



---

# Characteristics of Intended, Implemented and Attained Educational Innovations at Wageningen University - A Research Study Executive Summary

Valentina Tassone, Perry den Brok, Harm Biemans, Piety Runhaar  
Education and Learning Sciences Group, Wageningen University & Research



## Preface

This executive summary reports on a two-phases study mapping the characteristics of educational innovation projects at WUR (Wageningen University and Research). It provides a description of the whole research study conducted in phase 1 (quantitative study) and phase 2 (qualitative study), introduces the evaluation framework and research approach adopted, reports on key findings emerging from the study, and presents recommendations that can guide future innovation of WUR education. The study was funded via the Wageningen educational innovation fund, and as such is part of the 4TU Centre for Engineering Education activities.

Tassone V., den Brok P., Biemans H., Runhaar P. (2020). Characteristics of Intended, Implemented and Attained Educational Innovations at Wageningen University. A Research Study Executive Summary. Wageningen University & Research, The Netherlands.



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/)

# Contents

<b>1</b>	<b>Description Research Study</b>	<b>4</b>
<b>2</b>	<b>Educational Innovation Evaluation Framework</b>	<b>5</b>
<b>3</b>	<b>Research Approach</b>	<b>7</b>
<b>4</b>	<b>Findings</b>	<b>10</b>
<b>5</b>	<b>Recommendations</b>	<b>23</b>
	<b>References</b>	<b>26</b>



# 1 Description Research Study

## Aim and rationale

Over the past years, many teachers, program directors and others have been engaged in educational innovation fund projects at Wageningen University & Research (WUR). These projects have sparked new initiatives, transformed existing courses and programmes, potentially changed the expertise of those involved, and hopefully changed the learning and performance of students. However, despite the efforts and funding involved, up till now no systematic evaluation has taken place in order to examine to what degree the potential effects actually have been achieved, either on the shorter or longer term. Neither is clear to what extent and in what sense the projects have contributed to major priorities in education of WUR, for example those mentioned in the new and former visions on education.

The research study, presented in this executive summary, aims to map the characteristics of the 88 WUR *course-related* educational innovations, granted by the WUR innovation fund and implemented throughout the years 2015-2017 (programme-related innovations were not included in this research). The rationale, underpinning this study, is that understanding the characteristics of educational innovations can help to generate awareness about the nature of those innovation endeavours, and to make informed choices for boosting future WUR educational innovation.

This study explores the whole innovation process by evaluating the *intended, implemented and attained* innovations (Van den Akker, 2003). It is constituted by two-phases. *Phase 1* is a *quantitative study* focused on analysing the 88 WUR educational innovations *intended* to be pursued and proposed by educators in their project proposals. *Phase 2* is a *qualitative study* focused on analysing a sample of those WUR educational innovations, as they were actually *implemented* by the educators in their courses, and the *attained* results of those innovations.

After this introduction (Section 1) describing the aim and rationale of this research study, this executive summary presents the Educational Innovation Evaluation Framework (see Section 2) developed and implemented in this study in Phase 1 and Phase 2 to evaluate the innovations. It is followed by a description of the two-phases research approach, research questions and methodological steps adopted (Section 3). The findings are then summarized for each phase and presented with the support of graphics (Section 4). Based on the findings, recommendations for each phase are reported (Section 5).

## 2 Educational Innovation Evaluation Framework

The *Educational Innovation Evaluation Framework* is a set of 13 tested *Criteria*, implemented in *Phases 1 and 2*. The Framework is constructed based largely on existing literature (top-down approach) and partly on the analyses of WUR educational innovation proposals (bottom-up approach). Table 1 lists each criterion, the underlying question(s) the criterion addresses, and the main reference(s) upon which the criterion is conceptually grounded. When no reference is indicated, it means that the criterion has emerged from the analysis of the WUR intended innovations (bottom-up approach only).

**Table 1 – The 13 Criteria (C) Educational Innovation Evaluation Framework**

<b>C1</b>	<b>General Characteristics of the Innovation</b> What are general features of the innovation? (based on Brans et al, 2016)
<b>C2</b>	<b>Reason for the Innovation</b> What are key reasons for the innovation? (based on Brans et al, 2016)
<b>C3</b>	<b>Connectivity Education-Society</b> Is this innovation concerning linkages between curriculum and society? (based on Tassone et al. 2018)
<b>C4</b>	<b>Goal of the Innovation</b> Which WU educational goals is this innovation project aiming to meet? (based on WUR, 2014; 2017)
<b>C5</b>	<b>Type of Course Innovation</b> What aspects of the course are innovated? (based on Van den Akker, 2003; 2006)
<b>C6</b>	<b>Product(s) Developed through the Innovation</b> What are the products to be developed through the innovation?
<b>C7</b>	<b>Learning Domain of the Innovation</b> Which main learning domains are enhanced through this innovation? (based on Bloom, et al. 1956; Krathwohl, et al. 1964)
<b>C8</b>	<b>Competence Domain of the Innovation</b> Which competencies are enhanced through this innovation? (based on ELS, 2018)
<b>C9</b>	<b>Underpinning of the Innovation</b> Is there a theoretical, empirical, and/or experiential underpinning?
<b>C10</b>	<b>Newness of the Innovation</b> How new is the innovation? (based on Gupta et al. 2016; March, 1991)
<b>C11</b>	<b>Depth of Innovation</b> How deep is the change fostered through the innovation? (based on Bessant, 2013; Lotz-Sisitka, et al. 2015)
<b>C12</b>	<b>Evaluation Strategy</b> Is this innovation project evaluated and how?
<b>C13</b>	<b>Dissemination Strategy</b> In what way is this innovation project disseminated? (based on Fincher, 2000; Gravestock, 2002, King, 2003; Gannaway, 2013)

The 13 criteria help to map and analyse innovations regardless of their form (e.g. intended, implemented or attained). To be able to map consistency between these forms and reflection on these consistencies and inconsistencies, additional criteria are needed, Form and Reflective Criteria (FC). Table 2 lists each Form/Reflective-criterion, the underlying question(s) the criterion addresses, and the main reference(s) upon which the criterion is conceptually grounded or no reference(s) when the criterion emerges from a bottom-up approach only.

**Table 2: Form and Reflective Criteria (FC)**

<b>FC1</b>	<b>Implementation Consistency</b> Is the innovation implemented as intended, or what is different? (based on Van den Akker, 2003; 2006)
<b>FC2</b>	<b>Outcome Consistency</b> What are the attained outcomes of the innovation, are they as intended, or what is different? (based on Van den Akker, 2003; 2006)
<b>FC3</b>	<b>Durability</b> Is the innovation durable?
<b>FC4</b>	<b>Reflection and Suggestions for others</b> What are suggestions for others based on the lessons learned? (based on Van den Akker, 2003; 2006)

## 3 Research Approach

This is an empirical evaluation study, grounded on established curricular theories (e.g. Van den Akker, 2003). It maps in a meta-analytical fashion the characteristics of the WUR *intended*, *implemented* and *attained* educational innovations, by means of a *quantitative (Phase 1)* and *qualitative (Phase 2)* analysis, and based on the Criteria of the developed Educational Innovation Evaluation Framework and the Form and Reflective Criteria.

