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Mapping course innovation in higher education: a multi-faceted analytical framework

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ABSTRACT

This paper presents a multi-faceted analytical Course Innovation Framework (CIF) that can help institutes of higher education analyze multiple aspects of course innovation. The CIF was constructed by integrating insights from literature, policy documentation and course-innovation practices at Wageningen University and Research in the Netherlands. The resulting CIF considers multiple stages of course innovation – intended, implemented and attained – along with multiple innovation processes organized into the following five clusters: Rationale for the Innovation; Nature of the Innovation; Innovation in Teaching and Learning; Evaluation and Dissemination Strategy; and Consistency and Reflection. University stakeholders experienced the CIF as usable and relevant. This study is intended to generate a multi-faceted understanding of course innovation and to provide university policy-makers and educators with inspiration or even guidance in their efforts to analyze, map and decide upon their course-innovation practices.

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Introduction

Higher education is changing rapidly and in many respects. Several developments are driving a need for innovation in higher education curricula and courses (den Brok, 2018). One relevant development concerns society's need for a new type of graduate, who is capable of coping with the world's sustainability challenges. Today's graduates must possess the capacity to operate within environments that are complex, uncertain and dynamic (Kamp, 2020). This has implications for what and how to teach, both of which are in need of reconsideration (Lotz-Sisitka et al., 2015). Another crucial development is related to technological and digital innovation. Information and communication technologies (ICT) are bringing about changes in the way education is organized (Toro & Joshi, 2012). New forms of online course delivery, novel teaching practices informed by audio-visual and telematic tools, and the need for students to organize their learning practices more flexibly in terms of time and place are examples of how the digital

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world is changing education, teaching, and learning (Henderson et al., 2017). Relevant developments are also taking place in science and research. Examples include the blurring of boundaries across disciplines and between science, technology and society, as well as the influence of public engagement in research endeavors and the emergence of responsible research and innovation (Stilgoe et al., 2013). Universities are therefore seeking ways to engage with society in order to generate value, and develop curricula and courses that connect students and scientists from multiple disciplines with people in society (Sengupta et al., 2020).

Examples of the efforts that institutes of higher education are taking in order to innovate their curricula and courses include also university-based course-innovation calls, ed-tech programs and teaching-development grants (Grunefeld, 2020; Malfroy & Willis, 2018). The deployment of funding opportunities is considered to be a relevant resource supporting educational innovations (Anakin et al., 2018). In response to the developments outlined above and to gain insights about innovation in higher education, researchers have investigated specific facets of educational innovations, including contextual factors that affect innovation processes in higher education (Bajada et al., 2019); possible characteristics of the innovators and reasons for innovating education (Hasanefendic, 2017); innovative pedagogical modalities for co-shaping curricular elements (Bovill & Woolmer, 2019); authentic approaches to teaching and learning, focusing on building the capacities of students to address problems in society (Iain & Congreve, 2020); evaluation of the implementation of educational innovations (Hum et al., 2015); and dissemination of the results of innovations (Gannaway et al., 2013).

The growing insight concerning specific facets of educational innovations in the emergent field of innovation in higher education is accompanied by a need, as indicated by Cai (2017), for a more integral understanding of the various facets of innovation. This study targets this need by addressing the following question: what does a framework for analyzing multiple facets of course innovation in higher education look like? In order to answer this question, this contribution presents a multi-faceted analytical Course Innovation Framework (CIF). It also provides examples of the implications of using the CIF. This framework can help to analyze course innovations by considering multiple stages of the lifecycle of the innovation and multiple processes of innovation. With the introduction of the CIF, this study contributes to the current body of literature by fostering an integrative understanding of course innovations. It can also provide insight or even guidance to university policy-makers and educators in their efforts to analyze, map and decide upon their educational-innovation policies and practices.

