Though the CoP was created mainly to enact the new curriculum, it became clear that teachers did not just take the espoused curriculum as - given. They re-analysed it, raised new questions and deliberated about certain aspects during their interactions. They questioned, for example, the adequacy of the innovations in the curriculum and its potential to live up to its ambitions. One topic that emerged was the issue of internships. Currently, the curriculum does not have internships embedded into its structure. Interested students however get supporting letters from the Department to seek internship opportunities in various organisations themselves. Following students' requests, the CoP deliberated on the

need for formalized internships within the curriculum. There was agreement on the usefulness of internships to the achievement of curriculum innovations – normative consensus. Deliberations however centred on how to supervise these, where to fit it in the two-year schedule, whether students needed to earn credits from the internship, whether the university's policy allows stakeholders outside academia to assist in grading student work and the implications of internships for mid-career professionals who may not have study leave and therefore need to return to their regular work schedules during vacations. These issues were raised on different occasions during the four year study period and postponed for further discussions but no decision had been taken on internships yet.

Following feedback from students, the teachers also deliberated on the level of flexibility the curriculum offers to students to choose optional courses. Currently, all the fourteen courses are compulsory and students could take additional courses from other departments in the university. Two key positions were presented in the deliberation. Position one was to create flexibility within the fourteen courses such that students could choose other options of interest and still end up with the same number of courses. The argument here was that adding more courses to the fourteen would be overburdening. Position two was that these fourteen courses were designed to offer the relevant combination of experiences that would equip students with relevant capabilities. They argued that granting flexibility within those courses will not give the diversity of disciplinary backgrounds needed for the innovation. These deliberations were also guided with experiences from literature. Those with position one later felt position two would serve the best interest of the responsive curriculum.

Interaction among the teachers also led to rethinking the appropriateness of the workload of the curriculum and the sequencing of the programme. Regarding the workload, a member commented:

"I also wanted to know if we were not too ambitious....I think there are too many lectures ..... that could also be a problem .... there is no room for going out and so on.... these are also issues that should be checked so that if we move to next semester we see to the content of the program, whether we cut down to allow for practical works"[N3 P7]

Upon deliberations, the teachers believed that the problem was not about the workload being too ambitious but rather about how the individual courses were organized to create space for more practical hands-on sessions. Thus, deliberations shifted the initial framing of the problem and the new framing became a shared perspective. The CoP also considered whether some courses, particularly those with a major focus on skills development needed to be moved from the first to the second semester to allow the development of enough theoretical understanding. Here again, the discussions revealed that the sequencing was still appropriate but in the enactment of the skills courses, time is to be allocated to establishing the theoretical basis but majority of the period should be used for practical work.

Enhancing congruence between the design and enactment of the curriculum

Interactions among the teachers also focused on ensuring the appropriate enactment of the curriculum. During the process, a number of changes were made to the enactment of the curriculum as a result of the interactions among teachers within the community of practice (Table 4.2). Teachers learnt to adjust both the content of the curriculum as well as teaching and learning strategy.

Content adjustments

At the end of the first year, it became clear that owing to the cross-disciplinary nature of the courses, some teachers were veering into the content of other courses, creating unwanted overlaps. For example, three courses were providing learning experiences on the same topic but it was agreed that one lecturer would address the topic and the others would draw on that. At the end of the second year, overlaps previously identified had been corrected but there were other areas of overlap. At this stage, members agreed to form sub-teams consisting of teachers with related courses. These would share their course materials and discuss its details to avoid excessive overlaps. These teaching teams are however yet to be created. Its formation required facilitation by the programme coordinator, who did not also have a time release from regular responsibilities to follow up on certain activities of the CoP. Though some unwanted overlaps remain, without the CoP it would have been difficult to identify and address these overlaps.

Also, students had indicated that the programme was more skewed towards forestry but they wanted a balance of all other aspects of natural resources and environment in their education. They also needed more practical (hands-on) sessions on the use of software for data analysis. These student evaluations were deliberated on in the CoP and used as basis for improving programme enactment. For example each teacher, tried to bring in more case studies beyond forestry.

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Table 4.2 Changes made in curriculum enactment over time

Enactment Issues (Challenges)	Changes over time		
	Inception*	Year 1	Year 2
Overlaps in course content	Profound	Less profound	Less profound
Skewness towards forestry	Most examples from forestry	Forestry examples balanced with cases from other sectors	
Group work	Ineffective, long debates among students; Mainly graded by teachers	More effective group debates	Teacher deliberately facilitates group formation, more effective and also efficient discussions, some peer grading of group work
Facilitating student centred learning	Increasing skills in encouraging active student roles in teaching and learning		
Guest lectures with practitioners	None	Few in the second semester	More guest lectures. First cohort students invited.
Real-life learning environment	None	Provided in one course and a joint activity at the end of the year	Many opportunities provided in several courses and also at the end of the year
Hands-on software training	Not done	A colleague engaged to offer several hands-on training sessions for students	Few sessions offered because resource person leaves the country
Balancing knowledge, Skills, attitudes and mind-set development	Students showed absenteeism and other negative attitudes and mind-sets. Teachers struggled to address attitudinal changes	Student-Academic Tutor system instituted. Some attitudinal changes observed	Addition of Student-Practitioner mentorship proposed but not implemented
Formative assessment of learning	None	Feedback given to students at the end of the year	Students received feedback on their work at the end of each semester

* This refers to the first semester of the programme

Adjustments in teaching and learning strategy

Group work was one of the key strategies for optimizing learning from different disciplines and professional experiences of students. Through engagement within the CoP members learnt from each other how to organize and grade group work effectively and they kept changing their strategies to optimize learning among students. Engaging students in interactive learning sessions, allowing them to lead discussions and to take responsibility for what they learn has not been the convention at the institution studied. This curriculum however required that teachers become facilitators of learning. The CoP allowed teachers to learn to play this role better. At the start of the programme, several teachers struggled with students making demands, expecting transparency and participation in decision making. Experience sharing and peer feedback within the CoP helped members to better deal with these struggles over time. Some teachers also changed their strategies for providing feedback to students during student-led discussions.

Regarding the creation of opportunities for students to engage with practitioners, in the first year of the programme, students only had a minimal engagement with practitioners besides those already employed as part-time lecturers. Following feedback from student evaluations and interactions among the CoP, a database of potential practitioners and other resource persons was created. Some of these were invited to the classroom to share experiences as guest lecturers. They addressed diverse topics students were interested in and this boosted students' satisfaction with the programme (see Ameyaw et al., 2017b).

Without the CoP, some teachers could still organise guest lectures but may not have accessed the same variety of resource persons. Additionally, CoP members also used their relationships and networks to provide easier access and reduce the cost of inviting practitioners to the classroom.

Providing real-life learning experiences for students was a major challenge to teachers because they all had several other courses alongside teaching in the new programme and were thus, time constrained. The CoP however challenged individual teachers to increase and also improve the practical (field work) component of their courses. For example, those teachers who were unable to take students to authentic learning environments brought in several real-life case studies using videos and narratives. Interactions within the CoP also revealed deficiencies in enactment of one of the major courses designed specially to provide real-life experiences for students. A new strategy was developed within the CoP to ensure that other teachers support organization and facilitation of the practical training. Efforts were also made to give more hand-on training on data analysis software but this has not been well-done yet since the resource person who provided this opportunity left the institution but is yet to be replaced.

The various changes agreed on in the CoP were to be implemented by teachers without any threat of sanctions or pledge of incentives. Without the CoP however, the necessity of such formative changes would have been downplayed. The CoP also kept deliberating on ways of achieving a balance between knowledge, skills, attitude and mind-set components of the curriculum. They instituted a mentorship system where each student was assigned to a member of the CoP to provide guidance in shaping the attitudes and mind-sets of students. They also considered assigning students to practitioner-mentors but this is yet to be implemented.

Navigating difficult institutional barriers

As explained in the study context, the curriculum innovations were introduced at a departmental level while most of the structures in the university remained conventional. The CoP became a place where strategies were discussed to navigate the challenges this situation posed and to maximize the opportunities it offered. For example, the programme wanted to engage practitioners as part-time lectures to ensure that the curriculum was well connected to the world of work. While normally, it is possible to arrange this, the high number of such contracts that was required for this curriculum raised questions. The Head of Department (who was a member of the CoP) was asked to justify this need and the CoP deliberated on how to give a good justification.

Another institutional barrier that needed to be overcome was the conventional mode of assessment of student learning. Innovations in the curriculum required that students spend much time on group work and learning outside the classroom. These activities are graded differently from the conventional "time-bound sit-in" examinations organized in the university. The university's policy however requires that the majority of student marks – around 70% - be obtained from such examinations. The innovated curriculum included two courses that were mainly skills-based and for which a different proportion of marks would be appropriate. The CoP questioned the values underpinning this approach to assessment. It also discussed how skills could be assessed and how much flexibility would be desirable in various courses.

Other challenges presented by the university context included getting sufficient resources for the extra effort required to develop and deliver the curriculum. Acquiring those funds through the university's system posed questions and required justification. This was difficult since workload and required capacity are normally calculated on the basis of time spent on teaching, while in this case, much of the extra effort for which funding was required was spent on preparing the curriculum and the courses. The CoP discussed the level of extra funding needed as well as strategies to obtain such funding.

4.4.2 Developing a learning platform

The discussions between teachers focused not only on the curriculum and on teaching, but also on their own learning process and interactions, while forming a learning platform and a CoP. A number of issues stood out: the sharing of experiences and problems, reflection and self-critique, and peer monitoring.

Experience and problem sharing

During the process, the CoP meetings became a place where teachers could share their personal experiences and what they had learnt from other peoples' experiences. This was necessary because most of the innovations were new to the teachers, which meant that no one was an expert. Members thus, shared their experiences with what they had tried in their courses. For example, the changes in organizing and grading group work discussed above were attained through experience sharing in the CoP. Peer assessment of group work was deliberated on since it was a controversial issue among the teachers. Members were struggling to reach a preference consensus on assessing group work. Some teachers had the position that students would favour their colleagues and the assessment would be biased. Others believed that since teachers are usually unable to sit through group discussions to monitor group dynamics, some people are likely to free-ride and therefore peer assessment would help reduce this. During the deliberations, a lecturer shared what he does in his class:

"*What I do with them [students] is that if I give them assignment and they bring it, I ask them to assess the assignments themselves and award marks themselves. I allow them to award only a fraction of the total marks for the assignment. They know the group, they know how to assess and it's interesting to see how they grade themselves and that was also skills building*".

This teacher felt that using peer assessment does not mean allowing only students to provide all the scores but giving them room to contribute to the final score. He shared that from his experience, it reveals interesting aspects of students' efforts that otherwise would have remained hidden. Some teachers considered this to be a possible option while others were more hesitant and preferred to not delegate grading to students.

Teachers also shared experiences on the usefulness of providing feedback to students. As shown in Table 4.2, provision of feedback on learning improved over the study period. Some CoP members recounted their experiences with how formative and summative assessment was done in their own universities where they were trained. Those teachers who were not familiar with the difference between the two types of assessments freely asked for clarification. Other teachers who had given students detailed formative or summative feedback recounted their experiences with their colleagues and showed how this helped to improve their performance in a subsequent course that was a sequel to the previous.

On how to facilitate student-centred learning, members shared experiences on how teachers' attitude in class affects student learning. Such input clearly gave a message to CoP members about attitudes to avoid in class:

ITP2*: As a student, I had a lecturer who will say that 'when I come to class, don't ask stupid questions'……and how do I know that the question I'm going to ask is a stupid question or not? So that class, nobody asks questions because if you ask a question, every question is stupid and you will be insulted…(laughs)*

Chorus*: Laughs*

CCP3*: Yes, and that puts fear in the students…*

ITP1: *What you said, the same thing happened in [mentions a certain department], he didn't accept questions from students; he said he was lecturing he was not teaching……laughs*

Improvement observed in the area of learning from stakeholders outside academia (Table 4.2) was also based on experiences shared in the CoP. Members discussed how some organisations take advantage of visiting professors, employers or practitioners to arrange for guest lectures. From their experience, though opportunistic, it was cost-effective and it complemented other strategies. Teachers from departments more experienced in engaging local communities also shared strategies they used in establishing standing relationships that allowed students to visit communities frequently to engage and learn from them.

Interactions among teachers provided an important opportunity for sharing problems encountered in class and for finding solutions to them where possible. There were open communication and all members had opportunities to share their views. Having interacted over several years, the sense of community among the teachers improved and they were better able to share their vulnerabilities. One of the means of linking the curriculum to the world of work (practice) was to encourage the enrolment of mid-career professionals. For many of those professionals, organizing study leave proved difficult and so they had to combine their studies with their work schedule. At the inception of the programme, the teachers acknowledged this issue and deliberated on several options for addressing it. They considered running the programme with a modular design where each course could be taken intensively for a few weeks or having weekend sessions. There was consensus on how a modular approach would affect the values of the curriculum. Teachers believed that the modular approach would not allow students to spend enough time together to interact and learn from each other and that they felt that that would affect the ambitions of the curriculum. Besides, teachers also had to give other lectures during the semester; they therefore decided against these options and agreed to schedule lectures from Monday to Wednesday so that mid-career professionals who need to, can return to work on Thursdays and Fridays except when there is the need for the students to undertake an activity on those days. In spite of this arrangement, there was still lateness and absenteeism among the students. The CoP became a platform where teachers could share these observations and discuss possible solutions to it. Some of the teachers, especially practitioners outside academia could also share their challenges with getting human and material resources for enacting planned innovations and get suggestions and assistance from colleagues.

Teachers also anticipated and discussed potential problems that could arise with certain decisions. During the preparation of the programme, there were discussions on resource persons who had extensive experience on various courses and the names of a number of

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retired academics and practitioners came up. Though the team could agree on the useful contributions these persons could make to the curriculum, they also anticipated difficulties with the university's policies on post-retirement contracts. Similarly, the team also anticipated challenges with inviting experienced practitioners from long distances away from the university as guest lecturers because of financial resource constraints. In the second year of the programme, a teacher also drew attention to potential problems with how assignments outside the classroom were organized. Following feedback from the first year, many teachers had adjusted their strategy to give students assignments that take them to real-life learning environments (Table 4.2). Thus, students were also becoming overburdened with many assignments. This teacher therefore anticipated that if such assignments were not well co-ordinated, they would defeat their purpose.

The community of practice was not able to address all problems. For example, discussions within the CoP kept coming back to importance of documenting the planned innovations in the curriculum and the experiences in the enactment of these innovations so that future teachers could build on the work done. A teacher lamented:

"my fear is... this analysis shows that if our generation of teachers pass ...maybe we all retire and then somebody only takes our course content there are many things they will miss in terms of delivery details...the person may not get it. We are doing well now because we know what we want and we are delivering it ourselves but somebody only taking the curriculum to run with it may not. Maybe if we have another opportunity we can put some details down on the course delivery... at least everybody can do it for your course"

Although this issue was raised several times, the teachers kept postponing writing down details. There were two reasons for this. First, the teachers pointed to their already high workload. Second, this documentation is not a requirement neither of the university nor the national accreditation board.

Reflection and self-critique

Reflection was a key activity within the CoP. Usually, meetings were aimed at reflecting on the enactment of specific components of curriculum innovations. The key reflection questions were: to what extent have we been able to execute what was planned? What accounts for the lapses? Are we placing emphasis where we should? And ultimately, are we delivering on our promises? Such reflection on curriculum enactment was not part of the regular culture of the study institution where evaluation and reflection was restricted to student evaluations of individual courses and periodic curriculum review every five years.

One course in the curriculum was dedicated to the development of skills and attitudes, without much emphasis on technical knowledge. It was to expose students to different real-life scenarios where students learn to develop team skills and strategies for stakeholder engagement, among others. Various teachers were to provide input to the cases and support students' work. This proved to be particularly challenging. Discussions within the CoP revealed that much of the practical aspects of the course were undertaken in class and students were not sent out to real-life situations (the field) as initially planned. Various reasons were identified for these lapses and a strategy was developed to address the gap during the next semester. This was an unusual intervention made possible by the role of the CoP because typically, corrections are made the next year when the course is taken by the next student cohort while here, the corrections ensured that particular student cohort still learnt what was intended (Table 4.2).

Engendering a good balance between knowledge, skills and attitude development was central to reflections on the curriculum because, although there was agreement on the importance of this balance, teachers struggled with delivering this. A CoP member reiterated the centrality of this balance, two years into the start of the programme:

"*when we developed it [the curriculum], we made a strong justification for the programme based on the fact that our observation is that in the university we are …putting a lot of emphasis on knowledge and the attitudes especially are missing, and that, for governance, attitude is a key issue. Ok, so I think the interest now is that if we were unable to deliver on that promise then what do we do? What do we need to fill the gap?"*

As seen above, these reflections did not necessarily accuse specific individuals. Instead, weaknesses were discussed in collective terms and this enhanced the sense of community. Such reflections alerted specific teachers to what needed to change in how they enact their courses. They were not called by a senior colleague to discuss their courses but the open discussions within the community engendered amendments.

The CoP also provided a platform for self-critique. During discussions, members brought up practices they consider unhelpful, even though that has been the convention in the university. A member for instance commented:

"Normally, in this university, we don't often give feedback on examinations. After exams you just move on to the next semester and teach. But with these students, I think it's important that those of us who are going to teach again this semester, for the papers that they wrote, we give them feedback on the way they answered questions".

This critique was well accepted and teachers started putting it into practice (Table 4.2) and sharing their experiences with colleagues, as explained above.

Peer monitoring and feedback

The sense of community established within the CoP allowed members to freely monitor the work of their colleagues and to give feedback during meetings. At the inception of the programme, a CoP member commented:

"I didn't actually teach this semester on the programme but I used to go to the class. I used to interact a lot with the students and they were very appreciative with the way this programme was being carried out."

Other CoP members also engaged with the work of colleagues and emphasised the overlaps indicated above and deviations from the espoused curriculum:

"*But another observation I also made was the overlaps. In teaching the course and interacting with students, there are a lot of overlaps, sometimes in terms of exam questions and the different topics that different teachers taught. But I think that some of us deviated from the course outline."*

After a year, student evaluations and peer monitoring showed improvements and some areas but not others (Table 4.2) and therefore alerted the need for further changes. Improvements in the opportunities offered for learning outside the classroom was also identified through peer monitoring. A colleague provided the following feedback in the second year:

"I checked on what other teachers are doing and this semester the students also mentioned it, that many teachers have given them assignment that takes them outside the classroom".

This peer monitoring was not an officially assigned duty of any CoP member nor was it superiors monitoring the activities of junior colleagues. Any one was encouraged to bring feedback on observations made. Also there were no threats of sanctions or punitive measures associated with observations made. The feedback helped to improve curriculum enactment because teachers learnt about the areas that needed improvement in their own work and also took note of unhelpful practices they need not undertake. Additionally, they got positive feedback about the things they were doing well. Observations made were shared generally, without an intention of 'naming and shaming' those struggling to enact the curriculum as intended. Without the CoP, teachers could still hear about strategies used by other colleagues from students close to them but this would only be coincidental. Again, when teachers had information about teaching strategies of colleagues, unless they have close working relationships, the feedback may not be relayed to the lecturer in question.

4.5   DISCUSSION

Our analysis has shown that in our case, the CoP has functioned as a vehicle for innovation and change (Lawrence and Sankey, 2008). It appears that the CoP enhanced the congruence between design and enactment of the curriculum by facilitating the rethinking of the curriculum and the improvement of teaching to meet the ambitions of the innovation. This is important because though teachers could have been trained to enact the curriculum innovations through other teacher development methods, there is usually no guarantee of such training resulting in a change in their teaching practices (Deni et al., 2014). Changes made to teaching practice however occurred in a successive incremental manner (Lindblom, 1959) and progressively enhanced congruence between the enacted and the espoused curriculum. Nonetheless, in spite of the progressive nature of the incremental change, certain forms of experiential learning and critical pedagogy that would have supported enactment like collaborative decisions regarding student marks (Breunig, 2005) and supervised internships are still not well developed in spite of the CoP. This notwithstanding, the successive incremental changes are still significant considering that there were no institutional structures nor forms of coercive power that 'forced' these changes in teaching practice. Teachers could have easily enacted the curriculum with conventional methods whenever they found the innovations too challenging.

Importantly, the CoP was instrumental not just in facilitating deliberations about the curriculum itself, but also by providing a platform for teachers to learn how to interact and exchange experiences. Over time, teachers learnt to give feedback to each other without direct confrontations or accusation. Learning was largely self-directed (Schugurensky, 2000). Through the CoP, teachers improved their practice through peer learning in a less formal manner (Boud, 1999). Where the teachers identified weaknesses in facilitating skill development, they were proactive in seeking tailor-made training which was also based on peer learning and coaching. This would not have happened if teachers had worked as individuals without the interactions engendered within the CoP. Through experience sharing in a collegial environment, certain behaviours, attitudes and values inappropriate for the new curriculum were highlighted. All this increases the the likelihood of tacit learning taking place (Schugurensky, 2000). Further, deliberate involvement of practitioners was central to the vision of the new curriculum but these were new to academia. This study also confirms that practitioners were encultured into the academic environment through the CoP (Boud, 1999; Lave and Wenger, 1991). It helped them not only to gain mastery of processes and procedures (Boud and Middleton, 2003) but also to have a safe environment to ask questions and learn. The group could also ask questions about values underpinning the university's modus operandi and make fundamental

changes within their own curriculum. In other words, the CoP facilitated the double loop learning that is considered crucial for innovation and transformative change (Armitage et al., 2008; Muro and Jefferey, 2008; van der Veen 2000; Wilner et al., 2012). Such double loop learning is a clear indication of the deliberative quality of the interactions. Regarding deliberative outcomes, analysis of interactions show a high level of agreement among the teachers particularly regarding values underlying the curriculum like disciplinary integration and student-centeredness. The effect of actions on these values were also not disputed in the CoP. These consequently enhanced the generation of productive power to act. What needed to be done to realise these values was however not always agreed on. It is not surprising though, to have no preference consensus sometimes because of the diversity in the group and the varied willingness and capacity to experiment and learn (Armitage et al., 2008). The cordiality engendered in the community over the four-year period removed barriers to deliberation creating the right climate for questioning and seeking to change the basis for age-long teaching and learning philosophies of the university without fear of intimidation or victimization (Van der Veen, 2000; Pellizzoni, 2003), enhancing double loop learning.

Our analysis has also pointed to the limits of the CoP in ensuring follow through and implementation of agreed changes. These limitations were related to the role of power within the CoP as well as to the institutional context in which the CoP operated. The changes usually discussed among the teachers may be put into two basic categories; ones that could be implemented by individual teachers in their own courses and ones requiring collective action. The latter category of changes proved more difficult to implement. This was not necessarily due to a lack of agreement over the values underlying these changes (normative consensus) or how actions would affect these values – epistemic consensus (Niemeyer and Dryzek, 2007). In fact there was agreement about this within the CoP. As a consequence of this agreement, coercive power was not needed and instead teachers learned and they did "what they would have otherwise not have done". They felt motivated through their new knowledge, to act differently. However, for the implementation of changes requiring collective action, it seems that this was not sufficient and the needed motivation to act was not accomplished. This, we suggest was due to the lack of enabling institutional environment, specifically, a lack of support for the curriculum innovation at the level of the university. Here, the exercise of coercive power could have made a positive contribution to the enactment of the curriculum. This study therefore seems to support Mansbridge's et al.'s, (2010) assertion for the need to use coercive power in addition to deliberative processes when it comes to implementing decisions. We add that this may be especially important when it comes to change at high levels in traditional organisations such as universities.

The implementation of changes requiring collective action needs prompting and follow-up by a leader of the curriculum innovation. Her/his ability to do so depends on institutional support. Apart from the role of power and agreement in the CoP itself, institutional support is a major factor that determines how curriculum innovations would be enacted. This study shows on one hand, how availability of institutional opportunities enabled enactment of curriculum innovations. For example the university's policy supported employment of qualified practitioners as part-time lecturers and also allowed the deployment of staff from other disciplines to promote transdisciplinary education. On the other hand, other factors like lack of time release for staff enacting the innovative curriculum, inadequate recognition of teaching innovations in staff promotion (Davis and Jacobsen, 2014) and poor remuneration became a disincentive which influenced trade-offs and decisions teachers

made over time. As the findings portray, the CoP was a platform for learning to deal with the atypical challenges (Boud and Middleton, 2003) that came from the institutional context. However, it also confirms the observation of Boud (1999) that having a strong interest or concern for something is not enough to sustain a COP and its outcomes. Once there is a link between the enactment of curriculum innovations and teachers' promotion for example, there is a better probability of sustaining the interactions among the teachers within the COP and also for sustaining curriculum innovations.

Putting the three concepts of deliberation, power and institutional context together we have provided a framework for understanding the functioning of a CoP and for analysing how it could support the enactment of innovative curricula. The first factor, power, can be presented on a continuum from coercive to less coercive forms of power (Mansbridge et al., 2010). Our analysis highlights a general absence of coercive power– there were no enforcement or threats of sanctions – and a rather strong presence of productive power – the CoP empowered members to act based on their own motivation and skills. The second factor, deliberative agreement refers to the extent to which teachers agree on the values underlying the curriculum and how actions would affect these values (Niemeyer and Dryzek, 2007). Our findings reveal the presence of different levels of normative, epistemic and preference consensus. The last factor is institutional support which may be adequate or limited. Figure 4.1 below shows how the different combinations of these factors affects the prospects of curriculum enactment with the support of a CoP.