The *research questions* addressed in the *Phase 1* and *Phase 2* studies, are:

- How were the educational innovations distributed across WUR, and to what extent were they fostering collaborations within (and outside) WUR? (C1)
- How were these innovations related to major challenges and goals of the WUR vision for education? (C2, C3 and C4)
- What type of innovations were (aimed to be) conducted (e.g. in terms of learning focus) and what type of (end) products and outcomes were they aimed at / did they lead? (C5, C6, C7 and C8)
- To what degree were innovation proposals/projects evidence-informed (e.g. based on scientific knowledge), and how innovative were they? (C9, C10 and C11)
- To what extent and how were these innovations (intended to be) evaluated and disseminated? (C12 and C13)

The *research questions* further addressed in the *Phase 2* study only, are:

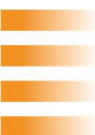
- What were similarities or differences between implemented and intended innovation? (FC1)
- What were the attained outcomes? (FC2)
- Is the innovation still in place and are there plans for its continuation? (FC3)
- What lessons were learned and are there suggestions concerning the educational innovation process and policy (FC4)

The *methodological* steps undertaken within each phase are the following:

### Phase 1

*First*, in order to map the characteristics of the educational innovations, an *Educational Innovation Evaluation Framework* was developed by the authors (see Section 2). This Educational Innovation Evaluation Framework comprises a set of 13 Criteria developed by integrating conceptual insights from literature focusing on evaluation of educational innovations and from the WUR educational vision policy documents (top-down approach) *with* practical insights emerging when analysing a sample of the granted WUR course innovation proposals (bottom-up approach). The Educational Innovation Evaluation Framework is complemented with additional Form and Reflective Criteria developed in the same fashion.

*Second*, the 13 Criteria Educational Innovation Evaluation Framework was tested. In a series of iterative steps, all researchers involved in this study further adapted and piloted the framework on subsets of proposals. In the last iterative step, two authors applied the framework on a sample of the WUR innovation project proposals under study, selected randomly from each of the three years



2015-2017 and across the science groups proposing the innovations. The Inter-Rater Reliability Coefficient Cohen's Kappa was determined based on the random sample, and it positively resulted into a value of 0.80, denoting thus the reliability of the developed Educational Innovation Evaluation Framework.

*Third*, the successfully tested Educational Innovation Evaluation Framework was applied by the four authors for evaluating the characteristics of the *intended* WUR course innovations under analysis. This evaluation is based on the scrutiny of all the 88 proposals submitted by the educators and approved by the WUR innovation fund, the analysis of information available in course guides and in the reports of the WUR innovation fund staff. The data, resulting from this scrutiny work, was encoded for each criterion of the framework. The data was further examined through *statistical analysis*, i.e. descriptive analyses, cluster analysis, factor/multiple correspondence analysis, by means of SPSS software. The findings are presented in Section 4 (under Phase 1).

*Fourth*, based on the empirical findings emerged, a set of recommendations for WUR innovation policy was developed in a participatory manner. The findings were presented and discussed in a workshop at WUR attended by 15 participants, in order to jointly formulate recommendations to inspire future innovation of education at WUR. The participants were researchers, educators and educational managers from the WUR Education and Learning Sciences Group, WUR Education Student Affairs, and the 4TU Centre for Engineering Education. The proposed recommendations were written down by participants themselves, and additional notes were transcribed during the conversation. Based on this, a summary of recommendations was produced and is presented in Section 5 (under Phase 1).

## Phase 2

*Fifth*, a sample of educational innovation cases was selected, in order to evaluate in-depth the characteristics of the *implemented* and *attained innovations*, also in the light of the *intended* plans. By taking as starting point the quantitative data set of Phase 1, a multi-correspondence analysis was conducted on the characteristics of the encoded 88 intended course innovations. Extreme cases were then mapped across the empirical dimensions emerging from the correspondence analysis. Out of those extreme cases, *four educational innovation projects representing different combinations of the empirical dimensions* were selected as cases taking into consideration availability of the case information (e.g. reports, evaluation forms, learning materials).

*Sixth*, each of the four educational innovation cases selected was evaluated by one of the four authors. The 13 Criteria of the Educational Innovation Evaluation Framework, complemented with the Form and Reflective Criteria, were applied for evaluating the characteristics of the *implemented* and *attained* innovations of each case. This evaluation was based on the scrutiny of the implemented and attained innovation course materials (e.g. course guide, learning material, course evaluations) and dissemination products (e.g. reports, presentations, articles), on the interviews with the educators of each case, and on the analysis of case portraits produced by the four authors and summarizing key aspects of each case. The data was encoded for each Criterion of the Framework and for each Form and Reflective Criterion. The data was further elaborated by means of a qualitative *cross-case analysis* and *comparative evaluation* between *intended, implemented and attained innovation* of each case. The findings are presented in Section 4 (under Phase 2).



*Seventh* and last, the findings related to those four cases revealed that saturation was reached, as the set of findings was comparable across those four cases. Therefore no further selection of new cases to be studied was made by the authors. As final step, a set of recommendations was elaborated, partly based on what was suggested by the educators themselves during the interviews, and is presented in Section 5 (under Phase 2).



## 4 Findings

### Phase 1

This section reports on the findings of *Phase 1*, exploring the *intended innovations*. For each of the 13 Criteria of the Educational Innovation Evaluation Framework, a summary of main findings is reported, followed by supportive figures offering a graphical and more detailed description of the findings.

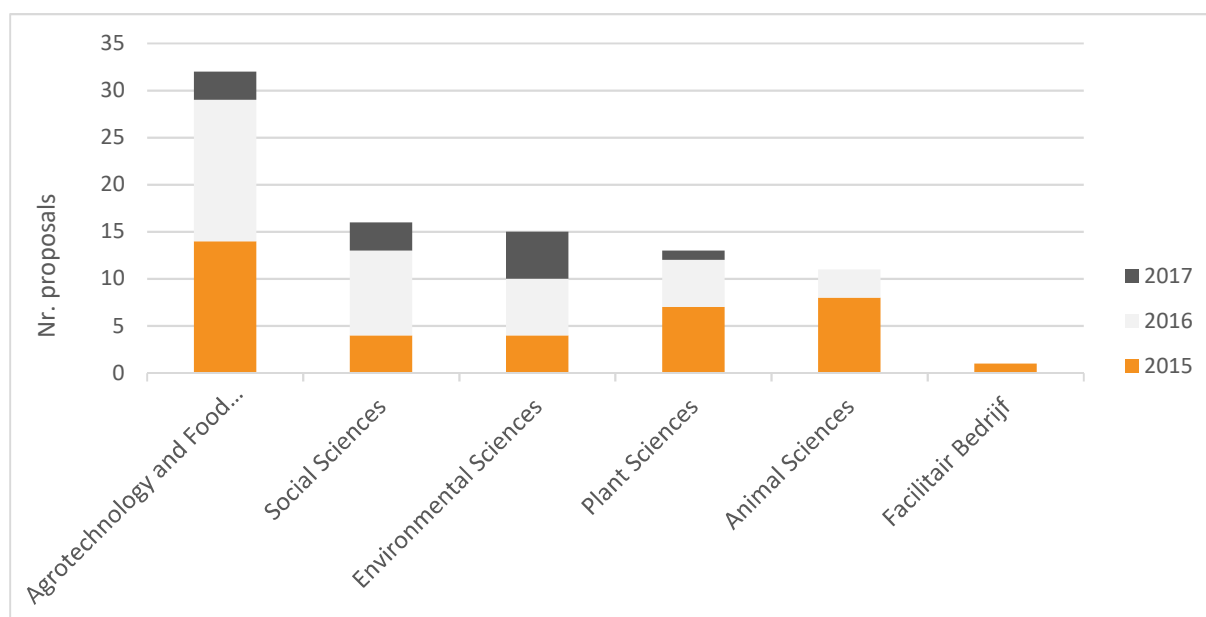
#### Criterion 1: General Characteristics of the Innovation

*Summary Main Findings:* A total of 88 course innovation project proposals were granted and implemented at WUR in the years 2015-2017. All science groups were involved in course innovation endeavours, although the granted course innovations are not evenly distributed across science groups and across chair groups. The innovations concern both BSc and MSc courses, with more emphasis on the former; and concern various types of courses, with large emphasis on obligatory courses. Most proposals foster collaborations between teachers, assistants, and the Education Support Staff (Education and Student Affairs). Proposals that fosters collaborations across chair groups, across science groups and with people outside WUR are relatively scarce.

