Future in Action

Sustainability in education at Wageningen University

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Green Horizons Consultancy

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Executive Summary

Sustainability has become a buzz word in all spheres and so its interpretation. Green Office Wageningen an organization responsible for sustainability aspect within the University was interested to understand how sustainability in education at the University is practiced. according to Green office Wageningen sustainability in education goes beyond the traditional definition of the term which includes environmental, technical or operational aspects of sustainability, but look at how sustainability in education is practiced, integrated and incorporated in the learning and teaching process to solve complex problems which require critical thinking and an analysis from different perspectives in solving abstract problems.

The main objective of the study was to provide an analysis of the current situation and to find inspiring examples of sustainability in education within courses and programs at Wageningen University. The concept sustainability in education was developed and define for the purpose of the project. Next to the definition a set of 13 criteria was developed and used as a benchmark to evaluate aspects of sustainability in education at the university

In order to identify examples of how sustainability in education is practiced, integrated and incorporated in the learning and teaching process at the University, and to identify best practices, information about courses and projects related to sustainability in education was used for analysis. Course descriptions, a student survey and nominated teachers for the Teacher of the Year award were used in the methodology to identify teachers for interviews. In total eleven semi-structured interviews were conducted with selected teachers, to get insights in the current teaching practices. In addition documents such as the Annual report 2011 and the Strategic Plan 2011-2014 were reviewed against the set criteria. Interviews with the ‘Onderwijs Instituut’ and the facility department of the University were also conducted to understand the current situation of the University regarding sustainability in education from a policy level.

Recommendations were given how sustainability in education can be implemented based on the findings. The final outputs of this report will also be included at the‘ Green Storming’ seminar dedicated to sustainability in education organized by Green Office Wageningen.

In this project, ‘sustainability in education’ is not related to the content of the courses, but to the competences students acquire.

Contents

1. Introduction

1.1 Background

The project "*Future in Action: Sustainability in Education at Wageningen University*" was initiated by Green Office Wageningen. The main goal of the project was to evaluate the current situation at Wageningen University concerning its position regarding sustainability in education, and to identify examples of how sustainability in education is practiced, integrated and incorporated in the learning and teaching process at the University.

Green Office Wageningen was interested in understanding the situation of the University regarding sustainability in education due to the unwillingness of the University to sign the Manifesto of Tomorrow. The Manifesto of Tomorrow (*Het Manifest van Morgen*) is a ten-pointed list of actions initiated by students and several HBOs (Hoger Beroeps Onderwijs, Higher Vocational Education) that was signed by several Dutch universities. The manifesto claimed for the necessity to provide students with skills and knowledge to work towards a sustainable society, which offers a comfortable environment for the current and future generations and an economy that runs on sustainable energy. To ensure that students obtain these knowledge and skills, the manifesto states that sustainability should become part of the curricula of all University programs. In a nutshell, the main goal of the manifesto is to devise an action plan for the development of sustainability in education in higher education(the text of the Manifesto can be found in Appendix 1). Wageningen University did not sign the manifesto, based on the reasoning that the University is already paying enough attention to sustainability issues. This is one of the reasons why Green Office Wageningen has decided to investigate what the University is doing in terms of sustainability in education. Wageningen University is already trying to address sustainability with regards to the environmental sustainability of the campus and its infrastructure, for example concerning the energy use and the waste management (Wageningen UR, 2013); however, the scope of this project addresses only the educational aspects of sustainability.

Due to the ambiguous nature of the concept 'sustainability in education', the term is often perceived as having diverse interpretations. For the purpose of this project, the interpretation used for sustainability in education includes a holistic educational approach in which sustainability is integrated in the pedagogies. The understanding of this concept puts emphasis on the pedagogical approach, and on the processes of teaching and learning that aim at the acquisition of tools to solve complex problems[1] related to sustainability. This approach also includes the integration of systemic and critical thinking in order to enable students to deal with complex issues related to sustainability.

[1] With the term "problem" we do not refer necessarily to a problematic situation. Within this paper this term is used in the more general meaning of "issue".

1.2 Objectives

The main objective of the study is to provide an analysis of the current situation and to find inspiring examples of sustainability in education within courses and programs at Wageningen University.

Hence our main research questions are:

1.What is the current situation of Wageningen University with regards to sustainability in education?

2. How is sustainability in education practiced and integrated in the learning and teaching process?

1.3 Relevance of the paper

The project provides an overview of the situation in the University with regards to sustainability in education, and indicates some inspiring examples of teachers that integrate sustainability in education in their way of teaching.

The report may highlight strengths and weaknesses of which the University might not be aware of, and it can be a reason of merit as well as an incentive to improve the performance of the University on sustainability in education.

Wageningen University is attempting to address sustainability with regards to the environmental sustainability of the campus and its infrastructure, and is trying to apply a sustainable operational management (Wageningen UR, 2011).This paper could represent a starting point for a new process to increase orientation towards sustainability in education and use it as a central concept of the educational policy of the University. Green Office Wageningen could be the promoter of this process, by also using the weaknesses highlighted in the report as a reason to open the discussion and an incentive to improve the performance of the University in this field.

1.4 Overview of the project

In order to provide an overview of the situation in the University with regards to sustainability in education, and to indicate inspiring practices of teachers that integrate sustainability in education in teaching approaches, our project was divided in three main parts.

The first step was the definition of the concept of sustainability in education and the formulation of some criteria to operationalize this concept. Together, these two elements were used as a yardstick to identify and measure sustainability in education.

In order to evaluate the current situation of Wageningen University concerning sustainability in education, the project examined the policy aspects as well as the educational aspects.

The policy analysis was done through the review of two official documents of the University. In addition, interviews were held with representatives of the Executive Board of the University to explain the reason for the unwillingness of the University to sign the Manifesto of Tomorrow and what the university´s standpoint is concerning this document. The Education Institute of the University known as Onderwijs Instituut (OWI) was also approached to shed some light on how sustainability in education is currently integrated and incorporated in the teaching and learning process at the university.

For the educational aspects of the current situation, the various courses and programs offered by the University were screened for the presence of elements of sustainability in education based on our criteria.

Our last step was to examine how sustainability in education is practiced, and this was done through interviewing lecturers. From these interviews we selected some inspiring examples which show the execution of sustainability in education at the university, and can be used by other teachers to incorporate these teaching methods in their way of teaching.

2. Analysis: activities and methodology

We decided to conduct our analysis at two different levels. The first one is related to the policy of the university, and is aimed to understand how sustainability in education is integrated in the University at a policy level. The second part is related to those initiatives put in practice by individual teachers and integrated in their educational approaches. For these two levels of analysis the main activities are listed, together with the related methodology.

Prior to that, our first step was to develop a common definition of sustainability in education, and to formulate criteria to assess it.

2.1 Formulation of concept and criteria

Together with our commissioner we arrived to a common definition of what we mean with sustainability in education. As already mentioned, we believe that sustainability in education is focused on the acquisition of those knowledge, skills and competencies that allow students to deal with complex issues related to sustainability.

Issues related to sustainability, like environmental problems, are in many cases highly complex and interconnected, and characterized by a certain degrees of uncertainties (Connelly and Graham, 2003). We believe that in order to be able to fully understand and solve these complex problems students have to apply an holistic approach which is characterized by system thinking and a multidisciplinary and multi-perspective analysis, and at the same time they have to be aware of the intrinsic limits of human knowledge and scientific research. In addition, sustainability problems often involve cultural identities and ethical questions like social equity (Wals and Jickling, 2002), and for this reason we consider the acknowledgment of own and different values as a crucial skill to deal with sustainability. Since most of the times correct and definitive answers are not available for issues related to sustainability, it is also our belief that students have to be stimulated in elaborating the solutions for designing the sustainability of tomorrow. From this perspective the development of critical thinking, the participation in lectures and the mutual learning from other students become essential tools for sustainability in education.

For this reason the knowledge and competencies that enable students to deal with these issues are not related to specific fields or topics, but are related to the way in which teachers present issues within their lectures, and to the way teachers try to stimulate student participation and critical thinking.

In this regard Sterling states that “an ecological view implies putting relationship back into education and learning – seeking synergy between all aspects of education (...) - with emphasis on such values as respect, trust, participation, ownership, democracy, openness, and environment. (…) In essence, what we all are engaged in here is a critically important ‘learning about learning’ process, and one which will directly affect the chances of a more sustainable future for all.” (Sterling, 2001, p. 1).

The identification of the criteria to assess sustainability in education was a crucial step in our project. These criteria have been extremely useful in having a consistent and coherent framework of understanding of the concept during the entire research. Furthermore, these criteria operationalized our concept, that is the identification and measurements of elements related to sustainability in education: we used these criteria to analyze the documents for the policy analysis part, to elaborate the questions for the interviews with the teachers and to assess these interviews.
Our first step to develop these criteria was a literature review that was conducted to understand what are the elements related to sustainability in education that can be found in the literature. We used the criteria and indicators suggested in the literature for the development of our own criteria, which are the following:

1. **Interdisciplinarity and complexity**
   Integrating different disciplines in problem analysis and highlight the complexity of the relations between issues and phenomena.

2. **Focus on consequences**
   In analyzing problems, the focus on short term and long term effects.

3. **Awareness of limits and uncertainties in knowledge**
   The importance of making students aware of the uncertainties and the limits that characterize the scientific research.

4. **Analyzing from different perspectives and dimensions**
   Making students aware of the different perspective and points of view in analyzing a problem.

5. **Stimulating responsibility**
   Creating ownership of problems in students, stimulating sense of responsibility towards the issues.

6. **Acknowledging and understanding own and different values**
   Making students aware of the existence of different values and their influence in the understanding of an issue.

7. **Critical thinking**
   Development of well-reasoned opinions, capacity of analytical thinking, giving room to students to express their opinions.

8. **Stimulating participation**
   Stimulating students participation in the courses through group-works, debates etc.

9. **Cooperative learning**
   Mutual process of learning and teaching and exchange of knowledge: teachers also learn from the students, and students also learn from each other.

10. **Use of real-life examples**

Linking theoretical knowledge to examples, both on local and global level, to make students aware of the effects of theory in the reality.

11. Linking knowledge and practices

Engaging students in practical and experiential learning, for example in laboratories, field-work or experiments.

12. Flexibility in course

Flexibility of the structure of the course according to students backgrounds and interests, updating the courses on the basis of more recent data/ information.

13. Assessment of competences for sustainability

Assessing students not only on the acquisition of the contents but also on the acquisition of the skills and competencies mentioned above, for example critical thinking or analyzing from different perspective and dimensions.

For the sake of the analysis of the interview we also decided to weight our criteria according to the importance we assigned to them. However, at the end we did not use this ranking in our analysis. The description of the methodology of this process can be found in Appendix 2.

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2.2 Policy analysis

The policy analysis was aimed to understand whether sustainability in education is integrated in the University at a policy level.

Activities

- Document analysis of the Annual Report 2011
- Document analysis of the Strategic Plan 2011 -2014
- Interview the Integrated Facility Management department
- Interview OWI

For the policy analysis we considered two documents: the Annual Report 2011 (Wageningen UR, 2011) and the Strategic Plan 2011-2014 (Wageningen UR, 2012). In addition, to find out the reason why the University did not sign the Manifesto of tomorrow we interviewed the Integrated Facility Management department of the University, who met us on behalf of University's board. Finally, we interviewed the OWI to find out how sustainability in education is integrated in the policy of Wageningen University with regard to the structure of course and curricula. The OWI is the office in charge to develop the curricula of the courses following the suggestions of the program directors.

These different sources helped us to understand the direction and the policy of Wageningen University with regard to sustainability in education. The outcomes of this analysis can be found in Section 3.

Methodology

The two documents were chosen for our analysis because they were the latest and most important documents available online, and because they were supposed to give us a good general overview, since one of them is specific for 2011 while the other one is a Strategic Plan that covers 4 years. We read the documents and we summarized the sections regarding sustainability in education using our criteria as a guide-line.

For the interviews to the Integrated Facility Management department and the OWI we used open ended interviews.

