

THE INTEGRATION OF SUSTAINABILITY IN COMPETENCE BASED HIGHER EDUCATION

Using competences as a starting point to achieve
sustainable higher education

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Abstract

This paper deals with two characteristics of 21st century higher education: the emergence of competence-based education and the reorientation of education towards sustainable development. It focuses on how these two, seemingly opposing, elements can be combined to strengthen the integration of sustainable development in higher education. Throughout the years, different competences for sustainable development were defined, offering a complete set of knowledge, skills, values and attitudes necessary in order to achieve a sustainable future. Although these sets are highly valuable, it is not always easy to introduce new competences into study programs. In order to find out how and to what extent sustainability-related competences are already integrated, the competences within the Leuven University College bachelor programs were analysed. This approach gives a concrete starting point to further integrate sustainability competences based on the present competences, and, to a wider extent, rebuild the curriculum towards sustainable development.

Keywords

Sustainable higher education, competences, education for sustainable development.

1. Introduction

Facing uncertainties, challenges, opportunities and new problems are features of all times. But the kind of problems is now different than before: ecological pressure is becoming very urgent and obviously linked to social and economical aspects of society. How to deal with these new situations is a main target of education. Learning how to live in sustainable ways will be essential to cope with this unpredictable future and therefore, education for sustainable development (ESD) should become a priority in all learning fields.

Higher education institutions play an important role as they prepare the professionals, decision-makers, and democratic citizens of the future. The problems that arise today – economical crisis, lack of social cohesion, ecological disasters – force us to answer some critical questions. Does higher education have a role to play in sustainability? And if yes, to what extent should higher education integrate sustainable development? How can this integration process be realized, measured, improved? Is higher education really preparing students to the complexity of economical, social, ecological problems? Are graduate students equipped with the necessary skills, competences, knowledge, values and attitudes to cope with these problems and find suitable solutions?

2. Sustainable higher education

In the past years, a lot of attention has been drawn to the concept of “sustainable higher education”, which can be defined as “higher education preparing students to cope with the uncertainty, complexity and relations of (future) economical, societal and ecological problems, thus equipping them with the necessary competences to do so. Re-thinking the mission of the university and its goals, and re-orienting education, research, outreach and operations towards sustainable development are key elements in sustainable higher education” (Lambrechts *et al.*, 2009).

Many authors agree with the fact that higher education has a role to play in sustainable development. But opinions differ greatly on the matter of how sustainability should be integrated in higher education. Some recommend a simple “add-on” of the concept to the curriculum; others are more critical and say that it is simply impossible to realize sustainable higher education within the existent framework of higher education, characterized by its disciplinary approach (Corcoran and Wals, 2004). Sterling (2004) points out that there are four “staged social and educational responses to sustainability”, going from a (very) weak response to a (very) strong response. A weak educational response to sustainability is characterized by simply adding the theme of sustainability to the curriculum, without any

further reform. A very strong educational response will rebuild or redesign the entire curriculum. It is clear that the strong response is the most effective in realizing sustainable higher education. However, university leaders are not willing to do so, because there are too many barriers, related to the structure of higher education (e.g. disciplinary approach) lack of funding, and lack of acknowledgment of the theme. Therefore, within the current framework of higher education, the weak(er) response can be seen as a first and feasible step towards the gradual achievement of sustainable higher education (Lambrechts *et al.* 2009).

Thus the key question in realizing sustainable higher education is “how can we integrate sustainability into the current framework of higher education, in order to prepare students for their role in society, hence take the first steps towards transition to sustainable higher education?” As more and more attention is given to competence based education, competences can be the starting point for this transition process. This paper describes the (possible) relationship between competences and sustainability, and the way they can contribute to sustainable higher education.

3. Competences and sustainability

3.1. Defining competences

The definition and selection of competences, which have a broader spectrum than skills, is achieving a relevant importance in all contexts. Selecting competences “contributes to improve assessments of how well prepared young people and adults are for life’s challenges, as well as identify overarching goals for education systems and lifelong learning” (Rychen, 2002).