**Figure 1.1 - Number of Course Innovations and Yearly Granted Budget (2015-2017)**

Year	Nr. Educational Innovations	Granted Budget € (min. 1,500 - max 33,500)
2015	38	612,079
2016	38	599,469
2017	12	230,634
<b>Total</b>	<b>88</b>	<b>1,442,182</b>

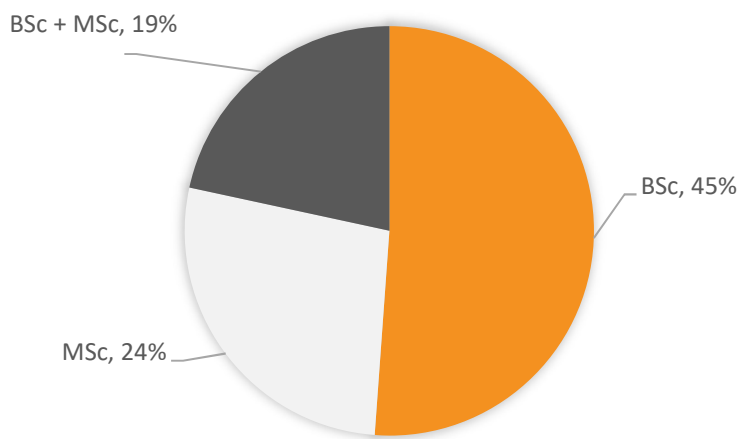
**Figure 1.2 - Distribution of Granted Course Innovation Projects across Science Groups (2015-2017)**



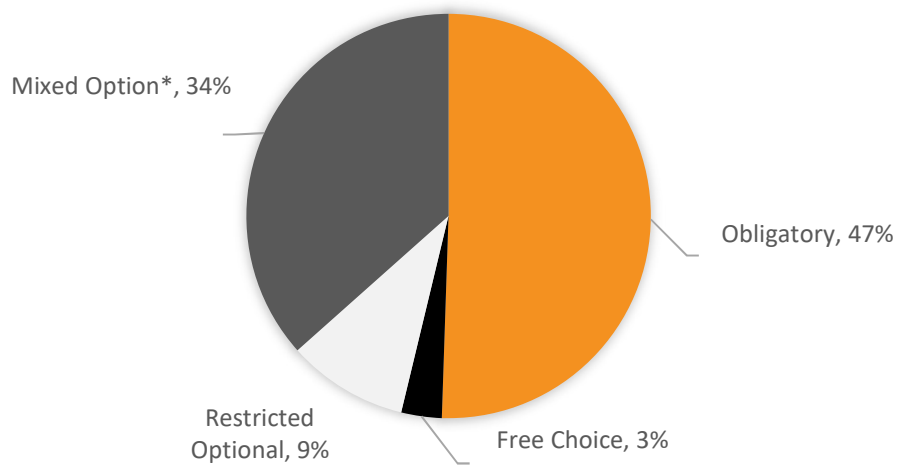
**Figure 1.3 - Distribution of Granted Course Innovation Projects across Chair Groups (2015-2017)**

Nr. Proposals 2015-2017 for each Chair Group	
HNE; ORC; FCH	6
FPE; HAP	4
HSO; CBI; MAQ; ECS; PCC; PPH	3
FHM; CS; INF; KTI; LAR; TOX; WRM; AFI	2
ANU; BHE; CLB; ESA; ETE; EZO; FNP; FPH; FTE; GEN; GRS; MCB; MST; NAD; NEM; NMG; PAP; PBR; SDC; SLM; SOQ; SZB; HWM; VIR; YAS; YEI; YNH	1

**Figure 1.4 - Levels of Innovated Courses (2015-2017)**



**Figure 1.5 - Types of Innovated Courses (2015-2017)**



\*mixed option: including two or more of the other types.

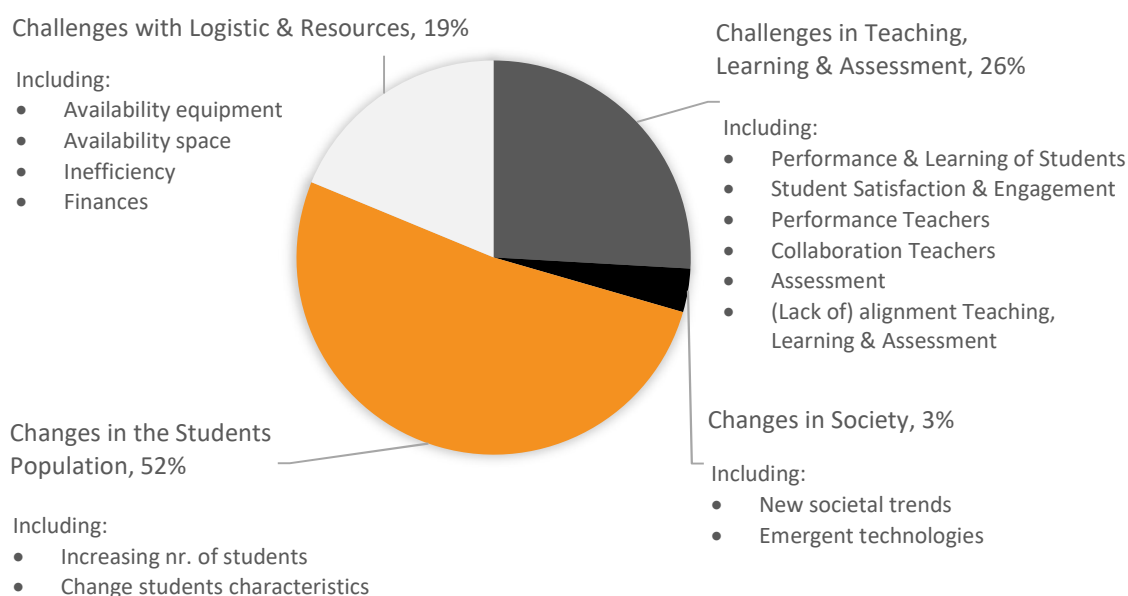
**Figure 1.6 - Collaborations Fostered through the Course Innovation Projects (2015-2017)**

	% Proposals 2015-2017
Teacher and Educational Support Staff (ESA)	76%
2 or more Teachers	65%
Teacher and teacher-assistants (students, PhDs)	54%
2 or more Chair Groups	20%
Teacher and Organizations external to WU	19%
2 or more Science Groups	7%