2.3 Education analysis

In this part we wanted to find those initiatives relevant for sustainability in education that are put in practice by teachers. Since one of the aims of our project is to identify inspiring examples of sustainability in education in teaching approaches, we decided to interview some teachers to see whether their ways of teaching match with our criteria.

Our work was divided in four main phases: selecting the teachers, conducting the interviews, analyzing the interviews and selecting the inspiring examples.

2.3.1 Select teachers

We decided to interview 12 teachers – a reasonable number considering our time boundaries - using three different methods for the selection, so 4 teachers from each method. The methods include the selection of the teachers from the nominated and awarded teachers, from a course content analysis and from a student survey. The list of the teachers that we contacted and of the teachers we interviewed can be found in Appendix 3. Below the different methods to select the teachers are listed, together with the related activities and methodology.

I. Select teachers from nominated and awarded teachers

Activities

- Compare our criteria with the criteria used to select, nominate and award teachers for the Teacher of the Year Award
- Find the list of the nominated and awarded teachers
- Contact the nominated and awarded teachers

We selected four teachers for the interviews from the list of the nominated and awarded teachers of the Teacher of the Year Award. This award is intended to stimulate high quality education at Wageningen University, awarding teachers for their ability to inspire students (Wageningen UR).

Methodology

The reason for the choice of this method lies in the fact that the criteria used to select the teachers for the award are partly similar to the ones we developed. Hence, it was very likely that we could find inspiring examples from these teachers. The selection of the teachers is based on the votes of the students and on an interview made by a student-jury, according to a questionnaire that can be found in Appendix 4.

Every year five teachers are nominated and one teacher is awarded as the Teacher of the Year. At first we contacted the nominated and awarded teachers of 2012 and 2013. However, from these contacts we were not able to interview four teachers, partly because some names were repeated in the nominated teachers of different years, partly because some teachers were not available for the interview. For this reason we decided to contact the teachers nominated and awarded in the previous years. At the end we contacted all the awarded and nominated teachers from 2008 to 2013 – 16 teachers in total. One of the

teachers in the list was already selected by using another method (the course analysis). Another teacher was not selected because of a conflict of interest that was occurring, since this teacher was the expert assigned to our ACT project, and helped us to develop the questions for the interviews.

II. Select teachers from a course content analysis

Activities

- Define keywords from our criteria
- Analyze course and program descriptions of the WUR Study Handbook website according to the keywords
- List all results in an excel sheet and rank them according to the number of different keywords found in the description of the courses
- Qualitative check of courses with the highest scores in keywords
- Select 11 courses with highest scores in keywords and contact coordinators (teachers)

Four teachers were interviewed based on the courses analysis related to our criteria. Our analysis was done on the course descriptions in the Study Handbook 2012/2013 on the website of Wageningen University. At the end we contacted the coordinators (teachers) of the 11 courses that showed the highest number of keywords, and we fixed four interviews according to the availability of the teachers.

We also performed an analysis of the descriptions of the programs, that together to the analysis of the courses was used to provide insights of the current situation of the University concerning sustainability in education.

Methodology

The reason why we chose this method of selection is because we wanted to include also teachers that were not awarded and mentioned in the student survey.

We selected two keywords for each criterion, which means 26 key-words in total. The list of the keywords that we used for our analysis can be found in *Table 1*. Every keyword was checked preliminary to see whether it was giving results in the analysis. In case no results were found for a keyword, we selected synonyms or alternative words. If there was not a good alternative for the keyword and no results came up, it was assumed that these criteria are difficult to include in course descriptions. By using a search script in google.com (site: https://ssc.wur.nl/ Handbook/Course/"keyword") it was possible to go through all keywords, and use combination of words as well. A possible disadvantage of this method is the small probability that courses that are indexed by Google search tool differently might not come up as a search result. However, it is most likely that all courses are indexed in the same way in the Study Handbook and there were no evidence to assume that courses are missing.

Two lists of keywords were defined: a broader and general list of keywords and combination of keywords to analyze programs descriptions, and a list of more specific keywords for

courses description. The reason for this was that the total amount of text in the program descriptions is not enough for sufficient results, general keywords resulted in more matches and were directly checked in which context they were used to filter non-related descriptions.

We listed the courses in an Excel sheet according to the number of different keywords present in the course description. At the end, 11 courses were selected according to the number of keywords that they were showing. Only one course matched 4 keywords, while 18 courses matched 3 keywords. We excluded 3 of these 18 courses because two of the three keywords were referred to the same criterion, hence these courses matched 3 keywords but only 2 criteria. The remaining 15 courses went through a qualitative analysis to verify on suitability for the selection by reading the whole course description, to ensure that the keywords were used in relation to our criteria and not in different context. Only 10 courses were selected with this process. Together with the course which matched 4 criteria we had 11 courses in total.

The analysis for the programs was done by analyzing how often the code of the programs is listed. The search script site was: https://ssc.wur.nl/Handbook/Programme/ "keyword", and we used the same keywords used for the course analysis. In case keywords did not give any results, which was more likely because of the smaller number of programs, more general keywords were used. We also read the programs descriptions to ensure that all the keywords were used in a proper context. All results were listed from these general keywords.

Table 1. The 26 keywords used to select teachers from the course description.

CRITERIA	KEYWORDS	CRITERIA	KEYWORDS
Interdisciplinary	interdisciplinary	**Stimulating participation**	active participation
	interrelated		teamwork
Focus on consequences	term effects	**Cooperative learning**	cooperative learning
	consequences		social learning
Awareness of limits and uncertainties in knowledge	limitations	**Use of real-life examples**	real world
	uncertainties		real life
Analyzing from different perspectives and dimensions	different perspectives	**Linking knowledge and practices**	apply knowledge
	different views		apply theory
Stimulating responsibility	responsibility	**Flexibility in course**	preference of students
	ownership		interests of students
Acknowledge and understand own and different values	different values	**Assessment of competences for sustainability**	assessment of competencies
	personal values		evaluation of competencies
Critical thinking	critical		
	analytical skills		

III. Select teachers from student survey

Activities

- Prepare questions for the survey
- Ask students about inspiring teachers
- List teachers' names in an excel sheet
- Select eight teachers based on students' preferences
- Contact the teachers

We made a survey asking students to mention the name of a teacher that they found inspiring. After collecting the names from the students, we selected the eight teachers that were mentioned the highest number of times, and conducted four interviews according to their availability.

Methodology

Students are, together with teachers, the main actors involved in this project. For this reason we wanted to include students' opinion at least in one step of the project. Our first idea was to interview the students members of the program committee to have their opinion about the teaching method of the teachers that we interviewed. However, this phase was excluded due to time constraints, and therefore we decided to interview a sample of students to include their voice in the project. We acknowledge the fact that students are already involved in the selection of the Teacher of the Year. However, we decided to introduce a method that allowed students to participate in a more direct way to our project, also in consideration of the fact that first-year students cannot vote for Teacher of the Year.

The purpose of this survey was to identify those teachers that put in practice initiatives towards sustainability in education as defined by our criteria. Since our criteria include elements related also to innovative, non-conventional and stimulating teaching, we decided to ask students to mention teachers that they found stimulating in their way of teaching. The questions we addressed to the students were thus formulated as follow:

- Are you a student of this university?
- Can you give us the name of a teacher that you find inspiring and stimulating in his/her way of teaching?

A non-random sampling design (specifically: quota sampling) was used to contact students. We contacted 99 students, 33 from each of three buildings of the University: Forum, Orion and Leeuwenborch. According to our experience as students of this University, in these buildings it is easy to find a high number of students from different study programs. The students were approached during lunchtime to avoid disturbing them during their study time. Each student had the possibility to indicate the name of one teacher only. The list of all the teachers mentioned by students can be found in Appendix 3. Six teachers received more than two preferences, but three of them were already present in the list of the awarded and nominated teachers. Hence we selected three teachers from this list and we randomly selected the remaining five names from the list of the teachers that received two preferences.

The method used for this selection is the fishbowl method: we wrote the names of the teachers on some pieces of paper and we randomly extracted five of them.

2.3.2 Interview teachers

Activities

- Formulate the questions for the interviews
- Interview the teachers

Our aim for the interviews was to check whether the teaching methods of the teachers met our criteria for sustainability in education. In order to do so, a very important step for our analysis was the formulation of the questions for the interviews. A semi-structured interview was developed with eleven questions linked to our criteria. Each interview lasted approximately one hour. At least two people from our team were present during each interview, and all the interviews were recorded. At the end we conducted 12 interviews, but one of these was not included in the analysis because we made some mistakes in recording it.

Methodology

We needed to formulate questions for the interviews that ensured that the teachers were going to include all our criteria in their answers. The formulation of these questions happened to be a very difficult task. On the one hand, we did not want to mention the criteria itself in the question, to avoid steering the conversation excessively. On the other hand, the risk was to develop questions that were too vague. At the beginning we also tried to formulate questions that could include different criteria, because we thought that we had too many criteria to formulate one questions for each criterion. Therefore we tried to group the criteria in clusters. We soon realized that reaching an agreement on this division was an extremely time-consuming process, because of differences in perspectives among the team members about these criteria. For this reason we developed eleven questions, the majority of them addressing only one criterion. The questions for the interviews can be found in Appendix 5 and the table with the links between different questions and criteria can be found in Appendix 6.

2.3.3 Analyze interviews

Activities

- Transcribe interviews
- Rearrange interviews using our criteria
- Give scores to each teacher for every criteria met

We transcribed the interviews and in a separate document we used our criteria to rearrange the transcription, which means that we listed under each criterion different parts of the interviews. For example, the parts of the interviews in which the teachers were describing the way he/she uses examples during lectures were placed under the criteria “Use of real-life examples”. After relevant data were rearranged, we concluded whether the teachers met the different criteria.

Methodology

We transcribed the interviews almost entirely, skipping only the parts in which teachers were talking about something not related to the questions of the interviews (for example during the greetings), in order to prevent unnecessary work.

We analyzed the rearranged interviews and we decided whether the teachers were meeting the criteria. Only two team members were involved in this phase, in order to have a comparable standard for all the interviews. These two members gave individual marks to the rearranged interviews and then they discussed the results together. The marks were assigned for each criterion according to the following scheme: 1 for teachers who were using the criterion actively and focused on the students competencies, 0.5 for those who met it to some extent, for example, teachers that were aware of the criterion and what role it played in their teaching but did not focus on it that much; lastly, 0 for those teachers who did not use the criteria in their teaching or did not do it actively.

Our initial idea was to select inspiring examples only among those teachers who were scoring above the average. However, at the end we decided to select inspiring examples from all the interviews, because the differences in scores between the interviews were rather small, and because all the criteria have more or less the same importance for us (see Appendix 2). Anyway, the scoring of the interviews was used to formulate some general considerations about the teaching methods of the teachers we interviewed.

2.3.4 Select inspiring examples

Activities:

- List inspiring examples for each criterion
- List inspiring examples for the creation of an imaginary teacher called “Professor T.”

Our first step was to summarize the answers in the interviews for each criterion, in order to provide a general overview of the answers of the teachers and to highlight some interesting, unusual and innovative practices that are supporting sustainability in education.

Our second step was to find and choose the most inspiring practices and combine them in the creation of the ideal teacher “Professor T.”.

Methodology

For these two activities we performed a qualitative analysis of transcribed and rearranged interviews. The inspiring examples were selected based on our criteria and expertise and on the interest of the commissioner.

3. Findings. Analysis of current situations

The finding of this project is twofold. Sustainability in education in this project is observed from policy and education viewpoints. In the policy analysis, we reviewed the Strategic Plan 2011-2014 and Annual Report 2011 of the university. In addition to these documents, we also conducted interviews with the OWI to understand how sustainability in education is applied in different courses of the university. The Integrated Facility Management Department on behalf of the Board was approached to explain the reasons why the University did not sign the Manifesto of Tomorrow.

3.1 Policy analysis

3.1.1 Strategic Plan 2011 – 2014

The Strategic Plan outlines the near future and the ambitions of Wageningen University for the period 2011 – 2014. We analyzed this document by trying to identify those elements related to our criteria for sustainability in education. In this document, we found some features of the education system of the University which can be linked to sustainability in education.