In the cases where the teachers within the CoP do not agree on the values underlying curriculum innovations and institutional support is limited, it would be difficult to generate productive power and the curriculum innovations would most likely not be enacted (LAPPLS). Where coercive power operates within the CoP instead (LACPLS), even if people are forced to act, teachers are likely to rebel, with the excuse that they lack needed support and the innovations are likely to be short-lived. Where teachers do not agree on issues regarding the innovations but there is institutional support, the presence of coercive power within the CoP (LACPAS) will cause teachers to enact the innovations as required as long as support exists and as long as there is a supervisor insisting that they act differently. In the absence of coercive power (LAPPAS), only those teachers who believe in the values underpinning the innovations are likely to take advantage of the available support to enact the innovations as envisioned.

Where teachers do agree on values and what to do regarding the curriculum innovations but where there is no institutional support, the presence of coercive power (HACPLS) will lead to teachers making excuses for not enacting innovations as required. However, if people are motivated to act through the CoP (HAPPLS) then enactment would depend on the extent to which this motivated group of teachers can be proactive in generating the needed support within or outside the institution. We argue that the desirable situation for enacting curriculum innovations, as envisioned, is when the CoP functions with a high level of agreement on the values underpinning the curriculum, on how their actions would affect these values and on what needs to be done. In addition to a well-functioning CoP, adequate support is indispensable. In situations where less coercive forms of power are fostered within the CoP, enabling teachers to deliberate freely and becoming motivated to act based on their capabilities (HAPPAS), innovations are likely to be enacted as envisioned and may be sustained. A CoP could also facilitate the enactment of curriculum innovations under conditions where coercive power exists together with a high level of agreement and of institutional support (HACPAS). However, the longevity of the innovations will depend on persistence of authority as the source of coercive power.

High Deliberative Agreement (HA)

Coercive Power (CP)

Productive Power (PP)

Low Deliberative Agreement (LA)

HACPAS
Innovations well enacted as long as coercive power remains

HACPLS
Teachers likely to make excuses for not enacting innovation

HAPPAS
Innovations well enacted over a long period of time

HAPPLS
High motivation for enacting innovations but realisation is dependent on proactive creation of support

LAPPAS
Partial enactment by those who agree with values as long as support exists

LAPPLS
Innovations unlikely to be enacted

LACPAS
Teachers forced to enact curriculum as long as supervision exists

LACPLS
Teachers disagreeing with values underpinning innovations likely to rebel against its enactment

– – · **Adequate Support (AS)**

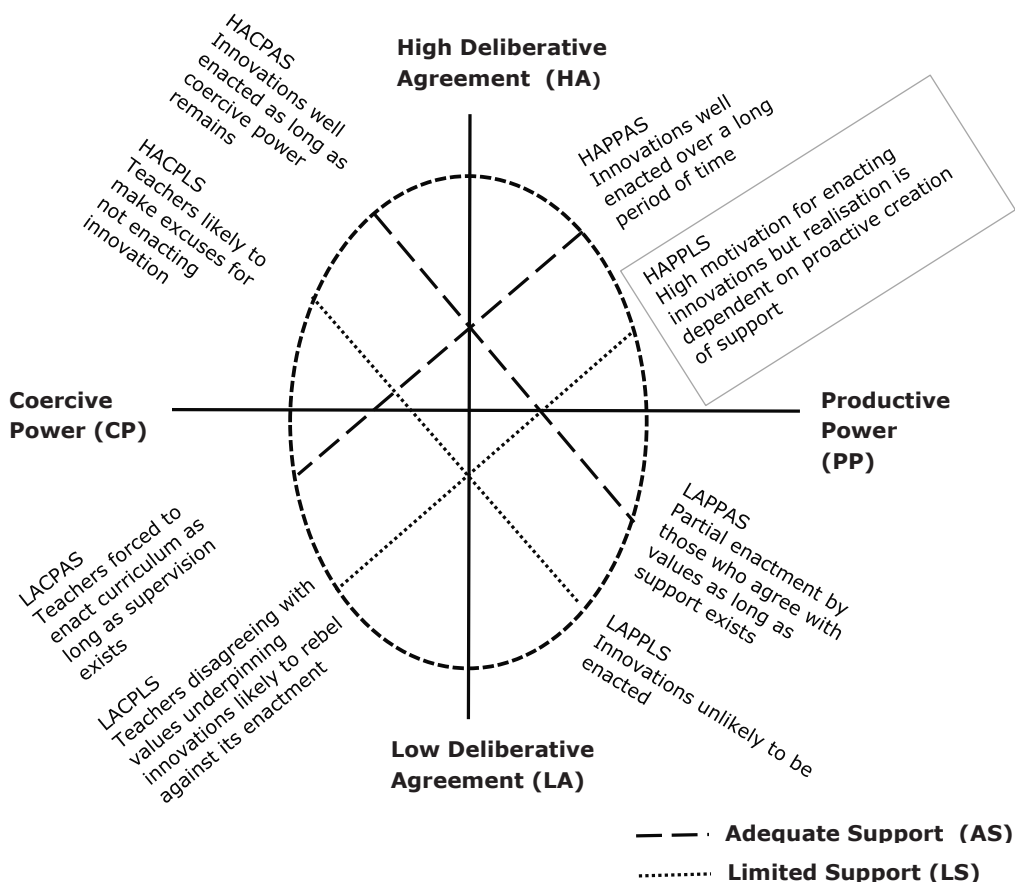·········· **Limited Support (LS)**

Figure 4.1: Framework showing interplay between power, deliberative agreement and institutional support for enactment of curriculum innovations with a community of practice

For the case studied, there was high agreement among the teachers over the values underlying the curriculum (normative consensus) and how their actions would affect these values (epistemic consensus), even though they did not always agree on the details of what to do in order to implement the agreed values (preference consensus). Also, there was less coercive power exhibited within the CoP. No threats of sanctions were observed and teachers were not forced to act. However, institutional support for the curriculum innovation was limited. Thus, though the teachers were highly motivated to enact curriculum innovations, their ability to sustain the innovation will depend on whether they would be able to harness support proactively within the institution (highlighted portion of Figure 4.1). If they are unsuccessful at this, over time, the enactment of innovations is likely to fade into business as usual.

4.6   CONCLUSIONS

Across the globe universities are seeking to incorporate innovations embracing theories that develop new skills and thinking capacities relevant to the 21st century professional. Enacting such new curricula has proven to be challenging as it requires that today's teachers consequentially learn to develop new capabilities as well. This study looked at how a group of lecturers from academia and practitioners outside academia employed as part-time lecturers interacted in the context of a CoP to facilitate the enactment of an innovated curriculum. It also analysed how the CoP functioned as a platform for learning among the teachers. The study shows that the CoP indeed functioned as a vehicle for change, enhancing the congruence between design and enactment of the curriculum by facilitating the rethinking of the curriculum and the improvement of curriculum content and teaching strategy to meet the ambitions of the innovation. The CoP also created a safe environment for teachers to learn but also question the values underlying age-long teaching and assessment methods. Thus, the CoP facilitated the double loop learning that is considered crucial for innovation and transformative change.

The functioning of the CoP was restricted by the institutional context in which it was embedded. Although the CoP was a platform for learning to navigate institutional barriers, several decisions were not followed through due to these limitations. Hence, instead of waiting for complex university structures to change to accommodate innovation in curriculum, it may be useful to encourage the emergence of smaller inter-linked communities of practice among faculty. These 'networked' small CoPs will learn to learn from each other and to bring change to teaching and learning in their smaller spheres of influence. They would also develop ways of navigating institutional barrier to ensure their own career development and promotion within a university system that remains unchanged.

We dare say that without a community of practice approach, the faculty-led innovation would fall back to 'business as usual' very quickly. The innovation would have only been envisioned but would not have been enacted, thus, leaving the development of graduates with capabilities for addressing challenges in their professional field as only a mirage. However, even with the community of practice, it is necessary to proactively generate support within the institution and also from other external sources where possible, to sustain the innovations.

ACKNOWLEDGEMENTS

Chapter 5

Does a transdisciplinary approach to forestry education meet students' career aspirations? Lessons from a curriculum innovation in Ghana

ABSTRACT

The forestry sector is generally transitioning towards becoming more inclusive, responsive and responsible, thus creating an increasingly dynamic professional environment. Many universities are thus, broadening the scope of traditional forestry programmes towards a more transdisciplinary paradigm. This chapter assesses the transdisciplinary approach used in a Natural Resource and Environmental Governance programme in Ghana. It identifies students' motivations for choosing this transdisciplinary programme and determines how the programme satisfies their future career aspirations. The study reveals that students prefer transdisciplinarity because they expect it will make them more versatile, thus, offering better job prospects. Our study also shows that although the programme exhibits features of transdisciplinarity, its collaborations beyond academia is still rather limited. Despite this, we found that the programme largely satisfies the aspirations of most students, except those with non-academic career aspirations. The chapter concludes by arguing that transdisciplinary education requires a supportive institutional environment.

Keywords: Transdisciplinary, Forestry education, Student aspiration, Natural resources curriculum, Ghana

5.1   INTRODUCTION

The forestry sector is going through a worldwide transition to become more inclusive, responsive and responsible (Amanor and Brown, 2003; Beckley et al., 2006; Scheyvens et al., 2007; Wily, 2002). This transition creates an increasingly dynamic professional environment that requires new sets of knowledge, skills and thinking capacities (Ameyaw et al., 2016; Arevalo et al., 2010). At the same time, students' interest in pursuing forestry professions is dwindling, resulting in declining enrolment and closure of some forestry schools (Innes and Ward, 2010; Leslie et al., 2006; Temu and Kiwia 2008). These changes are taking place amidst general cuts in spending on higher education and decline in employment (Addae-Mensah, 2002). In response, many agricultural and life-science universities are making changes to traditional forestry programmes in order to remain relevant for these newly developing environments (Arevalo et al., 2014).

One of the key changes has been to include additional non-technical skills (Arevalo et al., 2010, Temu et al., 2006) that will prepare forestry graduates for a wide variety of future careers, including jobs in sectors not directly related to forestry (Ackom, 2010). Some have also rebranded their forestry departments and faculties and others have broadened their traditional forestry programmes to include courses on land, natural resource and the environment (Innes and Ward, 2010). Some forestry educators have created integrated programmes that draw on knowledge from different disciplines to address existing problems (Manning, 1998), while others enlist the support of employers and other stakeholders in training forestry professionals (Taylor, 2000; Tombaugh, 1998). These reforms all aim to bridge the gap between forestry education and the realities of the world of work by giving students the diversified knowledge and skills needed to address cross-cutting issues like poverty and food security (Taylor, 2000; Temu and Kiwia, 2008).

These changes in forestry education can be seen as part of the emerging paradigm of transdisciplinarity in higher education. Transdisciplinarity is an interaction of two or more sets of disciplines along with non-scientific expertise, which combine into a comprehensive framework that organizes knowledge in a new way to holistically address complex socially relevant issues (Pohl, 2011; Ramadier, 2004). An important characteristic of transdisciplinarity, distinguishing it from interdisciplinarity or multidisciplinarity (Table 5.1) is the intentional combination of knowledge of professionals with the know-how of other stakeholders (Horlick-Jones and Sime, 2004; Klein, 2004). Thus, professionals from different disciplinary backgrounds collaborate with stakeholders with local knowledge systems to define, analyse and solve problems. Here, professionals within and outside academia learn from each other to equip each other with skills, knowledge and ethical values that go beyond a technical understanding of the issues (Aneas, 2015; Balsiger, 2004; Ciannelli et al., 2014; Klein, 1990; Yeung, 2015). The concept of transdisciplinarity has therefore been presented as, 'being between the disciplines, across the different disciplines, and beyond all disciplines' (Nicolescu, 2002, p. 44). It responds to joint problem solving in a way that it is more than juxtaposition of disciplines (Hugill and Smith, 2013; Nicolescu, 2002; Ramadier, 2004) and it is considered a crucial and indispensable paradigm for addressing complex problems like natural resource depletion, biodiversity loss and climate change (Balsiger, 2015).

Chapter 5

Table 5.1 Overview of concepts on disciplinarity

Concepts	Meanings associated with concept
Mono-disciplinary	Domain specific knowledge Emphasizes learning outcomes based on contents and processes of a given domain
Multidisciplinary	Combination of knowledge from different disciplines. Usually additive, involving juxtaposition of disciplines Mainly within academia
Interdisciplinary	Synthesis of knowledge from different disciplines Seeks to integrate the different perspectives; May be difficult to attribute outcome of integration to any specific discipline Remains within academia
Transdisciplinary	Integration and synthesis of knowledge from different disciplines Use of knowledge beyond any discipline Involves knowledge outside science/academia (lay knowledge, indigenous knowledge) Knowledge produced jointly with scientist and other stakeholders Focused mainly on addressing complex socially relevant problems or issues

Source: Authors' construct based on Klein, 1996; Spelt et al., 2009; Pohl, 2011

While there is general support for innovations towards inter and trans-disciplinarity in forestry, natural resource and other life science curricula (Ewel, 2001; Innes, 2005), concerns have also been raised about the depth of domain specific knowledge of graduates (Innes and Ward, 2010). This notwithstanding, today's forestry graduates have a variety of career options open to them even outside forestry practice, requiring that they have diverse capabilities (Blickley et al., 2013). Again, even for professionals working in forestry, the complexity of emerging problems requires new capabilities (Ameyaw et al., 2016). It is therefore important to assess the usefulness of forestry curriculum innovations promoting transdisciplinarity as little is known empirically about transdisciplinary education (Nash, 2008).

This article assesses the transdisciplinary approach used in a forestry department-led graduate Master of Philosophy (MPhil) programme in natural resource and environmental governance in Ghana. In our case, the forestry department led the curriculum development process but the content of the programme was meant to address other natural resource and environmental issues as well. This programme is considered transdisciplinary because it focuses on addressing complex real-life problems by engaging knowledge from other disciplines and non-academic stakeholders. This transdisciplinary approach was used for three reasons: first, to address employers' concerns about the gap between theoretical knowledge and emerging competence requirements for professional forestry practice; second, to respond to similar challenges in other natural resource and environmental sectors which remain inadequately addressed in the country; and third to increase postgraduate enrolment. This chapter assesses the experiences of the first two student cohorts from the transdisciplinary programme. It seeks to understand the motivations and aspirations of students and to determine if, and how the transdisciplinary approach meets students' aspirations. The chapter consequently explores three key research questions; i) what motivated students to choose a transdisciplinary programme? ii) To what extent and how did the transdisciplinary approach satisfy students with different career aspirations? iii) To what extent do students develop specific capabilities for *forest* governance in a broader transdisciplinary programme in *natural resource and environmental* governance?

The next section elaborates how transdisciplinarity has been applied in education, highlights the main features of transdisciplinarity, and gives the basis for assessing the transdisciplinary forestry curriculum case studied. Subsequently, section 3 gives the

methods used for the study. The results are presented in section 4. Sections 5 and 6 discuss the implications of the findings for future transdisciplinary curriculum innovations and present the conclusions.

5.2   TRANSDISCIPLINARITY IN EDUCATION

Traditionally, universities develop curricula around academic disciplines, each of which has its own intellectual history, agreements and disputes about subject matter and methods (Hugil and Smith, 2013). This makes it difficult for university structures to create space for transdisciplinarity. To create such space, Max-Neef (2005) proposed to reorient higher education to specific thematic areas (e.g. climate change, forest governance, water) rather than towards specific disciplines. Such programmes would include students and faculty from different professional backgrounds to help see the problems from an integrated perspective. Thus, the defining aspect of transdisciplinary education is its purpose of producing graduates capable of addressing complex problems in an integrated way (Nash, 2008).

To achieve this, two main characteristics of transdisciplinarity are crucial: integration of disciplines and collaboration beyond academia (Balsiger, 2015; Krott, 2003; Pohl, 2011). Integration of disciplines is optimized in education through group activities that facilitate mutual learning and allow interaction and knowledge sharing leading to compromises and negotiated consensus (Klein, 2008). To accomplish this, it is important to identify what tools and disciplines are needed and to create flexible spaces where these different tools and disciplines can interact (Klein, 2008). Collaboration in transdisciplinary education involves the interaction of teams of faculty members from different disciplines, working together with actors in non-academic professions (Nash, 2008). Non-academic actors may include practitioners, policy decision maker or lay people (Balsiger, 2004; Pohl, 2011). They work together to help students develop a comprehensive understanding of the complexity of current problems and issues in society and the world of work. This collaboration can take various educational forms. For example, simulation exercises may be used in the classroom to demonstrate real-life problems in role plays (Balsiger, 2015). Sometimes stakeholders working on specific problems are invited to the classroom to engage with students (Martinich et al., 2006). Students may also be taken to local contexts to study specific phenomena (Graybill et al., 2006) during internships or field research. Balsiger (2015) offers a typology for understanding and exploring varieties of transdisciplinary approaches. The typology is based on two features; the extent of integration of disciplines and the degree of collaboration (Figure 5.1). These two features are considered as a continuum where the levels of integration and collaboration could either be increased or decreased. The different combinations of these features result in four types of transdisciplinarity. In cases of narrow transdisciplinarity the integration of disciplines is weak and collaboration with stakeholders is also limited. In inclusive transdisciplinarity integration is weak but collaboration is extensive with an increasing number of stakeholders playing a role in education. Reflexive transdisciplinarity is characterized by high levels of integration, but limited collaboration.

Collaboration beyond academia

		Limited	Extensive
Integration of disciplines	Weak	Narrow transdisciplinarity	Inclusive transdisciplinarity
	Strong	Reflexive transdisciplinarity	Comprehensive transdisciplinarity

Figure 5.1: Varieties of transdisciplinarity (adapted from Balsiger, 2015)

Finally, comprehensive transdisciplinarity is achieved when both disciplinary integration and collaboration are well developed. Blickley et al., (2013) have established that students aspiring for non-academic careers are likely to benefit from capabilities developed through transdisciplinary learning. However, for a student group with varying career aspirations, the appreciation of transdisciplinarity in higher education may be mixed. Particularly, it has been established that students who aim for a job in academia can be hindered by transdisciplinarity (Klein, 1996; Nash et al., 2003; Nash, 2008; Rhoten and Parker, 2004). This raises the question of whether transdisciplinary education meets the needs of students with both academic and non-academic career aspirations.

In the next section, a background to the programme studied is given, summarizing how the curriculum was developed and which key elements of transdisciplinarity were introduced in the programme. The research participants and methods used in gathering and analysing data are also described.

5.3   RESEARCH CONTEXT AND METHODS

5.3.1 Study context and participants

Formal forestry in Ghana started with colonial administration and the establishment of a Forestry Department in 1909. Before then, however, forestry was already being practiced by local communities, using sacred grooves and protected areas. Until the 1980s, the focus of forest management was to ensure the maximum and sustained production of timber. Consequently, forestry education focused on forest science and silviculture (Kotey et al., 1998). International discourses on forestry together with a perceived failure of state-controlled policies led to the introduction of collaborative forest management in Ghana which emphasized the role of people in sustainable forest management (Oduro et al., 2011). Forestry curricula were therefore reviewed accordingly to include new perspectives on participatory or community based forest management (Ameyaw et al., 2016). With the increasing prominence of multi-actor and multi-level governance of forests and other natural resources in Ghana, there is a renewed need for innovation in forestry education.

The study was based on a two-year Master of Philosophy (MPhil.) programme in natural resource and environmental governance (NREG) at a university in Ghana. The forestry department that initiated the programme was the first to start professional forestry training in Ghana. It is part of a faculty that runs a composite undergraduate programme in natural

resource management, with a specialisation in forestry and a traditional research-based Masters programme in silviculture and forest management (Ameyaw et al., 2016). This research-based programme however enrolled an average of three (3) students per year between 2008 and 2014. This low enrolment coupled with a desire to remain relevant motivated the department to respond to recommendations from several workshops for capacity building in forest governance. Conventionally, to develop a new master programme, the department forms a committee made up of its faculty members, to prepare a draft curriculum and submit it to stakeholders for feedback. However, in the case reported here, the department decided to depart from this convention. This decision was informed by lessons learnt from an institutional capacity building process, which emphasized the added value of developing curricula with rather than for stakeholders in today's rapidly changing world.

The forestry department led the formation of a six-member curriculum development team made up of faculty members from different disciplines and a practitioner from the organization that employs majority of the nation's natural resource graduates. This team extensively engaged stakeholders from all sectors relevant to the envisaged programme to understand the challenges of the sector and the capabilities they require from students. This engagement led to the realisation that students need capacities related to the governance of not just forests, but also other natural resources and the environment. The stakeholders (including employers) agreed that to train the desired crop of graduates, a transdisciplinary approach to education was necessary. The six-member team used input from the stakeholder engagement to draft the curriculum. This draft was reviewed by prospective lecturers in the programme as well as by a wider stakeholder group. Thus, the curriculum was a joint product from faculty members and potential employers. The resulting MPhil NREG programme spans four semesters.

The first two semesters involves a taught component with fourteen courses aimed at developing students' knowledge, skills, attitude and mind-sets for understanding and analysing concepts and cases in NREG. Two courses are dedicated to enhancing their ability to work in teams, engage stakeholders and communicate effectively. At the end of the first year, students undertake a practical field project in a community, where they gain experience in analysing complex problems like illegal logging, illegal small scale mining, or improper waste management.

As depicted in Figure 5.2, this transdisciplinary approach had two main tenets: 1) integration of disciplines, and 2) collaboration beyond academia. Three main elements were deemed necessary for disciplinary integration. First, students from different academic disciplines were eligible for enrolment. In class, they worked on projects either as groups from the same discipline, such that the output from the different groups show the diversity in their perspectives on the same issues (Vedeld and Krogh, 2005) or as cross-disciplinary groups to enhance learning through interaction (Fortuin and van Koppen, 2016; Misra et al., 2009). Second, courses synthesized perspectives from different disciplines. An example of such a course was Political Economy of Natural Resources, where perspectives from political science, economics and natural resource management were interlinked to explain governance decisions. Third, all courses in the programme were intended to be coherent, with each course drawing on the other, without excessive overlaps. Faculty members from different disciplines thus worked together to design and teach in the programme and to facilitate the process of knowledge integration across the disciplines (Spelt et al., 2009).

Collaboration beyond academia also had three key elements: First, the programme encouraged the enrolment of students with mid-career professional experience to enrich classroom interactions. Conscious efforts were made to encourage collaboration, information sharing and critical reflection (Gilkey and Earp, 2006) among these students and those without professional experience. Second, practitioners with relevant academic qualifications similar to university faculty were engaged as part-time lecturers to bring their rich experiences to the classroom. Periodically, other practitioners outside academia were also invited to share experiences as guest lecturers. Third, students were taken out to local communities and other settings outside the classroom, to learn from real-world situations. The first two cohorts of students admitted to the programme were the participants in this study. These were forty eight (48) students, including nine (9) females. More than half (54%) of the students were aged above 30 years. About 45% of the students had no background in forestry, natural resources or environmental sciences. They were from social sciences, business management, and community development backgrounds. About 70% of the students were midcareer professionals but two-thirds of them were pursuing careers not related to forestry, natural resources or the environment. In both cohorts however, almost a quarter of the students were mid-career professionals in a field related to NREG.
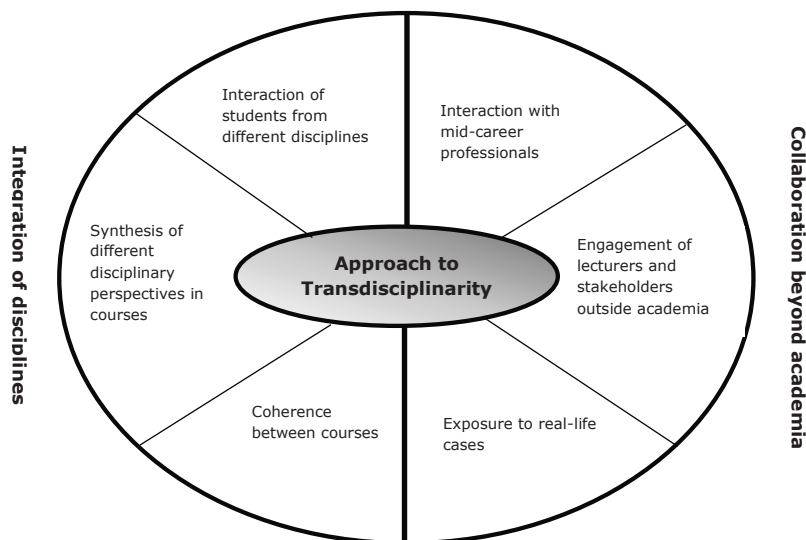

Figure 5.2: Overview of the transdisciplinary approach used in the case study

Three main data collection methods were employed; interviews, questionnaires, and focus group discussions. Four sets of interviews were conducted, one at the beginning of the academic year when students enrolled in the programme and one at the end of one year, after students had taken all their courses. The purpose of the pre-programme interviews was to understand students' motivations for choosing the programme and to identify their career aspirations. The end of year interviews were to understand students' impressions about the transdisciplinary approach used in the programme. All students were interviewed. Interviews were conducted face-to face, using an interview guide. The interviews were complemented with a questionnaire that was administered to all students. Respondents were required to show their level of agreement with statements formulated to assess different aspects of transdisciplinarity in the programme on a five point Likert scale. Apart

from the above questionnaire, another set of questionnaires was administered to solicit students' pre-programme self-assessment of their competences in dealing with specific aspects of forest governance in Ghana. Similar self-assessment questionnaires were given to students, after one year, when they had completed all their course work.