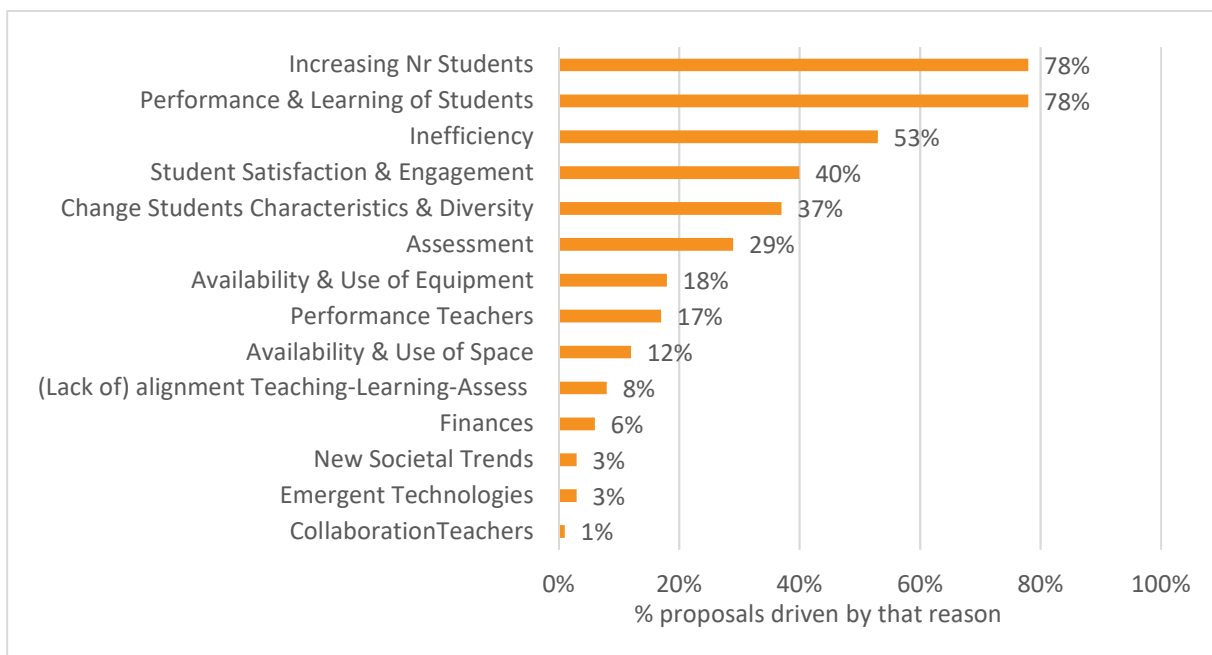
## Criterion 2. Reason for the Innovation

*Summary Main Findings:* Most intended innovations are driven by changes in student populations. To a lesser degree, they are driven by challenges in teaching, learning, and assessment, and by challenges with logistics and resources. Hardly any innovation is driven by changes in society. More specifically, the most prominent reasons for innovation are the increasing number of students, and the related need for guaranteeing student learning and performance (in other words, maintaining educational quality).

**Figure 2.1 - Clustered Reasons driving the Intended Innovations**



**Figure 2.2 - Specified Reasons driving the Intended Innovations**



Note: a proposal can be driven by more than one reason

### Criterion 3: Connectivity Education-Society

*Summary Main Findings:* Innovations intending to enhance the connectivity between education and society are scarce.

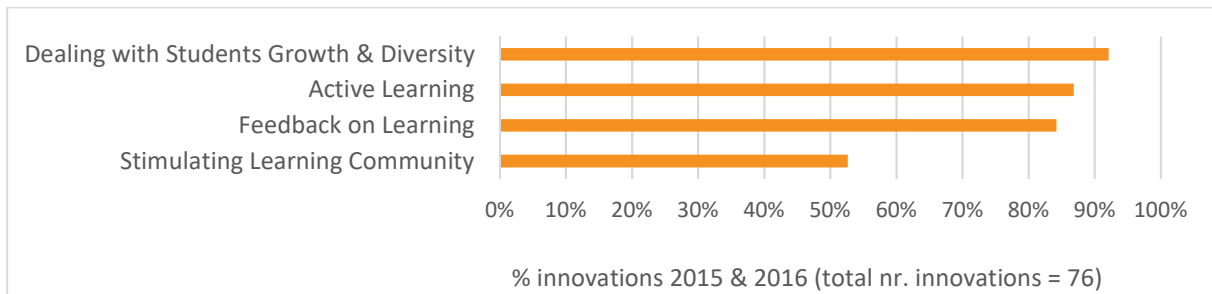
**Figure 3.1 – Innovations fostering Connectivity between Education and Society**

	% Proposals
<b>Education with Society</b>	
The innovation concerns new or improved ways for connecting students (and teachers) with stakeholders in society	3%
<b>Education for Society</b>	
The innovation concerns new or improved ways for understanding and engaging with societal challenges	4%

#### Criterion 4: (WUR) Goals of the Innovation

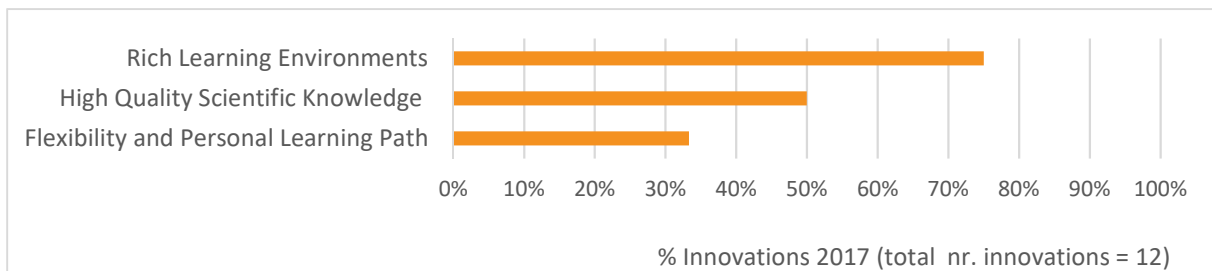
*Summary Main Findings:* All intended innovations meet the pre-set WUR educational goals, as required for obtaining the grant. Proposals tend to connect to more of the WUR educational goals at once. Note that innovations of 2015 and 2016 are distinguished from innovations of 2017, given the fact that the policy priorities of the WUR educational visions in 2015 and 2016 are different from those of 2017.