The CIF was developed by integrating insights from literature, policy documentation and course-innovation practices taking place within the context of Wageningen University and Research (WUR) in the Netherlands. A medium-size university of life sciences engineering in the Netherlands, WUR offers 19 Bachelor's programs, 30 Master's programs and six graduate schools, making it a leading international university in the domain of 'healthy food and living environment'. Similar to other universities, WUR is experiencing considerable growth, as well as increases in the use of ICT in teaching and learning, in the number of personal and flexible learning trajectories, and in engagement with actors outside the university (Graham, 2018). At WUR, course development has been encouraged by the establishment of an innovation fund that allows educators to receive funding for innovating their courses in either Bachelor of Science or Master of

Science programs. Educators submitted proposals for innovation projects with a duration of 1–2 years, providing details about their proposed innovation. The quality of the proposals was judged by a team of university professors and support staff. This study explores course innovations that received these grants ($n = 88$), in an attempt to understand and contribute to the analysis of stages and processes of innovation.

After elucidating the conceptual grounding of the CIF and the approach taken in its development, we present the CIF according to its multiple stages, process characteristics and descriptors which are organized into clusters. Finally, we formulate our main conclusion about the usage and relevance of the framework, accompanied by examples about the implications of its application for policy and practices in reference to the context of our study. At the end of the paper, we note some limitations of the study and provide recommendations for future research.

Conceptual background and approach

Conceptual foundation of the Course Innovation Framework

The conceptual foundation of the CIF consists of two elements: forms in which curriculum development can appear, and processes of innovation. An initial conceptual foundation for the CIF was provided by the established curriculum development theory developed by Van den Akker (2003). This theory draws a distinction between three inter-related forms (or stages) in which an innovation can appear: *intended*, *implemented* and *attained*. *Intended* innovations are proposed in curriculum or course design plans, and they are meant to be pursued. *Implemented* innovations are actually implemented by educators in practice. Finally, *attained* innovations are the results that have been achieved through innovations in terms of teacher and student satisfaction, learning outcomes and other indicators. In some cases, there can be consistency across those forms, with *intended* innovations being *implemented* and *attained* consistently as planned. In other cases, differences may occur between the plans for an innovation, its implementation and its outcomes. The analytical framework designed in the present study is sensitive to possible distinctions between *intended*, *implemented* and *attained* course innovations. This feature facilitates an integrated understanding of the innovations, considering various points throughout its development. This approach enabled us to design a CIF that examines course innovations in their full breadth by considering multiple stages of their lifecycles.

A second element in the conceptual foundation of the CIF was provided by the practice-based innovation model proposed by Ellström (2010). This conceptual model focuses on the interplay between knowledge formation and processes of innovation. In order to understand innovation, this conceptual model proposes integrating knowledge about processes of innovation as already described or prescribed in literature, policy or other sources (a top-down approach) with knowledge emerging from innovation processes performed in practice (a bottom-up approach). The model suggests that this synergy enhances both the conceptualization and the analysis of concrete innovation processes (e.g., within an educational context). Based on this model, the CIF was developed by integrating existing insights about innovation processes from literature and policy documentation, with practical insights emerging from the examination of

course innovation practices taking place within the university in which the current study was performed. Proceeding from these insights, we defined clusters, characteristics and descriptors that could be helpful in the conceptualization and analysis of innovation processes. This approach made it possible to design a CIF that allows the in-depth examination of multiple processes of innovation throughout the practice of course development.

Approach to developing the Course Innovation Framework

Grounded in the concepts introduced above, the CIF was constructed by considering the various stages of the course innovation and by integrating knowledge about innovation processes from a variety of sources. By taking a top-down approach, with the objective of distilling facets for the description of innovation processes, the first author performed a general scan of literature discussing innovation (in curricula and courses within the context of higher education) and the examination of documents on educational innovation policy within the university that formed the context of this study. Proceeding from the same objective, but with a bottom-up approach, all four of the authors examined selected examples and, ultimately, all 88 *intended* course-innovation project proposals that were written by educators, and that were granted by the university management through the aforementioned innovation fund throughout a three-year period (2015–2017). In addition, the authors conducted an in-depth analysis of four *implemented* and *attained* case projects (selected from the pool of 88 projects) that were distinctively different from each other in their aims, focus and setup. For each case project, one of the four authors documented course materials and products (e.g., course guides, innovated learning material, course-innovation evaluation reports by the educators, course evaluations by students) and dissemination products (e.g., reports, presentations), conducted interviews with the educators responsible for the innovation projects, and created case portraits summarizing the key findings of the interviews. Interview questions focused on obtaining insights about the *implemented* and *attained* innovation. Some questions were open-ended and concerned the experiences of the educators, while others were semi-structured, inviting the educators to reflect on what they had managed to implement and attain from their own proposed plans. Given that the set of findings was comparable across the four projects cases, no further cases were selected for the study.