Four focus group discussions were also conducted with students, one at the end of each semester of the first year. Students were grouped based on their career aspirations. The focus group approach was used to enable students with similar aspirations deliberate and build consensus (Kumar, 2014) on the value of the transdisciplinary approach to their career goals. They discussed what they valued most and what they found less valuable about integration of different disciplinary perspectives and engagement with stakeholders outside academia. Each group then presented their views to their colleagues. Data from interviews and focus group discussions were recorded, transcribed and subjected to thematic analysis to identify dominant motivations, aspirations and perceptions about the transdisciplinary approach. Data from questionnaires were first entered manually into Survey Monkey and summarized data were exported to Microsoft Excel for further analysis. Differences in opinion between two groups (example Cohort 1 students aspiring for career in Government and Cohort 1 students with different aspirations) were analysed using Mann-Whitney U test. Differences between the opinions of the different categories of student career aspirations were analysed using Kruskal-Wallis test. Differences in students' self-assessment before and after the programme were determined using Wilcoxon signed rank test in SPSS.

5.4   RESULTS

5.4.1 Students' motivation for choosing transdisciplinary education

Students were motivated by three main expectations; better prospects for employment, the prospect of changing existing jobs to one related to natural resource and environmental governance (NREG), and career development (Figure 5.3). To a significant extent, these motivations were associated with specific student categories. Career development was the main motivation for most of the students already having NREG related career. Such students were mid-career professionals who worked as district forest managers, forest product inspectors, certification officers and advocates on land issues, among others.

Those motivated by better prospects of getting employed or changing jobs were mainly students without employment and those with a career not related to NREG. These students were attracted to, and made decisions based on the title of the programme. They believed that the wide scope of the programme would make them eligible for jobs in different sectors. They explain:
"*The combination of natural resources and environmental issues was attractive*" (Interview C1-16)
"*The title of the programme was promising*" (Interview C2-11)

Students who had a career but still indicated they were motivated by better prospects of finding employment explained that their current employment contract was ending so they needed other employment opportunities. Students with a career in non-NREG related fields anticipated that the programme could enhance their chances of getting jobs relate to natural resources or the environment. They explained:

"*I have been teaching integrated science in the secondary school since I completed my bachelor degree in 2006 but I have always wanted to have a career related to my bachelor [and not a teaching career]. One day, I visited the Faculty website; saw the advert and the preamble was exactly what I wanted*" (Interview C1-15)

Students motivated by career development prospects could be put into two categories; The first category were those with formal training and work experience in NREG who wanted to further their education to enhance their performance.
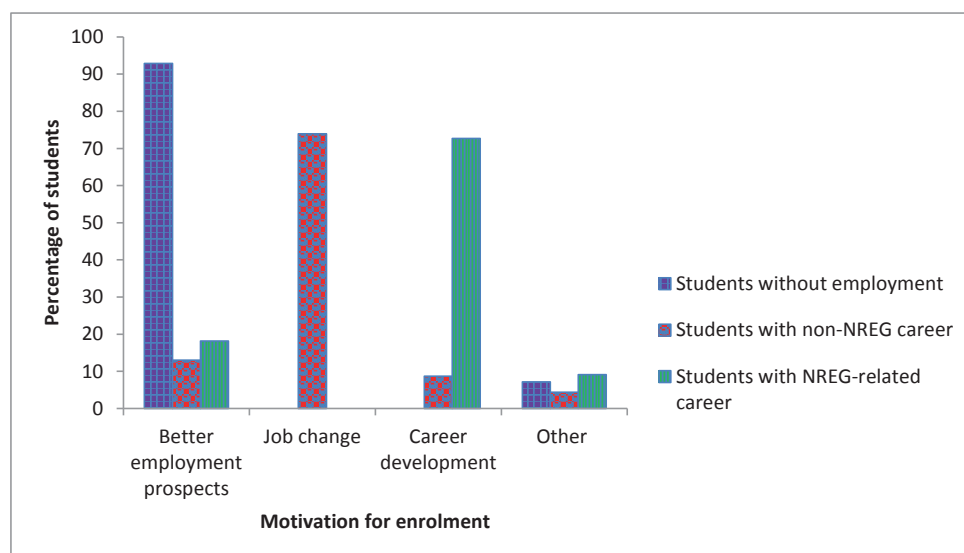

Figure 5.3 Students' motivation for enrolment in transdisciplinary programme

The second category were those already in NREG related career but their formal training was not in natural resources or environmental fields and they wanted to address their knowledge gap. One such student explained:

"*I work with a research and advocacy platform and had previously done a master's degree in democracy, law and development studies but this platform discusses issues of land and natural resources. Sometimes when I make contributions, some members would want to downplay them and listen to people with technical background in natural resources. They believe I am not a technical person. I therefore wanted to have this technical exposure*" (Interview C1-18).

The group of students labelled as "Other" (Figure 5.3) were motivated by curiosity and a desire to learn something new. More than half of the students (56.2%) aspire for a career in academia or research (Figure 5.4) and not professional practice in forestry, other natural resource or the environmental sectors. Others (39.6 %) however desired to be in professional practice within government, private or non-governmental organisations. Few (4.1%) were undecided about their career path.
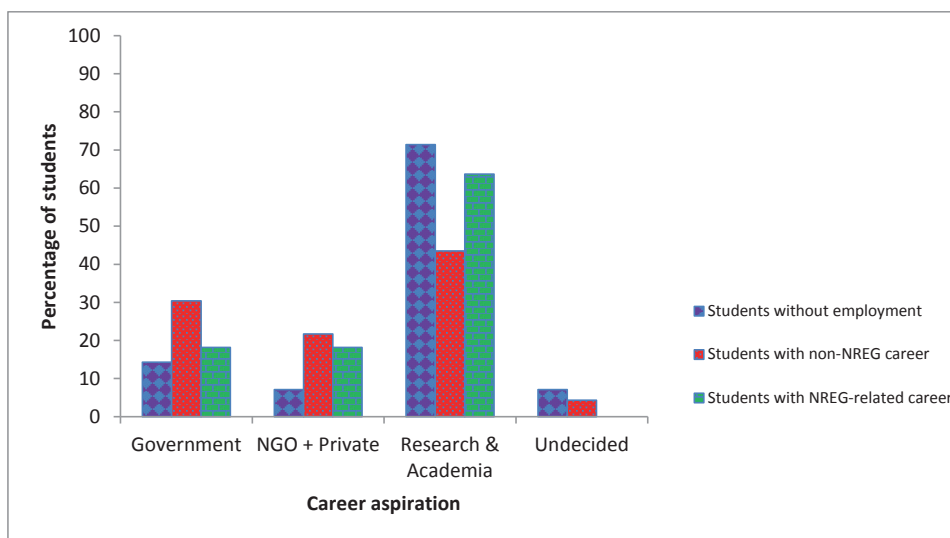
Figure 5.4 Career aspirations of students

Students' perceptions of and satisfaction with the programme were studied based on the two main characteristics of transdisciplinarity; integration of disciplines and collaboration beyond academia. These are elaborated below.

Integration of disciplines

Focus group discussions with students highlighted two elements they value most about the integration of several disciplines: First they argued that it gives them a holistic view of challenges in NREG and how to address them. They explained that they no longer analyse problems from a single perspective but are able to assess the different perspectives to problems. This ability has broadened their horizon by making discussions richer and deeper. They explained:

"*Sometimes you may have never thought of a problem in a particular way or perhaps you thought your perspective was the best but if somebody from another discipline within your group makes a submission, then you say 'oh...Ok, there is this aspect to the problem too.*"

Second, they develop appreciation for other disciplines. They indicated that previously, students from science backgrounds perceived students from other disciplines as not being erudite. They indicated:

"*Now, we appreciate those from different backgrounds and have moved from that to think that all the people from different backgrounds are very important in terms of solving complex problems*"

The questionnaires presenting different statements to students to assess their perceptions showed that students valued the conscious enhancement of interaction between students from different disciplines through group work. Over 80% of the students (Table 5.2) agreed to the statement "There was sufficient cooperation between students from the different disciplinary backgrounds". The only person who strongly disagreed with the statement aspires to work in research and academia, and recounted an experience where students from a particular background dominated discussions, therefore undermining cooperation.

The students also valued linkages made between disciplines in the content of various courses. Generally, over sixty percent of students from all categories of career aspirations were satisfied with the linkages created with other disciplines and how ideas from different disciplinary perspectives were synthesized (Table 5.2). Students who were not yet certain of their career paths were particularly satisfied. About a fifth (18.2%) of students who aspire to work in government institutions were however not satisfied. They felt the linkage with other disciplines needed further strengthening. Generally, students experienced some overlap between the content of the various courses within the programme (Table 5.2). Probing this concern indicated that these overlaps were not evident in the curriculum document but individual lecturers (teachers) veered into other topics when teaching.

The discussions in the focus groups showed a nuanced picture about the integration of disciplines. Some students raised criticisms and noted an imbalance between forestry content and other aspects of natural resources and environmental governance. They also indicated that having different disciplines in the classroom sometimes drags discussions:
"It draws back the progress of the class; we should have been moving forward but because some of us lack knowledge in an area we have to go over and then explain".
Other students expressed concerns about becoming what they described as a "Jack of all trades." They explained they wanted to specialize in a particular aspect of natural resources or environmental governance.

Students also gave an overall score representing their impression of how well different disciplinary perspectives were brought to bear in addressing NREG problem. Generally, more than 90% of students believed integrating several disciplinary perspectives was at least achieved satisfactorily. Only few students (4.2%) believed it had been poorly achieved. These students emphasised time lost in ensuring all students from different disciples understood technical concepts.

Table 5.2 Students' perception of how elements of disciplinary integration were achieved

Statement	Students' career aspiration	Percentage of students responding to statement					
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No response
There was sufficient cooperation between students from the different disciplinary backgrounds	Government sector (n=11)	36.4	36.4	27.3	0.0	0.0	0.0
	NGO + Private sector (n=8)	50.0	37.5	0.0	0.0	0.0	12.5
	Research and Academia (n=27)	29.6	51.9	14.8	0.0	3.7	0.0
	Undecided (n=2)	50.0	50.0	0.0	0.0	0.0	0.0
I am satisfied with the linkages and synthesis of perspectives from other disciplines	Government sector (n=11)	36.4	27.3	18.2	18.2	0.0	0.0
	NGO + Private sector (n=8)	62.5	25.0	0.0	0.0	0.0	12.5
	Research and Academia (n=27)	25.9	63.0	7.4	3.7	0.0	0.0
	Undecided (n=2)	100.0	0.0	0.0	0.0	0.0	0.0
Courses in the programme were coherent with no excessive overlaps	Government sector (n=11)	9.1	36.4	27.3	18.2	9.1	0.0
	NGO + Private sector (n=8)	0.0	12.5	12.5	50.0	25.0	0.0
	Research and Academia (n=27)	7.4	25.9	33.3	25.9	7.4	0.0
	Undecided (n=2)	0.0	0.0		50.0	50.0	0.0

Kruskal-Wallis tests showed no significant difference in opinion between students of different career aspirations for all the three statements in the table.

Collaboration beyond academia

The study also investigated students' satisfaction with the role stakeholders outside academia (practitioners in the NREG sector) played in their education. Collaboration beyond academia was designed to start in the classroom, where midcareer professionals, especially those with NREG related careers, would share their field experiences. Students with both academic and non-academic career aspirations unanimously agreed that cooperation between students with different levels of professional experience was good, allowing them to learn about the world of work, even from the classroom.

In the focus group, students discussed four main things they valued most about collaboration beyond academia. First, it makes learning more practical. They explained that when mid-career professional colleagues and lecturer-practitioners bring real-life experiences to class, it gives a practical understanding to theories discussed. Second,

students emphasised that their colleagues with NREG-related mid-career experience acted as resource persons to them for example by giving informal tutorials where necessary. Third, they indicated that the presence of experienced students improved the style of teaching and changed the role of the lecturer in class. Learning was no longer a one-way delivery of knowledge from the lecturer. They engendered more discussions and sometimes, lecturers also learnt about changing practices in the world of work. Fourth, collaboration beyond academia was seen as a way of enhancing networking and securing future links to the job market. A student highlighted:

"In future if you want to change your profession...like we the teachers...if you want to move to the forestry sector, your colleague is there and he will help you and give you guidelines".

At the end of the first year of the programme, it became clear from cohort 1 students' comments that they would appreciate more engagement with practitioners outside academia (Table 5.3). More such opportunities were therefore offered during the second year for cohort 2. More practitioners were invited to give guest lectures and have seminars with the students. Students then had time to interact with the practitioners and to ask them questions not only related to topics discussed but also related to their future career interests. A Mann-Whitney U test showed a significant difference (U=174,000; p=0.012) in rating of Cohort 1 and 2 students regarding involvement of relevant practitioners. The second student cohort expressed a better appreciation of involvement of practitioners.

There were however certain aspects of collaboration beyond academia students did not value. The discussions and debates that emerged during some learning sessions where students bring on board their field experiences were deemed unnecessarily prolonged. They explained that sometimes, those with NREG-related experience engaged lecturers in lengthy discussions over issues that had no clear-cut solution. When dragged on too long, these discussions ceased to be useful to other students in the class. Students with non-NREG related professions particularly pointed out that in some instances, the depth of the experience shared by others made them feel inferior and unequipped to participate in the discussions.

To improve collaboration beyond academia, most students strongly agreed with the idea of having an internship. Currently the programme does not offer internships. Additionally, students wanted more opportunities to study outside the classroom. Lecturers however gave time constraint as one of the reasons for being unable to grant students more opportunities to learn in the real world. Much time was required for the preliminary arrangements necessary for taking students out to communities, industries and other locations to further explore concepts discussed in class but lecturers had many other responsibilities in addition teaching in the programme.

Table 5.3 Students' rating of engagement with stakeholders outside academia

Students' rating of how well the programme involved relevant practitioners	PERCENTAGE OF STUDENTS	
	Cohort 1 (n=29)	Cohort 2 (n=19)
Not achieved	0	0
Poorly achieved	21	0
Satisfactorily achieved	65	63
Well achieved	14	32
Very well achieved	0	5

5.4.2 General satisfaction with transdisciplinary approach

As students had experiences they appreciated and others they did not appreciate, the study assessed the overall satisfaction with the programme. First, students were asked about their preparedness for the job market. Over 70% of students, in all categories of career aspirations felt well prepared (Figure 5.5). Some students (18.18%) who aspire to work in the government sector however felt inadequately prepared for the job market. These students belonged to the first cohort. Their concerns were that they needed more opportunities for internship and practical training. Second, students were asked about their willingness to recommend the programme to other students' (Figure 5.6) and the extent to which the programme meets their expectations (Figure 5.7).
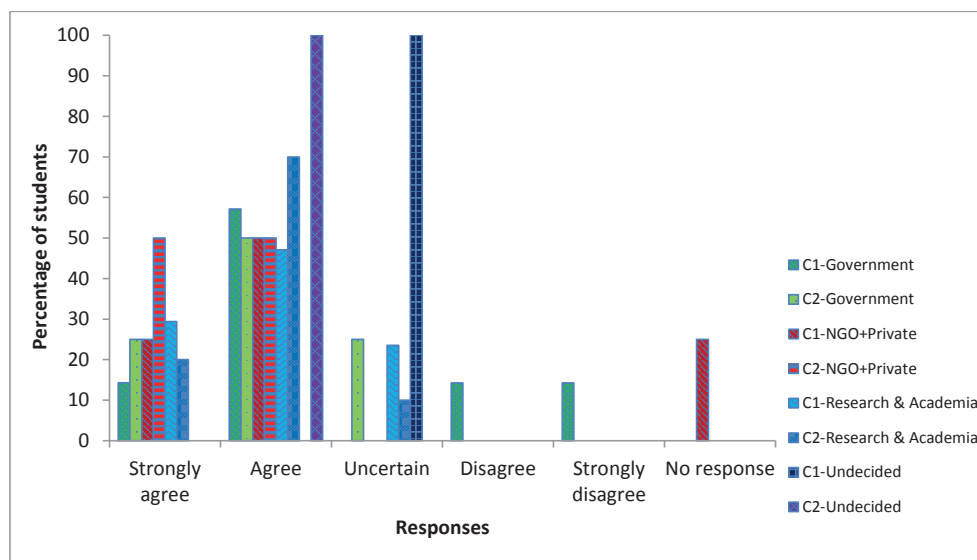

Figure 5.5: Preparedness for the job market

At least eighty percent of the students with academic or non-academic career aspirations indicated the programme met their expectations (Figure 5.7) and they were willing to recommend the programme to others (Figure 5.6). This willingness was confirmed by the fact that sixty percent of students from the second cohort enrolled based on recommendations made by students from the first cohort. Almost a fifth of the students with non-academic career aspirations were however unwilling to recommend the programme to others. They also indicated that the transdisciplinary programme did not meet their expectations. These were all first cohort students who wanted more collaboration beyond academia.
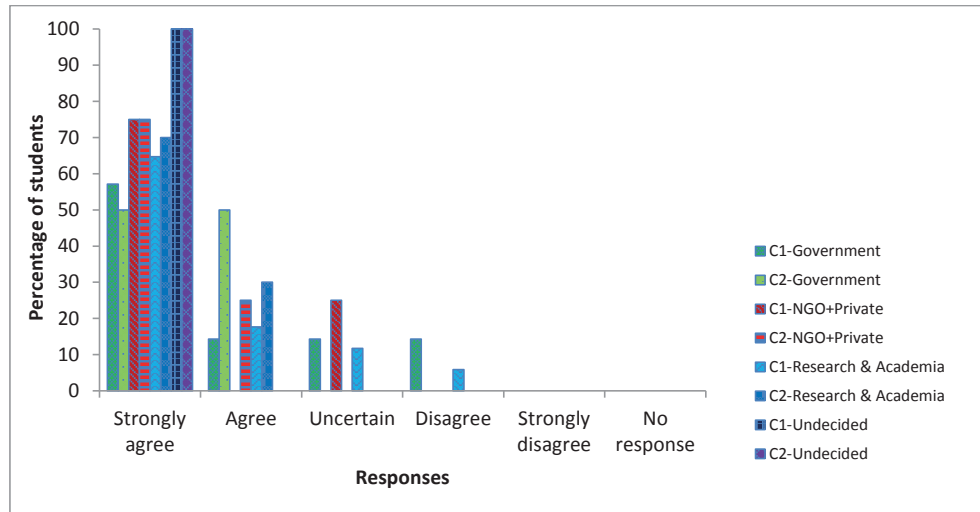

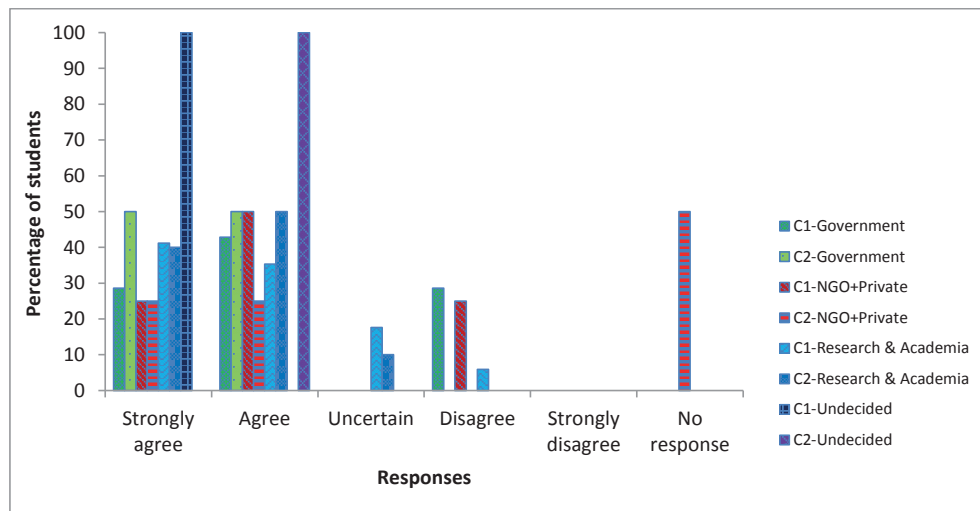Figure 5.6: Willingness to recommend transdisciplinary programme to others

Figure 5.7: Students' overall satisfaction with the transdisciplinary programme

5.4.3 Developing forestry-specific capabilities within transdisciplinarity

A main risk of transdisciplinary programmes on integrated natural resources, as discussed in section 1 is that they may not offer enough substantive details about the specifics of forestry, so that graduates may lack in-depth knowledge and skills in this domain (Innes and Ward, 2010). The study therefore assessed whether students experienced such. At the start of the programme, students were asked to provide a self-assessment of specific abilities necessary for forest governance in Ghana (Ameyaw et al., 2016). One year later, at the end of their course work, they provided a self-assessment of the same abilities (Table 5.4).

Five main abilities were assessed (Table 5.4); they include capabilities for assessing and initiating changes needed in the forest sector as well as the ability to make and defend professional decisions in the face of criticisms. The ability to package information appropriately for different stakeholder groups and also effectively engage them in addressing contemporary forestry issues were also assessed. As expected, almost half of the students without forestry-related experience considered themselves to have poor or only fair abilities to address forest governance issues. After the programme however, they felt relatively more capable. Wilcoxon's signed rank test shows that for all the capabilities assessed, there was a significant difference in students' self-assessment before and after the programme for both students with forestry-related experience and those without (Table 5.5).

Table 5.4 Students' self-assessment of their ability to address forest governance challenges in Ghana

STATEMENT ASSESSING FOREST GOVERNANCE ABILITIES How will you assess your own ability to:	STUDENTS' SELF-RATING	STUDENT CATEGORY			
		Students with no forestry related career experience (n=37)		Students with forestry related career experience (n=11)	
		Before (%)	After (%)	Before (%)	After (%)
Objectively analyse current forest governance situation in Ghana	Poor	27.0	0.0	27.3	0.0
	Fair	45.9	0.0	18.2	0.0
	Average	21.6	5.4	36.4	9.1
	Good	5.4	73.0	18.2	63.6
	Very good	0.0	21.6	0.0	27.3
Make bold professional decisions about what needs to change in how forests are governed and stand by it	Poor	10.8	0.0	18.2	0.0
	Fair	48.6	0.0	18.2	0.0
	Average	32.4	18.9	45.5	0.0
	Good	8.1	62.2	18.2	45.5
	Very good	0.0	18.9	0.0	54.5
Be an agent of change in how forests are governed in Ghana	Poor	16.2	0.0	18.2	0.0
	Fair	32.4	2.7	18.2	0.0
	Average	35.1	21.6	45.5	18.2
	Good	10.8	51.4	18.2	54.5
	Very good	5.4	24.3	0.0	27.3
Engage forest stakeholders at local, district, national and international levels to find solutions to Ghana's forest governance challenges	Poor	13.5	0.0	0.0	0.0
	Fair	21.6	0.0	18.2	0.0
	Average	43.2	18.9	45.5	9.1
	Good	18.9	37.8	36.4	45.5
	Very good	2.7	43.2	0.0	45.5
Package technical information about forests in a way local communities and other stakeholders can understand	Poor	13.5	0.0	0.0	0.0
	Fair	35.1	0.0	36.4	18.2
	Average	35.1	24.3	45.5	0.0
	Good	13.5	40.5	9.1	54.5
	Very good	2.7	35.1	9.1	27.3

TABLE 5.5 Wilcoxon signed rank test results of self-rated capabilities before and after programme

ABILITIES	STUDENT CATEGORY			
	Students with no forestry related career experience		Students with forestry related career experience	
	Z-test statistic	p-value	Z-test statistic	p-value
Analysing current forest governance situation in Ghana	-5.293	0.000*	-2.844	0.004*
Making and defending professional decisions on what needs to change in forest governance	-5.337	0.000*	-2.971	0.003*
Initiating change in how forests are governed in Ghana	-4.487	0.000*	-2.558	0.011*
Engaging forest stakeholders to find solutions to Ghana's forest governance challenges	-4.799	0.000*	-2.754	0.006*
Packaging technical information appropriately for different stakeholders	-5.029	0.000*	-2.636	0.008*

* Shows statistically significant difference between student's self- rating before and after programme

5.5   DISCUSSION

This study brings out three key findings. First, it shows that the transdisciplinary programme indeed attracted a wider range of students than the more traditional forestry programme. The main motivation for increased student enrolment was the belief that a programme integrating several disciplines would offer better job prospects. Second, the study highlights some tensions within transdisciplinary education, particularly the dilemma between providing education that equips students with a broad range of knowledge and skills and the desire to specialize in a particular field. Third, it showed that though the transdisciplinary approach generally satisfies students' aspirations, the type of transdisciplinarity offered is important. While students were generally satisfied with the degree of integration of disciplines, they preferred more extensive collaboration with stakeholders outside academia. The discussion below elaborates these findings and their implications for transdisciplinary education generally and forestry education in particular.

Generally, students were motivated by prospects of finding jobs or of developing their career, which is not surprising. The interesting aspect is that students assumed that a programme integrating several disciplines has better job prospects. This assumption seems to find support in literature. Research from other parts of Africa and Europe indicate that employers require graduates with broader generic skills (Arevalo et al., 2014; Arevalo et al., 2010). Studies from America and Australia also show that graduates find employment in varying fields including consulting, procurement and environmental services and as such require broader cross-disciplinary backgrounds (Brown and Lassoie, 1998; Cubbage et al., 1999; Sample et al., 2015; Vanclay, 2007). As in other developing countries, graduates

struggle to get employment in their academic specializations, thus many end up with available employments, other than what they were trained for. Such students believe pursing postgraduate studies that differ slightly from their undergraduate specialization could improve their chances of being employed in their desired professions. Most discipline-based graduate programmes however prefer to enrol students who already have a background in that discipline. This may explain why many mid-career professionals in non-NREG related career showed interest in a transdisciplinary programme open to students from different disciplines. While the traditional forestry programme enrolled less than five students each year, the transdisciplinary programme attracted forty-eight students within two years. What is yet to be seen is whether this interest in transdisciplinary education will be sustained. Where graduates end up working and their satisfaction with their work would also affect their long-term appreciation of their transdisciplinary education. For students with a career in NREG-related fields who seek new knowledge and skills to address complex professional challenges, their interest in the programme is likely to be sustained because transdisciplinary education adequately offers such capabilities (Aneas, 2015; Balsiger, 2004; Ciannelli et al., 2014; Pohl, 2011; Ramadier 2004; Rosenfield, 1992). For those seeking a broader knowledge base to better their prospects of finding jobs, their sustained appreciation of a transdisciplinary programme will depend on several factors: i) whether they actually find jobs, ii) their interest in working at the interface between disciplines (Blickley et al., 2013; Nash, 2008) and iii) their preparedness for the challenges of a transdisciplinary career (Klein, 1996; Nash et al., 2003).