**Figure 4.1 – Goals of the Intended Innovations based on WUR Educational Vision (2015 & 2016)**



*Note: a proposal can aim to foster multiple WUR educational goals*

**Figure 4.2 – Goals of the Intended Innovations based on WUR Educational Vision (2017)**

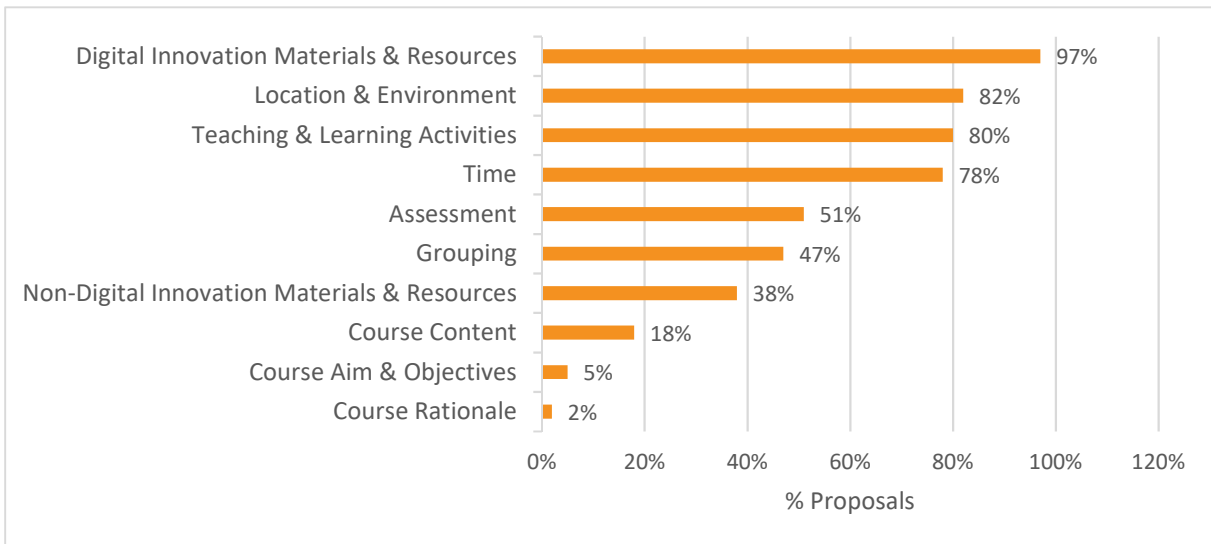


*Note: a proposal can aim to foster multiple WUR educational goals*

## Criterion 5: Type of Course Innovation

*Summary Main Findings:* Almost all intended innovations focus on creating digital learning materials (with what to learn). A large part of the intended innovations foster changes in the learning environment, learning activities and a more flexible learning time (where, how and when to learn). Only few proposals focus on changing course rationale and aim (why learning).

**Figure 5.1 - Types of Changes fostered through the Intended Innovations**

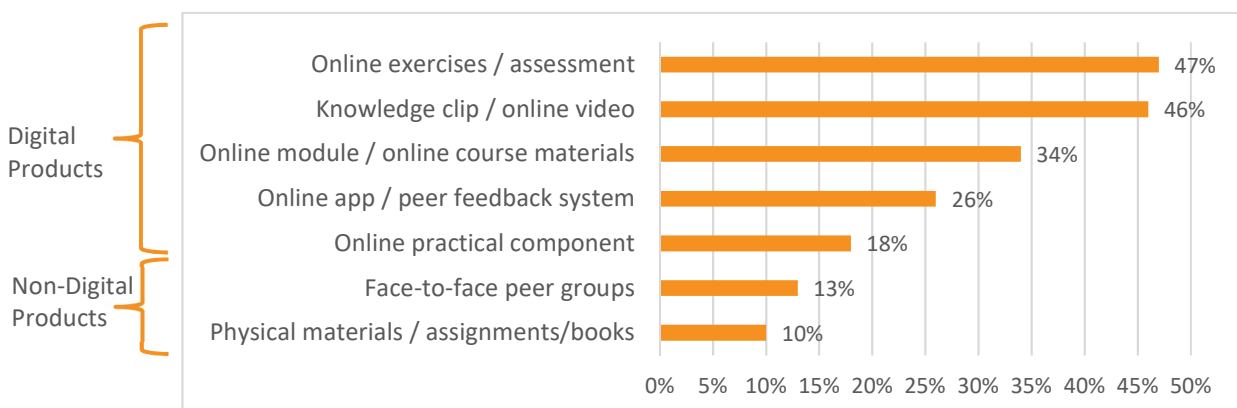


*Note: a proposal can foster multiple types of changes*

## Criterion 6: Products Developed through the Innovation

*Summary Main Findings:* Almost all innovations focus on producing digital products. Very few innovations focus on non-digital products.

**Figure 6.1 – Types of Products Intended to be Developed**



*Note: a proposal can foster development of multiple products*

## Criterion 7: Learning Domain of the Innovation

*Summary Main Findings:* Innovations intend to foster mostly cognitive learning, but not only. Various other learning domains (such as social skills, metacognition, affective, and psychomotor) are, partly, intended to be fostered too.

**Figure 7.1 – The Learning Domains fostered through the Intended Innovations**

	% Proposals
<b>Cognitive Learning Domain</b> Knowledge Development & Application	85%
<b>Social Skills Learning Domain</b> Collaboration, communication, etc.	34%
<b>Metacognitive Learning Domain</b> Planning, Evaluating, Reflecting, etc.	26%
<b>Affective Learning Domain</b> Motivations, Values, Social Attitudes, etc.	17%
<b>Psychomotor Learning Domain</b> Behaviour, use of Technologies in Labs, etc.	13%
<b>Unclear</b>	7%

*Note: a proposal can foster multiple learning domains*

## Criterion 8: Competence Domain of the Innovation

*Summary Main Findings:* Almost half of the innovations intends to foster academic competencies. However, even if to a lesser degree, operational competencies and life-long learning are intended to be fostered as well through the innovations.

**Figure 8.1 – Competence Domains fostered through the Intended Innovations**

	% Proposals
<b>Academic Competence</b> Becoming a skilled academic: i.e. information literacy, research methodology and skills, scientific argumentation and writing, (academic) presentation skills	46%
<b>Operational competence</b> Becoming a skilled professional, beyond academia: consultancy, teaching, etc.	28%
<b>Life-long learning</b> Navigating a complex world though encompassing types of competencies: creativity, intercultural skills, etc.	22%
<b>Unclear</b>	24%

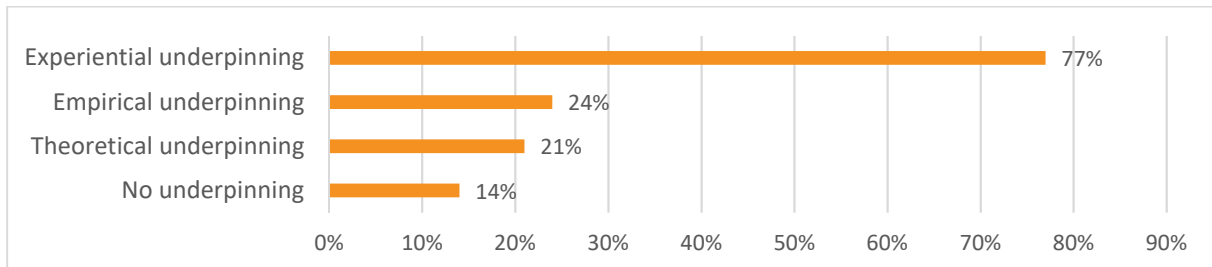
*Note: a proposal can foster multiple competencies*



## Criterion 9: Underpinning of the Innovation

*Summary Main Findings:* Most innovations are grounded on experiential underpinning. Some are grounded on theoretical and/or empirical underpinning as well. A small part of proposals includes no underpinning.