In a series of iterative steps, the four authors constructed the analytical framework by gathering insights about various facets of the innovation process. The top-down insights about innovation processes obtained from the literature and policies were gradually integrated with bottom-up practical insights about those processes as they emerged from the examination of random samples of the 88 proposals. More samples were added gradually, and then all of the proposals and the four related cases were analyzed and integrated with the top-down insights to facilitate the definition of innovation process components or clusters, characteristics and descriptors constituting the CIF. We arrived at our final framework by discussing the innovation process clusters, characteristics and descriptors that connect literature, policy and practices until consensus was reached between the four authors. The final CIF is fully illustrated in the next section, along with the references from the literature and policy that informed its development.

The four authors further applied the CIF to the previously collected course-innovation data, in order to assess its usability and implications. We reviewed each of the 88 *intended*

innovations proposals data, as well as the data from the four *implemented* and *attained* innovation projects. For each data set, we reported whether it contained a CIF descriptor of each characteristic and within each cluster, and, if so, in what way. The findings were reported in an Excel file and summarized. A workshop was then organized, involving 15 colleagues (policy-makers, educators, researchers) at the university where the study was conducted. This workshop focused on introducing the CIF, presenting our findings that resulted from the application of the CIF, and discussing the implications of the findings for the university with the participants. This activity was organized to validate the outcomes of the research and obtain insight into their relevance. Some of the reflections and implications for policy and practice, as discussed in the workshop, are outlined in the final section.

The Course Innovation Framework

This section presents the multi-faceted CIF for analyzing course innovations in higher education. As depicted in [Figure 1](#), we identified five clusters for examining the *intended*,

Attained – Implemented <i>Informed by van den Akker, 2003</i>	Rationale for the Innovation cluster <i>Informed by Brans et al., 2016; Baregheh et al., 2009; Cal, 2017; Hannan et al., 1999; WUR, 2014; WUR 2017.</i>	Nature of the Innovation cluster <i>Informed by Bessant, 2013; Cal, 2017; Fung, 2017; Gupta et al., 2006; Tassone et al., 2018; WUR 2014; WUR, 2017.</i>	Innovation in Teaching & Learning cluster <i>Informed by Anderson et al., 2001; Barnett, 2009; Barth et al., 2007; Sipos et al., 2008; Van den Akker, 2003; WUR 2014; WUR, 2017.</i>	Evaluation & Dissemination Strategy cluster <i>Informed by Gannaway, 2013; Jacobs, 2000; Nygaard & Belluigi, 2011; Southwell et al., 2010; WUR 2014; WUR, 2017.</i>
	Contextual Background <ul style="list-style-type: none"> ✓ Course Level ✓ Type of Course ✓ Budget ✓ Composition Team ✓ Academic Departments 	Depth <ul style="list-style-type: none"> ✓ Incremental Innovation ✓ Radical Innovation 	Typology <ul style="list-style-type: none"> ✓ Innovation of Rationale ✓ Innovation of Objective ✓ Innovation of Content ✓ Innovation of Activities ✓ Innovation of Digital (& Non-digital) Materials & Resources ✓ Innovation of Grouping ✓ Innovation of Location/Environment ✓ Innovation of Time ✓ Innovation of Assessment 	Evaluation Strategy <ul style="list-style-type: none"> ✓ Inclusion or Lack of Evaluation Strategy
	Reason <ul style="list-style-type: none"> ✓ Challenges in Teaching, Learning & Assessment ✓ Changes in Society ✓ Changes in Student Population ✓ Challenges relating to Logistics & Resources 	Newness <ul style="list-style-type: none"> ✓ Explorative Innovation ✓ Exploitative Innovation 	Competence Domain <ul style="list-style-type: none"> ✓ Academic Competence ✓ Operational Competence ✓ Life Competence 	Dissemination Strategy <ul style="list-style-type: none"> ✓ Dissemination for Awareness ✓ Dissemination for Understanding ✓ Dissemination for Action
	Underpinning <ul style="list-style-type: none"> ✓ Theoretical Underpinning ✓ Empirical Underpinning ✓ Experiential Underpinning 	Connection between Curricula & Society <ul style="list-style-type: none"> ✓ Education for Society ✓ Education with Society 	Learning Domain <ul style="list-style-type: none"> ✓ Cognitive Learning ✓ Affective Learning ✓ Psychomotor Learning ✓ Metacognitive Learning ✓ Social Skills Learning 	
	Institutional Goal <ul style="list-style-type: none"> ✓ High-quality Scientific Knowledge ✓ Rich Learning Environments ✓ Flexibility & Personal Learning Paths 			
	Consistency & Reflection cluster <i>Informed by Van den Akker, 2003; Kirkpatrick and Kirkpatrick, 2006</i>			
	Implementation Consistency <ul style="list-style-type: none"> ✓ Consistency or Differences between Intended and Implemented Innovation 			
	Outcome Consistency <ul style="list-style-type: none"> ✓ Consistency or Differences between Intended and Attained Innovation 			
	Durability <ul style="list-style-type: none"> ✓ Continuation or Extinction of the Innovation after Implementation 			
	Reflection <ul style="list-style-type: none"> ✓ Experiences ✓ Lessons Learned ✓ Suggestions for Others 			