Though the programme was designed to train graduates for professional practice, our results show that more than half of the students aspire to work in research or academia and such students are also largely satisfied with the transdisciplinary approach. Rhoten and Parker (2004) had observed that early career researchers and academics see transdisciplinarity as an obstacle to their career development. This was however not strongly highlighted in our findings. This could be explained from two perspectives: 1. Possibly those students do not fully understand the challenges of career in cross-disciplinary research yet or 2. With the increasing popularity of cross-boundary research and education they envisage better opportunities within their career trajectory.

Tensions within transdisciplinary education were evident; some students appreciated the broad range of knowledge and skills offered in the programme, whereas others desired to specialize in specific aspects of natural resource or environmental governance. In line with the observations of Nash (2008), some students complained about becoming a " Jack of all trades" and desired to have a greater depth of specialized knowledge for example in forest, water or environmental governance. This need for specialization probably became more evident to students because of how inter-connectivity between various sectors of natural resources and the environment was handled. With the transdisciplinary approach being led by a forestry department, programme content seemed biased towards forestry issues, missing out adequate depth in other sectors like water, mining and the environment. Possibly the increased emphasis on forestry content explains why students showed a significant change in their self-assessment of their capabilities for addressing forest governance challenges. The concern that needs further research is whether students could similarly develop adequate capabilities for addressing governance challenges in other sectors like water and environment. How well the forestry department would be able to integrate other sectors to ensure transboundary learning will determine the extent to which the interest of students and subsequently future enrolment will be sustained.

Another area where tensions with transdisciplinarity manifested was with how the integration of disciplinary knowledge was carried out, in practice, within the programme. The study shows that some students became frustrated with prolonged discussions among the diversified disciplinary backgrounds represented in the programme and others were not able to actively engage. This observation is not uncommon with transdisciplinarity. Pohl (2011) recounts his experience:

"I remember stimulating and frustrating discussions in a project team made up of a philosopher, a sociologist, an anthropologist and an environmental scientist. In relation to progress, I had two different feelings: On the one hand, I gained a number of new insights on the issue we discussed— the implicit assumptions of scientific experts on lay people. On the other hand, I experienced several situations of "de´ja`vu", particularly when trying to integrate our thoughts originating from different disciplinary backgrounds, and making no progress in the question of how to integrate" (p. 619).

Extending Pohl's observation to this study, it is important to recognize that the transdisciplinary approach presented a learning experience for both lecturers and students. That some class discussions become unduly prolonged may be because some lecturers are on a learning curve, still struggling with facilitating such discussions. Students are also learning how to engage with colleagues from different disciplines and how to facilitate mutual learning and knowledge sharing that leads to compromises and negotiated consensus (Klein, 2008). Developing such competences is part of transdisciplinary education (Nash, 2008). Lecturers' capacity however needs to be built on tools and skills for, as well as facilitation of cross-disciplinary interactions and synthesis of knowledge from different disciplines (Spelt et al., 2009; Vedeld and Krogh, 2005). The overlaps students experienced during the enactment of courses also requires careful curriculum mapping involving detailed knowledge of every lecture or teaching experience and mapping how to avoid these overlaps and allow learning experiences to re-inforce each other.

The study confirms that students, especially those with non-academic career aspirations prefer to have more collaboration with stakeholders outside academia as this reinforces knowledge gained from academic work (Vanclay, 2007). This was clearly evident in the fact that cohort 1 students with non-academic career who had fewer opportunities to collaborate with stakeholders outside academia were less satisfied with the programme. Their colleagues from cohort 2 with similar career aspirations were however satisfied because they had better opportunities for collaboration. Students believed extensive collaboration beyond academia will enhance their prospects of acquiring necessary skills (Blickley et al., 2013) and also establishing networks with the world of work. Being able to offer greater opportunities for collaboration beyond academia however has implications. The high cost and extensive time investment necessary for developing meaningful relationships with stakeholders outside academia to effectively support transdisciplinary education are major challenges (Balsiger, 2015). Finding innovative means of addressing these challenges is necessary to avoid stifling the success of such transdisciplinary programmes. Universities need to take into account the time requirements of quality transdisciplinary education and allow lecturers involved in such programmes the necessary release from other responsibilities. This will however only be effective if time investments into transdisciplinary education are duly recognised during promotion and faculty appraisal (Davis and Jacobsen, 2014). Addressing the need for extensive collaboration beyond academia is crucial in ensuring the continued usefulness of a transdisciplinary approach and its effectiveness in meeting students' career aspirations.

Reflecting on Balsiger's typology of transdisciplinarity (2015), the programme studied shows strong disciplinary integration (Figure 5.1), though in practice, there were challenges with realizing the full benefits of integration. Collaboration beyond academia was however perceived to be limited. This suggests that the programme currently mirrors reflexive transdisciplinarity. Following feedback from cohort 1 students, the level of collaboration was increased. However, considering that cohort 2 students still desired extensive collaboration outside academia, it is difficult to assume they experienced comprehensive transdisciplinarity (Figure 5.1). It would however suffice to say the programme, though exhibiting reflexive transdisciplinarity, shifted towards comprehensive transdisciplinarity. To enhance the use of the heuristic provided by Balsiger (2015), it may be useful to think of the four varieties of transdisciplinarity not as well-defined categories but rather as more fluid concepts. In that case, then within 'reflexive transdisciplinarity' for example, a programme could still exhibit varied strength of disciplinary integration and extent of collaboration. The heuristic was however useful in understanding where the programme is and where it needs to be, to better address students' career aspirations.

5.6   CONCLUSIONS

Transdisciplinarity has become one of the key strategies for ensuring that education in forestry and other life sciences remains relevant to addressing emerging complex challenges. This study has assessed students' perspectives on how a transdisciplinary approach to education satisfies their career aspirations. The chapter identified the enhanced prospects of finding jobs as the key motivation for student enrolment. Students believed having a degree encompassing a broader scope makes them more versatile. This thinking drives the kind of restructuring observed in several forestry and other natural resource departments in universities around the world today. Generally, the transdisciplinary approach satisfied students with varying career aspirations including those with an interest in research and academia. Most students, especially those with non-academic career aspiration, requested deeper levels of transdisciplinarity where they have more opportunities to engage with real life cases. Currently discussions on forestry education borders on interdisciplinarity but this chapter shows that beyond that, forestry education should address transdisciplinarity. This is because the additional element of transdisciplinarity – collaboration with stakeholders outside academia – is attractive, especially to students with non-academic career aspirations. Future success of a transdisciplinary approach to education in natural resource management and sustained student satisfaction will however depend on strengthening and broadening university departments' links to the world of work and stakeholders beyond academia.

Chapter 6

General Discussion and Reflections

6.1 INTRODUCTION

As has been argued in chapter 1 of this thesis, new skills and expertise are needed in forest and natural resource governance across the globe. The European Forest Institute recently advertised a position for a natural resources and forest governance practitioner for the European Union (EU) Forest Law Enforcement, Governance and Trade (FLEGT) facility to advance forest governance in Central Africa. Among the responsibilities outlined for this practitioner were: guiding stakeholders in addressing governance challenges, increasing transparency, increasing accountability, structuring stakeholder inclusion in sector reform, and dialoguing with producer countries in negotiating and implementing Voluntary Partnership Agreements. The striking part of this advertisement is the qualifications that are sought from applicants. Applications were open to those with Master's degree in natural resource management, forestry, political science, organisational management and economics. Consider a typical natural resource management or forestry degree holder whose university curriculum was mainly devoted to forest science and silviculture with some communication skills and social forestry bolted on. How does such a professional effectively promote dialoguing and negotiations for increasing transparency or accountability? A graduate from political science or organisational management may probably be better at these capabilities but how does this graduate adequately understand the forest governance arena? The economist may have an even more complicated capability gap. To address the disconnect between the capabilities acquired through the Master's degree programme of the applicant and the job requirements, the European Forest Institute may either rely on the experience gained after school or invest heavily in re-training this new employee. If the forestry sector needs people like the 'natural resources and forest governance practitioner' that was advertised, universities should be able to meet this demand. This study has therefore been inspired by the need for universities to better meet changing needs within the forestry domain.

The twofold objective of this thesis has been first to understand the context of forest governance in Ghana and what that means for the education of forestry professionals and second to examine the process of how to innovate curriculum design and enactment to provide the capabilities needed for responsible forest governance (RFG) in Ghana. The thesis addressed the following research questions:

- What are the key challenges for responsible forest governance in Ghana and which capabilities do forestry professionals need to address them?
- What are the attributes of a responsive curriculum development process and how are they demonstrated in the Ghanaian context?
- To what extent and how do interactions among lecturers and practitioners facilitate enactment of the responsive curriculum?
- To what extent and how does the integrated approach used in the responsive curriculum satisfy students' career aspirations?

Chapters 2 to 5 have presented the findings of the thesis and have addressed these four research questions.

This final chapter synthesizes the findings of the study, provides conclusions and reflects on the research. The next section gives a summary of how the research questions have been answered, highlighting the main conclusions. The section that follows reflects on the results of the study in a broader perspective, beyond the context of Ghana and the university studied. Reflections on the theoretical and methodological positions taken in the

study are then given. The final section provides future directions for both research and practice.

6.2 ANSWERING THE RESEARCH QUESTIONS

6.2.1 Research question 1: Professional capabilities for responsible forest governance

Research question 1 sought to understand the main challenges affecting the proper governance of Ghana's forests and to explore capabilities that could position forestry professionals to address them. As detailed in Chapter 2, indicators of responsible governance were used as the starting point for unearthing the challenges. Several challenges emerged, which were put into seven key categories and also ranked by forestry stakeholders in order of importance to RFG in Ghana. The political culture emerged as the most important challenge to governing forests responsibly, followed by non-compliance and poor enforcement. The other challenges were considered to be statistically similar in ranking. They related to: 1) the incentive structure which did not provide easily recognisable benefits to local communities and also provided low incomes and poor remunerations to forestry officials, 2) the legal framework which did not adequately cover certain aspects of forestry like non-timber forest products and also contained rules that were impractical to implement, 3) bureaucracy regarding processes for obtaining services related to timber rights and review of rules, 4) resources including lack of staff and logistics for forestry operations, lack of information for other forestry stakeholders on their rights and inadequate knowledge and skills for new forms of governance, 5) disposition of forestry officials which covers lack of authority and autonomy as well as lack of commitment to addressing some challenges in the sector.

The study showed that the self-serving power positions of some key actors like politicians, traditional authorities and the timber industry are interfering with professional practice. These power positions enabled these actors to emphasize the sanctioning of offenders, the allocation of resources and the determining of stumpage fees. This exclusive use of power for self-interest found in this study, finds support in literature on Ghana (Hansen and Lund, 2011; Kotey et al., 1998) and elsewhere (Baird, 2010; Trevin and Nasi, 2009) and is nourished by a culture of corruption within the forest sector; powerful elites are aware that forest stewards are open to receiving bribes and they are willing to pay to steer affairs in their favour, thereby prohibiting RFG.

The study indicated that elite power positions in forestry created a cycle that eventually marginalizes professionalism in forestry. This cycle can however be broken, should there be a critical mass of forest stewards with sufficient capacity and collective power to insist on professional practice without fuelling the culture of corruption. This is because, as this research shows, challenges to RFG are interlinked. Thus, without fuelling the culture of corruption, revenues from forests could be increased to provide resources for logistics, staff employment, capacity building and information dissemination. Incentives in the form of adequate income would make forest stewards less inclined to compromise their professionalism. This will in turn strengthen them to exercise greater authority and autonomy.

Among the seven capabilities identified in the study (Chapter 2), those for leadership, authority and autonomy emerged as the most crucial for forestry professionals to ensure the responsible governance of Ghana's forests. This set of capabilities will enable the

forester to make and defend professional decisions while enforcing rules without partiality. Professional passion and an interest in improving one's organisational image are critical attitudinal and mind-set dispositions for a functioning forestry professional. The forest governance arena may not have changed significantly since Opoku's (2006) vivid portrayal provided more than a decade ago: the poorly remunerated forester is still at the mercy of wealthy and powerful elites. However, with a better appreciation of the priceless consequences of losing professional integrity, the new professional may be able to make better choices with long-lasting benefits of responsible governance both for the forester and the profession.

Other capabilities the study identified were ranked with a similar level of importance (statistically), showing that they are indeed interconnected and collectively needed for RFG. These capabilities included: initiating and managing change, critically analysing the state of forestry and forest governance, and effectively networking and communicating with different categories of stakeholders. Additionally, capabilities for building relationships with stakeholders based on trust and also for mobilizing and acquiring resources, were mentioned as being important. Specific knowledge, skills, attitude and mind-set areas for developing these capabilities were also explored. Previous studies (Arevalo et al., 2010; Arevalo et al., 2014; Vanclay 2007) had identified individual generic skills necessary for foresters such as negotiation, critical thinking and business skills but this study aggregated these generic skills into composite capabilities, together with attitude and mind-set components. Additionally, as elaborated in Chapter 2, these capabilities were derived with a link to governance challenges, thus giving generic skill development a context. For example, in developing communication skills, the focus will not only be on presentation skills and report writing as general skills but will also focus on tailoring communication to the specific needs of multiple stakeholders as required in new modes of governance.

Seemingly contradictory with the earlier findings highlighting the importance of changing mind-sets and countering corruption, harnessing a new ethic was ranked as being the least important for forest governance, in comparison with the other capabilities. This possibly reflects the traditional notion that ethics is considered to be beyond education or training. Addressing challenges like the ingrained culture of corruption undeniably requires new ethics. Thus, in line with the position of some researchers (e.g. Temu and Kiwia, 2008), this study argues new ethics should be interwoven into professional forestry education.

6.2.2 Research question 2: Unique attributes of responsive curriculum development

The second research question sought to identify unique attributes of responsive curriculum development (RCD) and assess how it is manifested in the KNUST case. This was addressed in chapter 3. The results showed five process attributes and three actor attributes unique to RCD. The process attributes included:1) iteration, 2) built-in learning, 3) linkage to the world of work, 4) team teaching and 5) formative improvement-oriented evaluations. I will describe each of them briefly.

Iteration comprises a non-linear progression in RCD requiring extensive deliberations and reflection on curriculum content and enactment methods. Previous decisions and activities may need to be revisited upon reflection. *Built-in learning* establishes RCD not as an expert activity but rather as a learning process for both curriculum developers and teachers. Mechanisms like reflection are built into the process to facilitate this learning. *Linkage to the world of work* provides students with learning experiences beyond the classroom. It

allows students to learn from real-life situations within professional practice. *Team teaching* requires teachers to work together not only in course design but also in enactment to build synergies based on their varied disciplinary and experiential strengths. Finally, *formative improvement-oriented evaluations* require that the curriculum does not run for a number of years before it is being evaluated but incorporates short-term periodic appraisals for making changes where necessary. The study created a conceptual framework which shows that although these processes are interlinked, iteration and built-in learning are more prominent at the design stage while during the enactment stage, linkages to the world of work and team teaching play out more strongly.

The findings highlighted *the role of the champion* and demonstrated that RCD requires more than just a team leader. The champion kept the long process on track and the other actors motivated. The crucial *role of expert facilitators* was also demonstrated. They brought in insights, experiences and theoretical perspectives from different RCD contexts to stimulate reflection and generate new ideas. They did not dictate or direct what needed to be done but rather supported the process and ensured that the team takes ownership of the curriculum. Lastly, *actors outside academia*, including employers, prospective students and practitioners formed the backbone of RCD and connected the curriculum to the professional environment. They also helped not only in defining the status quo in professional practice but also in creating a vision of what it could be done in the future.

The study showed that RCD's unique attributes were demonstrated to varying extent in the KNUST case. All the actor attributes were strongly demonstrated (Table 6.1), with strong evidence of championship leading to acquisition of funds to cover the additional costs involved in the process. Such funding is crucial for curriculum innovation especially in developing countries like Ghana (Addae-Mensah, 2010). As elaborated in Chapter 3 the extensive involvement of actors external to academia was also observed as these actors were given decision-making roles in the RCD. Some were even recruited as part-time lecturers to assist in curriculum enactment. Some actors (Table 6.1) who could have ensured that positive lessons from RCD would be carried beyond KNUST were however not involved, which was a missed opportunity. The process attributes strongly demonstrated in the KNUST case were those related mainly to curriculum design. Enactment and evaluation attributes were either demonstrated moderately or weakly (Table 6.1). This is however not surprising because the journey towards enacting curriculum innovations that promote experiential education and critical pedagogies is challenging (Breunig, 2005) and in itself requires much learning by doing.

Table 6.1 Attributes of responsive curriculum development as demonstrated in the KNUST case

Attribute		Evidence
Strongly demonstrated		
Iteration	o	Concept notes explaining rationale for the programme reviewed on 3 occasions by different stakeholders
	o	Input of some teachers initially left out; constituted a team of all teachers, to re-look at the curriculum
	o	Initial curriculum draft not validated by stakeholders; Went back for validation
Built-in learning	o	Consistent and systematic reflections
	o	INRM process creating on inclusiveness and stakeholder engagement
	o	Tailor-made training for teachers
Championship	o	Negotiated funding for RCD process
	o	Kept process on track
	o	Followed up on implementation of recommendations
	o	Encouraged and motivated participants
	o	Continuous oversight of programme implementation
Expert facilitation	o	Guided reflections
	o	Enriched discussions with theories and experiences from other RCD processes
	o	Coordinated formative evaluation of programme
Involvement of actors outside academia	o	Identified professional capability needs
	o	Validated draft curriculum
	o	Ensured objectivity in discussions with academia
	o	Lecturing and coaching students
Moderately demonstrated		
Linkage with world of work	o	Mid-career professional students enrolled and practitioners employed as part-time lecturers
	o	Out-of-classroom engagement with communities and organizations
	o	Opportunity for outside classroom work however not enough
	o	Struggle to use student-centered methods because it is time consuming
Formative improvement-centered evaluation	o	Feedback from students used to adjust curriculum to reduce overlap
	o	Feedback from first cohort used to improve out-of-classroom engagement for second cohort
	o	Innovations in teaching and learning methods however largely remains undocumented
Weakly demonstrated		
Team teaching	o	Field work in one course involves a team of teachers
	o	Teachers are however not participating actively in joint field trips
	o	Most courses are taught by individual teachers

The study also revealed that the institutional context in which RCD takes place plays a major role in how well the unique process and actor attributes may be exemplified. Generally, the national and institutional policies had paid insufficient attention to most of the unique process and actor attributes of RCD. Again, there were insufficient incentives for teachers. However, there were still opportunities within the institutional policies for part-time engagement of qualified practitioners outside of academia and also for guest lecturers and getting field work opportunities among the extensive alumni network. Contextual factors thus determined the trade-offs faculty members made regarding time investments and had a potentially large effect on the success of RCD. This study has demonstrated the value of a gradual and incremental approach to RCD in cases where institutional support is incomplete and where an institution's policies and structures have not changed adequately to accommodate RCD. With this approach, the process could make optimal use of available opportunities and resources and was able to avoid overly drastic changes that may very well have ended up being short-lived (Patterson, 2007).

6.2.3 Research question 3: Interactions among lecturers and practitioners

Research question 3 investigated how interactions among lecturers and practitioners (teachers) facilitated the enactment of the responsive curriculum. These interactions were conceptualized as taking place in a community of practice (Wenger 2000) where the teachers had a common interest and where their regular engagement allowed them to develop new ways to improve teaching and learning. The role and functioning of the CoP in the enactment of the curriculum were investigated using the concepts of deliberation (Niemeyer and Dryzek 2007) and power (Mansbridge et al. 2010). The study showed that the CoP was indeed a vehicle for change in how the curriculum was enacted, allowing the curriculum to better achieve its ambition of becoming responsive to the dynamics in natural resource and environmental governance. We showed that the CoP enhanced congruence between the designed and the enacted curriculum. Over time, the CoP became a platform where teachers shared experiences from the classroom and elsewhere, adding to their repertoire of insights and strategies for further improvement. Considering that the group was diverse not only in terms of disciplinary backgrounds and professional practice, but also in terms of experience in innovative teaching, they shared their vulnerabilities and challenges in enacting innovations and received input for addressing them where possible.

The study also highlighted that the CoP also became a platform for rethinking the designed curriculum. Within the CoP, members questioned certain aspects of the design as well as the values underpinning those design choices. They also critiqued their own actions and inactions based on peer monitoring and reflection without directly attacking members or being offensive. Thus, the study showed evidence of double loop learning among the teachers. This was facilitated by the safe environment created within the community over time. Furthermore, the study showed how through their interactions, teachers generated new ideas for navigating the challenges posed by institutional barriers to change. This was crucial in this case because the innovation took place with a small group within the university, without changing the wider institutional context.

The CoP was able to facilitate the enactment of the responsive curriculum because of the quality of deliberations and the power dynamics fostered within the group. Largely, there was high deliberative agreement among the teachers particularly regarding the values underpinning the innovated curriculum and how the actions or inactions of teachers could affect these values. However, the teachers not always agreed on the preferred strategies for achieving the values of the curriculum. This was not surprising because deliberative ideals are difficult to realize in practice, also considering the differences in perspectives, willingness and ability to experiment with new things among members. The study showed that, despite the presence of power differences which could have been a basis for the CoP to operate based on coercive power, there were no threats of sanctions or use of force neither regarding deliberations within the CoP nor in enforcing the enactment of the curriculum. Rather, members were empowered to act based on their own motivations and skills. While these productive forms of power were crucial in facilitating deliberation and also motivated teachers to implement changes in their own 'classrooms', there were also limitations in terms of implementation in the sense that not all ambitions were realized. It turned that certain changes required much time and other resources and that to realize them, more support from the university was needed. This was in spite of the level of agreement from deliberations or the productive power generated in the group, thus confirming earlier assertions about the central role of an enabling institutional environment to CoP (Boud 1999). In the case of limited institutional support, CoPs are however not necessarily incapacitated. They could still work together to proactively seek the needed

support from the institution or even elsewhere, as demonstrated in our case, regarding the need for tailor-made training. Also, the learning within CoPs could still enable teachers to implement successive incremental spirals of change, while keeping the curriculum vision in focus. The framework provided by this study (see Chapter 4) which combines the three factors of power, deliberation and institutional support thus helps to understand the functioning of a CoP and how it could facilitate the enactment of curriculum innovations.

6.2.4 Research question 4: Students' satisfaction with the integrated approach

Research question 4 examined the extent to which the integrated approach used in the curriculum satisfied students' career aspirations. The integrated approach used fitted well with transdisciplinary education, and was characterised by two key elements; 1) integration of disciplines, and 2) collaboration beyond academia (Balsiger, 2015). As elucidated in Chapter 5, the study showed that both students aspiring for future jobs and those aiming at career development found a programme integrating different disciplines attractive. Students' assumption that this integration could lead to better job prospects also found support in the literature. Current employers require graduates with more meta-disciplinary skills (Arevalo et al*.,* 2014; Arevalo et al., 2010) and research has shown that students tend to work in varied fields, often quite different from the ones they were trained in (Cubbage et al., 1999; Sample et al., 2015).

Students with academic and non-academic career aspirations were largely satisfied with how transdisciplinarity was enacted in the curriculum. They pointed out the strengths of disciplinary integration and collaboration beyond academia, which enhanced their learning (Table 6.2). Transdisciplinarity gave them not only a holistic perspective and a deeper understanding of NREG challenges but also a better understanding of the professional environment. Some tensions within transdisciplinary education noted in the literature (Pohl, 2011; Nash 2008) were highlighted in the study. Students experienced a struggle between having a broad range of knowledge and skills and being specialists in defined fields. Also, the prolonged discussions that came along with engaging with different disciplines and stakeholders were in some cases experienced as being somewhat tedious and inefficient (Table 6.2). This is however not unusual and is part of the learning process, of teachers as well as students, towards mutual learning and knowledge sharing (Klein, 2008).

Table 6.2 Students' perspectives on the strengths and weaknesses of the
transdisciplinary approach

	Strengths	Weaknesses
Disciplinary Integration	o Holistic view of NREG challenges and how to address them	o Overly prolonged discussions among students from different disciplines
	o Appreciation of other disciplines	o Overlaps in content enactment
	o Created good opportunities for interaction between students from different disciplines	o Overemphasis on forestry content, compared to other natural resources and the environment
	o Course content display strong disciplinary linkages	o Becoming a "Jack of all trades" without an area of specialization
Collaboration beyond academia	o Opportunity to learn about professional practice from colleagues with mid-career experience	o Overly prolonged discussions on professional dilemmas
	o Made learning more practical	o Inadequate opportunities for learning outside academia
	o Colleagues with Mid-career professional experience acted as peer resource persons	o No internships
	o Created two-way learning environment between teachers and students in class	
	o Opportunity for networking in preparation for the job market	

The study further showed that the type of transdisciplinarity offered is important if both students with academic and non-academic career aspirations are to be satisfied. In the first year of the programme, students with non-academic career aspirations indicated that the programme needed to have more extensive collaboration with stakeholders outside academia. When formative evaluations showed students' dissatisfaction on this issue, adjustments were made towards more extensive collaboration beyond academia and the programme ended up satisfying the demands of students with academic and non-academic career aspirations.