However, the term competence has currently been leading to extended debates. What is a competence? What are key competences? Why do they differ depending on the contexts? Why are they so important? How can they be acquired? All these questions are in the centre of the discussions. Thus, many different definitions and interpretations for competences can be found in the literature depending on the different contexts or interests. Several times, they have been misunderstood or interchanged by knowledge, skills, values, attitudes, etc. But a competence is much more than knowledge and skills (Rychen, 2002). Rychen and Salganik (2003) define competence, a holistic notion, as “the ability to successfully meet complex demands in a particular context through the mobilization of psychological prerequisites (including both cognitive and non cognitive aspects)”.

On the other hand, the term “key competence” refers to those competences relevant and useful for everybody and in every context, “they do not replace domain-specific competences which are necessary for successful action in certain situations and contexts” (Barth *et al.*, 2007).

3.2. Competences for sustainable development

Within the declaration of the Decade for Education for Sustainable Development (2005-2014), UNESCO states that education constitutes the pillar of strategies to promote values in sustainable development. To achieve a sustainable society, “education for sustainable development requires a re-examination of educational policy, in view of re-orientation of education [...] in order to focus clearly on the development of knowledge, skills, perspectives and values related to sustainability” (UNESCO, 2005). McKeown (2002) stresses that reorienting education requires teaching and learning those domains that will guide people to pursue sustainable livelihoods, to participate in a democratic society and to live in a sustainable manner.

With the considerable attention given to the notion of competence based education and sustainable higher education, it can be questioned which competences are needed in order to achieve a sustainable society. In the past, several research projects focused on formulating competences for sustainable development. De Haan (2006) defines eight sub-competences for sustainable development. Within the Comenius 2.1 project “Competences, Sustainability, Curriculum, Teacher training” (CSCT), Sleurs (2008) clustered the competences necessary to reorient teacher training programs towards sustainable development into five core competences. In the Netherlands, the Dutch Foundation for Sustainable Higher Education defined a set of general professional competences for sustainable development, known as VESTIA (DHO Nederland, 2007). Based on these general competences, it is possible to define disciplinary competences. Table 1. gives an overview of the competences for sustainable development described above.

Table 1. Competences for sustainable development

DHO Nederland (2007)	Responsibility	Emotional intelligence	System thinking	Future thinking	Personal commitment	Take action
De Haan (2006)						
Competence in foresighted thinking;				x		
Competence in interdisciplinary work;			x			
Competence in cosmopolitan perception, transcultural understanding and cooperation;		x				
Learning participatory skills;						x
Competence in planning and implementation skills;						x
The capacity for empathy, compassion and solidarity;		x				
Competence in self-motivation and motivating others;					x	x
Competence in distanced reflection on individual and cultural models.	x	x				
Sleurs (2008)						
Values and ethics;		x				
Emotions;		x				
System thinking;			x			
Knowledge;	x				x	
Action.						x

Sustainable development should be considered as a normative starting point for selecting key competences (Barth *et al.*, 2006), but if those competences are not accompanied by changes in the education systems and a reorientation of current curricula, “the acquisition of certain ones will remain an ‘accidental’ side product of the educational system” (Sleurs, 2008).

3.3. Competences versus values: contradiction or harmony?

Higher education institutions across Europe increasingly accept and integrate competence based education. Although the advantages are clear, the concept and process of defining competences has to be perceived with caution. The conversion to competence based education seems to cause a suppression of values that were (are) inherent to education.

This has problematic consequences for the integration of (education for) sustainable development, since this concept is based upon values, attitudes and ethics. One may conclude that the introduction of competences is contradictory with values and, to a wider extent, the concept of sustainable development (Hermans, 2007).

So how can these two seemingly conflicting concepts be applied in higher education? The case of Leuven University College shows a way to deal with this contradiction, by defining the professional competences for students (and staff) within a framework of five core competences, based on values: learning, commitment, initiative, cooperation and respect. These five main principles are the necessary step between values and competences, and a guideline for students and staff to attain and practice their competences (Lambrechts *et al.*, 2009, Hermans, 2007). Figure 1 shows the process of defining professional competences within the framework of the five core competences.