Figure 1. The Course Innovation Framework (CIF).

implemented and attained stages of course innovations: *Rationale for the Innovation*; *Nature of the Innovation*; *Innovation in Teaching and Learning*; *Evaluation and Dissemination Strategy*; and *Consistency and Reflection*. Each cluster includes characteristics of the innovation process (indicated in bold in [Figure 1](#)) and related descriptors (presented as bullet points under each characteristic). The innovation stages, clusters, characteristics and descriptors were drawn from literature, policy and course-innovation practices. The literature and policy documentation informing the CIF is indicated in italics. In the remainder of this section, we provide a further description for each cluster of the CIF.

Rationale for the Innovation cluster

This cluster focuses on the background, motives and goal of an innovation. It helps to analyze the innovation both as *intended* and as *implemented*.

Contextual Background provides insight into the underlying features of the course innovation and the innovators. It has been generally acknowledged that understanding the context is crucial in any innovation effort (Baregheh et al., 2009; Brans & Bayram-Jacobs, 2016; WUR, 2014, 2017). In our analytical framework, the context is explored within the setting of the educational courses under innovation, and it includes the following descriptors: *Course Level* in which the innovation takes place (e.g., Bachelor's level, Master's level); *Type of Course* innovated (e.g., obligatory course, elective course); *Budget* for realizing the innovation (thus providing financial insight into the innovation); *Composition of the Innovation Team* (e.g., teachers, students, external organizations), elucidating the collaborative character of the innovation; *Academic Departments* involved, providing insight into the scientific domains engaged in the course innovation.

The *Reason* for the innovation adds to the contextual background knowledge by pursuing the 'why' of the innovation. There can be a variety of motives for initiating and pursuing an innovation (Brans & Bayram-Jacobs, 2016; Hannan et al., 1999). We distilled the following possible reasons driving course innovations: *Challenges in Teaching, Learning & Assessment* (e.g., challenges involving the student learning performance, student satisfaction and teacher performance); *Changes in Society* (e.g., the need to respond to emerging societal challenges or to cope with technological development); *Changes in Student Population* (e.g., increasing numbers of students, thus calling for a different teaching approach); *Challenges Relating to Logistics & Resources* (e.g., lack of equipment, financial constraints).