**Figure 9.1 – Type of underpinning of the Intended Innovations**

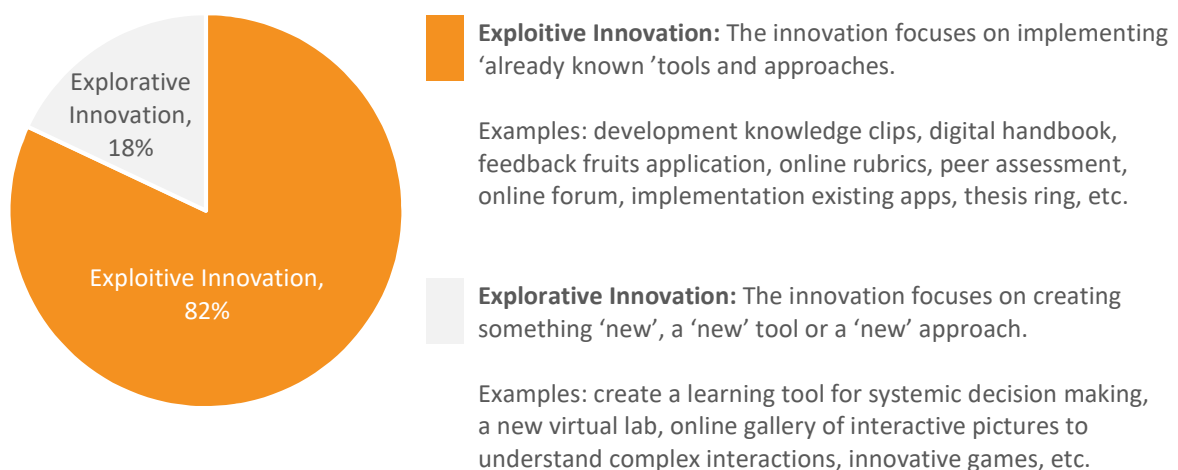


*Note: a proposal can be underpinned in multiple ways*

## Criterion 10: Newness of the Innovation

*Summary Main Findings:* The vast part of the intended innovations has an exploitive character, i.e. focuses on implementing already known tools and approaches, and thus on the spreading or implementation of good practices. Few intended innovations only have an explorative character, i.e. focus on creating something new and on exploring or experimenting with not yet known educational practices.

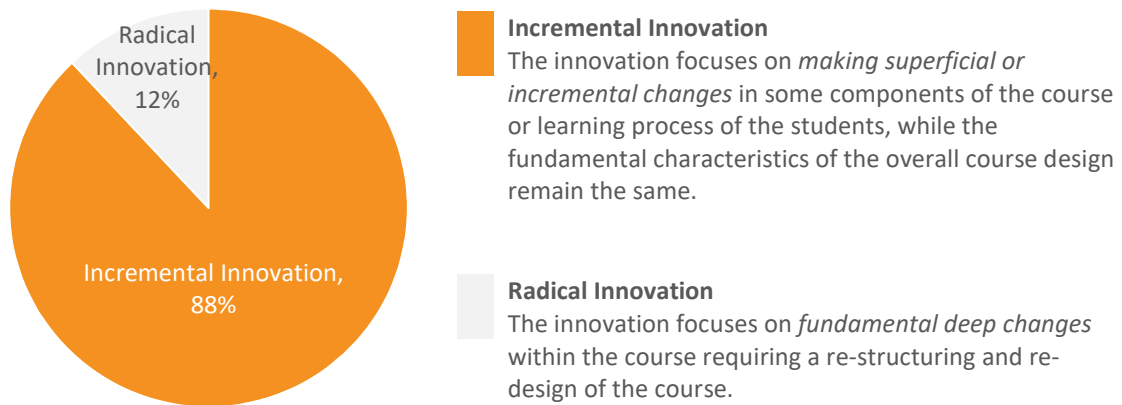
**Figure 10.1 – Levels of Newness of the Intended Innovations**



## Criterion 11: Depth of the Innovation

*Summary Main Findings:* Intended innovations are mostly incremental, with a focus on rather superficial changes or aspects of the course. Only few innovations intend to foster radical, more profound changes in the course design or structure.

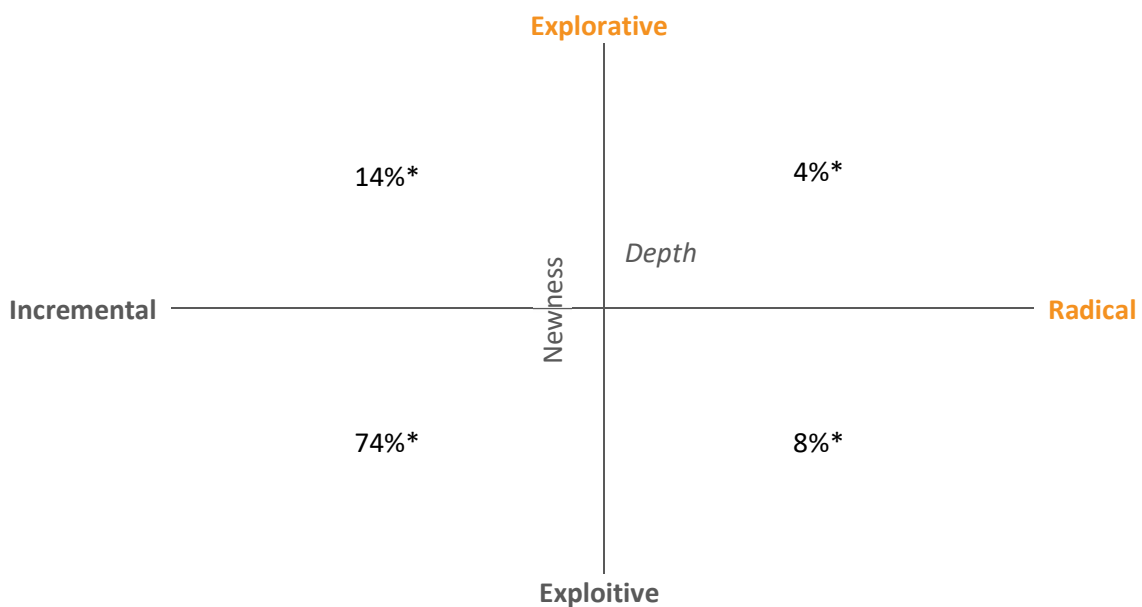
**Figure 11.1 – Levels of Depth of the Intended Innovations**



## Criteria 10 & 11 combined: Newness and Depth of the Innovation

*Summary Main Findings:* Rather traditional proposal ideas, that are both exploitive and incremental, are the most popular. Few are the more innovative proposal ideas, explorative and/or radical.

**Figure 11.2 – Levels of Newness and Depth of the Intended Innovations combined**



\* = % proposals

Compared with the less innovative proposals, the more **innovative proposals** that are explorative and/or radical (14%+4%+8%= 26%) are to a higher extent characterized by:

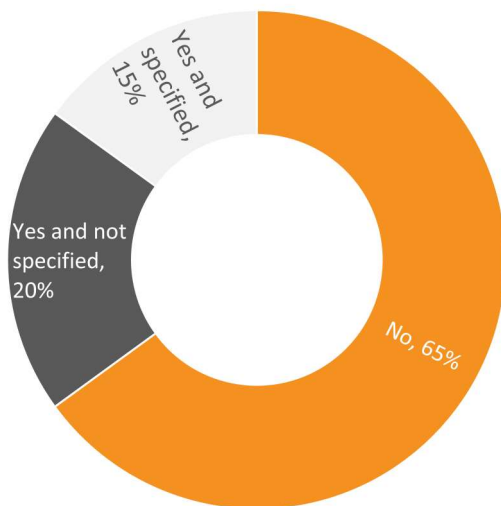
- Theoretical underpinning
- Innovation in the rationale of the course
- Innovation of the aim and objectives of the course
- Intended learning outcomes in the Affective learning domain
- Intended learning outcomes in the Metacognitive learning domain
- Enhancement of lifelong learning
- Education for society

No proposal adhered to all of these characteristics, at best the majority of the characteristics was satisfied.

### Criterion 12: Evaluation Strategy

*Summary Main Findings:* More than half of the intended innovations does not include an evaluation strategy. Only 15% of the proposals includes and specifies an evaluation strategy.