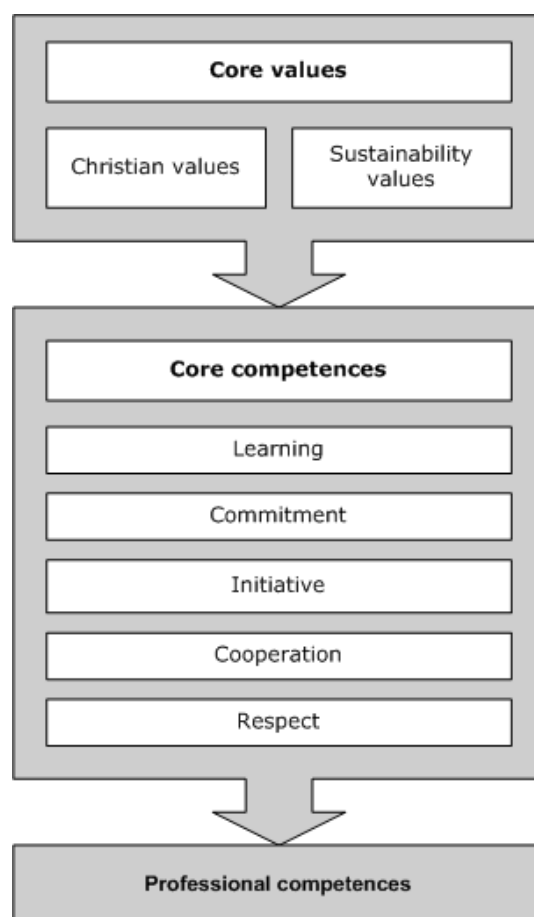


Figure 1. Core values and core competences used as a framework for professional competences at Leuven University College (Lambrechts *et al.*, 2009)

Competences are the starting point for the educational programs of Leuven University College. Based on competences, the curriculum is designed in order to practice, acquire and assess them. Within Leuven University College, each professional bachelor program has its own competence matrix, a complete set of all competences that have to be acquired through the program. It is clear that these competence matrices are the current framework for our education, and that they are the appropriate way to integrate sustainability, as a step in the transition towards sustainable higher education. But in order to integrate sustainability in an effective way, it is necessary to find out where and to what extent sustainability may already be present within the competences.

4. Analysis of competences

4.1. Methodological approach

The competences of all bachelor programs of the Leuven University College were analysed in order to discover to what extent sustainable development had been already integrated. This offers a concrete starting point to further integrate sustainability in the competences, and, to a wider extent, in the curriculum. All competence matrices were screened using a tool based on the competences for sustainable development, as defined by DHO Nederland (2007).

However, the concept of competence matrices has some shortcomings and therefore, the screening has to be used for what its worth. First, competence matrices give a theoretical framework, and a screening cannot be used to evaluate a course's progress in the integration of sustainable development. The competence matrices show which competences a university (and, to a wider extent, the government) wishes to train in the curriculum, but they do not show the current situation. Second, it is possible that a competence may be very relevant in the field of sustainable development, but barely covered in the curriculum. At Leuven University College, this deficiency is tackled through the design of concordance tables, which give an overview of the compliance between the competence matrices and the curriculum. However, this is still a work in progress and therefore, they are not used in this study.

The screening of competence matrices was conducted in fourteen professional bachelor programs of Leuven University College. Table 2 gives an overview of these programs. The department of social work was, on the moment of screening, in the process of redesigning their competence matrix. Therefore, the matrix for this program was not used in this study.

Table 2. Overview of bachelor programs screened in this research

Department of Business Studies	Bachelor in Business Management – option Accounting and Fiscal studies
	Bachelor in Business Management – option Finance & Insurance
	Bachelor in Business Management – option Marketing
Department of Health and Technology	Bachelor in Biomedical Laboratory Technology
	Bachelor in Nutrition and dietetics
	Bachelor in Office Management
	Bachelor in Applied Information Technology
	Bachelor in Chemistry
	Bachelor in Nursing
Department of Teacher Training	Bachelor in Midwifery
	Bachelor in Pre-primary education
	Bachelor in Primary education
	Bachelor in Secondary education
	Bachelor in Special Needs education

Based on the possibilities of the methodology and the diversity of the bachelor programs described in table 2, the following assumptions were considered before starting the screening:

- the economical oriented bachelor programs are assumed to focus on competences linked to the ability to take action (e.g. decision making);
- the bachelor in Chemistry will stress on environmental aspects of sustainable development, due to a graduation option in environmental care;
- the bachelor programs in teacher training, nursing and midwifery will probably stress competences linked with emotional intelligence and responsibility.