The reason for innovating and the overall development of an innovation can be guided by multiple sources (e.g., Hannan et al., 1999). In our case, the analytical framework distinguishes three sources characterizing the *Underpinning* of the innovation: *Theoretical Underpinning*, meaning that the innovation is informed by concepts from literature (e.g., innovation in the learning outcomes of a course is inspired by a certain learning taxonomy); *Empirical Underpinning*, meaning that the innovation is informed by empirical findings (e.g., an analysis of the course evaluation reveals certain challenges to student learning, thus calling for course innovation); *Experiential Underpinning*, meaning that the innovation is informed by educational practices (e.g., in-class observations identify the need to rethink certain course activities).

Each course innovation has a certain goal and is embedded within a certain institutional environment. The *Institutional Goal* represents another relevant characteristic that clarifies what the innovation aspires to achieve, including with respect to what the institution wishes to achieve (Baregheh et al., 2009; Cai, 2017). The CIF distills three Institutional Goals (WUR, 2014, 2017): *High-quality Scientific Knowledge* (i.e., the innovation is intended to provide solid, state-of-the-art scientific knowledge); *Rich Learning Environments* (i.e., the innovation is intended to promote an active, participatory learning environment, the development of learning communities and group work); *Flexibility & Personal Learning Paths* (i.e., the innovation is intended to accommodate the influx of students in terms of growth and diversity, while promoting personalized learning paths). Note that this characteristic is contingent on the institutional environment within which the innovations take place. In other words, the three goals that are elucidated as descriptors are connected to the institutional context within which this study was performed. The application of this characteristic in other contexts could thus lead to the identification of other goal descriptors pertinent to those settings.

Nature of the Innovation cluster

This cluster defines the character of an innovation in terms of its depth, newness and connection to society. It helps to analyze the innovation both as *intended* and as *implemented*.

The characteristic *Depth* considers two possible ways of promoting course innovation: doing radically different things (i.e., *Radical Innovation*) and doing the same things better (i.e., *Incremental Innovation*) (e.g., Bessant, 2013; Cai, 2017). *Radical Innovation* refers to a deep change within a course. It entails a fundamental re-design of the entire course, thus implying a radical transformation in the aim, learning objectives, activities or other aspects of the course. For example, transforming a course from a mono-disciplinary focus into a cross-disciplinary focus calls for radical changes in the aim, outcomes and overall design of the course. *Incremental Innovation* entails incremental or more superficial changes within a course, while the underlying features of the whole course remain the same. For example, the introduction of a new learning activity could help to innovate the course and do things better, but it would not require a fundamental re-thinking of the course design.

Similar to Depth, the *Newness of the Innovation* also emerged as a relevant course-innovation characteristic in this study. *Newness* refers to the *Exploitative* or *Explorative* nature of the innovation. This distinction largely inspired the understanding of organizational innovations (e.g., Gupta et al., 2006). In this study, the *Newness* characteristic concerns the innovation of approaches and tools within a course, in contrast to *Depth*, which concerns the innovation from a whole-course design perspective. An innovation is considered *Exploitative* if it centers on the use or refinement of approaches and tools that are already known and implemented elsewhere, which are then introduced in the course to be innovated. For example, this could entail modifying a face-to-face lecture into a digital one by making a knowledge clip, which is a well-known digital tool enabling teachers to share their knowledge through a video clip and enabling students to watch the clip repeatedly whenever they want. An innovation is considered *Explorative* if it entails a process of experimentation and the creation of something

new (e.g., a new approach or a new tool). For example, it could involve the creation of a new game that engages students in complex decision-making. An innovation, whether it is *Radical* or *Incremental* with regard to the course as a whole, can be either *Explorative* or *Exploitative* with regard to the changes involving approaches and tools.

Within the various ranges of *Depth* and *Newness*, innovations can also seek to enhance *Connection between Curricula & Society* (Fung, 2017; WUR, 2014, 2017) by promoting *Education for Society* and/or *Education with Society* (Tassone et al., 2018). Innovations aimed at *Education for Society* focus on enhancing the students' understanding of and engagement with societal challenges. In such cases, neither the course nor its pedagogy are organized around subjects and disciplines. Instead, they are organized specifically around complex, real-life societal challenges. Problem-based learning, project-based learning and real-world learning are examples of pedagogical models that could inspire curricular innovation. Innovations aimed at *Education with Society* focus on facilitating an interplay between academic and societal actors. Such innovations can boost the development of dialogical spaces where students can discuss multiple perspectives and develop socially robust knowledge amongst themselves, as well as with scientists and people within society.