One of these elements is the fact that Wageningen University wants to apply knowledge in practice (as related to the criterion “linking knowledge with practices”) . For example, some projects of the University are conducted in collaboration with companies or governments. The research in the University is also oriented towards those fields that offer more opportunities in terms of practical applications.

The importance of an inter- and multi-disciplinary method in the educational approach in the University is explicitly addressed in the document. Wageningen University applies the ”beta-gamma” approach (also known as “Wageningen Approach”) using knowledge and competencies of disciplines from natural and social sciences to address complex issues. Furthermore, the University wants to stimulate students to look beyond the boundaries of their own field of expertise and to see things from an international context.

In addition to multi-disciplinarity, another characteristic of the “Wageningen Approach” is the focus on the connection of knowledge across various levels, “from gene and cell to plants, animals and ecosystems on one side, and from individual to household, society and international communities on the other side” (Wageningen UR, 2012, p. 27). This aspect can be linked to our criterion “analyzing from different dimensions and perspectives”.

Another element that match our criteria is flexibility in courses, which is ensured by the fact that “Wageningen University is a relatively small-scale institution” (Wageningen UR, 2012, p. 30), where there is close contact with the students and there is focus on the students’ needs. Students have many options for choosing courses in line with their studies and interests, and can switch between courses at various moments during their studies.

The key themes found in the Strategic Plan such as interdisciplinarity, system thinking, and relations between different dimensions of a problem are related to our criteria and important in developing the skills and competencies to analyze complex issues related to sustainability.

3.1.2 Annual Report 2011

In the Annual Report 2011 some information can be linked to sustainability in education.

The Masters program of Wageningen University is attracting a number of international students. It also incorporates a multi-disciplinary approach to teaching and due to this its course curriculum is highly international (Wageningen UR, 2011). According to the Annual Report, approximately 45% of Master students are non-Dutch. From this information we can make an indirect link with the criteria of stimulating different values, the analysis from different perspectives, and cooperative learning.

Some courses are redesigned in order to meet students need and interest, and this is linked to our criterion “flexibility in courses”. For example the Earth and

Environment Master’s program was redesigned in 2011. This program is still linked with Soil Sciences but has a more integrated approach and includes both atmosphere and water components (Wageningen UR, 2011). This adaptation was done in response to the professional needs of students that wanted to balance the theoretical knowledge with more practical skills in earth sciences. This example of revision of a Master program can be linked with our criteria about flexibility in courses, and also to interdisciplinarity, analysis from different perspectives and dimensions, and linking knowledge with practice.

3.1.3 The Role of Onderwijsinstituut (OWI) for Sustainability in Education

The OWI is an umbrella body which oversees the development of curricula and educational courses offered by different programs of the university.

In order to understand how sustainability in education is integrated in the university`s policy, it is important to understand the role of OWI with regard to sustainability in education. OWI is responsible for reviewing and approving the learning goals of all the programs. It also oversees the activities of program committees and chair groups regarding courses and programs offered at the University. The focus on sustainability in education in the university`s curricula depends on each program committee, as they have autonomy on how to reach their learning goals. The program committee decides which courses are suitable and valuable for their program, and negotiates with the chair groups in what manner to offer these courses.

At the end of each course, the teacher is evaluated by his/her students. The head of the chair group also uses evaluation by students to form his/her opinion in evaluating the teacher`s performance. Sometimes exam results are also considered under specific conditions and taken as representative for the teacher's performance. OWI take actions in case the results of the evaluation is below the standard. The ultimate goal of evaluation is to improve the course or the quality of teaching.

The possibility to improve the focus towards sustainability in education at the University is determined by the feedback from society. This feedback is received by field committees, which are in charge of collecting information about the performance of Wageningen University`s graduates from employers. In addition, feedback from academic staff , students and student council is also taken into consideration, and they can act as important input towards sustainability in education aspects.

Overall, Wageningen University has already integrated several elements related to sustainability in its courses and curricula according to the learning goals of each program.

3.1.4 The Manifesto of Tomorrow

De Manifest van Morgen translated as the Manifesto of Tomorrow (MOT) is one of the bases for this project. The history of the Manifesto in the University dates back to 10th October 2012, when the Student Council of WUR approached the University Board representatives, asking them to sign the Manifesto. As mentioned in the beginning of this report, Wageningen University did not sign the manifesto. We interviewed the Integrated Facility Management Department on behalf of the Board to understand the reasons why the University did not sign the MOT.

According to the outcome of the interview, the unwillingness of the Board to sign the manifesto was based on the reason that the University is currently involved in multiple and diverse programs in which sustainability aspects are integrated and incorporated. The Board therefore did not see any new or additional contribution that the signature of the manifesto could have brought, since the University is already addressing sustainability at all levels. Parallel to this, the Strategic Plan of the University clearly indicates the phases planned to bring the sustainability aspects concerning research and educational level at par with the operational level. Nevertheless, the University is aware of the fact that much more needs to be done. According to the criteria set for this project, the University is meeting almost all the criteria and covers some of the points raised in the Manifesto. For example point 5 of the manifesto, which states the importance of the interdisciplinarity of higher educational institute and solutions for a sustainable society is covered, the center for sustainable development and food security of the University is operational, although in its initial stages. This center is a multi-disciplinary center operating on a national level. According to the information we received from the Integrated Facility Management Department on behalf of board, Wageningen University is not just seen as a forerunner in sustainability aspects in the Netherlands, but it is apparently also one of the green universities. In order to maintain or improve on these accomplishments, the University has developed ways and means to integrate and incorporate sustainability aspects at all levels as an organization, as illustrated in its Strategic Plan .

According to Wageningen University `s motto ‘Do not do everything at once and be sure to do everything well’ (Wageningen UR, 2012, p. 5), the University is therefore not prepared to commit itself by signing anything which is not able to commit one hundred percent to, which in turn can tarnish the image and put the reputation of the University in jeopardy. Nevertheless, the University Board is maintaining its open door policy, is willing to listen to concerns and suggestions and to deliberate and address the concerns when possible.

Currently the task group of 2012 under the name of Sustainability on Operations was mandated by the Board to improve the sustainability of the University support services. This task group is also given the mandate by the Board to have an overall picture of all the sustainability aspects that the University is carrying out, and how the University is progressing as an organization in this regard. The main focus of the university’s sustainability task group is to have an overview of the accomplishments of the University concerning the sustainability process, what the University is doing including the incorporation of the operational and academic aspects of sustainability, to monitor and follow up on the chain of progress and improve on the shortcomings . However, the indicators used to measure this progress is unknown to us.

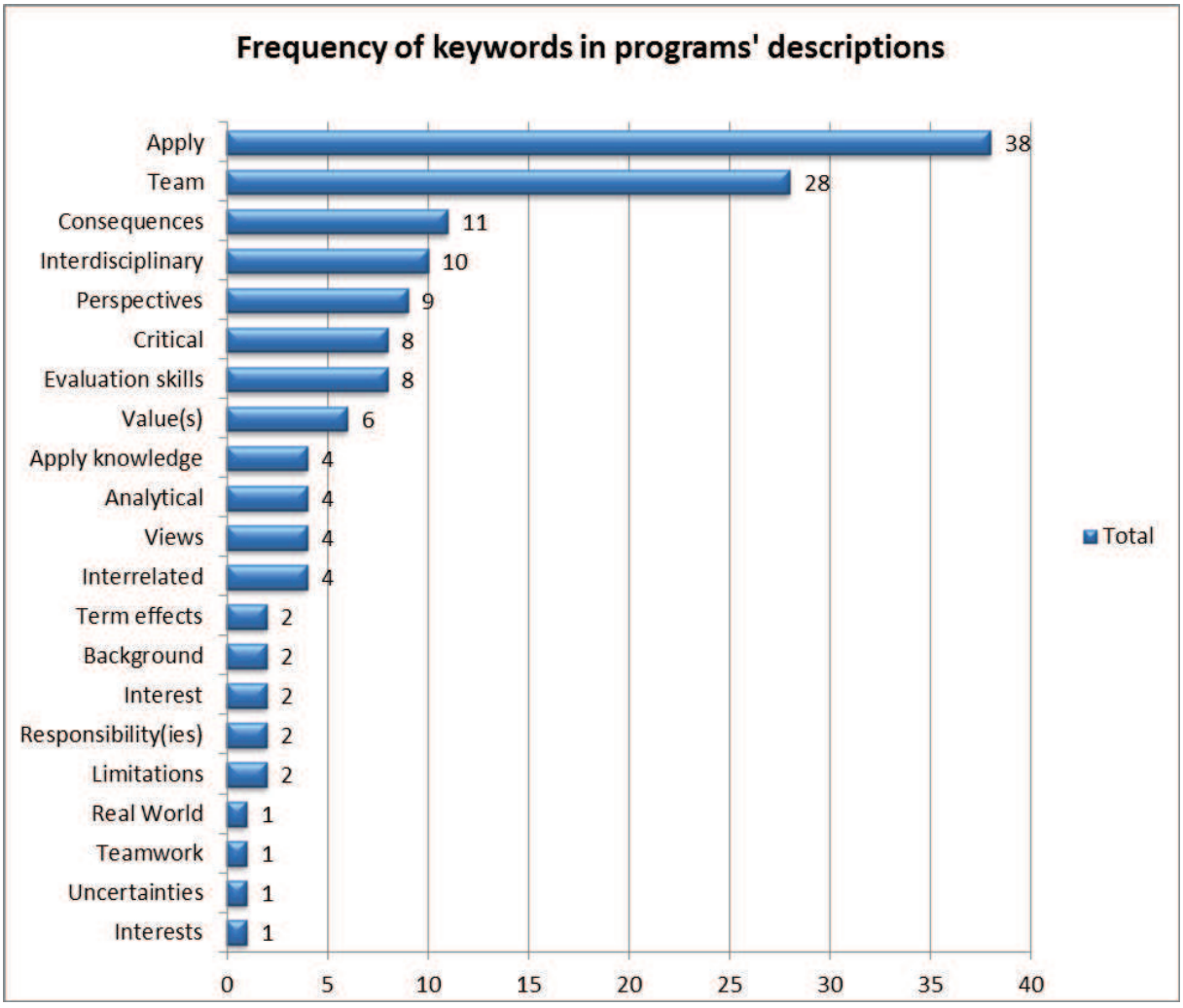
In sum, the Wageningen University did not sign the Manifesto of Tomorrow based on its mottos of ‘be sure to do everything well’. However, the Strategic Plan of the University make room for the integration of sustainability in education to be implemented in different phases.

3.2 Programs and courses analysis

To have an overview of the current situation and public available information regarding issues of Sustainability in Education in programs and courses descriptions in Wageningen University, a course analysis was done based on keywords that we developed according to our criteria, as elaborated in *Table 1* above.