Based on these assumptions, the screening was conducted in order to find out:

- To what extent is/are (elements of) sustainable development integrated in the competence matrices of the different bachelor programs?
- How is sustainable development integrated in the matrices, and to a wider extent, is it possible to define integration strategies?
- How can this theoretical information be used to further integrate competences for sustainable development in the curriculum?

4.2. Results of the screening

4.2.1. To what extent is/are (elements of) sustainable development integrated in the competence matrices of the different bachelor programs?

Since all professional competences are formulated within the framework of the five core competences of Leuven University College (cf. figure 1), these core competences were screened in order to expose their contribution to sustainability. The results are shown in table 3. The intensity of the colour represents the sustainability integration magnitude. The table only shows the general name of the competences, which, in practice, are defined in detail in different levels (the core competences) and sub competences (the DHO competences for sustainable development).

Table 3. Five KHLeuven core values and their contribution to sustainable development (the intensity of the colour represents the sustainable development integration magnitude)

Core competencies \ DHO Competences for SD	Responsibility	Emotional Intelligence	System thinking	Future thinking	Personal commitment	Take action
I. Learning	x	x				
II. Commitment	x	x	x	x	x	x
III. Initiative				x		x
IV. Cooperation		x	x			
V. Respect	x	x				

The screening pointed out that the general competence “learning” is closely linked with the competences “responsibility” and “emotional intelligence”. The second core value “commitment” contains an explicit reference to sustainable higher education and it is a very strong frame to define competences for sustainable development. The core competence “initiative” contains a lot of elements of “future thinking” and “take action”, while “cooperation”

is more focused on “emotional intelligence” and “system thinking”. Finally, the core competence “respect” bears a lot of elements of “responsibility” and “emotional intelligence”. Over all, this analysis shows that the competences for sustainable development are all covered in the core competences, with a strong focus on commitment, emotional intelligence and respect.

The individual competence matrices, containing the professional competences for each bachelor program, were analysed in the same way. The results of the screening confirmed some of the assumptions described above, but disproved others.

In general, following conclusions can be made:

- All matrices contain elements of sustainable development in a fragmented way. This means that there are few competences which focus on the concept of sustainable development, but a lot of competences include partial elements of sustainability;
- Competences for sustainable development are often linked with ethical and moral attitudes, and less with system thinking, future thinking and taking action.
- Elements of sustainability are frequently implicitly present in the competence matrices. This implies that competences for sustainable development are passed on to the students in an “unconscious” or “unofficial” way, because they are not explicitly placed within the context of sustainable development.

Furthermore, following conclusions can be made for each department:

- Department of Business Studies: the three competence matrices of this department have integrated competences for sustainable development and corporate social responsibility as one focused, explicit competence. Furthermore, elements of sustainability are also present in the competence linked with business ethics.
- Department of Health and Technology: the competence matrices of the bachelor programs in nursing and midwifery contain, as assumed, a lot of competences in the field of emotional intelligence. The competence matrix for the bachelor program in midwifery contains one competence which strongly connects with the holistic notion of sustainable development, although not using the term explicitly. The competence matrices of the bachelor programs in biomedical laboratory technology, nutrition and dietetics, office management and chemistry contain elements of sustainable development in an implicit but fragmented way, and the option in environmental care does not seem to have an effect on the integration of sustainability competences in

the matrix. Finally, the competence matrix of the bachelor program in applied information technology contains several explicit competences for sustainable development.

- Department of Teacher Training: all competence matrices contain, as assumed, competences for sustainable development, mostly connected with emotional intelligence and responsibility. Elements of sustainable development are integrated throughout every competence, although in an implicit and fragmented way. Although in practice, the curriculum contains a lot of sustainable development issues, this does not appear in the competence matrix. This is a clear indication that the screening of competences does not give a thorough view of the practical integration of sustainable development in the curriculum.