Innovation in Teaching & Learning cluster

This cluster focuses on the components and culture of teaching and learning. It helps to analyze innovations both as *intended* and as *implemented*.

The course-innovation characteristic *Typology* explores the components of teaching and learning components that are to be introduced or modified in an innovation (Van den Akker, 2003; WUR, 2014, 2017). An innovation can be related to one or more course components, such as: *Rationale* (why students learn); *Objectives* (the objectives towards which students learn); *Content* (what students learn; e.g., theories, skills); *Activities* (how students learn; e.g., lectures, field work); *Materials and Resources* (with what students learn), in digital format (e.g., videoclips) and/or non-digital format (e.g., articles); *Grouping* (with whom students learn; e.g., alone, in groups); *Location* (where students learn; e.g., at home, in the classroom); *Time* (when students learn; e.g., prior to class, after class); *Assessment* (how students are assessed; e.g., multiple-choice tests, field performance). It is crucial to consider proper alignment across these interlinked course components when innovating a course, as innovating a certain course component can imply innovating other courses components also.

In relation to the various types of intervention, course innovations can entail the development of an innovative teaching and learning culture that is more enabling, extending beyond knowledge transmission, centering on the characteristic of *Competence Domain* (e.g., Barnett, 2009; Barth et al., 2007). A competence – defined as a dynamic interplay between knowledge, skills and dispositions – is articulated across three descriptors: *Academic Competencies*, including the technical knowledge needed in order to perform academic research work (e.g., research methodology, scientific argumentation); *Operational Competencies*, including the knowledge needed in order to function in the world of work outside academia (e.g., consultancy, entrepreneurial skills); *Life Competencies*, including those that are relevant in multiple contexts (e.g., intercultural

communication, ethical competencies). Overall, this characteristic helps to map competencies that could potentially be addressed through the innovation.

An innovative culture of teaching and learning also requires a re-orientation of learning processes. This could concern a variety of *Learning Domains* within which students learn and develop (e.g., Anderson & Krathwohl, 2001; Sipos et al., 2008), including: *Cognitive Learning*, focusing on thinking processes (e.g., processes of knowledge construction and application); *Affective Learning*, concerning affectivity (e.g., motivation, values); *Psychomotor Learning*, concerning physical/kinaesthetic processes (e.g., enhancing behavior, use of technologies in labs); *Metacognitive Learning*, focusing on metacognition (e.g., planning, reflecting); *Social Skills Learning Domain*, focusing on social capacities (e.g., collaboration, communication). This characteristic helps to clarify the domains to be re-oriented through the innovation.

Evaluation and Dissemination Strategy cluster

This cluster focuses on examining possible strategies for evaluation and dissemination. It helps to analyze innovations both as *intended* and as *implemented*.

The *Evaluation Strategy* characteristic concerns whether an innovation does or does not include a strategy for evaluation. If present, such a strategy can enable educators and universities to reflect upon the quality of the course-innovation efforts that have been initiated and to interrogate the future development of the innovation (e.g., Jacobs, 2000; Nygaard & Belluigi, 2011). Within the context of this study, it was not possible to distill types of evaluation strategies, as the dataset was not sufficient to make a clear-cut distinction across strategies. Nevertheless, when considering this characteristic in the analysis of innovation efforts, it is possible to consider various types of strategies (or descriptors) for conducting an evaluation. For example, formative evaluation focuses on identifying improvements throughout an ongoing innovation, illuminative evaluation attempts to increase awareness about how the innovation works (without necessarily changing its course) and summative evaluation focuses on assessing the results of the innovation.