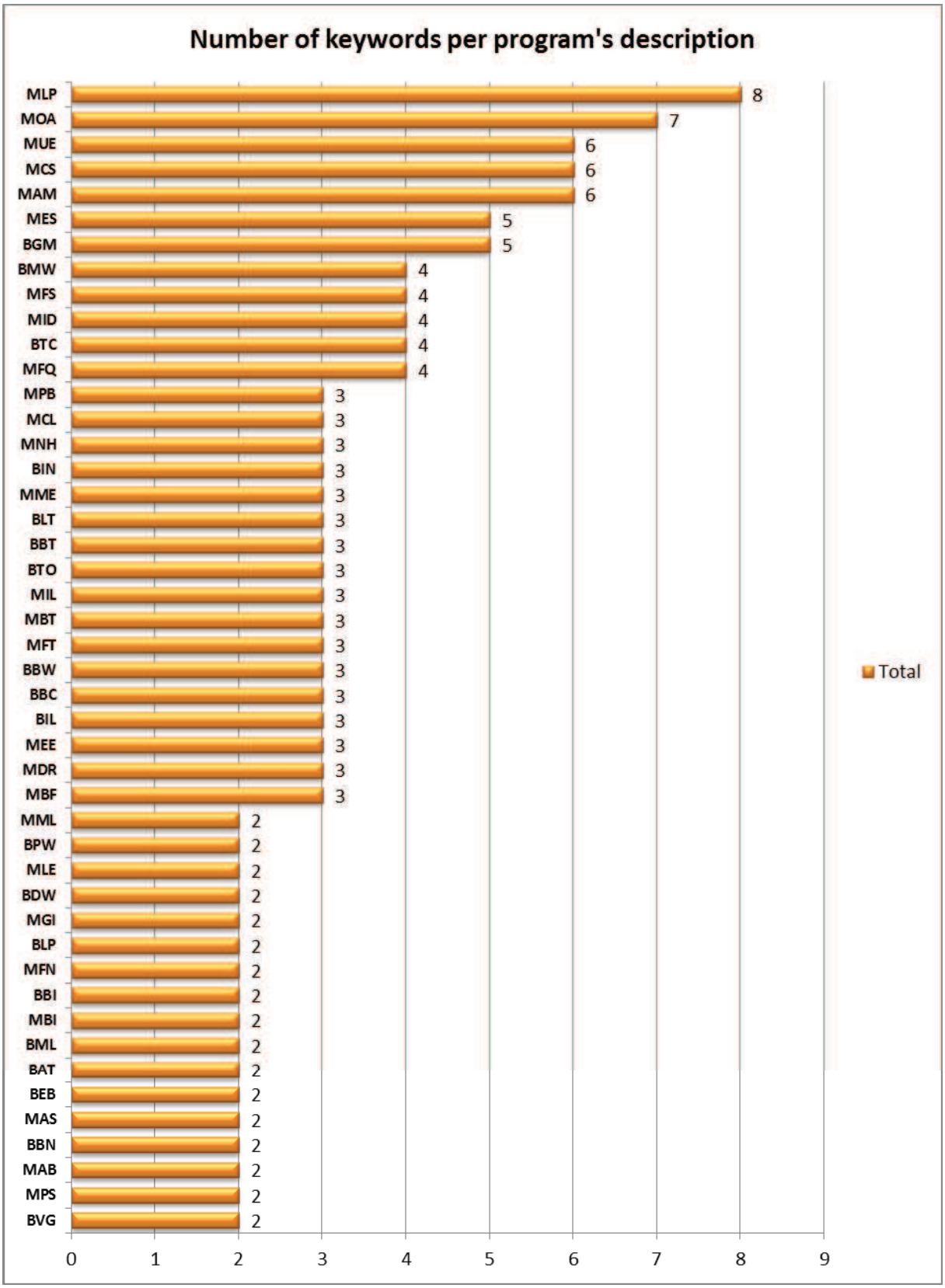
3.2.1 Programs

Graph 1 illustrates overall amount, diversity and frequency of keywords/combination of keywords were taken into account while analyzing descriptions of the programs which are published on the Wageningen University official website. In order to capture more details from programs descriptions more single keywords and combination of keywords without quotation marks were used.



Graph 1. Frequency of keywords in total in Programs descriptions

On *Graph 2* amount, diversity and frequency of keywords/combination of keywords in the each particular program are shown. 48 different programs of Wageningen University are presented here, with a range from 8 to 2 matches with keywords.



Graph 2. Amount, diversity and frequency of keywords/combination of keywords in programs description

In total 148 matches of 21 keywords/ combination of keywords within programs descriptions have occurred. The high popularity of the words “Apply” – 38 times and “Team” – 28 times is

not surprising, these are very general words used in many descriptions, though in published documents we analyzed in section 3.1 we did not find emphasis of importance of group work. From this, we may conclude that group work is integrated in programs but was not reflected in the analyzed documents. They refer to our criteria of 'participation' and 'linking knowledge and practice', which also score high in the scores of the interviews (see section 3.2.2). Other important keywords/combination of words, such as "Real world" and "Uncertainties", were found only once each. *Graph 1* shows the whole range of keywords found.

On *Graph 2* the number of keywords/combination of keywords in the each particular program are shown. 48 out of 52 different programs of Wageningen University are presented here, with a range from 8 to 2 matches with keywords. In the Appendix 7 you may find more detailed graph illustrating number and diversity of keywords per program.

Top 5 programs with at least six matches are the following:

- MLP - Landscape Architecture and Planning – keywords: Interrelated, Consequences, Limitations, Views, Perspectives, Critical, Apply knowledge, Apply;
- MOA - Organic Agriculture – keywords: Consequences, Perspectives, Critical, Analytical, Team, Apply, Evaluation skills (without quotation);
- MUE - Master Urban Environmental Management– keywords: Limitations, Views, Perspectives, Critical, Teamwork, Apply;
- MCS - Applied Communication Science – keywords: Interdisciplinary, Perspectives, Value(s), Team, Apply, Evaluation skills (without quotation);
- MAM - Aquaculture and Marine Resource Management – keywords: Interdisciplinary, Consequences, Views, Team, Apply, Interest.

Table 2. Number of keywords/combination of keywords per type of program.

Type of the program	Number of the programs in Wageningen University	%, Number of the programs in Wageningen University	Number of the key words /combination of keywords	%, Number of key words /combination of keywords
Master program	**31**	60%	**96**	65%
Bachelor program	**21**	40%	**52**	35%
Grand Total	**52**		**148**	

From the total of 48 programs almost all courses had some keywords in the description. The results of this analysis show that the MSc. programs have more matches in range of MSc and BSc. programs. This is of course due to the fact that there are more MSc. programs however, as we can see from the *Table 2*, it could also indicate that MSc. courses in general are more focused on combining knowledge and developing competencies to solve complex problems than BSc. programs that focus more on understanding concepts and factual knowledge.

3.2.2 Courses

For the courses analysis 26 keywords/combination of keywords were formulated – 2 per each of the 13 criteria, see the *Table 1.*

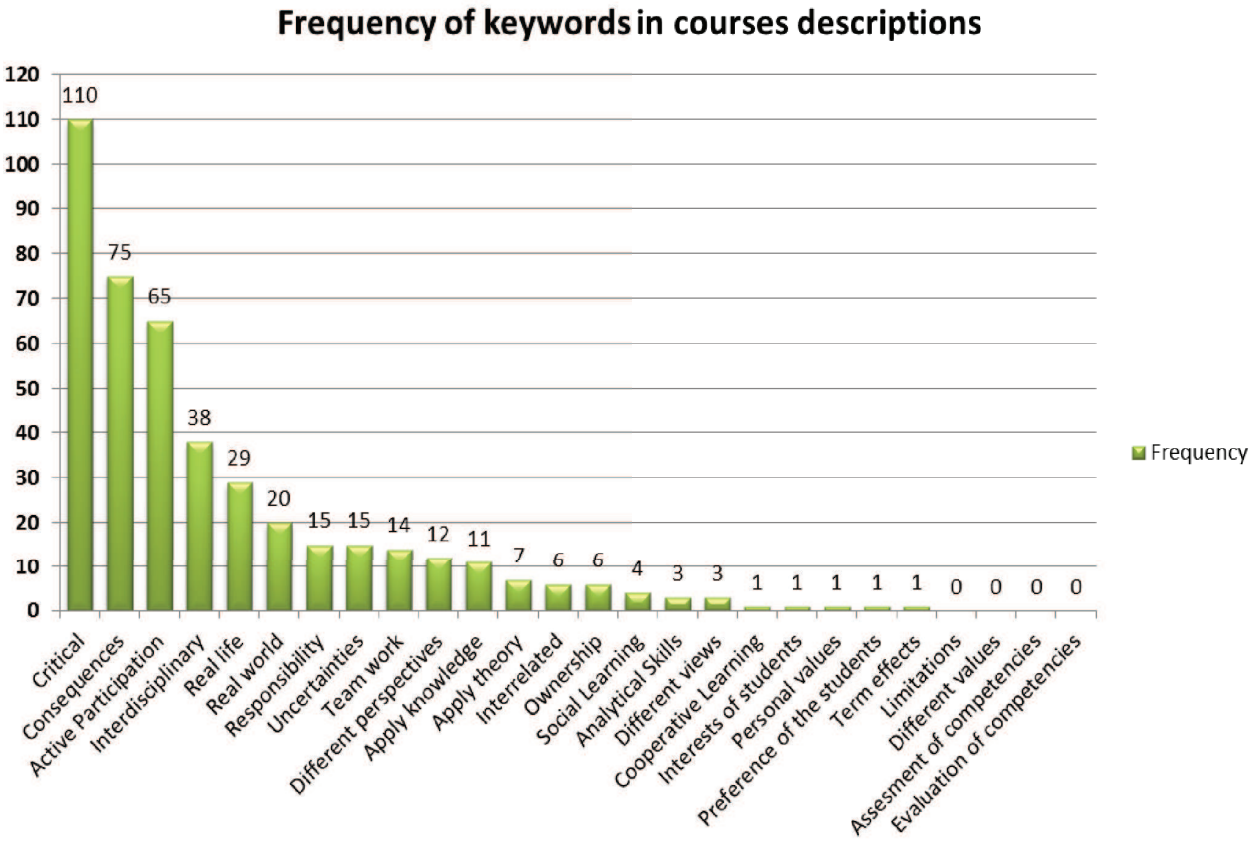
In total 329 courses out of 870 in total (according to the Education Institute) existing courses in Wageningen University have met at least one of the keywords. The overall results are presented in the *Table 3.*

Table 3. Overview. number and frequency of keywords/combination of keywords in courses description

Issue	Amount
Number of developed keywords from criteria	**26**
Number of keywords found in descriptions in Total	**437**
Number of courses in Total	**870**
Courses with at least one match	**329**
Courses with 4 matches	**1**
Courses with 3 matches	**18**
Courses with 2 matches	**69**
Courses with 1 match	**241**

From this can be seen that approximately half of the courses have a keyword in the description. If we take into account the generality of the keywords and the overlap of the criteria with general academic learning goals, this number is actually quite low. This could show that the criteria of sustainability in education are only partially represented in the course description and there is more focus on other aspects of education.

Graph 3 illustrates overall frequency of keywords that were taken into account while analyzing descriptions of the courses.



Graph 3. Frequency of keywords in total in Courses descriptions

As a last step we summarized results from the content analysis of courses description, and made Top-16 of courses with a high probability to match our criteria toward sustainability in education (see *Table 4 below*).

Table 4. Top-16 of courses according to descriptions in Wageningen University regarding Sustainability in Education

Title of the course	Keyword 1	Keyword 2	Keyword 3	Keyword 4
Introduction to Global Change	consequences	critical	interdisciplinary	uncertainties
Intellectual Property Rights	critical	different views	ownership	
Organization of the Agribusiness	consequences	critical	real world	
Advanced Microeconomics	apply theory	real world	uncertainties	
Methods for Strategic Planning	consequences	critical	uncertainties	
Advanced Food Quality Management 2	consequences	critical	interdisciplinary	
Environmental Toxicology	consequences	interdisciplinary	uncertainties	
Interdisciplinary Topics in Earth and Environment	active participation	critical	interdisciplinary	
Natural resource governance in a complex world	active participation	critical	real life	
European Workshop Environmental Sciences and Management	apply theory	interdisciplinary	team work	
Studio Strategic Planning	interdisciplinary	team work	uncertainties	
Environmental Project Studies	consequences	different views	interdisciplinary	
Food Related Allergies and Intolerances	active participation	apply knowledge	consequences	
Closed Cycle Design	consequences	critical	interdisciplinary	
Social Justice, Technology and Development	critical	interdisciplinary	responsibility	
Leisure, Tourism and Environment: Experiences and Environments	consequences	different perspectives	interdisciplinary	

4. Findings. Sustainability in education in practice

4.1 Assessment of teachers

Description of the table of scores

Searching for inspiring examples for sustainability in education in Wageningen University was the next step in our analysis. First of all, for this reason we made an effort to evaluate teachers according to our criteria with the range 'yes'-'partly'-'no' per criteria how it is explained in the methodology section. In order to provide a general overview of these interviews, we scored each interview on the basis of the number of the criteria that the teachers met. The results of this process can be seen in *Table 5*.