Table 4 gives an overview of the results of the screening. Again, the intensity of the colour represents the sustainable development integration magnitude.

Table 4. Screening of the individual competence matrices
(the intensity of the colour represents the sustainable development integration magnitude)

DHO Competencies for SD Competence matrix of individual bachelor programs		Percentage of competences containing elements of SD					
		Responsibility	Emotional Intelligence	System thinking	Future thinking	Personal commitment	Take action
▪	Bachelor in Accounting – Fiscal studies						
▪	Bachelor in Finance & Insurance						
▪	Bachelor in Marketing						
▪	Bachelor in Biomedical Laboratory Technology						
▪	Bachelor in Nutrition and dietetics						
▪	Bachelor in Office Management						
▪	Bachelor in Applied Information Technology						
▪	Bachelor in Chemistry						
▪	Bachelor in Nursing						
▪	Bachelor in Midwifery						
▪	Bachelor in Pre-primary education						
▪	Bachelor in Primary education						
▪	Bachelor in Lower-secondary education						
▪	Bachelor in Special Needs education						

Legend:

0-10 %	
11-20 %	
21-30 %	
31-50%	
> 50 %	

4.2.2. How is sustainable development integrated in the matrices, and to a wider extent, is it possible to define integration strategies?

The screening of competences showed that there already are a lot of elements of sustainable development present, though implicitly, fragmented and strongly linked with emotional and ethical values, thus overlooking other important elements such as system thinking, future thinking, and take action. However, the screening of competences revealed three main integration strategies for competences of sustainable development. First, a “vertical integration strategy” could be defined, where competences for sustainability are clustered in one competence which explicitly focuses on sustainable development. This strategy, applied in the economical bachelor programs, assures an explicit mentioning of sustainability in the matrix, which encourages the integration in the curriculum. On the other hand, this strength can also be seen as a weakness, because sustainability can be interpreted as an extra competence “on top” of the others, clearly separated from other competences.

In order to tackle this probable weakness, another integration strategy can be applied: “horizontal integration”. This implies that elements of sustainability are implemented in an implicit way. This strategy can be found in the teacher training and nursing programs. The strength of this strategy is that sustainability can be seen as a framework for competences, and that elements of sustainability are integrated in every competence. However, sustainability can be seen as an optional element and integration in the curriculum is not assured.

The third integration strategy is a combination of the first two. It implies an implicit integration of sustainability elements in every competence, and the introduction of one (or more) competence(s) with an explicit focus on sustainable development. This strategy can be found in the bachelor programs of midwifery and applied information technology. The strength of this combined strategy is that it assures a clear framework to formulate competences for sustainability. On the other hand, the risk of “overkill” has to be kept in mind. Table 5 gives an overview of the integration strategies, with their strengths and weaknesses.

Table 5. Strategies for the integration of competences for sustainable development
(Lambrechts *et al.*, 2009)

Strategy	Description	Strength	Weakness	Applied in
Vertical integration	Elements of sustainability are mentioned in one competence which is explicitly focused on sustainability	Sustainability is explicitly mentioned in the competence matrix, thus encouraging integration in the curriculum	Sustainability is considered an 'extra' topic, added to the matrix and clearly separated from other competences	Economical bachelor programs (Finance, accounting, marketing), office management
Horizontal integration	Elements of sustainability are integrated implicitly in all competences	Sustainability is included in all competences and can be seen as a larger framework for the competence matrix	Implicit integration of sustainability can make it into an 'optional' element; integration in the curriculum is not guaranteed	Teacher training, nursing
Combined integration	Implicit integration of sustainability in all competences and an explicit focus in one (or more) 'competence(s) for sustainability'	Horizontal (implicit) and vertical (explicit) integration assure a framework to formulate competences for sustainability	Risk of 'overkill'	Midwifery, Applied Information Technology

4.2.3. How can this theoretical information be used to further integrate competences for sustainable development in the curriculum?