The study also showed that students believed that the curriculum had improved their capabilities for RFG. For all the capabilities assessed, there was a significant difference in students' self-rating before and after the programme. What remains unknown however, is whether students' appreciation of the transdisciplinary approach to education will be sustained. This, we argue, will depend on the ability of graduating students to find jobs as they anticipate. It will also depend on whether they remain interested in and are prepared to work at the interface between disciplines, as this can be challenging (Blickley et al., 2013; Klein 1996).

6.3 RESPONSIVE CURRICULA AND THE QUESTION OF RESPONSIBLE FOREST GOVERNANCE

The aim of the responsive curriculum created through this study was to develop forestry professionals capable of promoting RFG. Following from the framework of this thesis discussed in chapter 1, what remains to be seen is whether professionals with the capabilities identified will indeed be able to influence forest governance towards more responsible outcomes. In this section, the possibilities but also the limitations of establishing a link between professional capabilities and RFG are considered. We do so from four main points of view. First, we consider the set of capabilities showcased in the thesis in light of the central role of ethics. Second, we reflect on the extent to which capable professionals are likely to contribute towards change, given the nature of governance challenges identified in the study. Third, we explore the increasing call for governance to pay attention to the connectivity between forests and other land use types and what that means for the curriculum described in this thesis. Lastly, the section ends with a reflection on the use of the terms 'responsive' and 'responsible' in this study.

The required capabilities identified in this study resonate well with present challenges to RFG in Ghana and also creates room for thinking beyond the present. Thus, the curriculum is not only for 'what is' but also for 'what could be (Breunig, 2005). Capabilities for analytical and critical reflection, which includes critical thinking and systems thinking, for example, become crucial in strengthening the ability of forestry professionals to see interlinkages between various governance challenges and also the connections between forests and the forest sector. These capabilities have also been highlighted as being key for sustainable development (Rieckmann, 2012). Anticipatory or forward thinking however needs to be strengthened among the capabilities to better enable professionals deal with the future, considering the dynamic nature of the forest governance arena. This study however revealed that ethics was not considered an important component of capacity-building of forestry sector actors in Ghana but as has been argued in Chapter 2, ethics are crucial as it underpins most of the challenges identified in practice. Ethics here does not constitute a monolithic concept comprising a set of 'dos and don'ts' to be impressed upon the new forestry professional. Rather, we consider ethics to involve dynamic processes of critical thinking and reflection on the values and moral basis for actions. Seen this way, the incorporation of ethics into responsive curricula has the potential to expose new challenges and also generate new possibilities (Jickling et al., 2006). For these reasons, ethics are an important component of education for transformative learning and change (Jickling, 2004; Jickling, 2005; Jickling et al., 2006; Tassone et al., 2017).

However, this will bring in new challenges for teaching. Here, the usefulness of communities of practice highlighted in this study comes to the fore. Teachers can learn new ways of supporting development of new ethics and sharing stories that are ethically inspiring (Jickling et al., 2006). Also, formative improvement–oriented evaluations integrated into responsive curricula will give feedback on the development of ethics, how and where teacher could improve. These new ethics would also need to be assessed in a responsive curriculum to determine how the ethical dispositions of students are changing. Though few studies assess changes in ethical and moral dispositions, this is possible and education can indeed affect ethical and moral dispositions (Felgendreher and Lofgren, 2017). Development and assessment of new ethics ties in with the need to create a stronger collaboration with the world of work in a responsive curriculum. A transdisciplinary approach with extensive collaboration outside academia, as suggested in Chapter 5, can provide opportunities for incorporating ethics and probably also for assessment. Specific

transdisciplinary courses may be designed for students to engage with practitioners outside academia for a considerable period of time and come out with joint solutions to real-live challenges (e.g. Fischer and Rieckmann, 2010). Here ethical dimensions in undertaking their transdisciplinary projects can be clearly outlined. Students may then be monitored as they "walk the change" (Wals et al., 2016) and experience the expected transformation towards responsible governance in practice.

The study has shown that challenges to RFG are complex and multifaceted. The persistence of one challenge creates or aggravates others. The political culture in Ghana fosters extreme interference of powerful elites in professional forestry practice. These elites have strong political and social interests and networks not only within the forestry sector but also in other sectors as well. Foresters on the other hand are portrayed as poorly remunerated and under-resourced (Opoku, 2006). There is also a widespread culture of corruption and illegal practices. Altogether, this picture of Ghana's forest governance arena raises a number of interlinked questions: 1) Is RFG possible at all, given the context of Ghana's political economy? 2) Who is even interested in RFG? and 3) To what extent can an individual forestry professional, having requisite capabilities for RFG, change deeply institutionalized systems and practices? This study showed that some forestry actors, especially in civil society, believe that certain forestry officials oppose suggestions for improving governance because they benefit from the current situation of poor forest governance. Whereas some forestry officials confirmed that the sabotaging of colleagues who desired to confront the culture of corruption were sabotaged, there was also evidence indicating that other forestry officials are committed to responsible governance. Thus, some forestry officials believe RFG is good for them and for Ghana's forests. Also, some forestry professionals, working particularly with civil society, seem highly motivated to advocate for and work towards RFG. This creates space for RFG to be accomplished, provided that there are sufficient practitioners with the right capabilities in place.

Indeed, the responsive curriculum discussed in this thesis seeks to build the capacity of individual forestry professionals for promoting RFG. Emphasis on analytical and critical reflection allows this new professional to better appreciate how much is actually lost, through corruption for example, not only to the nation in terms of Gross Domestic Product (GDP) and environmental services but also in terms of organisational image, personal reputation, inter-generational equity, missed opportunities for becoming better resourced and well remunerated in the future and so on. The curriculum also addresses how corruption affects professionalism through the loss of authority and the loss of trust of stakeholders. Together with the ability to initiate change, the new professionals educated by the responsive curriculum is likely to be better equipped to promote and enact RFG. We however also note that developing these capabilities implies a moral appeal on the professionals and some may chose not to uphold them in their professional environment but may instead choose to perpetuate the status quo, under the pressure of existing political culture. This notwithstanding, there is a greater possibility that with such a responsive curriculum, a critical mass (see Oliver, 2013) of new forestry professionals could be built, who would serve as change agents and who would use their capabilities to alter some of the institutionalized negative practices and ingrained culture. This said, we acknowledge that change in the forest sector towards RFG does not only need capable forestry professionals who can form a critical mass. It also needs a change in the political economy (Hansen and Lund, 2011) towards an enabling institutional environment with appropriate policies and economic resources in place that stimulate responsible practices within the sector (Lidskog and Lofmarck, 2016; Roy and Tisdell, 1998).

While this research has focused on forest governance, an emerging literature points to the need for forest governance to go beyond forests to consider the entire landscape of which the forest is a part (Arts et al., 2017; van Oosten, 2013). Even the conceptualization of forest-related initiatives like REDD+ have also shifted to emphasize the linkages between forests and other forms of land use (Turnhout et al., 2017). Such forest landscape governance and landscape approaches bear resemblance with forest governance as defined in this thesis in that they seek the engagement of multiple actors in making decisions and influencing their landscapes. Arguably, the curriculum has gone some way in adopting a landscape approach since it considers forests as situated in larger spatial units and as connected with other forms of land use and related issues like food security, biodiversity loss and sustainable land use (van Oosten, 2013). It also shows the need for forest governance to go beyond traditional forest-related ministries, department and agencies considered in multi-level processes to include cross-sectoral actors (Robiglio et al., 2014). This is why the insights of this thesis are also useful for professionals facilitating landscape governance in practice. Some of the skills necessary for forest landscape governance include ones for facilitating stakeholder interaction, negotiation and conflict mediation (van Oosten, 2013), which have also been highlighted in the findings of this thesis. Additionally, the study highlights systems thinking and critical thinking skills, which allows an appreciation of connectivity between forests and other related landscapes and phenomena. Thus, the responsive curriculum should be able to equip forestry professionals to govern not only forests but indeed entire landscapes responsibly.

Two key terms have been stressed through this study; 'responsive' and 'responsible'. The term responsive has been used with respect to curriculum development and has been operationalized to show a better linkage between abstract theories and the complex and continuously changing needs of the professional environment: keeping up with changes. The term responsible on the other hand was used in relation to forest governance, to bring out the need for multi-actor and multi-level forest governance to continually improve various context-relevant governance indicators, making room for progressively learning to care for the current and future well-being of forests and people. This is however not to suggest that responsiveness is not relevant to forest governance nor is a curriculum not required to be responsible. Recent debates in literature on both curriculum and governance emphasize the usefulness of these two terms. Responsiveness has been used as an indicator that shows more responsible governance (United Nations, 2015) and has been operationalized in forestry (e.g. IUCN Responsive Forest Governance Initiative) to address the need to strengthen representation of forest-based people in decision-making. In this thesis and also in other forest governance works, this notion has also been referred to as inclusiveness. Conversely, higher education is confronted with considering innovative educational paths that require new responsible forms of learning and capability development that contributes to the well-being of people and planet (Wals et al. 2016) as an alternative to singular economy-driven paths. This conception of a responsible curriculum embraces the notion of caring for the future, being *responsive* to the needs of the planet from a more value-based and ethical perspective (Grinbaum and Groves, 2013; Tasonne et al., 2017).

In addition to the terms discussed in this study, emerging literature also discusses reflexive curriculum and reflexive governance. A reflexive curriculum pays attention to questioning the underlying assumptions and values of education (Tassone et al., 2017). Reflexive governance looks at the totality of interactions among a broad range of stakeholders even across sectors, with the aim of managing complex, long-term societal challenge through

learning, experimenting and anticipation (see Kooiman, 1993; Voß and Kemp, 2006). Reflexive governance thus showcases reflection on challenges, opportunities but also the responsibilities governance engenders (Beck, 1992). Also, Marald et al., (2017) have propounded the need for reflexive forestry as a way of thinking and a flexible approach that brings forest governance and forest management closer together.

The values of a reflexive curriculum have been interwoven through the RCD process through the centrality of continuous learning through reflections, iteration and formative evaluations. The dimensions of reflexive governance and reflexive forestry also resonate with this study in its appreciation of transdisciplinary ways of knowing, multi-actor interactions and social learning. The responsive curriculum also addresses the need for critical and analytical reflection among forestry professionals. However, what has been indicated, but needs to be strengthened going forward with the responsive curriculum, is that reflection should not be limited to policies and practices on forestry and other sectors only but more importantly, it should also be a self-oriented examination of one's own values and assumptions.

In both curriculum and forest governance literature, the terms responsive, responsible and reflexive (3Rs) are interconnected (e.g. Tassone et al., 2017; Marald et al., 2017). As discussed above, in this study two of these terms (responsive and responsible) have been highlighted and the other one (reflexive) has emerged in a subtler fashion as the research progressed. Going forward in developing appropriate curriculum for forestry governance in higher education, the interlinkages between these can be made more explicit, as shown in Figure 6.1.

6.4   CONCEPTS AND THEORIES OF LEARNING

In this section, we reflect on the learning concepts used in the light of emerging literature. First, we situate the concepts in a broader frame and interrogate their usefulness but also their limitations in understanding the curriculum studied. Second, we argue that in view of the boundary crossing nature of forested landscape governance issues, it is necessary to take transdisciplinarity further, by considering transboundary learning. Third, we articulate the contributions of this thesis to emerging debates on transgressive learning.

There is a wealth of literature on learning, with many concepts. This thesis has applied a number of these concepts, including transdisciplinarity, communities of practice and deliberative theory. Arguably these could all fall under the broad banner of transformative learning (Lotz-Sisitka et al., 2015; Barth and Rieckmann, 2012). Transformative learning is distinguished from other learning theories that seek to find ways of doing things better and goes further to doing better things altogether, necessitating stepping out of the usual frame of reference and taking a meta-perspective (Ison and Russell, 2000). Transformative learning is contrasted with the transmissive view of education where facts and skills are transferred from the teacher who is 'knowledgeable', to the young impressionable minds of students. It leans towards socio-constructivist theories of learning where knowledge is co-created with learners who are deemed to have prior (tacit) knowledge and can become engaged in becoming more critically aware through education (Jickling and Wals, 2008). The innovations introduced in the curriculum studied were aimed at creating more space for the learner to be autonomous and to participate in knowledge co-production with practitioners outside the classroom as well as other learners.

The concept of transdisciplinarity helped us to analyse the responsive curriculum created. Transdisciplinarity is associated with transformative learning in that it questions the more fundamental notions of a single dominant way of knowing and highlights the relevance of boundary crossing and the inclusion of multiple ways and sources of knowing. It allows participants to experience the opportunities and limitations of their own discipline and, more broadly, their own way of seeing and framing the world, but also those of alternative ways, while at the same time exploring new ways of knowing. Balsiger's (2015) distinction of four typologies of transdisciplinarity was a good analytical tool for characterizing the transdisciplinary approach used in curriculum development. It was also helpful in analysing future directions of transdisciplinarity that would make the curriculum more responsive. Within a specified category of transdisciplinarity however, there could be several variations in practice but the typology was limited in providing such distinctions. In light of the need for boundary crossing between sectors and cultures – as contemporary forest governance and landscape approaches tend to deal with nexus issues that transcend forestry and include a range of different socio-cultural perspectives – the notion of transdisciplinarity may need to be expanded to transboundary learning (Cremers, 2016). This thesis proposes a shift in language from transdisciplinary to transboundary in the context of RCD to acknowledge this boundary crossing and to recognize that different sectoral and cultural perspectives need to be considered along with different disciplinary ones (Figure 6.1).
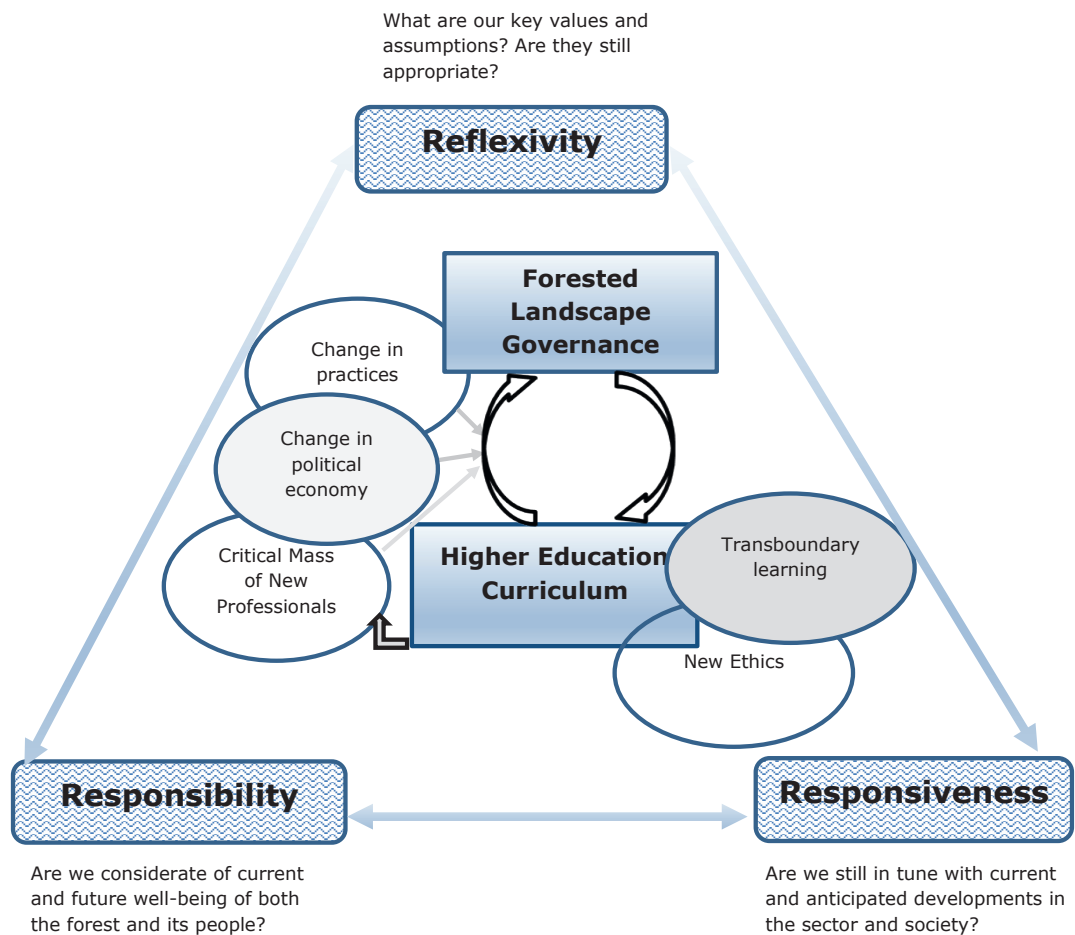
Figure 6.1 A new conceptual model for the interplay between forested landscape
governance and curriculum

The concept of community of practice identifies domain, community and practice as the
three distinguishing characteristics of a group of people interacting and finding new ways
of improving their practice. These characteristics were useful in contextualizing the
interactions among lecturers and practitioners towards learning new ways of teaching and
providing learning experiences for students. The concept of communities of practice is
closely linked with social learning which is often referred to as the learning that takes place
when divergent interests, norms, values and constructions of reality meet in an
environment that is conductive to learning (Wals and van der Leij, 2007). Though learning
is an important aspect of the interactions among lecturers and practitioners, this study
wanted to investigate other roles of the interaction, other than learning. The additional
focus on the community and their practice allowed us to unravel these other roles.

These concepts and theories of transformative learning are mostly rooted in a Habermasian ideal of communicative rationality, that suggests deliberating participants can ideally investigate generalizable interests and emphasizes mutual understanding (Habermas, 1971 in Niemeyer and Dryzek, 2007). As with many other Habermas-inspired concepts and approaches, they have been criticized for being insufficiently attentive to power dynamics and inequalities which do exist in engagements among different actors (Mansbridge et al., 2010). This points to a general shortcoming of concepts and theories of transformative learning generally and also this thesis because there is a common risk of painting a too rosy picture of what can be expected from social learning, communities of practice, or transdisciplinary approaches as normative ideals, provided that they are well managed and facilitated (e.g., Dietz and Stern, 2008). However sometimes, such processes may fail to reach intended outcomes (van Bommel et al., 2009) or may result in unintended and even paradoxical outcomes among participants (Aarts and Leeuwis, 2010; Turnhout et al. 2010). To address this, we complemented our analysis of communities of practice with the concepts of deliberation and power to offer a more detailed and realistic analysis of what transpired in the interaction among teachers (see chapter 4). Specifically, to show how power is an inevitable part of these processes and how it can play a productive role that contributes to the enactment of curriculum innovations.

Recent discussions on learning for sustainability show a move towards what is described as 'deeper transformation' (Wals and Peters, 2017), which highlights transgressive and disruptive learning. At the core of this emerging move is the need to expand modes of learning to be able to respond to and engage the wicked nature of problems confronting the world (Lotz-Sisitka et al., 2015). Transgressive learning is stimulated through dissonance, which confronts the dominate frames of participants and invites them to reconsider their views to co-create new ways of thinking and doing things (Paraskeva, 2011). Transgressive learning resonates well with the earlier referred to notion of boundary crossing and is central in emerging literature on sustainability transitions (Wals and Peters, 2017). On the part of the teachers studied, some dissonance had already been created prior to the development of the new curriculum, through the integrated natural resource management (INRM) process. This process engaged teachers, practitioners and other international consortium members and questioned teachers' traditional role as having the answers to the problems of society and providing education to transmit these answers to students. It did provide the basis for the new curriculum development process documented in this thesis.

To some extent, the transdisciplinary set-up of the programme, which placed students from different disciplinary background together to work collectively on natural resource and environmental challenges, was able to create space to foster these new ways of thinking and this also generated discomfort and some form of dissonance. Specifically, the curriculum confronted the dominant frames of the learners and caused them to re-think their views on natural resource problems but also other disciplines as demonstrated in Chapter 5. Inherent to the Soviet psychologist and social constructivist Lev Vygotsky's (1896 - 1934) Theory of Cognitive Development is the concept of zone of proximal development that constitutes a metaphor to refer to a space just outside one's comfort zone which triggers new learning. If one stays within this zone of comfort, little learning, or innovation for that matter, is likely to take change. Similarly, if one creates learning activities that are too far out of this comfort zone of zone of proximate development, a participant will feel inadequate or will lose interest and learning is likely to be blocked. In creating and enacting new curriculum, it is critical to find the zones or learning spaces that

keep both teachers and students on their toes, wanting to learn and engage to reach the next 'level'.

Our analysis has shown that the enactment of the curriculum faced difficulties because the institutional context had not changed to accommodate the requirements of the new curriculum. Therefore, an incremental approach was taken that enabled change to take place, but that also inevitably restricted the scope of change. In this incremental approach, teachers continually built on the current conventional approach and implemented changes by small degrees. The notion of a zone of proximal development suggests that the incremental spiralling towards a more desirable state makes more sense than trying to 'force' a transition by presenting a radical or provoking alternative that lies too far out of participants' comfort zones and requires some major reframing of deeper assumptions and values. This thesis shows that there is a preference for incremental curriculum development among the participants but also within the wider system. According to Lindblom (1959), incrementalism is not just a piecemeal approach, or a necessity because radical change is not possible, it is also preferable to ensure the relevance as well as legitimacy of change processes. This also holds for our case, and possibly also more generally for innovations towards transgressive learning. A step-wise process of multiple successive incremental changes may be the best way forward to foster transgressive learning, to allow students and teachers to adapt, and to make sure that this is embedded in a supportive institutional environment.

6.5   METHODOLOGICAL REFLECTION

6.5.1 The research approach

This study has used a mixed methods approach to understand the challenges in pursuing RFG in Ghana and to create a responsive curriculum that better equips the 21st century forestry professional to address these challenges. This approach was vital because the forest governance arena is not only complex but also continuously changing and the curriculum development process to be studied was also not well defined. The qualitative approaches like in-depth interviews, workshop and focus group discussions were insightful in unravelling these complexities and identifying the challenges and capabilities. The quantitative methods of ranking and rating that were used complemented this and made agreements possible about the priorities for the RCD.

Participatory action research (PAR) was the main research approach for creating the curriculum and investigating its development and enactment. The reflections as well as the cycles of continuous observations, learning and improvement typical of PAR enabled the identification of aspects needing iteration and it facilitated the learning process among the teachers. One of the distinctive qualities of PAR is that it moves away from the notion of an 'outside expert' coming into a context - the university in this case - to examine, theorise and propose ways of creating this curriculum (Walter, 2009). It also redefines the role of the researcher as a 'tool' for facilitating change along with others, and not the expert in the research (Walter, 2009). Here, I (the author of this thesis) therefore reflect on my roles in this study. Being a lecturer at the Department of Silviculture and Forest Management that led the curriculum development, I was a complete participant or member (Alder and Alder, 1987) in the entire process, playing varied roles as co-designer, co-

implementer, evaluator, and as researcher. These varied roles had advantages, but also presented challenges.

Researchers coming into unfamiliar educational environments may be regarded as outsiders and lecturers and practitioners may be hesitant to be completely open (Thijs, 1999 in Plomp, 2013). As an insider and participant, I did not have these problems and I could rely on acceptance, trust and a more thorough understanding of the context (Dwyer and Buckle, 2009; McKenney et al., 2006). This was also crucial to the success of the study because the creation of a responsive curriculum was new to the lecturers and practitioners. It involved a learning process where they had to reflect and where they also sometimes had admit incompetence, vulnerabilities and frustrations. My being a part of the group, experiencing and sharing similar vulnerabilities, further enhanced openness. Considering the traditional air of competence around academia as a citadel of knowledge, getting access to this learning process would have been difficult for an outside researcher. This study entailed not only research but also action. Being a professional forester in academia meant that I had contacts with both practitioners and lecturers and this facilitated the 'action' part of the study where we needed to organize workshops and discussions within communities of practice for example. This would have been difficult for an outsider considering the culture of independence among lecturers and practitioners. Working together with curriculum developers both as an insider and a researcher indeed developed expertise and insights as well as innovative solutions (Walter, 2009) that would not otherwise have been possible.

On the other hand, however, these multiple roles have been noted as a possible source of role confusion (Asselin, 2003) and potential conflict of interest. These challenges were experienced particularly with my role as an evaluator of the curriculum. Students had to open up about their positive and negative experiences with the curriculum to me, their lecturer, and also discuss the other teachers who are my colleagues. However, as the coordinator of the programme, I was the students' main contact and I supported them from their application into the programme through their orientation. In the early months of enrolment, I handled several issues that proved my commitment to their interest. This, coupled with the fact that I do not teach in the first six months of their enrolment built a greater rapport and trust which enabled me to execute this evaluation**.**

Being an outsider to a research context is noted to promote a greater degree of objectivity which may not be possible for researchers who participate in the process they study (McKenney et al., 2006). Taking cognisance of this, two main precautionary measures were taken. First, the research findings were made open to other participants in the PAR. As explained above, these are researchers, academics and practitioners, who could question assumptions and correct misrepresentations. Further, the fact that the PAR group was made up of not only academics from my department but also academics from other departments, as well as practitioners made objective reporting easier. Also, the challenge of not being objective was minimized by the involvement of several participants from the previous INRM programme which had brought lecturers to the realization that academia does not have all the answers thus enhancing the openness of participants to reflect Second, the research findings were also open to scrutiny by co-authors of the research

6.5.2 Five types of validity

This study sought to create a balance between scientific rigor and practical usefulness (Argyris et al., 1985; Reeves, 2011). In PAR, relevance is central to the study and problem holders define and participate in addressing the problem, with the aim of finding context-specific solutions (Ozanne and Saatcioglu, 2008; Walter, 2009). Expertise, insider knowledge and implicit theories of lecturers and practitioners in the field of forestry but also in other natural resource areas and in environmental governance were utilized in the study through the in-depth interviews, focus group discussions, workshops and validation of data documentation and analysis. As shown in each of the empirical chapters, the study relied on multiple data sources and methods of data collection. This triangulation was necessary and useful in improving the internal validity of results obtained (Altrichter et al., 2008). In a PAR approach, other participants in the research process also observed and validated the research findings and this contributed to the validity of the results as well (Archibald, 2016). In addition, the study paid attention to the five types of validity – outcome, democratic, process, catalytic and dialogical - deemed necessary in action research (Reason and Bradbury, 2001; Anderson et al., 1994 as recapitulated in Ozanne and Saatcioglu, 2008). Below, we reflect on how these types of validity were achieved in the study.