- The range of scores of the teachers is in between 7.5 and 12.0 points out of 13.0 points, with an average total score of 9.5.
- Two teachers scored 12.0 and one teacher scored 11.5. These scores are considerably higher than the rest of the teachers.
- From the scores it can be seen that all teachers meet at least half of the criteria out of the maximum. This means the interviewed teachers are meeting on average 73% of the criteria. This result is partly influenced by: 1) the overlap of the criteria with 'good academic teaching' in higher education, and 2) a selection bias towards teachers that meet the criteria.
- The criteria 'awareness of limitations/uncertainties' and 'critical thinking' has been seen in 11.0 and 10.0 teachers respectively, and this could be linked to the fact that both criteria are closely related to teaching in higher education.
- The criterion of 'stimulating participation' has also a high score of 10.0. Stimulating participation may be connected with the emphasis on group work in many of programs' descriptions, participation and (intercultural) collaboration within the Wageningen University.
- Criteria which are less commonly met are: stimulating responsibility, focus on consequences, analyzing from different perspectives and assessment of competences related to the criteria.

Observations and conclusions

Many criteria we used are not only important for sustainability in education, but in general for higher education. This is at least partly affecting the scores, contributing to high average score. We suggested that making a selection on the basis of the average scoring would result in acquiring inspiring examples of teaching methods which are most directed towards sustainability in education. However, we found that teachers who scored below average still met most criteria and are sufficient to provide inspiring examples. This gives room to select the most inspiring examples from all the teachers and creates a more complete picture the different aspects of sustainability in education.

We identified some of the limitations from teachers' perspective - the gap between what teachers want to do and have to do during classes:

- time limitations;
- content related issues – e.g. constraints to transmit certain values to students while teaching mathematics;
- complexity of new required material itself – i.e. constraints to incorporate even more complexity to the issue while subject is already complicated for students;
- size of the groups (too large groups);
- difference between teaching in bachelor and master programs regarding exchanging of experience.

Table 5. Table of scores

Title of criteria / Teacher	Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5	Teacher 6	Teacher 7	Teacher 8	Teacher 9	Teacher 10	Teacher 11	Total score per criteria
Awareness of limits and uncertainties in knowledge	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1	**11.0**
Use of real-life examples	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1	**10.5**
Critical thinking	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1	**10.0**
Stimulating participation	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1	**10.0**
Linking knowledge and practices	0.5	0.5	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	0.5	**9.0**
Cooperative learning	0.5	1.0	0.5	0.0	1.0	1.0	0.5	1.0	1.0	1.0	1	**8.5**
Interdisciplinarity	0.5	0.5	1.0	1.0	0.5	1.0	1.0	1.0	0.0	1.0	0.5	**8.0**
Acknowledge and understand own and different values	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	0.5	1.0	0.5	**7.5**
Adaptability in course	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.0	0.0	0.5	0.5	**7.0**
Focus on consequences	0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	1.0	1.0	0	**6.5**
Analysing from different perspectives and dimensions	0.0	0.5	1.0	0.0	0.0	1.0	1.0	1.0	0.0	1.0	1	**6.5**
Assessment of competences for sustainability	0.0	0.5	0.5	0.5	0.0	1.0	0.5	0.5	1.0	1.0	0.5	**6.0**
Stimulating responsibility	0.0	0.0	0.0	0.5	0.5	0.5	0.0	1.0	1.0	0.5	0.5	**4.5**
Total Score per Teacher	**7.5**	**8.5**	**9.5**	**8.0**	**8.0**	**12.0**	**9.5**	**12.0**	**9.5**	**11.5**	**9.0**	
Average score for Teachers												**9.5**
Average score for criteria												**8.1**

4.2 Findings for individual criteria

Based on our 13 criteria, we developed 11 questions for the interview. We ordered the answers according to our criteria to get a clear overview of the results. In this part we presented the total scores received in each criteria and highlighted some approaches of teaching which are supporting sustainability in education.

1. Interdisciplinarity and complexity: *Relations between issues and phenomena.*

The teachers' answers for this criterion varied quite a lot. The total score for interdisciplinarity was 8 points out of 13. For some teachers interdisciplinarity is the core of their course whereas other teachers said it actually does not go with the subject they are teaching. This is because there is a division between teachers that have to teach students factual knowledge and courses that are focused on combining and linking factual knowledge to look at multiple facets of problems or issues. During our interview, some teachers related the integration of interdisciplinarity in the programs as a whole and other teachers told us it is possible to include interdisciplinarity partly on certain discipline. To present interdisciplinarity teachers use different techniques, since some techniques overlapped, we chose one of each type which are highlighted below: Teachers use case studies, as case studies deal with several conceptual aspects. This can bring out complexity of issues and phenomena.

- To address complexity one of the teachers developed a flowchart. All the steps in thinking that should be done from a concept towards a report on a problem and all the steps in between are shown. The flowchart is in a way the anchor by which the course is given.

- For some courses interdisciplinarity is the focal point. Students from various cultural backgrounds deal with a real-life issues and real-world problems. By working on solving a complex problem with different students these courses are bringing interdisciplinarity in education system.

- Some teachers mentioned, that it is often not easy as human being to understand all parts of what is going on. To prevent this unworkable situation they break down complexity and start from simpler concepts which in later stage can be combined. Students, in particular in the BSc, need still to learn to work with high levels of complexity.

2. Focus on consequences. *Short term and long term effects.*

The total score of this criterion was comparatively low compared to other criteria. The total score was 6,5 points. Therefore, only a few examples came up under this criteria; the teachers said that they focused on it through content and examples. The examples are given below:

- Some teachers indicated that in their courses they talk a lot about long term effects for example, they talked about scarcity of water resources. They addressed that this is why technologies are being developed which address resource scarcity.

- A teacher mentioned that in his/her field these real examples with long term consequences form the real challenge in the future for students.

- One of the teachers told that if you have a bad operationalization of your concepts then you will have bad results in the end whatever you do in the middle. So there is a strong connection in between and there is consequence of choices that you make.

- A teacher stated that the whole program is focused on changing our paradigm in the urban context. Slowly changing the linear metabolism of the city we replaced by the concept of the circular metabolism.

3. Awareness of limits and uncertainties in knowledge.

This criterion is used by all 11 teachers we interviewed. With 11 points, this is the highest total score. It is seen as a prerequisite that as a teacher you tell the students about the limits and uncertainties that exist in knowledge and how to use this knowledge when developing solutions. Inspiring examples that came up are:

- A teacher said most of the teachers in his/her department, including her/him, know that teachers and people who try to distribute knowledge know the fact that 'the more they know, the more they do not know'.

- Another teacher said he/she likes to show the errors that were made, the things that we did not know and the errors other people made as well. This is not to show them who made errors but to show how science is progressing, how people are struggling and getting forward. That is reality in science and that is what makes science exist.

- A teacher said he integrates this criterion a lot in his/her course. He/she uses textbooks but does not stick to the textbook, rather uses recent papers that shed new light on research and it usually involves twigging or changing conceptions that have been written before. This approach relates with our another criteria flexibility of courses which has been mentioned below.

4. Analyzing from different perspectives and dimensions.

Analyzing from different perspectives is less commonly found. With a total score of 6,5 points it still can be seen in more than half of the teachers. Moreover, looking from different perspectives is often difficult and time consuming; it is not just relating different parts of the issue, but it is immersing in a different viewpoint towards the issue. From the results it can be seen that this is easier in the courses that are already working on the borders of different scientific disciplines. Appropriate methods we found include:

- Some teachers said they like to show the different perspectives through articles. Sometimes they give several papers about the same topic that obtain different results. The answers and opinions of the students are often very different from the authors. Here teachers stimulate students to find creative approaches towards problems. Different perspectives of different students come up through this process.

- One teacher said he/she made presentation compulsory. The students are asked to present in smaller groups, so they make a presentation about the topic and share this with all the other groups. In this way students can discover that their point of view of the topic may be different from the one that is being presented.

- In intercultural settings the teachers try to mix students from different programs, so that they have different perspectives to share and work with them.

- In another course, a central part of the teaching is simulation. In the simulation students submit their strategy papers writing about their background, why they have chosen the role they have and what they think they can bring into. Students choose a role from a completely different perspective, including the challenges associated with the industry and arguing on behalf of the industry. This gives them better insight to see what the industries are doing. In this way the teacher tries to challenge the perspectives of their knowledge but also of their beliefs, values and culture in different ways.

- Some teachers gave general opinions in their statements and mentioned they do not only use different examples for explanation but also look from different perspectives and try to widen the interest of the students.

- One teacher said he uses funny examples from YouTube just to draw attention which is a substantial part to stimulate students' attention. It helps students to talk about the same things in a completely different way.

- Some of the teachers said they talk about academic debates and have discussions where people disagree on a certain topic. They show that if people disagree and have discussions about something, it already indicates that it is not clear who is right in the discussion.

5. Stimulating responsibility. *Creating ownership of problems/issues.*

Stimulating responsibility has the lowest score among all criteria - 4,5 points. This is mainly because teachers do not see it as their task or duty to make students feel responsible. Most teachers think that the students have to decide for themselves. Even some teachers which do find it important are not addressing it directly. Though this criterion was not met by most the teachers we found some interesting points:

- One of the teachers said that he/she does not want students to feel responsible for solving complex problems like global warming. It requires years of experience, research, confrontation, negotiations. He/she would like to see the responsibility on

being engaged with people of keep asking questions, keep trying to figure out answers, in students. He/she wants to recover a sense of easiness. Because solving global warming is too tough for the students and the students are young so they should have some fun. He said 'life is tough we deal with very difficult problems but you should find some fun in learning and dealing with problems. It's a bit contradictory but that's my idea.'

- One teacher said that he/she does not have anything like this in his/her lectures but found another way to stimulate responsibility by starting the 'science café'. This space brings people together and students come into contact with scientists that deal with societal scientific matters.

- Some teachers said they think most of the students are very conscious and they choose this direction including the responsibilities. Many of the students saw those problems in their own countries or environment so they are already conscious and their consciousness is only growing by being exposed to so many people here. The teachers are therefore trying to stimulate responsibility by strengthen their interest and enthusiasm.

- Another teacher mentioned that responsibility already starts at small scale. He/she is therefore stimulating responsibility on this small scale, like cleaning the classroom, and connected it to the large scale problems to make students feel involved.

6. Acknowledge and understand own and different values.

Most teachers are partly taking into consideration acknowledgment and understanding of own and different values. The total score is therefore 7,5 points. Acknowledging values can be done on many different levels; the deeper it is done - the more effort it takes. It plays an important role in communication between different people. Clear differences exist among teachers: some do not find it important, while some discuss it or are actively working with it. Selected answers are as follows:

- A teacher explained that in his/her classroom he/she tries to develop values that belong to that classroom. In that way the class tries to find respect for all values. He/she tries to find and share these values by using examples of the students. Then he/she focuses on the examples that are not discriminating the values of others and looks for ways how these different values can be used in a positive way.

- One teacher described that a lot of students are already experienced as they worked in their own country before coming here. So he/she considers it very important to mix those different insights and cultures as he/she is aware of the fact that the students will address certain issues in a different way, not only when talking about topics but also in the way of (inter)acting and exchanging knowledge.

- Another teacher is doing research on importance of values in his/her current course. He/she thinks values play a role, and the research he/she is currently doing in the course is trying to assess whether students recognize their own values while doing this research.

- A nice idea that came up was a list of values or attitudes that people can have, like being pessimist or optimist, being materialist or spiritual, being left wing or right wing etc. is shown. Several students are then asked to determine where they stand in a certain position and discuss about the differences.

- Some teachers gave general statement and mentioned they use reflection exercises or papers for students to reflect on their own and different values.

- Simulation as discussed in criteria 4, gives students a better insight to see what is happening in practice. In this way the teacher tries to challenge the perspectives of their knowledge but also of their beliefs, values and culture in different ways.