The results of the screening give some concrete starting points to emphasize and further integrate competences for sustainable development. In the case of Leuven University College, elements of system thinking and future thinking have to be stressed, as these competences are lacking in the matrices. On the other hand, competences related to respect and emotional intelligence frequently appear in the matrices.

Furthermore, each bachelor program can now decide which integration strategy to apply, whether to integrate sustainability implicit, explicit, focused or fragmented. It is important to highlight that there is no good or bad strategy, and that implications for the curriculum shall differ for each program.

Competences for sustainable development indicate “what” has to be trained. With the effective integration of competences for sustainable development in the matrices, it is possible to realize a structural integration in the curriculum. At this point, it is important to think about “how” the competences have to be trained, acquired and assessed. After all, educators should guarantee that these competences are likely to be achieved by the students. Weinert (2001) states that the question is whether competences can be acquired through planned instructional programs. Students should receive a wide range of resources to internalize the knowledge, skills, values, attitudes desired, and acquire all those competences that have been designed and selected for them. De Haan (2007), when defining the *Gestaltungskompetenz* (‘shaping competence’), states that acquiring competences represents a multifaceted teaching task: teaching in all subjects, learning through project work and opportunities for action on the part of students, both inside and outside the classroom.

Based on existing handbooks and articles (e.g. Scoullos and Malotidi, 2004, Steiner and Posch, 2006, Junyent and Geli, 2007, McKeown 2002, Lambrechts *et al.*, 2009), it is possible to define further methods and techniques to teach and assess competences for sustainable development. Analyses of these methods showed that there are three main characteristics (Lambrechts *et al.*, 2009):

- Interactive and participative methods: e.g. Socrates method, group discussion, role play, group or personal diary, brainstorming, peer assessment, etc.

- Action oriented methods: e.g. learning through internships, solving real community problems, outdoor education, etc.
- Research methods: e.g. bibliographic research, problem analysis, value clarification, case studies, concept mapping, etc.

These methods and techniques can be used and combined to embed sustainability in the entire curriculum, thus filling the gap between theory and practice. They may even be used to assess the competences. Sluijsmans (2008) states that self evaluation, reflection and peer assessment can be used to make the evaluation process more sustainable. After all, assessment is too often only based on the knowledge component, which is problematic because acquiring competences can by no means be compared to pure knowledge acquisition (Sleurs, 2008). Rychen and Salganik (2003) state that competences can't be assessed through non-current and isolated achievements. It is, as an educator, very important to guide students in their learning process, this can be done using three steps in the evaluation process (Sluijsmans, 2008):

- Feed-up: give examples of what is expected during the evaluation, make evaluation criteria explicit for the students, be transparent about the assessment.
- Feed-back: give sufficient feedback to the students, allowing them to learn from their evaluation as much as possible.
- Feed-forward: give the students input on how to go further in their learning process.

5. Implementation model

The results of the screening of competences at Leuven University College were used to create an implementation model for sustainable higher education, within the current framework of a single university. Figure 2 gives an overview of the general implementation model, containing guiding principles for each step in integrating sustainable higher education in policy, education, research, outreach and operations. Figure 3 gives a schematic view of the specific integration strategies for education. This section is part of the bigger implementation model. (Lambrechts *et al.*, 2009).