Outcome validity requires that the study generates practical knowledge for improving the situation under research. This study has shown the usefulness of the knowledge generated; each of the research results documented in chapters 2-5 has been used to develop, evaluate and improve the curriculum. Challenges to responsible governance were used to discern professional capabilities for addressing current and emerging challenges. The professional capabilities informed the development of the curriculum in chapter 3. The continuous cycles of reflection and improvements used in the curriculum development led to a better understanding of RCD and the choice of a transdisciplinary approach to developing these capabilities. Through a community of practice, lecturers together with practitioners learn to enact the innovations in the curriculum which was deemed largely satisfactory to the first two cohorts of students. What remains to be seen, however, is how and to what extent the professionals educated with this curriculum will contribute to responsible governance. It is also difficult to say at this point whether the curriculum is sufficiently responsive to the professional capabilities required for RFG. The forest governance arena is very dynamic and the curriculum needs to be equally dynamic. Thus, determining the point where the action research has addressed the situation under research is difficult (Walter, 2009).

The extent to which relevant stakeholders of a particular problem participate deeply and fully in the research defines its *democratic validity*. Various relevant stakeholders in the forestry arena were engaged in the different parts of the study. For the RCD process, stakeholder participation was central to the participatory curriculum development framework on which the initial process started. Where specific stakeholders were left out, it was duly acknowledged as a missed opportunity. Interviews and surveys also involved stakeholder from government, the private sector and civil society as the three main pillars in multi-actor governance.

Process validity addresses the extent to which the research allows ongoing learning and improvement. This study documents reflection, both in the RCD process and in the community of practice as being key, not only to creating but also enacting curriculum innovations. Referring to the work of Hirschman (1985), Ozanne and Saatcioglu (2008)

indicate that the quality of data generated would depend on the trust and rapport between the researcher and participants. As illustrated in the empirical chapters, the researcher was immersed in the study context and had good professional relationships with lecturers, practitioners and other stakeholders participating in the study. The researcher and participant worked together on the RCD for a six-year period, thus further improving the rapport. This long period of the study also allowed several cycles of reflection, analysis and adjustments thereby avoiding premature closure (Herr and Anderson, 2005) to the RCD and further improving process validity.

Catalytic validity examines how research participants are energized to understand and change social reality within but also outside the study. An important aspect here is being able to break dichotomy between the researcher and participants to create mutual respect for people's capacities (Beach, 2003). Unlike the case when a researcher works with illiterate communities or smallholder famers for example, this study dealt with an equally elite group of lecturers and practitioners. Each participant was respected for the contributions they made to the process. By sharing the findings of the study through peer reviewed publications, others outside the study context get access to lessons learnt, which may provide useful input to their own RCD.

Finally, *dialogic validity* addresses the need for the study to engage in critical dialogue with peers regarding research findings to seek alternative explanations, confront problematic assumptions and reduce biases (Anderson and Herr, 1999). Results of the study were shared with participants in the PAR. These included academics and researchers who critiqued some of the outcomes. Also, as explained in Chapter 3, the co-authors of the articles in this thesis served as critical colleagues who raised alternative explanations, highlighted biases and helped in pointing out failure to include key stakeholders.

Related to validity is the question about the generalizability of the results of this study. A major strength of this thesis has been the opportunity to study RCD in 'real time' and over a long period of period of time. The RFG challenges and professional capabilities described in Chapter 1 were gathered from natural resource sector stakeholders across Ghana, thus giving an impression of the capability needs of that specific country and sector. The development of the responsive curriculum was however focused on one university and studied in-depth over a six-year period starting from the conception of the idea to the creation, enactment and evaluation of the curriculum thus generating rich contextualized knowledge. Huang (2010) posits that seeking to increase the generalizability of action research jeopardizes partnership with practitioners but suggests that sharing local knowledge through peer review mechanisms, as has been done in this study, makes the knowledge available to all and enhances its transferability. To enable other universities and researchers to relate to the findings of the study (Dzakiria, 2012) we offer in-depth descriptions of the study context.

6.6   FUTURE DIRECTIONS

The findings of this research have generated further research issues beyond the scope of this work and also provide recommendations for policy and practice.

6.6.1 Research implications

On the basis of the study, we identified the following areas for future research:

1. This study has assessed the development of professional capabilities of the first two student cohorts based on a self-assessment before and after the first year of the programme and established that students felt their capability for addressing forest governance issues had improved. It would however be necessary to investigate their capability development in the field. First, a tracer study would be necessary to establish whether indeed students find jobs relevant to their transdisciplinary training. Second, a three-dimensional assessment consisting of former students, their colleagues and their employers would be necessary to establish evidence of their new capabilities and how these capabilities are being applied to promote RFG in their jurisdiction. Such a study may be undertaken five years or more after graduation from the programme.

2. This study remained at the 'curriculum level' and did not provide details on individual course designs that could contribute to strengthening transdisciplinarity. It showed that students, particularly those with non-academic career aspirations require extensive collaboration with academia and this needs to be carefully designed and enacted in selected courses. A study that looks at designing hybrid learning configurations that allow students to work at the interface of academia and the workplace (see Cremers, 2016) would be necessary for providing insights on how to strengthen transdisciplinarity and the broader transboundary work that is required. Also, the capability-needs identified in this study need to be further operationalized into more concrete learning activities and experiences which can be easily assessed. Further research may pursue how this can be done.

3. The focus of this study was on developing capabilities for RFG. The transdisciplinary programme that emerged from the RCD however addressed issues other than those related to forests. Further research is therefore necessary to establish whether the students also develop adequate capabilities for responsible governance in the other natural resources domains. The responsive curriculum studied has just taken off and it will be relevant to study the dynamics of its innovations. Would the teacher be able to sustain the innovative curriculum enactment? What changes would be necessary for the curriculum to remain relevant to the continuously changing forest and natural resource governance arena in Ghana? What factors will enable or constrain the responsive curriculum in the long-term?

4. In this study, transdisciplinarity was conceptualized as integration of disciplines and collaboration beyond academia. It provided a good frame for analysing the programme and understanding its future directions. Further studies may however consider looking at the concept of transboundary learning where the aspect of disciplinary integration moves beyond academic disciplines to look at the interplay between forests and other cross-cutting issues linked to forestry like climate change, food security and poverty. This is also necessary for emerging landscape approaches to governance.

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5. Further research is required to establish and further develop the unique attributes of RCD particularly in other African contexts. The challenge envisaged here may be getting on-going curriculum development processes in these contexts. However, using insights from this study and the conceptual framework we propose as a starting point, such a study may be complemented with retrospective interviews in cases where a curriculum has already been developed. RCD may be tested also in professional fields other than forestry. The usefulness of a community of practice in supporting enactment of curriculum innovations also need to be investigated in other African contexts.

6.6.2 Implications for policy and practice

Policy

As elucidated in the study, students prefer greater opportunities to engage with the world of work. The ties between the university and other environments outside academia where forest governance can be practiced (local communities, private sector, government ministries and agencies) need to be strengthened and broadened to create more opportunities for student learning. Further, current assessment methods at the university studied remain rigid and allocate a large percentage of marks to end of semester sit-in examinations. Assessment methods need to fit the nature of the innovation introduced in a responsive curriculum. University assessment structures should therefore be made more flexible to accommodate the assessment of skills development through learning in the workplace.

The study has established that institutional support is one of the key factors determining whether a curriculum innovation can be enacted as intended and also determines the longevity of the innovation. The university should therefore consider providing the institutional support necessary for promoting RCD as this makes a university more relevant. The university therefore needs to take into account the time requirements of quality enactment of responsive curricula and allow teachers involved in such programmes the necessary release from other responsibilities. Their time investments should be also recognized with due remunerations and during promotion and faculty appraisal. Infrastructure development at the university also needs to provide for the new teaching and learning methods required for a responsive curriculum.

In discussing how contextual factors and institutional support affect RCD, the study has shown that where curriculum accreditation processes require only a minimum documentation of teaching and learning methods, teachers are reluctant to provide a detailed account and this is likely to affect the quality of curriculum enactment in the future, especially when original designers of the curriculum are not available. The study therefore suggests that the university and national accreditation systems consider updating their requirements to include richer descriptions of teaching and learning methods especially for curricula aimed at professional education. This would encourage curriculum developers to give detailed thought not only to what needs to be taught but also to the creation of the required learning experiences and the learning environments that invite such experiences. When these details are documented, new teachers will have a better understanding of the values underlying the curriculum.

Practice

For professional forestry education, this study has established that technical knowledge in forestry remains essential. However, additional space should be created for the development of non-technical knowledge especially at the postgraduate level. The study has also posited that a transdisciplinary approach works well for developing professional capabilities for RFG. Currently discussions on forestry education borders on interdisciplinarity; however, following from this study, we recommend that forestry education should become transdisciplinary and, ultimately transboundary, involving collaboration with stakeholders outside academia and exposure to alternative vantage points. Doing so will also make forestry education more attractive to students with non-academic career aspirations. Furthermore, it will need to balance forestry content with other aspects like water and the environment. Without adequately incorporating all relevant domains, the transdisciplinary or transboundary label the programme has may end up being a mere rhetoric or worse still, a deception.

Curricula for developing capabilities for RFG should also simultaneously develop not only knowledge but also skills, attitudes and mind-sets of students. The latter includes attention to values and moral positions. New ethics should also be addressed in such curricula at all levels. Additionally, it should aim at developing capacities for leadership and equipping professionals to make and defend professional decisions without compromise.

Further, this study has shown that a faculty within a university can initiate RCD on its own without waiting for major institutional change. However, in such cases, the faculty should consider being proactive in seeking financial support for the process as RCD processes are elaborate and require much stakeholder engagement. Also in such cases, mechanism for continuous learning and reflection need to be built into RCD process to ensure its success. In cases where a faculty does not have the necessary expertise to facilitate such a process, it may be necessary to engage an external facilitator and train someone within the university to take up this role to sustain curriculum innovations after external expert has left. The entire RCD needs not just a leader, but a champion who passionately motivates the team. Additionally, as this study has highlighted, RCD requires attention for professional development in order for teachers to develop the required capabilities for teaching and facilitating learning. The creation of a community of practice among teachers is therefore recommended to support learning and capacity development for enacting curriculum innovations.

Chapter 6

References

Aarts, N., Leeuwis, C., 2010. Participation and power: reflections on the role of government in land use planning and rural development. Journal of Agricultural Extension and Education 16, 131-145.

Ackom, E.K., 2010. Trends in Natural Resources Education: A Tracer Study for Graduates of the Faculty of Renewable Natural Resources. Kwame Nkrumah university of science and technology, Department of Silviculture and Forest Management, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Addae-Mensah, I., 2002. Funding constraints and quality education and research in African universities - A case study of Ghanaian universities, in: Mokwunye, A.U. (Ed.), Bridging the knowledge gap - revitalizing Africa's universities. Woeli publishing services, Accra, Ghana, pp. 7-19.

Adler, P., Adler, P., 1987. Membership roles in field research. Sage, Newbury Park, CA.

Agyarko, T., 2001. Forest Outlook Study for Africa: Ghana, Forest Sector Outlook Report. Food and Agriculture Organization.

Ahenkan, A., Boon, E., 2010. Assessing the impact of forest policies and strategies on promoting the development of non-timber forest products in Ghana. Journal of Biodiversity 1, 85-102.

Alao, J.S., 2010. Repositioning forestry education in Nigeria. Electronic journal of Environmental, Agricultural and Food Chemistry 9, 284–292.

Albanese, M.A., Mejicano, G., Andershon, W.M., Gruppen, L., 2010. Building a competency-based curriculum: the agony and the ecstasy. Advances in Health Science Education 15, 439-454.

Altrichter, H., Feldman, A., Posch, P., Somekh, B., 2008. Teachers investigate their work: An introduction to action research across the professions, 2nd ed. Routledge.

Amanor, K., Brown, D., 2003. Making environmental management more responsive to local needs: Decentralisation and evidence-based policy in Ghana. ODI forestry briefing Number 3.

Ameyaw, J., Arts, B., Wals, A., 2016. Challenges to responsible forest governance in Ghana and its implications for professional education. Forest Policy and Economics 62, 78-87.

Ameyaw, J., Turnhout, E., Arts, B., Wals, A., 2017a. Creating a responsive curriculum for postgraduates: lessons from a case in Ghana. Journal of Further and Higher Education, available from: https://doi.org/10.1080/0309877X.2017.1386285 .

Ameyaw, J., Wals, A.E.J., Arts, B., Turnhout, E., 2017b. Does a transdisciplinary approach to forestry education meet students' career aspirations? Lessons from a curriculum innovation in Ghana. International Journal of Forestry 19, 397-412.

Anderson, G.L., Herr, K., Nihlen, A.S., 1994. Studying Your Own School: An Educator's Guide to Qualitative Practitioner Research. Sage Publications, Thousands Oaks, CA.

Anderson, G.L., Herr, K., 1999. The New Paradigm Wars: Is There Room for Rigorous Practitioner Knowledge in Schools and Universities? Educational Researcher 28, 12-21.

Anderson, G.L., Herr, K.G., 2005. The action research dissertation: A guide for students and faculty. SAGE, London.

Aneas, A., 2015. Transdisciplinary technology education: a characterisation and some ideas for implementation in the university. Studies in Higher Education 40, 1715-1728.

Archibald, M.M., 2016. Investigator Triangulation: A Collaborative Strategy With Potential for Mixed Methods Research. Journal of Mixed Methods Research 10, 228-250.

Arevalo, J., Pitkanen, S., Gritten, D., Tahvanainen, L., 2010. Market-relevant competencies for professional foresters in European graduate education. International Forestry Review 12, 200-208.

Arevalo, J.,Mola-Yudego, B., Pelkonen, P., Qu,M., 2012. Students' views on forestry education: A cross-national comparison across three universities in Brazil, China and Finland. Forest Policy and Economics 25, 123–131.

Arevalo, J., Pitkänen, S., Kirongo, B., 2014. Developing forestry curricula: Experiences from a kenyan-finnish project. International Forestry Review 16, 78-86.

Argyris, C., 1982. Reasoning, Learning and Action. Jossey-Bass, San Francisco, CA.

Argyris, C., 1999. On Organizational Learning, 2nd edition ed. Blackwell, Oxford.

Argyris, C., 2002. Double-loop learning, teaching, and research. Academy of Management Learning and Education 1, 206-218.

Argyris, C., Putnam, R., Smith, D.M., 1985. Action Science: Concepts, Methods, and Skills for Research and Intervention. Jossey-Bass San Francisco.

Argyris, C., Schön, D.A., 1974. Theory in practice: Increasing professional effectiveness. Jossey-Bass, San Francisco.

Armitage, D., Marschke, M., Plummer, R., 2008. Adaptive co-management and the paradox of learning. Global Environmental Change 18, 86-98.

Arnouts, R., Arts, B., 2009. Environmental Governance Failure: The 'Dark Side' of an Essentially Optimistic Concept, in: Arts, B., Lagendijk, A., Houtum, H.v. (Eds.), The Disoriented State: Shifts in Governmentality, Territoriality and Governance. Springer Netherlands, pp. 201-228.

Arts, B., 2006. Non-State Actors in Global Environmental Governance: New Arrangements Beyond State, in: Koening-Archibugi, M., Zürn, M. (Eds.), New Modes of Governance in the Global System: Exploring Publicness, Deligation and Inclusiveness. Palgrave Macmillan, New York.

Arts, B., Appelstrand, M., Kleinschmidt, D., Pülzl, H., Visseren-Hamakers, I., 2010. Discourses, actors and instruments in international forest governance. Embracing complexity, in: Rayner, J., Buck, A., Katila, P. (Eds.), Meeting the challenges of international forest governance. A global assessment report. IUFRO World Series, Vienna, Austria, pp. 57-74.

Arts, B., Buizer, M., 2009. Forests, discourses, institutions: A discursive-institutional analysis of global forest governance. Forest Policy and Economics 11, 340-347.

Arts, B.J.M., Visseren-Hamakers, I.J., 2012. Forest governance: a state of the art review. In: Arts, B.J.M., Bommel, S., van Ros-Tonen, M.A.F., Verschoor, G.M. (Eds.), Forest People Interfaces; Understanding Community Forestry and Biocultural Diversity. Wageningen Academic Publishers, Wageningen, pp. 241–257.

Arts, B., Buizer, M., Horlings, L., Ingram, V., van Oosten, C., Opdam, P., 2017. Landscape approaches: A state-of-the-art review. Annual Review of Environment and Resources 42, 439-463.

Ascher, W., 1999. Why governments waste natural resources: policy failures in developing countries. John Hopkins University Press, Baltimore.

Asselin, M.E., 2003. Insider research: Issues to consider when doing qualitative research in your own setting. Journal for nurses in staff development : JNSD : official journal of the National Nursing Staff Development Organization 19, 99-103.

Awayiga, J.Y., Onumah, J.M., Tsamenyi, M., 2010. Knowledge and Skills Development of Accounting Graduates: The Perceptions of Graduates and Employers in Ghana. Accounting Education 19, 139-158.

Baird, I.G., 2010. Quotas, Powers, Patronage and Illegal Rent-Seeking: The Political Economy of Logging and the Timber Trade in Southern Laos. Department for International Development, UK.

Balsiger, P.W., 2004. Supradisciplinary research: history, objectives and rationale. Futures 36, 407-421.

Balsiger, J., 2015. Transdisciplinarity in the class room? Stimulating the co-production of sustainability knowledge. Futures 65, 185-194.

Barradell, S., Peseta, T., 2016. Promise and challenge of identifying threshold concepts: a cautionary account of using transactional curriculum inquiry. Journal of Further and Higher Education 40, 262-275.

Barth, M., Rieckmann, M., 2012. Academic staff development as a catalyst for curriculum change towards education for sustainable development: an output perspective. Journal of Cleaner Production 26, 28-36.

Bavinck, M., Chuenpagdee, R., Diallo, M., Heijden, P.V.D., Kooiman, J., Mahon, R., Williams, S., 2005. Interactive Fisheries Governance: A Guide to Better Practice. Eburon Publishers, Delft.

Beach, D., 2003. A Problem of Validity in Education Research,. Qualitative Inquiry 9, 859-873.

Beck, U., 1992. Risk society: Towards a new modernity. Sage publications, London.

Beckley, T., Parkins, J., Sheppard, S., 2006. Public Participation in Sustainable Forest Management: A Reference Guide. Sustainable Forest Management Network, Edmonton, Alberta.

Bernard, H.R., 2011. Research Methods in Anthropology: Qualitative and Quantitative Approaches. 5th ed. AltaMira Press, Rowman and Littlefield Publishers, Lanham.

Biggs, R., Diebel, M.W., Gilroy, D., Kamarainen, A.M., Kornis, M.S., Preston, N.D., Schmitz, J.E., Uejio, C.K., Van De Bogert, M.C., Weidel, B.C., West, P.C., Zaks, D.P.M., Carpenter, S.R., 2009. Preparing for the Future: Teaching Scenario Planning at the Graduate Level. Frontiers in Ecology and the Environment. E-view.

Binns, C., 2015. What can 'social practice' theory and 'socio-cultural' theory contribute to our understanding of the processes of module design? Journal of Further and Higher Education 39, 758-775.

Blickley, J.L., Deiner, K., Garbach, K., Lacher, I., Meek, M.H., Porensky, L.M., Wilkerson, M.L., Winford, E.M., Schwartz, M.W., 2013. Graduate Student's Guide to Necessary Skills for Nonacademic Conservation Careers. Conservation Biology 27, 24-34.

Bodegom, A.J., van, Klaver, D.C., F.H.J, v.S., van der Valk, O., 2008. FLEGT beyond T : exploring the meaning of 'Governance' concepts for the FLEGT process.

Bond, I., Grieg-Gran, M.,Wertz-Kanounnikoff, S., Hazlewood, P.,Wunder, S., Angelsen, A.,2009. Incentives to sustain forest ecosystemservices: A review and lessons for REDD,Natural Resouce Issues No. 16. International Institute for Environment and Development, with CIFOR, Bogor, Indonesia, andWorld Resources Institute, Washington D.C., USA., London, UK.

Boud, D., 1999. Situating academic development in professional work: Using peer learning. International Journal for Academic Development 4, 3-10.

Boud, D., Middleton, H., 2003 Learning from others at work: communities of practice and informal learning. Journal of Workplace Learning 15, 194-202.

Boshuizen, H.P.A., Bromme, R., Gruber, H., 2004. On the long way from novice to expert and how travelling changes the traveller, in: Boshuizen, H.P.A., Bromme, R., Gruber, H. (Eds.), Professional learning: Gaps and transitions on the way from novice to expert. Kluwer Academic Publishers, Dordrecht, pp. 1-8.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qualitative Research in Psychology 3, 77-101.

Breunig, M., 2005. Turning Experiential Education and Critical Pedagogy Theory into Praxis. Journal of Experiential Education 28, 106-122.

Brown, T.L., Lassoie, J.P., 1998. Entry-Level Competency and Skill Requirements of Foresters: What Do Employers Want? Journal of Forestry 96, 8-14.

Carlsen, K., Hansen, C.P., 2013. It is the rents: why competitive bidding is difficult to implement in timber right allocation in Ghana. In: Carlsen, K. (Ed.),What Shapes Output of Policy Reform? Forest Policy Implementation in Ghana. University of Copenhagen, Copenhagen, Denmark (PhD thesis).

Chakeredza, s., Temu, A.B., Saka, J.D.K., Munthali, D.C., Muir-Leresche, K., Akinnifesi, F.K., Ajayi, O.C., Sileshi, G., 2008. Tailoring tertiary agricultural education for sustainable development in Sub-Saharan Africa: Opportunities and challenges. Scientific Research and Essay 3, 326-332.

Ciannelli, L., Hunsicker, M., Beaudreau, A., Bailey, K., Crowder, L.B., Finley, C., Webb, C., Reynolds, J., Sagmiller, K., Anderies, J.M., Hawthorne, D., Parrish, J., Heppell, S., Conway, F., Chigbu, P., 2014. Transdisciplinary graduate education in marine resource science and management. ICES Journal of Marine Science: Journal du Conseil.

Cohen, L., Manion, L., Morrison, K., 2007. Research methods in education. Routledge, Abingdon.

Coleman, J.S., 1984. Universities in the New States of Africa and Asia, in: Hetland, A. (Ed.), Universities and National Development: A Report of the Nordic Association for the Study of Education in Developing Countries. Almqvist & Wiksell International, Stockolm, pp. 85-104.

Contreras-Hermosilla, A., 2011. People, governance and forests-the stumbling blocks in forest governance reform in Latin America. Forests 2, 168–199.

Corey, S.M., 1953 Action research to improve school practices. Teachers College Bureau of Publications, New York.

Cremers, P.H.M., 2016. Designing hybrid learning configurations at the interface between school and workplace. Wageningen University, Wageningen, The Netherlands.

Cremers, P.H.M., Wals, A.E.J., Wesselink, R., Nieveen, N., Mulder, M., 2014. Self-directed lifelong learning in hybrid learning configurations. International Journal of Lifelong Education 33, 207-232.

Creswell, J.W., Clark, V., 2011. Designing and Conducting Mixed Methods Research. 2nd ed. Sage, Los Angeles.

Cubbage, F.W., Jervis, L.G., Smith, P.G., 1999. Employment and education in forestry: National perspectives, North Carolina trends. Journal of Forestry 97, 24-28.

da Cunha, Z., Contento, I.R., Morin, K., 2000. A case-study of a curriculum development process in nutrition education using empowerment as organizational policy. Ecology of food and nutrition 39, 417-435.

Dar-es-Salaam-Declaration, 2010. Revitalizing Forestry Education in sub-Saharan Africa. African Network for Agriculture, Agroforestry and Natural Resources Education.

Davis, S.N., Jacobsen, S.K., 2014. Curricular integration as innovation: Faculty insights on barriers to institutionalizing change. Innovative Higher Education 39, 17-31.

Deni, A.R.M., Zainal, Z.I., Malakolunthu, S., 2014. Improving teaching in higher education in Malaysia: Issues and challenges. Journal of Further and Higher Education 38, 656-673.

Dietz, T., Stern, P.C., 2008. Public participation in environmental assessment and decision making. National Research Council of the National Academies.

Doyle, W., Rosemartin, D., 2012. The Ecology of Curriculum Enactment, Interpersonal Relationships in Education. Advances in Learning Environments Research 3, 137-147, SensePublishers, Rotterdam.

Dryzek, J.S., 1990. Discursive democracy: politics, policy and political science. Cambridge University Press, New York.

Dwyer, S.C., Buckle, J.L., 2009. The space between: On being an insider-outsider in qualitative research. International Journal of Qualitative Methods 8, 54-63.

Dzakiria, H., 2012. Theory of Relatability as a Possible Alternative to the Issue of Generalising of Research Findings: The Case of Open and Distance Learning (ODL) at Universiti Utara Malaysia. Malaysian Journal of Distance Education 14, 41-58

Elliott, J., 1981. Action Research: A framework for Self-Evaluation in Schools, Working Paper No.1, Schools Council Programme 2, Teacher-Pupil Interaction and Quality of Learning Project. Cambridge Institute of Education, Cambridge.

