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Sustainability segmentation of business students: Toward self-regulated development of critical and interpretational competences in a post-truth era

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ABSTRACT

This article adds insights in students' attitudes toward sustainability, with specific focus on students in business management/marketing. It builds upon a number of conceptual interpretations and barriers for change in higher education for sustainable development, followed by the concept of sustainability competences and the students' perspectives. A segmentation study is developed in order to frame the variety of student dispositions of sustainability attitudes, based on a survey among 458 students in business management/marketing. Four different segments of students are discovered, according to their attitudes toward sustainability issues: moderate problem solvers; pessimistic non-believers; optimistic realists; and convinced individualists. The results of the segmentation study reveal that a one-fit-for-all approach in acquiring sustainability competences is not feasible. This calls for a diversity in approaches to prepare students in dealing with the complexity and uncertainty of sustainability issues, oriented toward more self-regulated learning, and developing critical and interpretational competences.

1. Introduction

Since the launch of the Brundtland-report (WCED, 1987) and its definition of sustainable development (SD), higher education institutions (HEIs) are called upon to contribute to the transition to sustainable societies. The publication and ratification of several charters and declarations addressing sustainability in higher education (HE) has outlined different dimensions in curricula, research, operations, outreach, collaboration, assessment and reporting, transdisciplinary approaches, institutional frameworks, campus experiences and 'educate-the-educators' (Lozano et al., 2013; Wright, 2004). Initiatives to incorporate sustainability in curricula are often focused toward competences, as a result of the growing attention to social constructivism (Van den Berg et al., 2006). Different models and sets of competences for SD have been defined (Rieckmann, 2012; Wiek et al., 2011). Generally, these initiatives start from the perspective of university educators, HEI management or researchers, while the perspective of students is not at the core of such studies.

This paper adds insights of the students' perspectives to sustainability, and possible consequences to competence-based HE, by describing the development and results of a survey among 458 students in business management/marketing of a Belgian HEI. The objective of the study is to find out whether these students show different attitudes toward sustainability (segmentation), thereby moving beyond the bottom line which is presumably focused upon in their study program. Section 2 reflects upon the theoretical background, offering the base for the survey and segmentation study. Furthermore, this section provides insights in sustainability perception studies in student populations reported in the literature

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Abbreviations

ANOVA	Analysis of Variance
CSR	Corporate Social Responsibility
DEFRA	Department of Environment Food and Rural Affairs
ESD	Education for Sustainable Development
HE	Higher Education
HEI	Higher Education Institution
HESD	Higher Education for Sustainable Development
PCA	Principal Component Analysis
SD	Sustainable Development
UNECE	United Nations Economic Commission for Europe
WCED	World Commission on Environment and Development

previously. Section 3 describes the focus and method of the research, including the development of the survey. Section 4 presents the results of the survey, the descriptive statistics and results of the segmentation study. Section 5 discusses the outcomes of the survey, framing them in the context of contemporary competence-based HE. Section 6 presents the conclusions and offers insights for further research.

2. Literature review

Higher Education for Sustainable Development (HESD) has become a mature research topic, yet the field is characterized by a poor theoretical grounding (Karatzoglou, 2013), and an abundance of descriptive case studies with limited value toward theory (Corcoran et al., 2004). Nevertheless, regarding HE curricula, much work has been done to define, analyze and describe educational initiatives. This literature review focuses on three topics: (1) conceptual interpretations and barriers for change in HESD; (2) the emergence of competences for SD; (3) the students' perspectives toward sustainability.

2.1. Conceptual interpretations and barriers for change in HESD

Since the concept of SD was presented in the Brundtland report 'Our Common Future' (WCED, 1987), education has increasingly been called upon to integrate issues of sustainability, and to contribute to a sustainability transition process in society. This call is however questioned by several stakeholders, pointing toward the contested notion of SD. In order to clarify different perspectives in the discussion about Education for Sustainable Development (ESD), Jickling and Wals (2008) present a heuristic, in which different positions are clarified concerning ideas about education (transmissive versus transformative) and ideas about the social role of the educated person (authorative versus participatory). They labeled ESD initiatives characterized by transmissive and authorative approaches "big brother SD" (quadrant I), while initiatives on the other end of the heuristic, characterized by transformative and participatory approaches, are labeled as "enabling thought and action beyond SD" (quadrant IV). Different positions in between are characterized by approaches "freedom bounded by SD" (quadrants II and III).

Jickling and Wals argue that many ESD approaches could be described as freedom bounded by SD. To this end, they refer to Scott (2002), who describes different responsibilities for educators (Scott, 2002, 2; Jickling and Wals, 2008):

(1) To help learners understand why the idea of SD ought to be of interest to them;
(2) To help learners gain plural perspectives on issues from a range of cultural stances;
(3) To provide opportunities for an active consideration of issues through appropriate pedagogies which, for example, might begin from learners' and teachers' different interests, helping pupils understand what they are learning and its significance;
(4) To encourage pupils to continue to think about what to do, individually and socially, and to keep their own and other people's options open.

The different responsibilities point toward different transformative and participatory perspectives on education, however SD should not necessarily be seen as the framework for such transformative and participatory approaches. Instead, the uncertainty of SD requires to foster enabling thought and action beyond SD (Jickling and Wals, 2008). This perspective has been further developed in the literature, e.g. with a focus on sustainability issues as matters of concern (Van Poeck, Goeminne and Vandenabeele, 2016) and from a Deweyan perspective on the role of education in democracy (Lambrechts et al., 2017).