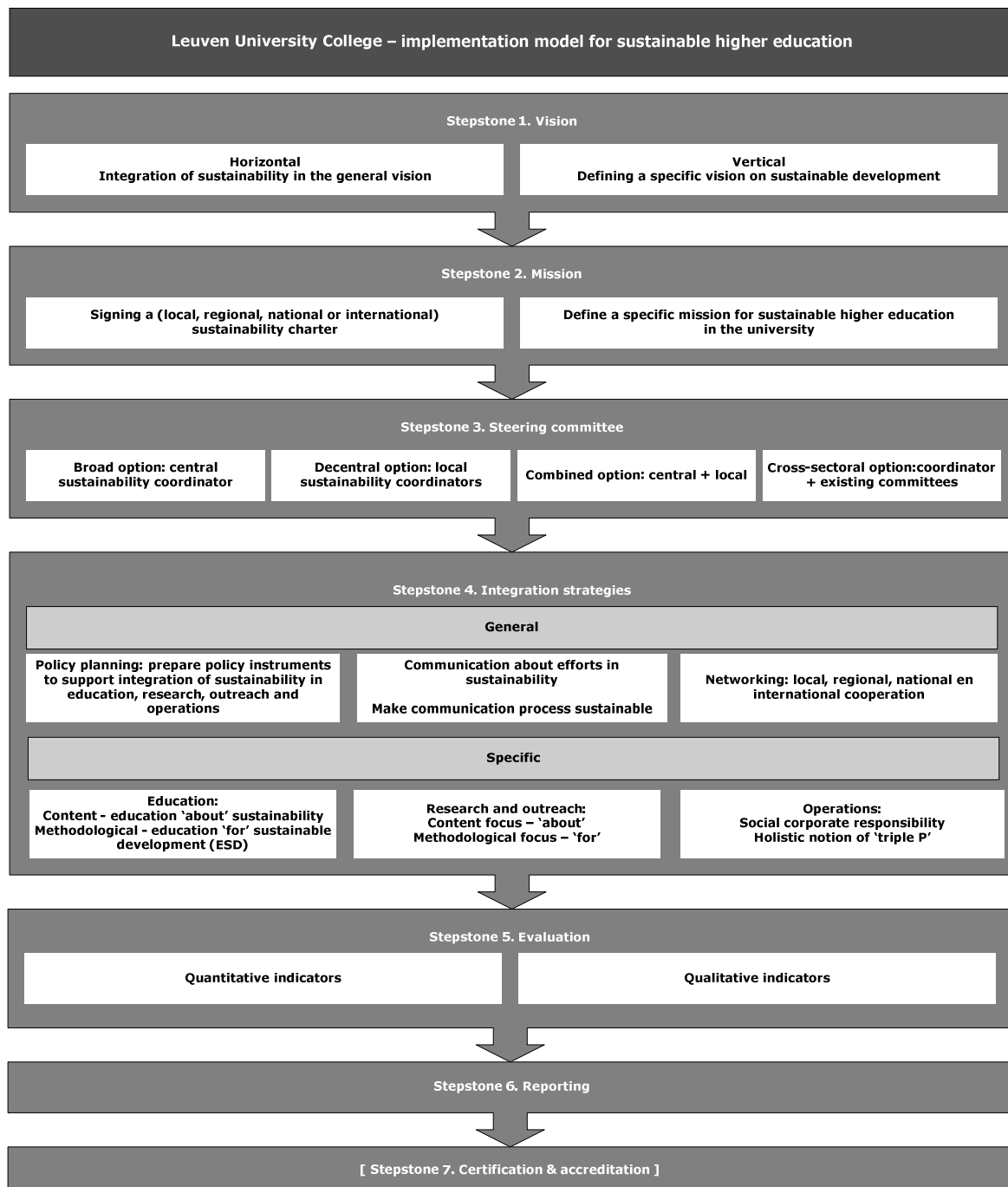


Figure 2. General implementation model for sustainable higher education
(Lambrechts *et al.*, 2009)