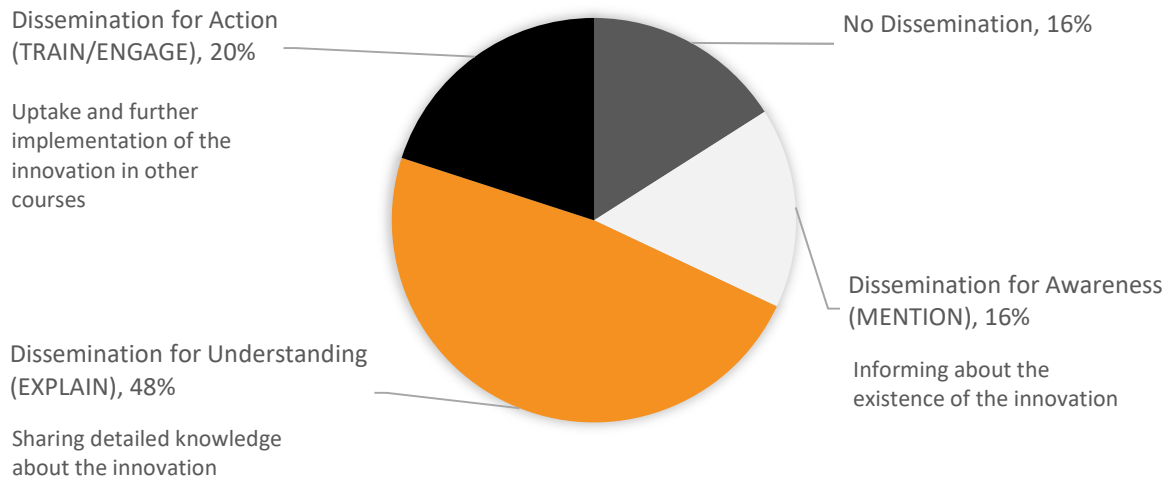
**Figure 12.1 - Inclusion of an Evaluation Strategy - % Proposals**



### Criterion 13: Dissemination Strategy

*Summary Main Findings:* Most innovations intend to disseminate results by providing detailed knowledge about the innovation, for example through a presentation of the innovation. Few proposals only, intend to foster the further uptake of the innovations (dissemination for action).

**Figure 13.1 – Type of Dissemination Strategy - % Proposals**



*Note: a proposal can be disseminated in multiple ways*

## Phase 2

This section reports on the findings of *Phase 2*, exploring the *implemented* and *attained innovations* also in the light of the *intended* plans. For the 13 Criteria of the Educational Innovation Evaluation Framework and for each of the Form an Reflective Criteria, a summary of main findings is reported.

### All 13 Criteria + Form and Reflective Criterion 1: Implementation Consistency

*Summary Main Findings:* Regardless of the nature of the innovation, in all four selected innovation cases the projects were implemented largely as they were intended. So, the implemented innovations kept the intended focus and goals, followed the intended plans and delivered the main intended products. Some differences, between the intended and implemented innovations, were found with respect to (*in brackets the number of innovation cases*):

- Changes with respect to those engaged in the innovation (2);
- Initial implementation of the innovation was less radical than planned, e.g. due to unexpected difficulties (2);
- Differences in the implemented innovations were intended by the educators, but not written down in their proposals (1);
- More and unexpected (2) or less dissemination (1);
- Implementation in more courses or in more implementation cycles than intended (2);
- Evaluation conducted more in-depth or elaborately than intended (3).

### Form and Reflective Criterion 2: Outcome consistency

*Summary Main Findings:* Similar attained (comparable to the intended) results were found for students, for educators, and for the organization, across the four cases. Those results are (*in brackets the number of innovation cases*):

- *Results for students (4):* Different behaviour (more skills, better feedback), more and higher quality knowledge, satisfaction, self-regulation and cooperation skills;
- *Results for teachers (3):* More efficient teaching, more opportunities for providing tailor-made support, less materials or assistants needed, more collaboration in teaching, possibilities for accommodating increasing number of students, satisfaction;
- *Results for the organization (2):* Tools and materials available for use in multiple courses, link to other projects or master theses.

### Form and Reflective Criterion 3: Durability

*Summary Main Findings:* All innovations are still in place, after their initial implementation. In some cases, additional plans are made concerning the innovation beyond what was intended and what was already implemented. More specifically, results indicate that *(in brackets the number of innovation cases)*:

- The tools or other products developed are still in use after the end of the project (4).
- Innovations were implemented in more courses than anticipated, already during the project (2).
- There are plans for further implementation of the innovation in other courses (also in other content domains) (2).
- There are plans to further work on the innovation case or link research to the innovation (3).

### Form and Reflective Criterion 4: Reflection and Suggestions for others

*Summary Main Findings:* All educators indicated they learned greatly from their innovation efforts, and provided recommendations concerning the educational innovation process and policy. Their lessons learned and related recommendations point out towards the relevance of developing sound proposals, of engaging into reflection activities throughout the implementation of the innovation, of approaching carefully the development and implementation of learning tools, and of performing thorough evaluation and dissemination activities. To give an impression of the lessons learned, examples of statements of educators are reported in Figure 14. The specific recommendations, and underlying lessons learned reported by the educators, are presented in Section 4 (under phase 2).

**Figure 14 – Example of statements of educators**

‘The quality of an educational innovation is higher ... if there is a clear evaluation strategy and intention to disseminate beforehand. When you have to think about how to evaluate, you also think about how to design the innovation more concretely, and when to disseminate.’

‘This innovation gave me the possibility to collaborate with teachers from other fields, that I would otherwise not meet. ....By having regular meetings with each other, we kept each other well-informed and inspired.’

‘For individual lecturers it is difficult to know about practices and outcomes of other courses. But it is important to get to know whether there are similar educational efforts already taking place, before starting one’s innovation.’

# 5 Recommendations

## Phase 1

Based on the *empirical findings of Phase 1*, recommendations that can guide the development of future WUR educational innovation calls and initiatives are reported hereby.

- **Strive for inclusive and evenly spread educational innovations at WUR**

While there is a good innovation engagement of some WUR educators also in collaboration with others, this study shows that more efforts can be made for making educational innovations inclusive and evenly embedded across WUR science groups and across chair groups. This can be realized, for example, by incentivizing more complex collaborative efforts across science groups and across chair groups; by offering educational support for improving proposals that would otherwise not be granted, and that are related to chair groups less active in getting educational innovation grants; by incentivizing academics in tenure track to engage into educational innovation endeavours (by receiving credits for that when their proposal is granted); by consulting students and integrating students' voice and needs when shaping the educational innovation agenda and related calls.

- **Create a balance between pre-set content requirements and an open content format, when structuring future calls for innovation**

Inevitably, educators will tend to direct the content of their innovation plans and write their proposals in a way that fulfils pre-set requirements, in order to get the grant. This has the advantage of enabling innovation in a desirable pre-set direction. But it can also hamper the exploration of new non-pre-set directions. For example, as noted throughout this study, fulfilling the formal WUR educational goals as pre-set requirement can boost achievement of those goals. On the other hand, it can potentially hamper the creation of other new possible educational goals that innovators might truly want to pursue, and that can in turn inform WUR educational policy. Make sure that calls provide enough openness for shaping the content of the proposal, and that educators are offered enough freedom to express their creative ideas and their students' specific ambitions.