7. Critical Thinking. *Development of well-reasoned opinions and room for expressing them.*

The total score for this criterion is 10 points; a high score that is related to the general nature of this criterion. Critical thinking helps students to develop well-reasoned opinions and room for expressing their. Therefore, many courses and teaching at Wageningen University are directed to learn to think critically. The answer of almost all teachers was ‘yes’ or even ‘of course’. It is a given concept in their teaching and they all hope it is conveyed. Standard methods are used like discussion and writing of scientific papers or comparing different cases. Other ways are mentioned below:

- Several teachers said they find it more important that students develop the analytical skills to be able to process the current information than know the information. Therefore, they really focus on analytical skills. On the other hand, some teachers who are focused on knowing the information want the students to be critical towards the facts and their usage.

- Several practical examples are given in which the students have to compare certain elements or concepts. For example, being able to relate concepts to guidelines, and to say which one of these makes sense or doesn’t make sense at all. But also, if students think that these things don’t make sense, they are asked to give inputs how the things can be improved based on their opinion.

- Many teachers mentioned they use open questions on their exams and assess the way of discussion and critical reasoning the students use.

- Some teachers said they stimulate students to be also critical towards the things they tell them. They make the students aware that they can make mistakes too.

- Another way to stimulate critical thinking is to come up with the best solution to a complex problem with different aspects. This requires combining elements in a wise and analytical way.

- Another teacher said he uses confronting pictures or movies to let the students think about the theories and get a discussion going. After this he/she makes the students think about why they accepted a certain theory but not another.

8. Stimulating participation. *Through group work/debates/etc.*

This criterion is similar with critical thinking. In general, the education at Wageningen University focuses on it and it has scored 10 which is a high total score. Without participation in education, students will not be able to work together in diverse teams or with different people, something which is unthinkable in global problems. All teachers have group work in their courses however, it was not always clear how they develop and use group work. For the ones that were clear it shows that methods are really diverse; from the conventional analyzing papers in groups and giving presentations to extensive role-plays. The majority however still uses the more conventional methods which are given below:

- Different teachers mentioned the importance of group dynamics. By relating to the students and finding out how they interact, participation could be done in different ways. One of the teachers called it 'managing the group'. Another told there should be a balance of giving the chance for students to interact and interfere but with a grounded argumentation.

- Provoking was one of the tools which was often mentioned. In the form of videos, questions or pictures this can easily lead to choosing sides and having discussions.

- Several teachers try to get students involved in not just listening but also coming up with stories themselves. Especially relating to daily life experiences and examples is an easy way to let the students give input.

- Some teachers use small discussion groups that can discuss a question for a few minutes as an effective way to stimulate participation. In this way the students feel more comfortable in speaking up because they already got the confirmation from the other students.

- Informality was something mentioned by a few teachers as important to have involvement of students. This makes the students at ease and comfortable and then they feel the teacher is approachable.

- An example of participation was teachers make peer review groups where one student check the other student's report and give feedback. This process helps students learn from each other and also learn how to work with each other.

- Two teachers do role-plays or simulations. These are ways of participation which require organization but very actively involve the students.

- Also pictures and graphs were used to make students interact. Some teachers said these are easier to understand and to discuss. One of the teachers uses interactive

pictures which are helpful in getting the students talk about processes and let the students be part of the explanations.

- In several courses projects are the central activity. In these courses the focus is on teamwork and discussion; not surprisingly, these courses are the most participative.

9. Cooperative Learning. *Mutual process of learning and teaching.*

With a total score of 8,5 cooperative learning was a criterion which was somewhat in the middle. It was often related by the teachers to participation, as in group work there are a lot of opportunities to learn from each other. Some other teachers were focusing more on the multitude of cultures we have in Wageningen and how students and teachers can learn from this. Cooperative learning requires in this sense more effort than participation. Not only have people to interact with one another, there has to be an environment where people and their views are accepted and discussed. This expression of ideas often requires a setting where actors are feeling equal and at ease. The scores were therefore also more diverse and very different answers were given. Again presentation and discussion were most often mentioned,

- One teacher said group work can also be seen as a collective teaching process by helping each other as students can solve a lot of problems themselves. Groups can perhaps explain better than the teacher can and if a student hears something from 2/3 people explaining in different ways the student can probably pick up much better than the one dimensional way of teaching. Like several teachers he focused therefore on group work.

- One of the teachers advises students to take the teacher's powerpoints and explain this to someone else. When the other student asks questions and he answers (or: tries to answer), the subject matter will be clearer.
- Another way to stimulate cooperative learning is by discussing statements. Some examples were given, for instance "every group needs a dominant boss" or "I can only work together when my group mates are friends". Often it then emerges that people have different opinions and discuss them.

- A common question that is asked by the teachers that focus on diversity of nationalities is: How do you do this in your country? With this question different ideas are shared and cooperative learning takes place.

- One teacher tells that there were multiple cases where students approached a teacher after a lecture and were not in agreement about certain issue. In his/her course students can come and discuss with him/her what they think is right and what is wrong with the logic. These discussions help him/her to also learn from their students.

10. Use of real-life examples. *Use of examples both from local and global level.*

Using real-life examples is a very commonly met criterion with a score of 10,5. Everyone said that they were using real-life examples except for one teacher who actually gives a course

that is fully practical. However the way examples are used are different, ranging from students, to daily life to newspapers. The answers that came up are:

- Many teachers use culture related examples (home country related examples) and also international examples from different places. The examples are used to get all students involved and learn from each other.

- Some teachers changed the examples according to interest of the students where possible. This makes the students feel more associated.

- Humor can involve students and makes topics a bit less serious, especially funny examples from for instance YouTube videos draw attention.

- Most teachers said they are up to date and searching for new information. For some this is not always easy, for others there is no shortage of real life examples. The teachers use real life experience to put the content into the context and make the students understand the real problems.

- One of the teachers even uses a real-life example for the main theme of his/her exams. He/she asks 20 questions on exam about this piece of movie. Thereby try to discuss things the students have seen and know about.

- A very important example is to put the concepts into the context and larger picture. At same time this makes students feel related to it. One of the teachers decided to identify an example under which five subjects can be summarized. These examples can be for instance different human diseases with which students can relate.

- As a form of participation some teachers ask students to come up with examples of their experiences from the last couple of days on the topic - whether they read something, heard something, experienced in their life that has something to do with the topic.

- One of the teachers uses all cultures and backgrounds of the students to come up with valuable examples. By asking the students what they do in their country or field of knowledge and combining this gives a more complete picture of the various possibilities and contexts.

- Calling to sympathy - one of the points the teacher mentioned. That means, he/she likes to choose real examples on which students' can sympathized with and use them as a tool to explain and present issues and concepts to connect them.

- A teacher uses examples on different levels he/she generally tries to bring in one large illustrative case per lecture to try to illustrate the whole theory. In between he/she uses smaller examples to show the different concepts and also let students come up with examples as the first steps.

11. Linking knowledge with practice. *Engaging in practical activities.*

Linking knowledge with practices is not an easy criterion for us to judge. Writing a research paper is something very different than doing a project for a NGO. So deciding when something is really contributing to the experience and knowledge of how to work practically is somewhat subjective. In total the criterion scored a 9. While all the teachers do practical things, a full point was given only if there was a large focus on it. Different sorts of practical activities include using cases, writing papers, doing excursions, fieldwork or doing a large project.

- One of the interesting ideas mentioned are games. While the teachers mentioned it, it was often still an undeveloped idea. One of the teachers had the idea of a student case competition. Basically it is developing a case study where the students have to work with practical things.

- Some teachers said they are constrained with the subject itself because it is very fundamental and facts based. To handle this some use their examples to make the link to practices. They don't really focus on the piece of knowledge but on how they can apply it and how it is related to a larger process.

- For some teachers practicals and excursions are central. They show students what the teachers talk about during the lectures. This is partly experiential learning and partly linking and seeing how theory works in practice.

- As mentioned above, some courses are project based and therefore really directed towards bringing knowledge into practices. For example the theoretical model which is linked to a case, an assignment that comes from a non-academic organization, and that can be an NGO, a ministry of environment, or a municipality.

- Also here role-plays can be a good tool to link theory to practice. It is a sort of experiential learning where the teachers try to give each students a role for example EU representative, so that students can reflect the challenges that these actors face while dealing with complex environmental problems.

12. Flexibility of the course. *Inclusion of student backgrounds, interests and current developments.*

The total score for flexibility was 7. Often this was present partly in the courses the teachers were talking about. When all, the interests, background and current developments were taken into account, then the full point was given but this was often not the case. Many teachers say it is not easy to make too much content related changes in a course. The interesting examples that came up are:

- One of the teachers told that in the large groups of students it is extremely difficult to completely satisfy the whole group. There is often a too large difference between the students but that's the challenge at Wageningen, still he/she is conscious of that and tries to tailor lectures to them.

- Also in this criterion group dynamics is important. Teachers say that they try to bring students who have different backgrounds together to see how they react and participate. One of teacher is doing some ‘spy work’. He/she talks with the study advisor. He/she finds out which course the students are doing and sometimes go to the excursions with them and observe the students and looks for extra information which might be helpful in advance of the course.

- A lot of teachers are keeping up to date on literature and new academic findings and include this in their courses. Some like to pick examples and articles from the news. One of the teachers is saying that by not deleting the old information but updating it every time students can see trends in the literature that is used. The teachers are also changing the assignments according to new developments.

- The teachers that have knowledge about several topics and are teaching the principle courses said that they can more easily adjust to interests of the students. They do this by talking about topics the students are interested in, using examples and adjusting the difficulty of the lectures.

- A few teachers ask continuously for a lot of feedback to adapt their course. One of the teachers does immediate midterm evaluations to have a chance to change the course if he/she thinks there are serious issues that have to be changed.

- Another tool to get feedback and change the course is questions from students. A few lecturers said that their lectures change constantly because of the questions they get from the students.

- One of the teachers said he/she uses group work games to consider all interests of the students.

13. Assessment of competences related to sustainability.

The assessment of the competences is a difficult criterion for the teachers. The total score for the assessment is 6. Many of the teachers deal with limited amount of time or a too high number of students to assess. However, some teachers made an extensive rubric for evaluation and spent a lot of time to assess the students and their competences.

- Some teachers said they believed that students should be assessed in a variety of ways. Also that factual information cannot take you anywhere after graduation, but you need the skills to implement the knowledge and this should be assessed.

- Most teachers use open question exams and analyzing or writing papers as their means to assess students on criteria like critical thinking and awareness of limits and uncertainties.

- Creativity was mentioned several times as an important assessment elements. This was not in our criteria however, it plays also an important role in sustainability in education.

- For the courses which were less fact-based and more participatory a different way of assessing is usually developed. This can be reflection papers or an extensive assessment rubric which includes criteria for participation, group work, critical thinking, etc. Mentioned was that this often takes a lot of time but ensures a better assessment of the students.

4.3 Professor T

The inspiring stories of the teachers inspired us so much that we started to imagine a teacher who has all these inspiring traits in teaching. We made an imaginary teacher based on the inspiring examples we received from the interviews and named the teacher as professor T.

Professor T : "What I am really inspired to do while teaching:

- I use pictures rather than 1000 words! I talk in pictures, to make abstract concepts tangible. This is the international language, and helps my audience to understand easily. It is easier **TALK IN PICTURES** for students to understand study material when they see simple picture instead of many words. I try to use as many nice graphs and pictures as possible, also funny videos.

- Since I am curious, **CURIOSITY** I do some spy work before classes start. I talk to the study adviser of the group about origin of the students and their background. Sometimes I am lucky, and have an opportunity to join other classes the group is already doing or join them for some excursions, so I am able to observe the 'personality of the class', i.e. personality of students and their relationships.

- I find it very important to relate students' experiences to the content. **COLLABORATION** So, I like to start my lectures by asking students what they experienced the last couple of days related to a certain topic. They can come up with examples **RELATIONS** from newspapers or something they experienced in their life. Then I combine their examples with my topic. This helps to involve students more.

- I have an illustration where I have a list of values or attitudes **AWERENESS** that people can have: like being pessimistic or optimistic, etc. Students can take positions from these options and discuss why they took that certain position. **COMPARISON OF VALUES** This helps them to be aware of others value and broaden their perspectives.