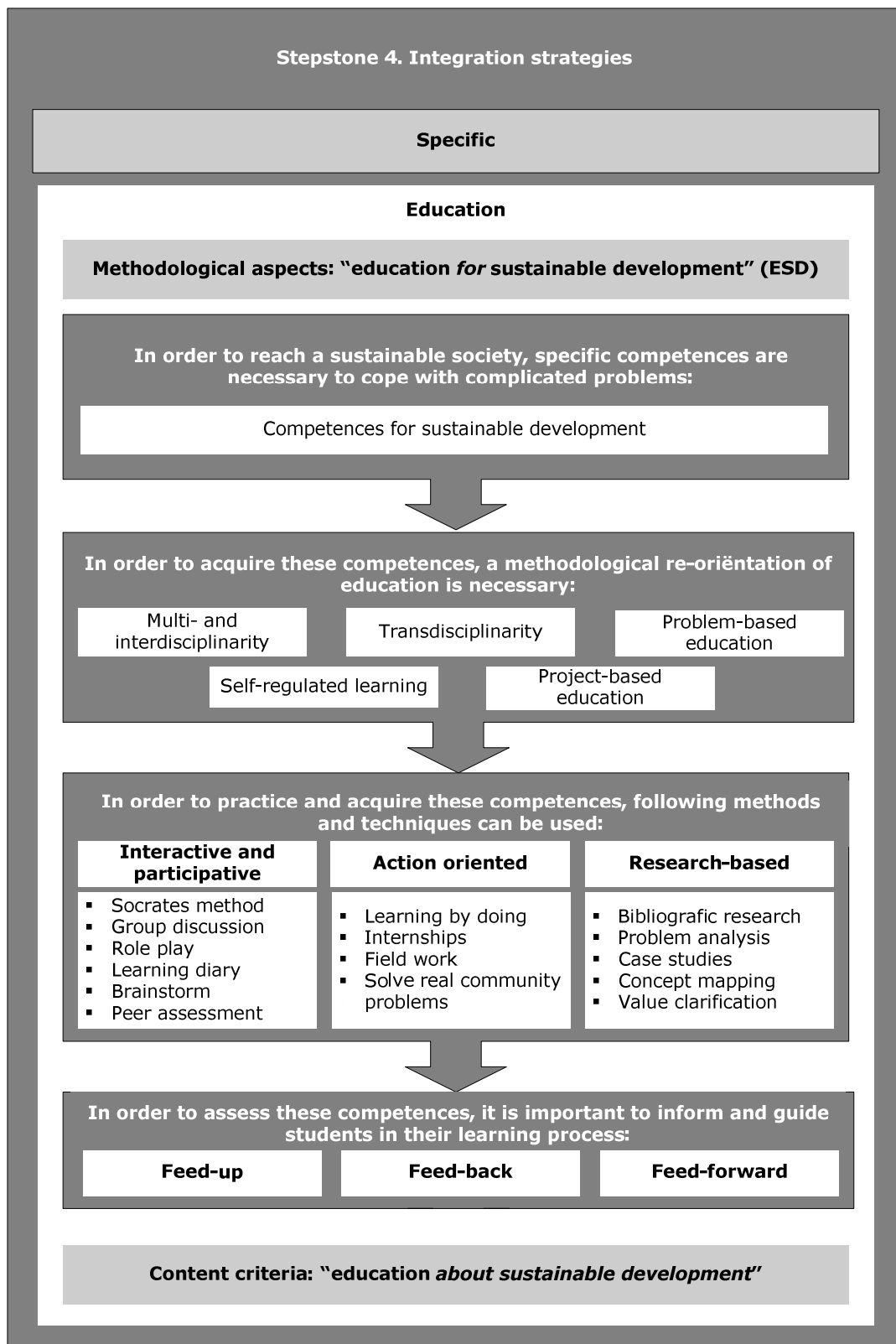


Figure 3. Implementation strategies for sustainable higher education
(Lambrechts *et al.*, 2009)

6. Conclusions

Many higher education institutions have integrated sustainable development in the competences defined for their students. In Leuven University College, sustainable development is a main value for policy, education, research, outreach and operations, and therefore, many bachelor programs have integrated sustainability in their competences.

The screening showed that competences for sustainable development are already present in different ways: implicit, explicit, focused or fragmented. Most competences for sustainable development are strongly linked with ethical and moral elements. Other competences, like future thinking and system thinking, are virtually absent, which requires a reorientation of existing, or integration of new competences.

Moreover, the screening indicated three main integration strategies for competences for sustainable development. A vertical integration points out that the elements of sustainable development are clustered in one competence, explicitly focused on sustainability. A horizontal integration is characterised by the, most likely implicit, integration of sustainability elements into several (or all) competences. A combined integration strategy is based on the strengths of the previous strategies, and uses sustainable development as a general framework to reorient existing, or integrate new competences for sustainable development.

It is clear that the definition of competences is only one element in the integration of sustainable higher education, and it has to be seen as a part of a broader process, combined with other teaching methods that assure the acquisition of the competences. Moreover, competences for sustainable development shall evolve throughout the years, demanding a constant review and revision. And lastly, the general competences for sustainability have to be translated into the context of each program or discipline.

Vitae

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