One interlinked course-innovation characteristic within this cluster is the *Dissemination Strategy*. By creating and implementing a dissemination strategy, the insights derived from the innovation and its evaluation can influence knowledge and practices elsewhere. This characteristic considers whether and in what ways the features and findings of the innovation are disseminated. Various strategies for disseminating innovation (e.g., Gannaway et al., 2013; Southwell et al., 2010) are pertinent to this study: *Dissemination for Awareness*, focusing on raising awareness about the existence of the innovation; *Dissemination for Understanding*, focusing on providing detailed knowledge about the innovation; and *Dissemination for Action*, focusing on sharing insights about the practical implementation of the innovation and supporting the uptake of the innovation within other contexts.

Consistency & Reflection cluster

This overarching cluster concerns various stages of the innovation, including the *intended*, the *implemented* and the *attained* innovation. It focuses on obtaining insight

into whether and how the innovation evolved and was consolidated in light of the intended plans, as well as about the overall experiences of those participating in the innovation (e.g., Kirkpatrick & Kirkpatrick, 2006; Van den Akker, 2003).

The *Implementation Consistency* characteristic considers the *Consistency or Differences between Intended and Implemented innovation* for each of the aforementioned clusters and their related characteristics and descriptors. Similarly, the *Outcome Consistency* characteristic considers the *Consistency or Differences between Intended and Attained innovation* for each of the aforementioned clusters and their related characteristics and descriptors. These two characteristics make it possible to track whether the intended plans have been implemented and attained, as well as whether any unexpected implementation characteristics have emerged that might call for a revision of the intended plans, while also identifying outcomes that could subsequently inform future plans.

The *Durability* characteristic goes a step further to consider the longevity of the innovation, in terms of its *Continuation or Extinction after its Implementation* and its related outcomes. Finally, the *Reflection* characteristic supports the qualitative examination of the innovation based on the views of those engaged and/or affected by it. This includes examining *Experiences* (e.g., of educators, students and others contributing to or participating in the innovation); distilling *Lessons Learned* throughout the actual innovation process and identifying possible *Suggestions for Others* engaged in similar processes.

Discussion and conclusions

This paper presented a Course Innovation Framework (CIF) for the multi-faceted analysis of course innovations in higher education. In this section, we formulate conclusions concerning the usage and relevance of the CIF and provide examples of the implications of its application for policy and practice. We then address the limitations of the study and provide recommendations for future research.

The CIF framework is based on the integration of conceptual and policy insights emerging from literature and documentation with practical insights emerging from the examination of innovation practices performed within a university context. It was constructed by considering multiple stages of the lifecycle of course innovations, as well as by delineating multiple processes that characterize them. First, the multi-stage approach adopted in this study, which encompasses *intended*, *implemented* and *attained* facets of innovation, offers policy-makers and educators the opportunity to analyze course innovations in their full breadth, and thus as long-term dynamic endeavors. Such an approach can help to identify possible variations that could occur throughout the development of an innovation (Ellström, 2010). Second, the multiple process clusters, characteristics and descriptors that have been defined offer policy-makers and educators a rich base for conducting in-depth analyses of multiple facets of innovation processes, extending across various stages of course innovation.

Our approach to developing the CIF, which was also based on the examination of course-innovation practices, enabled us to create a framework that is applicable in practice. As anticipated in the presentation of our study approach, we experimented with the application of the CIF by analyzing course innovations within the study context. In the final workshop that we held with stakeholders, we reflected on the CIF, its application

and the implications of our findings. This reflection revealed that the CIF innovation stages and processes can provide relevant guidance for course-innovation choices. In the section entitled ‘Implications for educational policy and practices’, we present examples to illustrate how the application of the CIF informed educational innovation choices within the study context. This illustration suggests that the CIF can help to map and, like a compass, to navigate educational innovations. One key conclusion is that the CIF is usable and relevant, and that it can help to make higher education reflexive about course-innovation efforts, responsive to the emergent innovation needs of educators (and stakeholders) and responsible by developing the desired culture of educational innovation.

Implications for educational policy and practices

To illustrate the relevance of using the CIF and to make more explicit the key conclusion presented above, we briefly discuss several examples about the implications resulting from the CIF usage in relation to each cluster of analysis.