- I like to make students feel comfortable. Many students are afraid to say their points, so I ask them a question and give room to discuss with their partner informally and then come up with the point. **INFORMAL COMMUNICATION COMFORT** During practical, I try to make students more involved and make it less formal. Thus students can comfortably interact.

- I like to make my teaching interactive, so I use simulation as an interactive learning tool. **SIMULATION** The students get different roles to play, which helps them to

replicate the challenges in dealing with complex problems. This method helps them to focus on argumentation, logical thinking, application of concepts. Later the students get the scope to analyze the consequences of the strategies they developed through argumentation and debate and, therefore, they have a point of reflection. **INTERACTIVE LEARNING TOOL**

- When I present global issues to the audience it is essential to escape 'holistic paralysis', i.e. I do not let students get paralyzed while addressing all the complexity of the problem. Instead, **BREAK DOWN COMPLEXITY** it is important to break down complexity into concepts which enable students to grasp the ways to analyze the complex problems. Meanwhile, I always connect and relate issues to the bigger context to show some more interrelations and interdependence. **CONNECT WITH BIGGER CONTEXT**

- Reasoning by analogy is what I find very important **ANALOGIES** so I often structure my examples in this manner.

- **CALLING TO SYMPATHY EXAMPLES** While using examples I like to choose real examples students can sympathize with and use them as a tool to explain and present issues and concepts, to connect them.

- Even more, to show the logic of changes, to see interrelations, I use interactive pictures. Students can **INTERACTIVE PICTURES** move points and see the changes on interactive pictures, it helps students to connect and to be involved in the studying process. Besides, they may play with interactive pictures and thereby repeat the material in the evening.

- Working with different nationalities is an advantage of our University. **DIFFERENCIES** I believe that we all can learn so much from each other. I consider it very important to mix those different insights and cultures. When we talk about issues in the class there is always a question how is it organized in students' countries. **COUNTRIES** From that we collect a lot of material and we learn from it a lot. I use the benefit of having multinational surroundings in the class. Students are coming from all over the world and solutions to practical issues are very different in different parts of the world. So **APPROACHES** I try to cover all, I show the most advanced, expensive, high-tech, highly efficient systems, but also simple systems that can be as effective as those complex one. This leads to students' ability to select or combine the most appropriate technologies in a certain context to come up with a sustainable solution.

- When I have to teach a white (noncontroversial) subject I prefer to present a provoking video of that particular **PROVOKING VIDEOS** topic and then like to have a discussion with my students.

- To demonstrate how science is progressing, how people are struggling and getting forward, **DEMONSTRATION OF LIMITS** I like to show the errors I made to students, the things I did not know and the mistakes other people made as well.

- I use rubric to assess students. The students can also see the rubric so that they know what I consider important while grading them. **RUBRIC TO ASSESS**

- The questionnaire that **IMMEDIATE FEEDBACK** students fill at the end of the course is not really helpful for me. So, in the halfway of the course I like to have an intermediate evaluation hence I ask students to give me feedback. Students can contact me whenever required for any kind of comments. The immediate evaluation helps to make necessary changes as required.''

5. Conclusions

The aim of our report was to provide an analysis of the current situation in Wageningen University concerning sustainability in education, and to identify some inspiring practices of teachers who apply sustainability in their pedagogies. The results can be useful to inspire other teachers to apply in their teaching approaches.

1. Current Situation

- From the interview with the facility department, it is clear that they think the University's level of sustainability in education is already high. They assume that the operational level is lower and they indicated the planned phases to bring the sustainability aspects concerning research and educational at par with the operational level. However, it is not clear from this interview what they define as sustainability aspects in education. Next to this, the analysis of Wageningen University`s policies documents shows that sustainability is mainly related to the research areas and educational content of the University. This information could be used as a primary focus on the sustainability related content. While it is important to have content related courses to develop the students in specific sustainability topics, it is just as important to focus on sustainability related competencies.

- The University is focusing on some of the criteria defined in this project. The incorporation of a multi-disciplinary approach, the use of different perspectives and the linking of knowledge and practices are all addressed in the policy documents. Other criteria are not explicitly mentioned but this does not show that the University is not performing well on these criteria. However, a central focus on sustainability in education as a holistic educational approach towards competencies for complex problem solving is clearly missing in the information of the current situation. While a combination of the criteria the University is focusing on, might lead to professionals capable of solving sustainability problems, this cannot be assured or checked without a central focus on sustainability in education.

- The information from OWI showed that it is difficult to assess or change the current situation from a policy level at the moment. The most determining factor of the focus on competencies is the learning goals of the courses and programs. These are determined by a complex negotiation between the chairgroups and program committees. A representative current situation can therefore only be given by analyzing the chairgroups and the programs. This might also be the reason why a central focus on sustainability in education is not applied in the current system of the University. Here the role of the OWI is relatively limited; it can only disagree on the learning goals. However, it is not clear when a certain course or program is denied and whether there is a central concept behind this.

- The analysis of the descriptions of programs and courses show that almost all the Bachelor and Master programs descriptions include some of our keywords, although

in many cases these are very general words, for instance ‘apply’ or ‘team’. Some words are related more directly to our criteria, like ‘uncertainties’ and ‘responsibilities’, have only few matches. Moreover, only half of the courses matched at least one keyword, and the percentage of the courses that matched at least two keywords drops to approximately 10% of the total. This suggests that sustainability in education, as defined in this project, is not yet used commonly in the language of the course descriptions and might be representative of a lack of focus towards sustainability in the courses and learning goals.

2. Practice

- The answers of the interviewed teachers show that on average, the teachers meet a lot of the criteria; the average is 9.5 out of 13 criteria. This is partly caused by the selection of criteria and selection of interviewed teachers does not necessarily imply a full focus towards sustainability in education (see chapter 5: Discussion).

- Most interviewed teachers actively integrate the development of competencies related to our criteria in their teaching. However, they do this with rather conventional methods. Conventional methods are in itself very useful but to tackle the current complex problems new competencies need to be developed that ask for new and innovative pedagogies. These innovative methods are better directed towards solving complex problems; for example simulations and role plays give you a better understanding of the different perspectives than giving and attending presentations.

- The focus on conventional methods is not necessary due to the unwillingness of the teachers but may also be related to limitations the teachers experience in working in the University. Mostly mentioned limitations were time limitations, large numbers of students, content related issues and complexity and amount of new required material that has to be presented to students. This seems contradictory with the findings in the Strategic Plan 2011-2014 where it is mentioned that the University is a relatively small-scale institution, where there is close contact with the students and there us a focus on the students’ needs.

- From the answers it was seen that some of our interviewed teachers feel that they need to stick to the existing course outline. This has to do with both the limitations they experience and the fact that most teachers do not have a pedagogical education. It is difficult to have a very innovative and flexible way of teaching related to competences if you do not know how to do it and do not have the time to invest on it.

- The interviews of the teachers showed that a lot of the answers depended on what content is taught. In courses that start from wicked problems it seemed easier to include competencies related to sustainability problems than in courses which focus on the understanding of concepts. We acknowledge that both are important and have a different starting point. Courses that are focused on complex problems have to make the students able to work with the complexity. Courses that are fundamental have to show why these concepts are important to understand and how they are

related to real-life problems. The fact is that both courses can have a central focus on solving complex problems. In the end it is more determined by the effort and viewpoint of the teacher than the content.

- Most interviewed teachers are committed to their job and a lot of good teaching practices that are related to sustainability in education are coming from characteristics such as; being passionate, being approachable, engagement with the students and willingness to learn. These characteristics lead to stimulation of involvement and curiosity, creating a strong learning environment, the use of differences among students, etc.

- Our interviews highlighted several admirable examples of teachers who really integrate sustainability elements in their own way. Some of the inspiring examples are; the use of interactive pictures, linking students' experiences to the content, extensive evaluation and feedback session, exercises with differences in values and multiday simulations. Some of these activities are small actions that can be easily put in practice regardless of the type of course, for example relate the students' experiences to provide a larger context of the content. Some others, instead, require a broader and more demanding adaptation of the course, for instance, set up role-plays and simulations which stimulates interdisciplinarity, different perspectives and working with different people.

We think that these practices demonstrate how sustainability in education does not have to be an abstract concept, but a practice that can actually be applied in all teaching at the University. It also shows that small changes in the pedagogies can increase the orientation towards sustainability of the educational system.

3. The link between current situation and practice

In this research, we separated the two aspect but in reality this is of course not the case. The University level is determined by the teachers and the other way around. As explained in the results of the current situation (see chapter 3.1) especially at Wageningen University this is a complex interrelation between chairgroups and program committees, which directly influences the teaching practices. The direct link between the practices and current situation lies within the chairgroups. As part of a chairgroup, all teachers are influenced by the learning goals they can offer and that are demanded from the program committees. Changing the education towards sustainability in education will therefore be a combined effort of the individual effort and improvement of teachers and appropriate learning goals on program level. The program committees are the main actors in this system that can steer all students to develop as complete sustainability professionals. Therefore, it is essential to have both; a good assessment and development of the teachers to ensure the students can develop important competencies and to ensure that the learning goals in the programs are in line with sustainability in education.

The assessment is now done primarily by students' evaluation. However the question is whether students are always able to assess the competences of the teacher and whether they actually fill in the evaluation seriously. The students' perspective is only one point of view but really determines the quality of the education. From our results we can see that many of the interviewed teachers are already making an effort but here there is a large bias towards inspiring teachers and is therefore not representative for the overall picture of the University. Nevertheless, it shows that there are possibilities among teachers to learn from each other.

For the programs, it is essential to make sure that learning goals comply with the need of society and current real-life problems. The field committees are a very important factor in this. Although the demands from society are important, it is also important to look what kind of influence this has on sustainability in education. It might be that society not always requests the competencies which are needed to solve complex sustainability problems and can be contradicting with the fact that Wageningen University wants to deliver the most capable professionals on sustainability. If sustainability in education needs to become a central concept in the whole University the development of the learning goals should therefore also be developed according to the competencies needed to solve sustainability problems. Furthermore, they should be checked by a central administrative body. Here comes the controlling role from policy level which in the current system lacks. Possibly this could be a task for the OWI. While the power of the OWI is limited the reviewing of learning goals can be used as a tool to ensure the inclusion of all learning goals towards sustainability competencies in a program. This has of course a large influence on the learning goals demanded from courses and therefore also on the learning goals the chairgroups should supply. It means changing the course outlines and teaching methods towards sustainability in education.

6. Discussion

1. Formulation of concept and criteria

The formulation of the concept of sustainability in education was made together with Green Office Wageningen, since a common understanding of the main concept was a pivotal step for our project. In our definition, sustainability is not defined in relation to the contents, but only to teaching processes and approaches. As a consequence, every time we talk about issues related to sustainability - sustainable development, climate change, depletion of natural resources and so on- we are not necessarily talking about sustainability in education.

This is the reason why:

- the interviews to the teachers were not focused on the content of the lectures but on the teaching techniques,
- in the policy analysis we did not take into consideration the fact that Wageningen University is focusing its research areas also on issues related to sustainability like sustainable food production,
- our keywords did not include the words “sustainable” and “sustainability”.

We acknowledge the fact that Wageningen University is trying to make students face issues connected to sustainability, and that a lot of teachers are addressing numerous topics related to sustainability in their courses. However, this is not directly related to sustainability in education as defined in this project.

The formulation of the criteria to assess sustainability in education was a crucial step in our paper. The aim of this process was to develop a list of elements that could operationalize our concept in order to enable the assessment of teaching methods. Though, sustainability in education is a very complex concept that cannot be easily defined and operationalized. Our criteria are the results of literature reviews and of our analysis of the concepts. This literature review was only a small selection of papers and reports. All papers had a slightly different perspective but of course could not give a complete overview of the different existing perspectives on sustainability in education. The criteria were our guideline throughout the project. Nevertheless, we acknowledge the intrinsic limits of these criteria, and the possibility that sustainability in education, due to its vague and changeable definition, may take form in different ways from the ones we formulated. In attempt to compensate for this limitation, during the analysis of the interviews we paid attention to possible new elements that could not be clustered in our criteria, but that still could have been relevant for our definition of sustainability in education. In the criteria of assessment several times the concept of creativity came back, and although we acknowledge this is important in solving problems related to sustainability, we could not include in our criteria anymore because the questionnaire did not address this concept and was already used in interviews.