Elliott, D., Hirsch, M.L., Puro, M., 1993. Overcoming institutional barriers to broad-based curricular change. Innovative Higher Education 18, 37-46.

Estes, C., 2004. Promoting student-centered learning in experiential education. Journal of Experiential Education 26, 141-160.

Evans, N., Henrichsen, L., 2008. Long-term strategic incrementalism: An approach and a model for bringing about change in Higher Education. Innovative Higher Education 33, 111-124.

Ewel, C.K., 2001. Natural Resource Management: The Need for Interdisciplinary Collaboration. Ecosystems 4, 716-722.

FAO, 2005. Best practices for improving law compliance in the forestry sector. FAO Forestry Paper 145.

FAO, ITTO, 2010. Forest Law Compliance and Governance in Tropical Countries: A Region-by-region Assessment of the Status of Forest Law Compliance and Governance, and Recommendations for Improvement (Available at: http://www.fao.org/docrep/012/al044e/al044e00.pdf (accessed 05/07/2014)).

FAO-PROFOR, 2011. Framework for Assessing and Monitoring Forest Governance. FAO, Rome.

Felgendreher, S., Löfgren, S., 2017. Higher education for sustainability: can education affect moral perceptions? Environmental Education Research.

Field, A., 2013. Discovering statistics using SPSS, 4th ed. Sage publications, London.

Finger, M., Verlaan, P., 1995. Learning our way out: a conceptual framework for social environmental learning. World development 23, 503-513.

Fisher, R., 2004. The Problem-Solving Workshop as a Method of Research. International Negotiation 9, 385-396.

Fischer, D., Rieckmann, M., 2010. Higher Education for Sustainable Consumption: Concept and Results of a Transdisciplinary Project Course. The Journal of Sustainability Education.

Flood, R.L., Romm, N.R.A., 1996. Contours of diversity management and triple loop learning. Kybernetes 25, 154-163.

Fortuin, K.P.J., van Koppen, C.S.A., 2016. Teaching and learning reflexive skills in inter- and transdisciplinary research: A framework and its application in environmental science education. Environmental Education Research 22, 697-716.

Fraser, S.P., Bosanquet, A.M., 2006. The curriculum? That's just a unit outline, isn't it? Studies in Higher Education 31, 269-284.

Freire, P., 1970. Pedagogy of the oppressed. Continuum, New York.

Gervedink Nijhuis, C.J., Voogt, J.M., Pieters, J.M., 2012. The cultural complexity of international collaboration: Conditions for sustainable curriculum development in Ghana. International Journal of Intercultural Relations 36, 647-658.

George, A., Bennett, A., 2005. Case studies and theory development in the social sciences. MIT Press, Cambridge, MA.

Gilkey, M.B., Earp, J.A., 2006. Effective interdisciplinary training: lessons from the University of North Carolina's student health action coalition. Acad Med 81, 749-758.

Global Witness, CIKOD, 2013. Making the Forest Sector Transparent: Ghana Annual Transparency Report 2012. Global Witness.

Government of Ghana (GOG), Forest Protection (Amendment) Act, 2002. Act 624. http://www.fcghana.org/library_info.php?doc=51&publication:The%20Forest%20Protection%20 (Amendment%20)%20Act,%202002.%20Act%20624&id=15 (Accessed on 16/01/2014).

Graybill, J.K., Dooling, S., Shandas, V., Withey, J., Greve, A., Simon, G.L., 2006. A rough guide to interdisciplinarity:graduate student perspective. BioScience 56, 757-763.

Grinbaum, A., Groves, C., 2013. What is "responsible" about responsible innovation? Understanding the ethical issues. Wiley, London.

Grindle, M.S., 2004. Good-enough governance: poverty reduction and reform in developing countries. Governance 17, 525–548.

Habermas, J., 1971. Knowledge and human interests. Beacon Press, Boston.

Habermas, J., 1984. The theory of communicative action. Vol 1: Reason and rationalization of society. Beacon Press, Boston.

Habermas, J., 1987. The theory of communicative action. Vol. 2. Lifeworld and system. A critique of functionalist reason. Beacon Press, Boston.

Hansen, C.P., 2011. Forest law compliance and enforcement: the case of on-farm timber extraction in Ghana. Journal of Environmental Management 92, 575–586.

Hansen, C.P., Lund, J.F., 2011. The political economy of timber taxation: The case of Ghana. Forest Policy and Economics 13, 630-641.

Hayward, F.M., 2012. Graduate Education in Sub-Saharan Africa: Prospects and Challenges. International Higher Education 66, 21-22.

Hendriks, C.M., Dryzek, J.S., Hunold, C., 2007. Turning Up the Heat: Partisanship in Deliberative Innovation. Political Studies 55, 362-383.

Herr, K., L., A.G., 2005. The Action Research Dissertation. Sage Publications, Thousand Oaks, CA.

Hirschman, E., 1985. Humanistic Inquiry in Marketing Research: Philosophy, Method, and Criteria. Journal of Marketing research 23, 237-249.

Hoff, P.S., 2009. Hutchins's University of Utopia: Institutional independence, academic freedom, and radical restructuring. Innovative Higher Education 34, 203-217.

Horlick-Jones, T., Sime, J., 2004. Living on the border: knowledge, risk and transdisciplinarity. Futures 36, 441-456.

Huang, H., 2010. What is good action research? Why the resurgent interest? Action Research 8, 93-109.

Hugill, A., Smith, S., 2013. Digital creativity and transdisciplinarity at postgraduate level: the design and implementation of a transdisciplinary master's programme and its implications for creative practice. Digital Creativity 24, 191-207.

Innes, J.L., 2005. Multidisciplinarity, interdisciplinarity and training in forestry and forest research. The Forestry Chronicle 81, 324-329.

Innes, J.L., Ward, D., 2010. Professional Education in Forestry, Commonwealth Forests2010: An Overview of the Forests and Forestry Sectors of the Countries of the Commonwealth. Commonwealth Forestry Association, London, pp. 76–93.

Ison, R.L., Russell, D.B., 2000. Agricultural Extension and Rural Development. Breaking Out of Traditions; A Second-Order Systems Perspective. Cambridge University Press, Cambridge.

Jackson, N.J., 2010. From a curriculum that integrates work to a curriculum that integrates life: changing a university's conceptions of curriculum. Higher Education Research & Development 29, 491-505.

Jickling, B., 2004. Making ethics an everyday activity: How can we reduce the barriers? Canadian Journal of Environmental Education 9, 11-26.

Jickling, B., 2005. Ethics research in environmental education. Southern African Journal of Environmental Education 22, 20-34.

Jickling, B., Lotz-Sisitka, H., O'Donoghue, R., A., O., , 2006. Environmental Education, Ethics, and Action: A Workbook to Get Started. UNEP, Nairobi.

Jickling, B., Wals, A.E.J., 2008. Globalization and environmental education: Looking beyond sustainable development. Journal of Curriculum Studies 40, 1-21.

Johnson, D.W., Johnson, F.P., 2000. Joining Together: Group theory and group skills, 7th ed. Allyn and Bacon, Boston, USA.

Jonsen, K., Jehn, K.A., 2009. Using triangulation to validate themes in qualitative studies. Qualitative Research in Organizations and Management: An International Journal 4, 123–150.

Kammesheidt, L., Idrus, R.M., Trockenbrodt, M., Hahn-Schilling, B., 2007. Linking academic forestry education with employers demands: a case study from Malaysia. International Forestry Review 9, 661-669.

Khan, M.A., Law, L.S., 2015. An integrative approach to curriculum development in Higher Education in the USA: a theoretical framework. International Education Studies 8, 66-76.

Kibwika, P., 2006. Learning to Make Change: Developing Innovation Competence for Recreating the African University of the 21st Century. Wageningen University, Wageningen, The Netherlands (PhD Dissertation).

Kincheloe, J., 2008. Critical Pedagogy, 2nd edition ed. Peter Lang Primer, New York.

Kiguli-Malwadde, E., Kijjambu, S., Kiguli, S., Galukande, M., Mwanika, A., Luboga, S., Sewankambo, N., 2006. Problem Based Learning, curriculum development and change process at Faculty of Medicine, Makerere University, Uganda. African Health Sciences 6, 127-130.

King, K., 2009. Higher education and international cooperation: the role of academic collaboration in the developing world, in: Stephens, D. (Ed.), Higher education and international capacity building: twenty-five years of higher education links. Symposium books Oxford, UK.

Klaver, D., 2009. Multi-stakeholder design of forest governance and accountability arrangements in Equator province, Democratic Republic of Congo. International Union for Conservation of Nature and Wageningen University and Research Centre.

Klein, J.T., 1990. Interdisciplinarity: history, theory and practice. Wayne State University Press, Detroit.

Klein, J.T., 1996. Crossing boundaries: knowledge, disciplinarities and interdisciplinarities. University of Virginia Press, Charlottesville VA.

Klein, J.T., 2004. Prospects for transdisciplinarity. Futures 36, 515-526.

Klein, J.T., 2008. Evaluation of Interdisciplinary and Transdisciplinary Research: A Literature Review. American Journal of Preventive Medicine 35, S116-S123.

Kooiman, J., 1993. Modern Governance. New Government-Society Interactions. Sage, London.

Kostilainena, A., 2005. A perspective of the students of higher forestry education. Forest Science and Technology 1, 224-227.

Kotey, N.A., Francois, J., Owusu, J.G.K., Yeboah, R., Amanor, K.S., Antwi, L., 1998. Falling into place. Policy that works for forests and people. International Institute for Environment and Development, London.

Kouwenhoven, W., 2009 Competence-based Curriculum Development in Higher Education: a Globalised Concept?, in: Lazinica, A., Calafate, C. (Eds.), Technology Education and Development. InTech, Rijeka, Croatia, pp. 1-22.

Krott, M., 2003. Evaluation of transdisciplinary research, Encyclopedia of life support systems. EOLSS Publishers, Oxford.

Kubo, H., 2010. Understanding discretionary decision making of frontline bureaucrats in state forestland management: a case from java, Indonesia. Society and Natural Resource 23, 240–253.

Kuffour, K.O., 2004. New Institutional Economics and the failure of sustainable forestry in Ghana. Natural Resources Journal 44, 743-760.

Kumar, R., 2014. Research Methodology: A Step-by-step Guide for Beginners. 4th ed. Sage, New Delhi.

Lancaster, T., Montinola, G., 1997. Towards a methodology for the comparative study of political corruption. Crime, Law and Social Change 27, 185-206.

Lave, J., Wenger, E., 1991. Legitimate Peripheral Participation in Communities of Practice. Situated Learning: Legitimate Peripheral Participation. Cambridge University Press, Cambridge.

Lavrakas, P., 2008. Encyclopedia of Survey Research Methods, Thousand Oaks, California.

Lawrence, J., Sankey, M., 2008. Communities of practice: A sphere of influence enhancing teaching and learning in higher education, Australian and New Zealand Communication Association Conference, Wellington.

Leeuwis, C., Pyburn, R., 2002. Wheelbarrows full of frogs. Social learning in rural resource management. Van Gorcum, Assen, The Netherlands.

Lemos, M.C., Agrawal, A., 2006. Environmental governance, in: Matson, P.A., Kammen, D.M., Gadil, A. (Eds.), Annual Review of Environment and Resources, 297-325.

Lenthall, S., Wakerman, J., Knight, S., 2009. The frontline and the ivory tower: A case study of service and professional-driven curriculum. The Australian Journal of Rural Health 17, 129-133.

Leroy, P., Arts, B., 2006. Institutional Dynamics in Environmental Governance, in: Arts, B., Leroy, P. (Eds.), Institutional Dynamics in Environmental Governance. Springer Netherlands, pp. 1-19.

Leslie, A.D., Wilson, E.R., Starr, C.B., 2006. The Current State of Professional Forestry Education in the United Kingdom. International Forestry Review 8, 339-349.

Leth, S., Hjortso, N., Sriskandarajah, N., 2002. Making the move: A case study in participatory curriculum development in Danish forestry education. The Journal of Agricultural Education and Extension 8, 63-73.

Leth, S., Sriskandarajah, N., 2004. Incorporating Sustainability in the Education of Natural Resource Managers: Curriculum Innovation at the Royal Veterinary and Agricultural University of Denmark, in: Corcoran, P.B.,Wals, A. E. J. (Ed.), Higher Education and the Challenges of sustainability: Problematics, Promises and Practice. Kluwer Academic Publishers.

Lindblom, C.E., 1959. The Science of "Muddling Through". Public Administration Review 19, 79-88.

Lindsay, J., Mekouar, A., Christy, L., 2002. Why law matters: Design principles for strengthening the role of forest legislation in reducing illegal activities and corrupt practices. FAO Legal Papers Online 27.

Lockwood,M., Davidson, J., Curtis, A., Stratford, E., Griffith, R., 2010. Governance principles for natural resource management. Society & Natural Resources: An International Journal 23, 986–1001.

Lotz-Sisitka, H., Wals, A.E.J., Kronlid, D., McGarry, D., 2015. Transformative, transgressive social learning: Rethinking higher education pedagogy in times of systemic dysfunction. Current Opinion in Environmental Sustainability 16, 73-80.

Maletz, O., Tysiachniouk, M., 2009. The effect of expertise on the quality of forest standards implementation: the case of FSC certification in Russia. Forest Policy and Economics 11, 422–428.

Manning, R.E., 1998. Integration in natural resource education: designing a core curriculum. Society & Natural Resources 11, 179-190.

Mårald, E., Sandström, C., Annika, N., Rist, L., Sténs, A., Beland Lindahl, K., Carlsson-Kanyama, A., Johansson, J., Keskitalo, E.C.H., Laudon, H., Lidskog, R., Lämås, T., Lundmark, T., Nilsson, U., Nordström, E.-M., Roberge, J.-M., Sonesson, J., 2017. Forest governance and management across time : developing a new forest social contract. Routledge, London & New York.

Marfo, E., 2006. Powerful Relations: The Role of Actor Empowerment in the Management of Natural Resource Conflicts: A Case of Forest Conflicts in Ghana. Wageningen University, Wageningen.

Martinich, J.A., Solarz, S.L., Lyons, J.R., 2006. Preparing students for conservation careers through project-based learning. Conservation Biology 20, 1579-1583.

Mansbridge, J., Bohman, J., Chambers, S., Estlund, D., Follesdal, A., Fung, A., Afont, C., Manin, B., Marti, J.L., 2010. The place of self-interest and the role of power in deliberative democracy. The Journal of Political Philosophy 18, 64-100.

Mayers, J., Morrison, E., Rolington, L., Studd, K., Turrall, S., 2013. Improving governance of forest tenure: a practical guide. Governance of Tenure Technical Guide No.2. International Institute for Environment and Development, and Food and Agriculture Organization of the United Nations, London and Rome.

Max-Neef, M.A., 2005. Foundations of transdisciplinarity. Ecological Economics 53, 5-16.

McEvoy, G.M., Hayton, J.C., Warnick, A.P., Mumford, T.V., Hanks, S.H., Blahna, M.J., 2005. A competency-Based Model for Developing Human Resource Professionals. Journal of Management Education 29, 383-402.

McFadden, K.L., Chen, S., Munroe, D.J., Naftzger, J.R., Selinger, E.M., 2011. Creating an innovative interdisciplinary graduate certificate program. Innovative Higher Education 36, 161-176.

McKenney, S., van den Akker, J., Nieveen, N., 2006. Design research from the curriculum perspective., in: Van den Akker, J., Gravemeijer, K., McKenney, S., Nieveen, N. (Eds.), Educational design research. Routledge, London, pp. 67-90.

McKernan, J., 1991. Curriculum Action Research - A Handbook of Methods and Resources for the Reflective Practitioner. St. Martin's Press New York.

McLaren, P., 2000. Paulo Freire's pedagogy of possibility, in: Steiner, H.F., McLaren, P., Bahruth, R. (Eds.), Freirean pedagogy, praxis and possibilities: Projects for the new millennium. Falmer Press, New York:, pp. 1-21.

Medema, W., Wals, A.E.J., Ademowski, J., 2014. Multi-loop social learning for sustainable land and water governance: towards a research agenda on the potential of virtual learning platforms. NJAS-Wageningen Journal of Life Sciences 69, 23–38.

Merton, P., Froyd, J.E., Clark, C., Richardson, J., 2009. A case study of relationship between organizational culture and curricular change in engineering education. Innovative Higher Education 34, 219-233.

Mezirow, J., 1995. Transformation theory in adult learning, in: Welton, M.R. (Ed.), Defense of the Life World. State University of New York Press, Albany, NY, pp. 39-70.

Miagostovich,M., 2004. Forestmanagement learning groups: building forest users' capacity to develop silvicultural practices to address local needs. Unasylva 55, 46–49.

Ministry of Lands and Forestry (MLF), Timber Resources Management Regulation, 1998. Ghana. http://www.fcghana.org/library_info.php?doc=46&publication:L.I.%201649%20-%20Timber%20Resources%20Management%20Regulations,%201998&id=15 (Accessed on 16/01/2014).

Misra, S., Harvey, R.H., Stokols, D., Pine, K.H., Fuqua, J., Shokair, S.M., Whiteley, J.M., 2009. Evaluating an interdisciplinary undergraduate training program in health promotion research. Am J Prev Med 36, 358-365.

Morris, L.V., 2007. Understanding change in the Academy. Innovative Higher Education 32, 1-2.

Mulder, M., Gulikers, J., 2010. Workplace learning in East Africa: A case study, in: Malloch, M., Cairns, L., Evans, K., O'Connor, B. (Eds.), The SAGE Handbook of Workplace Learning. SAGE, London.

Muro, M., Jeffrey, P., 2008. A critical review of the theory and application of social learning in participatory natural resource management processes. Journal of Environmental Planning and Management 51, 325-344.

Mustalahti, I., Lund, J.F., 2009. Where and how can participatory forest management succeed? Learning from Tanzania, Mozambique, and Laos. Society & Natural Resources 23, 31–44.

Narayanan, T.R., 2009. Academia-industry partnership: an impetus for strengthening teaching and research in higher education institutions. Current Science 96, 343-346.

Nash, J.M., 2008. Transdisciplinary Training: Key Components and Prerequisites for Success. American Journal of Preventive Medicine 35, S133-S140.

Nash, J.M., Collins, B.N., Loughlin, S.E., Solbrig, M., Harvey, R., Krishnan-Sarin, S., Unger, J., Miner, C., Rukstalis, M., Shenassa, E., Dubé, C., Spirito, A., 2003. Training the transdisciplinary scientist: a general framework applied to tobacco use behavior. Nicotine Tob Res 5, S41-S53.

Nicolescu, B., 2002. Manifesto of Transdisciplinarity. State University of New York Press, Albany, NY.

Niemeyer, S., Dryzek, J.S., 2007. The ends of deliberation:: Meta-consensus and inter subjetive rationality as ideal outcomes. Swiss Political Science Review 13, 497-526.

Oduro, K.A., Marfo, E., Agyeman, V.K., Gyan, K., 2011. One hundred years of forestry in Ghana: A review of policy and regulatory discourses on timber legality. Ghana Journal of Forestry 27, 15-32.

Oduro, K.A., Mohren, G.M.J., Affum-Baffoe, K., Kyereh, B., 2014. Trends in Timber Production Systems in the High Forest Zone of Ghana. International Forestry Review 16, 289-300.

Oliver, P., 2013. Critical Mass Theory, The Wiley-Blackwell Encyclopedia of Social and Political Movements. Blackwell Publishing Ltd.

Opoku, K., 2006. Forest Governance in Ghana: An NGO Perspective. In: Whitby, R. (Ed.) FERN.

O'Sullivan, E., 2002. What kind of education should you experience at a university. Canadian Journal of Environmental Education 7, 54-72.

Ozanne, J.L., Saatcioglu, B., 2008. Participatory Action Research. Journal of Consumer Research 35, 423-439.

Paraskeva, J., 2011. Conflicts in Curriculum Theory. Challenging Hegemonic Epistemologies. Palgrave MacMillan.

Patterson Jr, T.F., 2007. The rise and fall of innovative education: An Australian university case study. Innovative Higher Education 32, 71-84.

Patton,M.Q., 2002. Qualitative Research & Evaluation Methods. 3rd edition. SAGE Publications, Thousand Oaks, CA.

Paulsen, M.B., Peseau, B.A., 1992. A practical guide to zero-based curriculum review. Innovative Higher Education 16, 211-221.

Pellizzoni, L., 2003. Uncertainty and participatory democracy. Environmental Values 12, 195-224.

Peters, O., 2000. The transformation of the university into an institution of independent learning, in: Evans, T., Nation, D. (Eds.), Changing university teaching: Reflections on creating educational technologies. RoutledgeFalmer, Abingdon Oxon, UK, pp. 10-23.

Plomp, T., 2013. Educational Design Research: An Introduction, in: Plomp, T., Nieveen, N. (Eds.), Educational Design Research. Netherlands Institute of Curriculum Development, Enschede, The Netherlands, pp. 10-51.

Pohl, C., 2011. What is progress in transdisciplinary research? Futures 43, 618-626.

Popoola, L., Agbeja, B.O., 2008. Natural Resource Education in Nigeria: University of Ibadan Experience, in: Temu, A.B., Chamshama, S.A.O., Kung'u, J., Kaboggoza, J.R.S., Chikamai, B., Kiwia, A.A. (Eds.), New Perspectives on Forestry Education. FAO, Rome, Italy.

Ramadier, J., 2004. Transdisciplinarity and its challenges: the case of urban studies. Futures 36, 423-439.

Ramcilovic-Suominen, S., Hansen, C.P., 2012. Why some forest rules are obeyed and others violated by farmers in Ghana: instrumental and normative perspective of forest law compliance. Forest Policy and Economics 23, 46–54.

Ratnasingam, J., Ioras, F., Vacalie, C.C., Wenming, L., 2013. The future of professional forestry education: trends and challenges from the Malaysian perspective. Notulae Botanicae Horti Agrobotanici Cluj-Napoca 41, 12–20.

Reason, P., Bradbury, H., 2001. Introduction: Inquiry and Participation in Search of a World Worthy of Human Aspiration, in: Reason, P., Bradbury, H. (Eds.), Handbook of Action Research. Sage Publications, Thousand Oaks, CA, pp. 1-14.

Reeves, T.C., 2011. Can educational design research be both rigorous and relevant? Educational Designer 1, 1-24.

Rhoten, D., Parker, A., 2004. Risks and Rewards of an Interdisciplinary Research Path. Science 306, 2046-2046.

Rieckmann, M., 2012. Future-oriented higher education: whcih key competencies should be fostered through university teaching and learning? Futures 44, 127-135.

Robiglio, V., Armas, A.D., Silva Aguad, C., White, D., 2014. Beyond REDD+ readiness: land-use governance to reduce deforestation in Peru. Climate Policy 14, 734-747.

Rosenfield, P., 1992. The Potential of Transdisciplinary Research for Sustaining and Extending Linkages between the Health and Social Sciences. Social Science and Medicine 35, 43-57.

Roy, K.C., Tisdell, C.A., 1998. Good governance in sustainable development: The impact of institutions. International Journal of Social Economics 25, 1310-1325.

Rubin, H.J., Rubin, I.S., 2011. Qualitative Interviewing: The Art of Hearing Data. 3rd edition, Sage Publishers, Thousand Oaks, CA.

Ryan, J.M.L.S., 2015. Learning towards collegiality: narratives of university communities of practice. Deakin University, Australia.

Sample, V.A., Bixler, R.P., McDonough, M.H., Bullard, S.H., Snieckus, M.M., 2015. The Promise and Performance of Forestry Education in the United States: Results of a Survey of Forestry Employers, Graduates, and Educators. Journal of Forestry 113, 528-537.

Sheehy, D., Bohler, H.A., Heidi, R., Richardson, K., Gallo, A.M.I., 101., P., 2015. Professional Learning Community: Thriving While Facing the Challenges of Faculty Life Together, Movement Arts, Health Promotion and Leisure Studies Faculty Publications. Waterbridge State University, Virtual Commons.

Scheyvens, H., Hyakumura, K., Seki, Y., 2007. Forest governance in a state of transition - Overview of transition, analytical framework, summaries of country studies and synthesis, in: Scheyvens, H., Hyakumura, K., Seki, Y. (Eds.), Decentralisation and state-sponsored community forestry in Asia - Seven country studies of transitions in forest governance, contemporary forest management and the prospect for communities to contribute to and benefit from sustainable forest management. Institute of Global Environmental strategies, Nepal.

Schmidt, P., Lewark, S., Strange, N., 2008. What do we know about our graduates? Graduate analyses from forest sciences and related curricula, in: Schmidt, P., Lewark, S., Strange, N. (Eds.), SILVA Network Conference. SILVA Publications, University of Copenhagen, Denmark.

Schubert, W.H., 1986. Curriculum: Perspective, Paradigm and Possibility. Macmillan Publishing Company, New York.

Schugurensky, D., 2000. The forms of informal learning: towards a conceptualization of the field, SSHRC Research Network New Approaches to Life Long Learning. Centre for the Study of Education and Work: Department of Sociology and Equity Studies in Education, Ontario Institute for Studies in Education of the University of Toronto.

Sibbel, A., 2009. Pathways towards sustainability through higher education. International Journal of Sustainability in Higher Education 10, 68-82.

Simkins, T., 2005. Leadership in education: "what works" or "what makes sense". Education Management Administration and Leadership 33, 9-26.

Smith-Sebasto, N.J., Shebitz, D.J., 2013. Creation of an innovative sustainability science undergraduate degree program: A 10-Step process. Innovative Higher Education 38, 129-141.