- **Let educational innovation be theory-based and evidence-informed**

Based on this study, innovation in education is especially problem-oriented and thus focused on addressing urgent actual concrete problems (e.g. the increasing number of students). In this regard, many educational innovations are rather pragmatic. Let this problem-orientation be coupled with an educational science-orientation through which scientific concepts and evidence can inform the development of the specific innovation. This can take place, for example, by requesting a sound theoretical and/or empirical underpinning of education innovation proposals; by using empirical findings, as the ones emerging from this study, for inspiring the development of educational policy and innovation calls; etc.

- 
- **Consider distinguishing and alternating between an ‘implementation of good practices’ fund and an ‘experimentation’ fund**

An “implementation of good practices” fund can focus on supporting the implementation of already known successful tools and approaches, and thus on enabling the upscaling of good practices at a WUR level (in our opinion, upscaling is primarily the responsibility of the university as a whole instead of individual teachers or groups and should be monitored and supported by WUR Education and Student Affairs). On the other hand, an “experimentation” fund can focus on supporting the creation of new tools and new forms of education and thus on enabling experimentation of not yet known practices, to be undertaken in a transparent way allowing also for possible failures from which to learn. Making this distinction, and possibly alternating, between those two innovation funds can help acknowledging the relevance of, or even boosting, both forms of innovation, rather than mainly stimulating the first category as it appears to be according to this study.

- **Be conscious that only few proposals foster affective, metacognitive and life-long learning and education for society**

This study suggests that innovative forms of education foster learning across multiple learning domains, and beyond cognitive learning. It also suggests that innovation implies making education and students more connected to society and to real societal challenges, rather than just centring education on teaching and learning subject content. Those insights can be taken into consideration when shaping the future innovative educational agenda, and when providing guidance to academics in terms of teaching, learning, and assessment strategies.

- **Stimulate education for impact, by making sure evaluation and dissemination plans are an integral part of each granted proposal and monitor that these plans are actually executed**

Without evaluation, there is no formal reflection on the impact of the innovation. Without dissemination, there are not many possibilities for others to learn from the innovation. This study shows that evaluation and dissemination can be further stimulated. This can be done, for example, by providing a part of the grant only after the evaluation and dissemination have taken place; by offering support for defining and applying suited evaluation and dissemination strategies, etc.



## Phase 2

Based on the analysis of the cases and the *lessons learned and suggestions provided by educators in Phase 2*, recommendations that can guide the development of future WUR educational innovation calls and initiatives are reported hereby.

- **Stimulate development of robust and creative proposals**

Educators indicate that the theoretical and empirical underpinning of the intended innovation should be sound, and the evaluation and dissemination activities should be well-planned too, as this leads to deeper innovation. It is important to check whether there are similar (on-going) innovations before starting the project, and to consider connecting the intended innovations to other projects, e.g. a PhD, or Postdoc, or Master Thesis, to increase innovation capacity. Educators would appreciate the possibility of proposing wild creative ideas through bottom-up initiatives, beyond pre-set proposal standards. Furthermore, they indicate it is relevant to make sure that support is provided by the WUR Education and Student Affairs and Education and Learning Sciences (ELS) group, during the proposal writing process. Development of innovations in educational design labs can benefit too from the support of educational designers.

- **Promote (joint) reflection activities throughout the implementation of the innovation**

Educators highlight the relevance of planning-in and engaging into reflection activities throughout the implementation of the innovation. Not only educators within the same innovation project can regularly reflect on implementation aspects, but it is desirable to create opportunities for reflection also across educators working on comparable innovation projects at WUR, as they can inspire and learn from each other. In particular, it is important to avoid implementation of isolated on-line elements in a course, but to promote reflection and actions towards integrated approaches.

- **Encourage careful development and implementation of tools**

Educators recommend to not underestimate the development of new tools. Tool development implies a trajectory of years and good cooperation with the developers is essential. It is helpful to plan multiple cycles when developing a tool, and to test it on a minor scale first, and after that in bigger courses and programmes. The tool should only be implemented if proven robust. Potential commercial use of developed tools by external parties is a point of attention.

- **Foster evaluation and dissemination activities and allow for 'brilliant' failures**

Educators point out the relevance of engaging into systematic evaluation, through research evaluation activities, to understand more substantially the effects of the innovation. Educators consider lack of success in their innovation efforts as valuable too. They appreciate experimenting with their practices and they learn from it also if they face failure on some aspects of the innovation. Dissemination is considered crucial too. It is recommended to create opportunities for exchange across educators, which supports learning and can also lead to potential new collaborations.



## References

- Bessant, J. (2013). Innovation in the twenty first century. In R. Owen, J. Bessant, & M. Heintz (Eds.), *Responsible innovation: managing the responsible emergence of science and innovation in society* (pp. 51–74). London: Wiley.
- Bloom, B.S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. New York, David McKay Company.
- Brans, C., Bayram-Jacobs, D. (2016). *Bottom-up views on innovation in higher engineering education. A qualitative study within three technical universities*. 4TU.CEE Report, Eindhoven and Delft, December 2016.
- Education and Learning Science Chair Group (2018). *Enhancing the human potential in responding to challenges in the domain of food and life sciences: vision document*. Wageningen: Wageningen University and Research.
- Fincher, S. (2000). *From transfer to transformation: Towards a framework for successful dissemination of engineering education*. Paper presented at the 30th ASEE/IEE Frontiers in Education Conference, Kansas City, MO, USA.
- Gannaway, D., Hinton, T., Berry, B., Moore, K. (2013). Cultivating change: disseminating innovation in higher education teaching and learning. *Innovations in Education and Teaching International*, 50, 4, 410-421.
- Gravestock, P. (2002). Making an impact through dissemination. In C. Baume, P. Martin, & M. Yorke (Eds.), *Managing educational development projects: Effective management for maximum impact* (pp. 109–124). London: Routledge.
- Gupta, A.K., Smith, K.G., Shalley G.E. (2006). The interplay between exploration and exploitation. *The Academic of Management Journal*, 49, 4, 693-706.
- Lotz-Sisitka, H., Wals, A. E. J., Kronlid, D., & McGarry, D. (2015). Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability*, 16, 73–80.
- Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1964). *Taxonomy of educational objectives: The classification of educational goals. Handbook II: the affective domain*. New York: David McKay Company.
- King, H. (2003). Disseminating educational developments. In P. Kahn, & D. Baume (Eds.), *A guide to staff and educational development* (pp. 96–115). London: Kogan Page.
- March, J.G. (1991). Exploration and exploitation in organizational learning. *Organizational Science*, 2, 71-87.
- Tassone, V., McKenna, E., O’Mahoni, C., Eppink H., Wals, A. (2018). Redesigning higher education curricula in times of systemic dysfunction: a Responsible Research and Innovation perspective. *Higher Education*, 76, 2, 337–352.
- Van den Akker, J. (2003). Curriculum perspectives: an introduction. In J. Van den Akker, W. Kuiper, & U. Hameyer (Eds), *Curriculum Landscape and Trends* (pp .1-10). Dordrecht: Springer Science & Business Media B.V.
- Van den Akker, J., Gravemeijer, K., McKenney, S. & Nieveen, N. (Eds.) (2006). *Educational design research*. London: Routledge.
- Wageningen University and Research (2014). *The renewal of the Wageningen approach for education*. Discussion paper. Wageningen: Wageningen University and Research.
- Wageningen University and Research (2017). *Vision for education. The next step*. Wageningen: Wageningen University and Research.