Furthermore, we were aware that the criteria regarding sustainability in education overlap with criteria for ‘good’ teaching in general. This is because a lot of the competencies that are developed by ‘good’ teaching are equally important for solving complex problems. However, there are additional criteria for sustainability in education which do not apply to ‘good’ teaching. Nevertheless it becomes more difficult to distinguish ‘good’ teaching from sustainability in education in the results. Especially the number of the criteria that are met by

our interviewed teachers is much higher because of a selection bias. Therefore it might seem that all these teachers are excellent examples of sustainability in education however this is not necessarily the case.

2. Selection of the teachers

The selection of the teachers was aimed to identify those teachers that integrate sustainability in their pedagogies. Teachers were selected from a pre-existing list of awarded teachers, from the preferences of a sample of students and from the description of the courses. These three methods were chosen because at that time we already started interviewing awarded teachers, we wanted to include students directly in our project and also look at the broader scale of the courses. However, these methods are just a few of many possible methods that can be used to identify teachers. We listed for example also the official evaluation, a snowball method and teacher training as ways to identify teachers. Unfortunately, not all methods could be included in the timeframe of ACT. Nevertheless, we do think that more selection methods should be explored to come to with more inspiring examples.

Each of these methods has its own strengths and weaknesses. In the analysis of course and programs description using keywords, we chose keywords that we deemed to be representative of the criteria, but the reliability of the link between these keywords and the criteria is not proved. Also for the course descriptions, the keywords still might overlap with content. While there was given specific attention to the competency focused nature of the keywords, essential keywords like interdisciplinarity might also be related to the content. In the program description an immediate context check was done but this is could not be done for the large number of courses. In addition, the course analysis itself is based on the assumption that the courses are consistent with what is stated in the course description. On the other side, the main limitation of the list of awarded and nominated teachers and of the student survey is the fact that in case a teachers is not considered stimulating by his students, his/her name is not going to be selected with these two methods.

The cross-application of three different methods was aimed to balance the weaknesses of each method, and to ensure that a wide range of teachers were screened for the selection. However, we acknowledge the existence of possibilities that many teachers put in practice sustainability in their educational approach were not selected. For example, a teacher that is not considered stimulating by his students and that doesn't include our keywords in the course description would not be selected. Hence, it is likely that there are many teachers who are incorporating sustainability in their pedagogies, beyond the ones that we found with this research. Moreover, the teachers we interviewed are only a small percentage of those selected with our methods. Certainly, other inspiring examples could be found from the teachers we did not interview but were found with our methods.

The interviews themselves may be subjected to fallacies, since the information given by the teachers were not cross-checked in any way. As already mentioned, at the beginning we were planning to interview the students of the program committee of the teachers we interviewed, to hear the opinions of the students about the pedagogies of the teachers, but this option was not feasible in the time-frame of ACT.

7. Recommendations

In this section we would like to give some recommendations to increase sustainability in education at Wageningen University. The first section is recommendations regarding the role of sustainability in education at the University. The second section is a list of practical next steps Green Office could take to improve sustainability in education at the University.

1. **Proposed recommendations regarding the University:**
    - Sustainability in education should become a specific theme on the educational agenda of the University. In order to excel in sustainability in education the University should focus on the collective of competencies students need to acquire to solve complex problems around sustainability. This can only be done if there are some central guidelines for sustainability in education.
    - The OWI could play an important role to ensure focus on sustainability in education by checking that learning goals are in line with criteria for sustainability in education.
    - Teachers should be assessed in various ways. Not only from the point of students but possibly also by other teachers, by trainers of the teachers or independent actors. This includes the course assessment to ensure competencies related to sustainability in education are evaluated.
    - Inspiring examples of teaching practices related to sustainability in education should be exchanged between teachers.
    - Make teachers aware how they can include sustainability in every course. This can be done for example via teacher training.
    - Identify the hurdles teachers experience in using innovative pedagogies and reduce them.
    - Assess the effectiveness of sustainability in education, a very challenging and interesting option could be: to examine the capacities of the students at the end of their educational program at Wageningen University. This could be done, for example, through testing the ability of students to deal with complex issues and make a comparison with students from other universities in Europe.

2. **Proposed recommendations regarding Green Office Wageningen:**
    - Contact the former employees of Wageningen University, to take their opinion about the ability of the former students to work with complex issues regarding sustainability.
    - Assess interviewed teachers of the University. There is wide scope for further researches. For example, students could be interviewed about the teaching methods of their teachers, or the researchers could attend some of the lectures of the teachers or one teacher can assess another teacher (peer review).
    - Interview and assess new teachers by using other selection methods, for example the official student evaluation.
    - Create an overview of the learning goals of the courses and programmes and see whether they are line with each other and criteria for sustainability in education.

- Contact the program directors and encourage them to integrate sustainability in education in their courses and make this the specific theme on the educational agenda.
- Talk with members of the program committee and influence them to talk more about this topic during meeting so that they can encourage program directors.
- Like *Business cafe* and *Science café,* open *Sustainability cafe* where students and experts can come under one roof to share their ideas.
- Promote inspiring examples as much as possible to the teachers and to the students via seminar, posters and social media.
- Resource is read by all. So, make a section in resource where teachers or students can write a column on Sustainability in education in every issue.
- See what Green Office of Maastricht is doing and make a constructive comparison.
- Wageningen University has been awarded as the most sustainable Dutch University by Morgen in purchasing policy, property and the commitment of students and staff. Green Office can also look into the aspect of how sustainability in education can be brought into consideration.

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Appendices

Appendix 1. The 10 points of the Manifesto of Tomorrow

We, students of Dutch universities (including HBOs), would like to work towards a more sustainable society. A society with a future based on a cyclical economy that runs on sustainable energy. A society that offers a comfortable environment; here and now and there and tomorrow. We would like to acquire the knowledge and skills to create such a community.

Therefore, we ask managers of all levels to ensure that within four years:

1. sustainability is part of the curriculum of every University program and sustainable courses become accessible to all students;

2. lecturers and supporting personnel are given the education they need to integrate sustainability in a relevant manner in their work;

3. every program encourages sustainable development amongst students by making the competences critical thinking and systems thinking an integral part of the study program;

4. students are supported and stimulated to involve sustainability in their initiatives, internships, bachelor thesis and master thesis;

5. every higher educational institute has an interdisciplinary faculty that educates on and works towards solutions for a sustainable society;

6. every study program integrates a module on sustainability which teaches the basics of People, Planet, and Profit into the first year of their curriculum;

7. every study program gives attention to the history and future of their own field of study from the perspective of sustainability;

8. higher educational institutes aim to integrate sustainability in one of their main practical projects, for example by creating interdisciplinary teams that work with issues concerning a sustainable society;

9. higher educational institutes are compared on sustainable aspects of management, education, and research by an independent specialized committee on a yearly basis;

10. students have the opportunity to receive a mentioning of demonstrated acquisition of skills and knowledge in sustainable development on their diploma.

Appendix 2. Methodology of weighting the criteria

At one point we thought it could have been useful to weight our criteria according to the importance we gave them, and to use these findings in analyzing the interviews.

In order to do so, we decided to do give individual marks to our criteria using numbers from 1 to 5, where the numbers had the following meanings: 1 = Not important at all; 2 = Moderately important; 3 = Important; 4 = Very important; 5 = Extremely important.

After spending a huge amount of time for this process, we calculated the average score for each criteria and we found that there was not so much difference in the marks. Hence, all the criteria were considered having more or less the same importance by all the team members: the range went from 3.16 (where 3 is “important”) to 4.5 (between “very” and “extremely” important). This is the reason why we realized that this method could not help us in assessing the teachers.

Even though we decided to not to include this method in our analysis, it was interesting to see which criteria we considered the most important, and it also helped us in improving our understanding of the concept of sustainability in education and of the project itself. Our results showed that the three most important criteria for us were “Interdisciplinary” and “Analyzing from different perspectives and dimensions”, and “critical thinking”.

Criteria	Dziana	Silba	Challachew	Sadia	Luuk	Giulia	Average
1	4	4	4	3	5	5	**4.16**
2	3	1	2	4	5	4	**3.16**
3	4	4	3	3	3	3	**3.33**
4	5	4	4	4	5	5	**4.5**
5	2	4	3	4	4	5	**3.66**
6	3	4	4	3	4	4	**3.66**
7	4	4	4	5	3	5	**4.16**
8	3	4	4	4	3	3	**3.5**
9	4	4	4	4	3	2	**3.5**
10	4	4	3	3	3	2	**3.16**
11	5	1	4	4	2	3	**3.16**
12	3	4	4	5	2	3	**3.5**
13	4	4	4	5	3	4	**4**

The table shows the scores we gave for each criteria.

Appendix 4. Questionnaire for awarding teachers from the jury of the "Teacher of the Year"

- What kind of educational materials do you use (reader/ sheets/ powerpoint/ eduweb/ internet)?
- How do you develop your educational materials?
- How do you integrate current developments?
- How do you present your content? Do you use innovative techniques?
- Do you keep track of developments in your field of work?
- How do you take into account other courses of other teachers?
- How do you involve the students?
- How do you make the students actively work with the content?
- What do you do when a students does not understand the content?
- Are you easily approachable also outside of lecture hours?
- Are you involved in the innovation of education
- Do you stimulate students to look critically towards education?
- What is your passion to teach?

Appendix 5. Interview Guide

Introduction questions

- How long are you already teaching?
- Why are teaching at Wageningen University?

Main questions

1. We assume you use examples in your teaching. What kind of examples do you use and how do you use them?

2. Do you modify your courses according to background and interests of students, and current situation? How?

3. Do you help students to develop a well-grounded and analytical way of thinking? How?

4. Do you stimulate students interaction and group work in your teaching? How?

5. Do you link academic knowledge with practical aspects in your teaching? How?

6. Do you address limits and uncertainties in knowledge in your teaching? How?

7. Do you present complexity of issues to your students?

8. Do you try to stimulate student's responsibilities towards global issues? How?

9. Do you think that different personal values have an influence on an issue? How do you incorporate this in your teaching?

10. Do you also learn from your students? And do you stimulate students to learn from each other?

11. What do you find important in assessing students?

Appendix 6. Link between Interview questions and Criteria

Interview Questions	**Criteria**
We assume you use examples in your teaching. What kind of examples do you use and how do you use them?	Use of real life examples, both from global and local levels
Do you modify your courses according to background and interests of students, and current situation? How?	Flexibility in course including students background and interests, actuality
Do you help students to develop a well-grounded and analytical way of thinking? How?	Critical thinking developing opinions and express them
Do you stimulate students interaction and group work in your teaching? How?	Stimulating participation Through group works/debates/etc.
Do you link academic knowledge with practical activities in your teaching? How?	Linking knowledge and practices Engaging in practical and experiential learning
Do you address limits and uncertainties in knowledge in your teaching? How?	Awareness of limits and uncertainties in knowledge
Do you present complexity of issues to your students? (different perspectives, interrelations, interdisciplinary, system thinking, long term effects, what and what)	Interdisciplinary Complexity and relations between issues and phenomena
	Focus on consequences Short term and long term effects
	Analyzing from different perspectives and dimensions

Do you try to stimulate student's responsibilities towards global issues? How?	Stimulating responsibility Creating ownership of problems/issues
Do you think that different personal values have an influence on an issue? How do you incorporate this in your teaching?	Acknowledge and understand own and different values
Do you also learn from your students? And do you stimulate students to learn from each other?	Cooperative learning Mutual process of learning and teaching and exchange of knowledge
What do you find important in assessing students?	Assessment of competences for sustainability

Appendix 7. Diversity and number keywords in programs' descriptions