Within the context of the study, the application of the CIF provided clarity concerning when to incentivize the self-determined choices of educators about what and how to innovate; and when to incentivize innovation choices in a prescribed direction. In this section, we present one example with regard to incentivizing self-determined actions, and related to the analysis within the *Rationale for the Innovation* cluster and the *Consistency & Reflection* cluster. The analysis of the *goals* of the innovation as *intended*, *implemented* and *attained* by the innovators clearly indicated that educators were loyal to pre-set institutional innovation goals. Educators directed their efforts towards the fulfillment of the institutional goals, in an attempt to increase their chances of obtaining the innovation grants. This left little room to identify other creative innovation aims that educators might have had, which might also have informed further development of institutional goals. Within our study context, this insight pointed towards the relevance of allowing more leeway for the creative agency of educators to propose and be supported in meaningful innovations that they (and their students and stakeholders) truly want, even beyond pre-set institutional goals.

Another example has to do with incentivizing prescribed actions and the analysis within the *Evaluation & Dissemination Strategy* cluster. The analysis showed that, in practice, evaluation and dissemination actions, received only marginal attention in the innovation projects, even though they were perceived as important by innovators. Within our study context, this suggested the appropriateness of setting strategic incentives targeted towards a more sound embedding of evaluation and dissemination actions (e.g., providing a portion of the grant only after evaluation and dissemination have taken place). In short, the findings made explicit the appropriateness of fostering long-term innovation through both the self-determined actions of educators and the strategic innovation choices of the institution. This observation has also been highlighted in the literature (e.g., Fraser, 2019; Schophuizen & Kalz, 2020). The relevance of the CIF application is that, within our study context, it provided a concrete orientation about what to steer and what to set free when attempting to foster educational course innovation.

Our findings further explicitly highlight the appropriateness of facilitating a more challenging culture of innovation by encouraging innovations that are more *explorative* in nature and centered upon less conventional domains of teaching and learning. For example, the analysis within the *Nature of the Innovation cluster* revealed that most of the innovations considered were *Exploitative* in nature. They were thus targeted at creating course innovation by introducing tools and approaches that were already known. Only a few innovations could be characterized as explorative, thus focused on creating new tools and experimenting with new approaches. Within the university context addressed in the analysis, this imbalance was perceived as less desirable, leading to the consideration of two distinct types of funds for encouraging innovation: one for the ‘implementation of good practices’ and one for ‘experimentation’. The former was intended to support the upscaling of good practices (exploitation), and the latter was intended to promote processes of experimentation (exploration).

Additional insights on this point were gained through the analysis of the *Innovation in Teaching & Learning cluster*, which revealed that cognitive learning and academic competencies were the main focus of the innovations. At the same time, however, the few innovations that were explorative and/or radical, and thus highly innovative, focused on affective and meta-cognitive learning, life competencies and education for society. This understanding created explicit points of focus for policies and practice, in the attempt to facilitate the embedding of those partly neglected and less conventional, but highly innovative types of education, teaching and learning. Previous studies have discussed the importance of envisioning innovation as an explorative endeavor (Cai, 2017) and of moving beyond cognitive learning and knowledge transfer as operating methods for curricula (e.g., Barnett, 2009). The relevance of the CIF application is that it provides concrete insight into which types of course innovations are more challenging to be cultivated.

Taken together, these examples illustrate that the usage of the CIF generated relevant insights that could support decision-making within the study context.

Study limitations and recommendations for future research

Although the stakeholders in this study perceived the CIF as usable and relevant, it was developed specifically with reference to course innovations that had qualified for grants within a specific higher education institution (WUR). Future studies could enrich the framework by exploring its pertinency to other levels of innovations (e.g., program innovations), to cases that do not involve financial support for innovation and to other institutions and contexts. Cross-institutional studies could also help to map the possible influence of situational factors on the use of the framework to embed educational innovations (e.g., Bajada et al., 2019).

In addition to potentially expanding the CIF, future research along the lines suggested above could help to build further synergies across insights about educational innovation. It could thus enhance the integrative understanding of innovation that is needed in higher education. This study has made a step towards addressing this need by developing and presenting a usable and relevant framework for the multi-faceted analysis of course innovation. As such, the framework provides elements that could assist universities in their quest to understand, organize and practice course innovation in an integrative fashion.

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