Snyder, W., Briggs, X.S., 2003. Communities of practice: a new tool for government managers, Collaboration Series. IBM Centre for the Businerss of Government.

Sola, P., 2011. Forest law enforcement and governance and trade in the southern African development community. African Forest Forum, Working Paper Series 1.

Spelt, E.J.H., Biemans, H.J.A., Tobi, H., Luning, P.A., Mulder, M., 2009. Teaching and Learning in Interdisciplinary Higher Education: A Systematic Review. Educational Psychology Review 21, 365-378.

Spradley, J.P., 1980. Participant Observation. Rinehart and Winston, Holt, New York.

Sterling, S., 2004. Higher Education, Sustainability and the Role of Systemic Learning, in: Corcoran, P.B.a.W., A. E. J. (Ed.), Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice. Kluwer Academic Publishers.

Stoof, A., 2005. Tools for the identification and description of competencies. Open Universiteit Nederland, Maastricht.

Suri, H., 2011. Purposeful sampling in qualitative research synthesis. Qualitative Research Journal 11, 63–75.

Swantz, M.L., 2008. Participatory Action Research as practice, in: Reason, P., Bradbury, H. (Eds.), The SAGE Handbook of Action Research: Participative Inquiry and Practice. SAGE, London, pp. 31-48.

Tanner, D., Tanner, L., 2007. Curriculum Development: Theory into practice, 4th Edition ed. Pearson Merrill Prentice Hall, New Jersey.

Tassone, V.C., O'Mahony, C., McKenna, E., Eppink, H.J., Wals, A.E.J., 2017. (Re-)designing higher education curricula in times of systemic dysfunction: a responsible research and innovation perspective. Higher Education, available from: http://doi.org/10.1007/s10734-017-0211-4.

Taylor, P., 2000. Improving forestry education through participatory curriculum development: A case study from Vietnam. Journal of Agriculture Education and Extension 7, 93-104.

Taylor, P., 2003. How to design a training course: A guide to participatory curriculum development. VSO and Continuum, London.

Teddlie, C.B., Tashakkori, A., 2009. Foundations of mixed methods research: integrating quantitative and qualitative approaches to social and behavioural sciences. Sage, Los Angeles.

Temu, A.B., Kiwia, A., 2008. Future Forestry Education: Responding to Expanding Societal Needs. ICRAF, Nairobi Kenya.

Temu, A.B., Okali, D., Bishaw, B., 2006. Forestry education, training and professional development in Africa. International Forestry Review 8, 118–125.

Teye, J.K., 2013. Analysing forest resource governance in Africa: proposition for an integrated policy network model. Forest Policy and Economics 26, 63–70.

Thijs, A., 1999. Supporting science curriculum reform in Botswana: The potential of peer coaching. University of Twente, Enschede, the Netherlands.

Tombaugh, L.W., 1998. The forces of change driving forestry education. Journal of Forestry 96, 4-7.

Toohey, S., 1999. Designing courses for higher education. Open University Press and SRHE, Buckingham.

Tosey, P., Visser, M., Saunders, M.N.K., 2011. The origins and conceptualizations of 'triple-loop learning': A critical review. Management Learning 43, 291-307.

Trevin, J., Nasi, R., 2009. Forest law enforcement and governance and forest practices in Guyana: best practices for improving law compliance in the forestry sector. FAO Forestry Paper 145.

Turnhout, E., Van Bommel, S., Aarts, N., 2010. How Participation Creates Citizens: Participatory Governance as Performative Practice. Ecology and Society 15.

Turnhout, E., Gupta, A., Weatherley-Singh, J., Vijge, M.J., de Koning, J., Visseren-Hamakers, I., Herold, M., Lederer, M., 2017. Envisioning REDD+ in a post-Paris era: Between evolving expectations and current practice. WIREs Climate Change 8, 1-13.

UNDESA, 2015. Responsive and accountable public governance: World Public Sector Report 2015. United Nations, New York.

UNESCO, 2016. Education for people and planet: creating sustainable futures for all. United Nations Education, Scientific and Cultural Organisation, Paris, France.

United Nations Secretary General High Level Panel on Global Sustainability, 2012. Resilient People Resilient Planet: A Future Worth Choosing. United Nations, New York.

Vaismoradi, M., Turunen, H., Bondas, T., 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nurs Health Sci 15, 398-405.

Van Bommel, S., Röling, N., Aarts, N., Turnhout, E., 2009. Social Learning for Solving Complex Problems: a Promising Solution or Wishful Thinking? A Case Study of Multi-Actor Negotiation for the Integrated Management and Sustainable Use of the Drentsche Aa Area in the Netherlands. Environmental Policy and Governance 19, 400-412.

Vanclay, J.K., 2007. Educating Australian foresters for the 21st century. International Forestry Review 9, 884–891.

van Dam-Mieras, R., Lansu, A., Rieckmann, M., Michelsen, G., 2008. Development of an interdisciplinary, intercultural master's program on sustainability: learning from the richness of diversity. Innovative Higher Education 32, 251-264.

Van der Veen, R.G.W., 2000. Learning natural resource management, in: Guijt, I., Berdegue, J.A., Loevinsohn, M., Hall, F. (Eds.), Deepening the basis of rural resource management: proceedings of a workshop. ISNAR, The Hague, pp. 15-22.

Van Oosten, C., 2013. Exploring forest landscape governance : Practice, institutions, societal learning and the role of education, in: Newman, C., Nussaume, Y., Pedroli, B. (Eds.), Landscape and Imaginaton: Towards a new baseline for education in a changing world Bandecchi & Vivaldi, Pontedera, Paris, pp. 693-698.

Vedeld, P., Krogh, E., 2005. Crafting interdisciplinary in an M.Sc. programme in management of natural resources and sustainable agriculture. The Forestry Chronicle 81, 330-336.

Voß, J.P., Kemp, R., 2006. Sustainability and reflexive governance : introduction, in: Voß, J.P., Bauknecht, D., Kemp, R. (Eds.), Reflexive governance for sustainable development. Edward Elgar, Cheltenham, pp. 3–30.

Wadsworth, Y., (1998). What is participatory action research? Action Research International Paper 2.

Wals, A.E.J., 2006. The end of ESD...the begining of transformative learning-emphasizing the E in ESD, in: Cantell, M. (Ed.), Proceedings of the Seminar on Education for Sustainable Development, Helsinki, February 15, 2006

Wals, A.E.J., Alblas, A.H., 1997. School-based research and development of environmental education: a case study. Environmental Education Research 3, 253-267.

Wals, A.E.J., Caporali, F., Pace, P., Slee, B., Sriskandarajah, N., Warren, M., 2004. Education and Training for Integrated Rural Development: Stepping Stones for Curriculum Development. Reed Business Information.

Wals, A.E.J., Jicklings, B., 2002. Sustainability in Higher Education: from Doublethink and Newspeak to critical thinking and meaningful learning. International Journal of Sustainability in Higher Education 3, 221-232.

Wals, A.E.J., van der Hoeven, N., Blanken, H., 2009. The acoustics of social learning; Designing learning processes that contribute to a more sustainable world. Wageningen Academic Publishers, Wageningen, The Netherlands.

Wals, A.E.J., van der Leij, T., 2007. Introduction, in: Wals, A.E.J. (Ed.), Social Learning Towards a Sustainable World. Wageningen Academic Publishers, 17-32.

Wals, A.E.J., Tassone, V.C., Hampson, G.P., Reams, J., 2016. Learning for walking the change: eco-social innovation through sustainability-oriented higher education. Routledge, London.

Wals, A.E.J., Peters, M.A., 2017. Flowers of Resistance: Citizen science, ecological democracy and the transgressive education paradigm, in: König, A., Ravetz, J. (Eds.), Sustainability Science: Key Issues. Routledge.

Walter, M., 2009. Participatory Action Research, in: Walter, M. (Ed.), Social Research Methods. Oxford University Press, Oxford.

Watson, D., 2010. Universities' Engagement with Society, in: Penelope, P., Eva, B., Barry, M. (Eds.), International Encyclopedia of Education. Elsevier, Oxford, pp. 398-403.

Weiland, S., Dedeurwaerdere, T., 2010. Change in Forest Governance in Developing Countries — in Search of Sustainable Governance Arrangements. International Journal of the Commons 4, 683-686.

Wenger, E., 2000. Communities of practice and social learning systems. Organization 7, 225-246.

Wenger, E., Snyder, W., 2000. Communities of practice: The organisational frontier. Harvard Business Review January - February, 139-147.

Wenger, E., McDermott, R.A., Snyder, W., 2002. Cultivating Communities of Practice: A Guide to Managing Knowledge. Harvard Business School Press, Boston, MA.

Wenger, E., 2006. Communities of practice: A brief introduction. Available from: https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/11736/A%20brief%20introd uction%20to%20CoP.pdf?sequence%E2%80%B0=%E2%80%B01 (Accessed on 11th July 2015)

Wesselink, R., Biemans, H.J.A., Mulder, M., van de Elsen, E.R., 2007. Competence-based VET as seen by Dutch Researchers. European Journal of Vocational Training 40, 38-51.

Western, D., Wright, M., 1994. Natural Connections. Island Press, Washington, DC.

Willard, M., Wiedmeyer, C., Flint, R.W., Weedon, J.S., Woodward, R., Feldman, I., Edwards, M., 2010. The Sustainability Professional: 2010 Competency Survey Report. International Society of Sustainability Professionals.

Wilner, B., Wiber, M., Charles, A., Kearney, J., Landry, M., Wilson, L., 2012. Transformative learning for better resource management: the role of critical reflection. Journal of Environmental Planning and Management 55, 1331-1347.

Wolf, P., Hughes, J.C., 2007. Curriculum development in higher education: Faculty-driven processes and practices. Jossey-Bass, San Francisco, CA.

Wily, L.A., 2002. Participatory forestry in Africa: an overview of progress and issues., Second International Workshop on Participatory Forestry in Africa - Defining the Way Forward: Sustainable Livelihoods and Sustainable Forest Management through Participatory Forestry. FAO, Rome, Italy, pp. 31-58.

World bank, 2006. Strengthening Forest Law Enforcement and Governance: Addressing a Systematic Constraint to Sustainable Development. The World Bank, Washington, D.C.

World Bank, 2009. Roots for good forest outcomes: An analytical framework for governance reforms. The World Bank.

World Bank, 2000. Higher education in developing countries: peril and promise. The International Bank for Reconstruction and Development. The World Bank, Washington.

Xu, H., Morris, L.V., 2007. Collaborative course development for online courses. Innovative Higher Education 32, 25-47.

Yeung, R., 2015. Transdisciplinary learning in professional practice, in: Gibbs, P. (Ed.), Transdisciplinary professional learning and practice. Springer International Publishing, Switzerland, pp. 89-96.

Zietsman, S., Pretorius, R.W., 2006. Learning programmes for environmental sustainability:A different approach to curriculum design. South African Journal of Higher Education 20, 691-702.

Summary

This thesis examines the creation of a university curriculum that responds to the dynamic needs of present day forestry professionals. Such a curriculum is referred to in the thesis as a responsive curriculum: an adaptive curriculum that bridges the gap between abstract theories on one hand and the more contextual, continuously changing and demanding realities of the professional environment on the other. A responsive curriculum is deemed necessary because of the rapid changes occurring in the forestry arena which defines new roles and put new knowledge, skills, attitudes and thinking capacity demands on the forester. This study specifically focuses on the call for the 21st century forestry professional to be able to govern forests responsibly in the face of new forms of multi-actor and multi-level governance. On one hand, universities are mandated to educate these professionals to be able to address merging challenges however on the other hand, they are criticized for being unable to change traditional educational philosophies and pedagogical approaches to equip today's professionals with relevant capabilities. A study on how universities will navigate various barriers to create and enact a curriculum that can enable forestry professionals to learn to govern forests responsibly is therefore timely.

In Ghana specifically, there has been no systematic assessment of the governance challenges in the forestry sector, to serve as a basis for creating curricula that will not be based mainly on an 'ivory tower' perspective of academics but on a good understanding of the professional environment. Again, though several universities seek to respond to emerging changes in forestry, little is documented on the design implications of creating such curriculum and enacting them – from theory to practice in a way that would results in students developing relevant capabilities to meet their career aspirations. This study therefore pursued four key research questions. 1. What are the key challenges for responsible forest governance in Ghana and which capabilities do forestry professionals need to address them? 2. What are the characteristics of a responsive curriculum development process and how are they demonstrated in the Ghanaian context? 3. How do interactions among lecturers and practitioners facilitate enactment of the responsive curriculum? And 4. How does the integrated approach used in the responsive curriculum satisfy students' career aspirations?

Adequately pursuing some of these research questions (specifically questions 2 and 3) required the study of a curriculum design and enactment process in 'real time'. With an opportunity created at the Department of Silviculture and Forest Management of the Kwame Nkrumah University of Science and Technology, this study was set up within the context of a Participatory Action Research (PAR), where a researcher together with relevant actors (curriculum developers and teachers in this case) jointly reflect on, identify problems and take actions to bring change, while generating knowledge. The thesis follows the journey of the Department of Silviculture and Forest Management in leading a process towards creating such a responsive curriculum for addressing governance challenges. In addition to the general PAR set up, responsive interviews, focus group discussions, participant observations and questionnaires were also used in gathering both qualitative and quantitative data. Qualitative data was analysed mainly using thematic analysis, whereas quantitative data was to ascertain differences in responses using Mann-Whitney U tests, Wilcoxon signed rank test and Kruskal-Wallis test.

Chapter 2 answers the first research question. Indicators of responsible governance like rule of law, control of corruption and accountability were used as the starting point for exploring challenges to responsible forest governance (RFG). Emerging challenges were put into seven main categories and also ranked by forestry stakeholders in order of importance to RFG in Ghana. Political culture emerged as the most important challenge to governing forests responsibly. the self-serving power positions of some key actors like politicians, traditional authorities and the timber industry interfere with professional practice. These power positions enabled these actors to interfere with the sanctioning of offenders, the allocation of resources and the determination of stumpage fees – a situation made worse by the culture of corruption. The study indicated that elite power positions in forestry created a cycle that eventually marginalizes professionalism in forestry. Non-compliance and poor enforcement were ranked next to political culture. The other challenges were considered to be statistically similar in ranking. They related to: 1) the incentive structure which does not provide easily recognisable benefits to local communities and also provided low incomes and poor remunerations to forestry officials, 2) the legal framework which does not adequately cover certain aspects of forestry like non-timber forest products and also contained rules that were impractical to implement, 3) bureaucracy regarding processes for obtaining services related to timber rights and review of rules, 4) lack of resources including lack of staff and logistics for forestry operations, lack of information for other forestry stakeholders on their rights and inadequate knowledge and skills for new forms of governance, 5) disposition of forestry officials which covers lack of authority and autonomy as well as lack of commitment to addressing some challenges in the sector.

To be able to address emerging RFG challenges, seven capabilities were identified. Capabilities for leadership, authority and autonomy emerged as the most crucial for forestry professionals to ensure the responsible governance of Ghana's forests. This set of capabilities will enable the forester to make and defend professional decisions while enforcing rules without partiality. Other capabilities the study identified were ranked with a similar level of importance (statistically), indicating that they are indeed interconnected and collectively needed for RFG. These capabilities included those for initiating and managing change, critically analysing the state of forestry and forest governance and effectively networking and communicating with different categories of stakeholders. Additionally, capabilities for building relationships with stakeholders based on trust and also for mobilizing and acquiring resources, were also mentioned as being important. The study also gives specific knowledge, skills, attitude and mind-set areas for developing these capabilities.

Chapter 3 discusses the curriculum development. It highlights five process attributes and three actor attributes unique to responsive curriculum development (RCD). The process attributes included:1) iteration –reflecting on curriculum content and enactment and making changes where necessary, 2) built-in learning, 3) linkage to the world of work to offer students opportunities to learn in real-life settings, 4) team teaching and, 5) formative improvement-oriented evaluations. The findings also highlighted *the role of the champion* to keep the curriculum development process on track. E*xpert facilitators* also bring in experiences and theoretical perspectives to support the process. Lastly, *actors outside academia*, including employers, prospective students and practitioners formed the backbone of RCD and connected the curriculum to the professional environment. They also helped not only in defining the status quo in professional practice, but also in creating a joint vision of what could be done in the future. Evaluating these attributes in the Ghana

case studied showed that team teaching particularly was not well exemplified – an observation that is not surprising, since enacting innovative curricula requires that teachers also learn to do it better with time. In this chapter, the study also brings to bear, the crucial role of institutional context in determining how well the unique process and actor attributes may be exemplified. These Contextual factors determined the trade-offs faculty members made regarding time investments and had a potentially large effect on the success of RCD. As the university context did not provide much support for RCD, the process adopted an incremental approach to change thus being able to optimize available opportunities while avoiding drastic change that may not be sustained in the long-term.

Chapter 4 examined how interaction among the lecturers and practitioners (teachers) facilitated curriculum enactment. Their interactions were situated in the context of a Community of Practice (CoP) and concepts of power and deliberation used to investigate its functioning. The study showed that the CoP was indeed a vehicle for change in how the curriculum was enacted, hence allowing the curriculum to better achieve its ambition of becoming responsive. Over time, the CoP became a platform where teachers shared experiences from the classroom and elsewhere, adding to their repertoire of insights and strategies for improving curriculum enactment. Within the CoP, teachers could also rethink the designed curriculum. They could question the basis of certain aspects of the design and query values underpinning education within the university. They also critiqued their own actions and inactions based on peer monitoring and reflection without directly attacking members or being offensive. Thus, the study showed evidence of double loop learning among the teachers. Additionally, within the CoP platform, teachers generate new ideas for navigating challenges posed by institutional barriers to change. Without the establishment of such a platform, teachers could have easily enacted the curriculum in a "

business as usual" manner when faced with difficulties in trying to be innovative. This was crucial in this case because the innovation took place with a small group within the university, without changing the wider institutional context.

The CoP was able to facilitate enactment of the responsive curriculum because of the quality of deliberations and the power dynamics fostered within the group. Largely, CoP members agree on the values underpinning the curriculum and did not argue over how action or inaction will affect these values. Members however sometimes disagreed on how to achieve these values. Also, despite the presence of power differences which could have been a basis for exercising coercive power within the group, there were no threats of sanctions or use of force neither regarding deliberations within the CoP nor in enforcing enactment of the curriculum. Rather, members were empowered to act based on their own motivations and skills. Concepts of power and deliberation within the CoP were however not conclusive in explaining the observation that certain decisions of the CoP were not carried through. Institutional support also contributed to the functioning of the CoP in facilitating curriculum enactment. The study therefore provides a framework for understanding this interplay, using three factors – power, deliberation and institutional support.

In Chapter 5, students evaluate the integrated approach used in the curriculum, how it has affected the development of specific capabilities and overall, how the curriculum approach meets their career aspirations. The integrated approach used fits well with transdisciplinary education characterised by integration of disciplines, and collaboration beyond academia. (Balsiger, 2005). Students with academic and non-academic career aspirations were largely satisfied with how transdisciplinarity was enacted in the curriculum. They pointed

out the strengths of disciplinary integration and collaboration beyond academia, which enhanced their learning. They believed transdisciplinarity gave them not only a holistic perspective and a deeper understanding of the governance challenges but also a better understanding of the professional environment. Some tensions within transdisciplinary education were also highlighted in the study. Students experienced a struggle between having a broad range of knowledge and skills and being specialists in defined fields. Also, the prolonged discussions that came along with engaging with different disciplines and stakeholders were in some cases experienced as being somewhat tedious and inefficient. This is however not unusual. It is part of the learning process not only for students but teachers as well. Students, particularly those with non-academic career aspiration however preferred that the curriculum creates greater opportunities for collaboration beyond academia. Regarding capability development, students believed that the curriculum had improved their capabilities for RFG.

Chapter 6 is a reflection on the conceptual and methodological approaches taken in the study and what can be learnt for the future. What is yet to be known about the usefulness of the responsive curriculum is whether those trained will indeed be able to influence forest governance towards more responsible outcomes. We reiterate the relevance of the various capabilities identified in the study to developing a 21st century forestry professional capable of governing forests responsibly. We however argue that though ethic was not ranked as an important capability, it is crucial as it underpins most of the RFG challenges in practice. Incorporating ethics as a central element of new curricula for RFG will pose new challenges to teaching, which we propose could be surmounted with learning opportunities created for teachers within CoPs. Additionally, we reflect that though developing the capabilities of individual professionals is not all it takes to ensure RFG, it could generate the critical mass of new generation forestry professionals with the needed capabilities for stimulating change. In addition to this critical mass, changes within the political economy and social practice would be important for ensuring RFG. Further, we discuss the interlinkages between the concepts of 'responsiveness' and 'responsibility' used in this thesis. We highlight the use of both terms for curriculum and for governance in emerging literature and indicate the need for the link between these terms and a third, reflexivity to be made more explicit in future research. We thus offer a conceptual model for this purpose.

This study has been a contribution to learning theories, particularly transformative learning, which is distinguished from transmissive views of education where facts are transferred from 'knowledgeable' teachers to students. Transformative learning seeks to co-construct knowledge with learners and confront their worldviews with new frames or dilemmas that would force them consider other viewpoints. Transdisciplinary education is an important means of transformative learning. We however propose a consideration of transboundary learning, especially for the context of the programme studied (Natural Resource and Environmental Governance) which did not only integrate disciplines but also crossed the boundaries between sectors. Further, we discuss that emerging debates on transformative learning is moving towards deeper forms of transformation to consider transgressive and disruptive learning, where dissonance is created to stimulate new ways of thinking. This study cautions that following the concept of zone of proximal development, it would be necessary to be sensitive to the learners' comfort zone so that creation of dissonance does not result in counter-productive outcomes, hindering learning. Our work suggests that in the Ghanaian context studied, successive incremental spiraling towards a more desirable outcome is preferred.

Further research need to follow up on graduates from the new curriculum to determine where they find jobs, to ascertain their capability development and their contribution to more responsible governance of forested landscapes. University policies may also consider creating more supportive environments like time release and promotion recognition for teachers engaged in developing and enacting innovative curricula. Regarding practice, other universities seeking to develop responsive curricula for governing forested landscapes should incorporate the development of new ethics.

About the Author

Joana Ameyaw was born on the 5th of March 1980 in Sekondi in the Western Region of Ghana. She completed Fijai Secondary School for her Ordinary Level Certificate in 1994 and Holy Child School for her Advanced Level Certificate in 1996. After this, she spent seven months teaching in a village Junior High School as part of the then post A-level National Service. This was when she started unearthing not only her interest but also her talent in teaching. She enrolled at the Kwame Nkrumah University of Science and Technology (KNUST) in 1997 for a Bachelor of Science degree in Natural Resource Management. In the third year of the study, she was selected as one of two students for a student exchange programme at Lakehead University in Ontario, Canada as part of the Ghana-Canada in Concert programme. This opportunity exposed her to temperate forestry and deepened her interest in forestry. She completed her Bachelor degree in 2001 with First Class Honours, majoring in forestry. She was selected for the maiden one-year internship programme of the Resource Management Support Center of the Forestry Commission, Ghana. This opportunity afforded her the privilege of establishing professional networks with practitioners at different levels within and outside the Forestry Commission. In 2002, she was offered funding under the Netherlands Fellowship Programme to undertake a Master of Science degree in Forest and Nature Conservation at Wageningen University. She completed this degree in 2004, majoring in Forest and Nature Conservation Policy. Upon her return to Ghana, she worked for a few months with Tropenbos International Ghana. In 2004, she was employed at her Alma Mata, Kwame Nkrumah University of Science and Technology as a Lecturer. She teaches and researches on collaborative natural resource management and forest policy. In 2009, she applied for one of the two PhD positions within the NPT 278 Project. Her natural flare and interest in teaching won her the opportunity to carry out an interdisciplinary study at the interphase of forestry and education. In 2010, she returned to Wageningen University for her PhD with the Forest and Nature Conservation Policy and Education and Competence Studies Chair Groups. As part of her professional career, she facilitates several short courses, some for practitioners from different countries in partnership with the Centre for Development Innovations of Wageningen University and Research Centre. Currently she is the Co-ordinator of the MPhil. Natural Resource and Environmental Governance Programme and the Examinations Officer of the Department of Silviculture and Forest Management, KNUST.

Joana A. S. Ameyaw

Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Curriculum Development, ECS 50906	WUR	2011	6
Governance for Forest and Nature, FNP 24306	WUR	2011	6
Interactive Learning Competency for Rural Innovation in Higher Education	ICRA	2011	4
B) General research related competences			
Qualitative data analysis: Procedure and Strategies, YRM 60806	WUR	2010	6
Writing Research Proposal	WGS	2011	6
Techniques for Writing and Presenting Scientific Paper	WGS	2010	1.2
Information Literacy for PhD, including introduction Endnote	WUR Library	2010	0.6
'Responsive Postgraduate Curriculum Development for Natural Resource Governance in Ghana'	The GRESD International ESD research Conference, Uppsala, Sweden	2011	1
'Curriculum Development with INRM Perspective: Context, Process and Outcomes'	International Conference on INRM Principles for Improving Higher Education in Agriculture and Natural Resources, Kumasi, Ghana	2012	1
'Challenges to Responsible Forest Governance in Ghana and Its Implications for Professional Education'	First National Conference on Outreach, Kumasi, Ghana	2016	1
C) Career related competences/personal development			
Project and Time Management	WGS	2010	1.5
Interdisciplinary research: Crucial Knowledge and Skills	WGS	2010	1.1
Writing Grant Proposal	WGS	2016	2
Reviewing A Scientific Paper	WUR library	2017	0.1
Total			**37.5**

*One credit according to ECTS is on average equivalent to 28 hours of study load