The integration of sustainability, e.g. by means of competences for SD, requires an organisational change process in HEIs. Sterling (2004) describes different levels of change when it comes to integrating sustainability in HE, ranging from no change, over accommodation and reformation to the ultimate level of transformation. Pittman (2004) states that a whole systems design approach to organisational change is inevitable in the integration of sustainability: "institutions of higher education are then not only imparting knowledge, but also empowering, indeed cultivating, change agents through applied explorations in living sustainability" (Pittman, 2004, 207). Opinions are divided regarding sustainability competences; whether to integrate 'new' competences, or to reorient existing competences within a framework of sustainability. Critical questions can be raised about the usefulness of implementing sustainability competences, without reorienting the existing education system (Sterling, 2004). Others point to the possibilities of competences as a first step toward a more sustainable education (Sleurs, 2008). Integrating competences for SD seems, at least in the context of post constructivist educational policies and practices, a legitimate starting point.

In describing organisational change processes, focus has been set on barriers for change and strategies on how to turn these barriers into opportunities. Disterheft et al. (2013) point toward different 'transfer problems' at different levels. At the macro level, the growing economic-driven direction taken by HE worldwide, as well as privatisation of public education, pose a threat to the sustainability transition. At meso- and micro level many barriers are defined, related to the structure of HE, the lack of awareness, and the lack of resources (Disterheft et al., 2013; Filho, 2011). Many lists of barriers are described from the perspective and experiences of specific cases and HEIs. Hoover and Harder (2015) state that the barriers for change are complex and hidden, in which a number of synergies and controversies are at play. Taking this notion of complex, dynamic and changing barriers, Verhulst and Lambrechts (2015) connect the identified barriers for change to different human factors within the change process: factors of resistance against change, communication on changes, empowerment and involvement of stakeholders, and organisational culture. One of the proclaimed barriers is the lack of interest and involvement of students and staff (Verhulst and Lambrechts, 2015).

2.2. Competences for SD

As a result of growing alignment of HE curricula toward competence-based learning (e.g. supported by the European Qualification Framework), many initiatives describe the definition of competences for SD (e.g. Rieckmann, 2012; Wiek et al., 2011). Much discussion remains about competences, especially regarding conceptual problems, and the way they are integrated in HE curricula (Lambrechts and Van Petegem, 2016; Stoof et al., 2002). Despite the discussion, it seems that there is a consensus about the main characteristics of competences, i.e. an integrative approach of knowledge, skills, values and attitudes (Rychen and Salganik, 2003). Competences for SD have been defined as a way to enable students to cope with the complexity and uncertainty of sustainability issues, thereby strongly opposed to classical educational models, focusing on mere knowledge transfer (Wiek et al., 2011). Many authors defined rather general key competences for SD, which are applicable in all disciplines and study programs.

de Haan (2006) developed a model for ESD, based on 'Gestaltungskompetenz', and comprising competences in foresighted thinking; interdisciplinary work; cosmopolitan perception, transcultural understanding and cooperation; learning participatory skills; planning and implementation skills; empathy, compassion and solidarity; self-motivation and motivating others; and in distance reflection on individual and cultural models (de Haan, 2006). Wals (2010) builds upon de Haan (2006) 'Gestaltungskompetenz' and presents a model to foster 'Gestaltswitching' between different mind-sets: the temporal Gestalt, the disciplinary Gestalt, the spatial Gestalt, the cultural Gestalt, and in addition, the trans-human Gestalt (Wals, 2010).

Wiek et al. (2011) define five key competences for SD: systems-thinking competence, anticipatory competence, normative competence, strategic competence, and interpersonal competence. All five need to be interpreted and developed within a framework of 'sustainability research and problem-solving competence', thus ensuring a holistic approach (Wiek et al., 2011). Rieckmann (2011, 2012) presents a list of twelve key competences for SD, based on a comprehensive Delphi-method process involving academic stakeholders worldwide. More recently, Ploum et al. (2017) present a validated model of six sustainability competences: (1) Strategic management competence and action competence; (2) Embracing diversity and interdisciplinary competence; (3) Systems thinking competence; (4) Normative competence; (5) Foresighted thinking -or anticipatory-competence; (6) Interpersonal competence (Ploum et al., 2017).

The different sets of key competences for SD point toward the need to re-orient current teaching and learning approaches. Traditional teaching, organized around passive knowledge acquisition, is insufficient to embrace the holistic notion of knowledge, skills, values and attitudes inherent to sustainability competences. Rather, in order to meaningfully integrate competences, the learning process should be interdisciplinary, transdisciplinary, problem-based, self-regulated by the learner (Steiner and Posch, 2006), in a shared process of meaning-making between learner and educator (Garrison et al., 2015). Such a dynamic learning process encourages a meaningful integration of sustainability competences, enabling students to become change agents in society (Pittman, 2004). Critical inquiry and information literacy are important to understand the complexity and uncertainty of sustainability issues (Lambrechts and Van Petegem, 2016), and the importance of these competences further increases in the current context of the 'post-truth era', in which misinformation and fake news spreads through social media and taken for granted by citizens worldwide (Peters, 2017).

Several authors have analyzed sustainability competences in specific HE study programs. For teacher training, several competences, learning outcomes and models have been developed, focusing on different elements and competences. Such competence frameworks in teacher training context are characterized by the interlinking of knowledge and action (Mogensen and Schnack, 2010; Sleurs, 2008; UNECE, 2012). Furthermore, elements of complexity, critical thinking, dialogue, value clarification, and emotions should be at the core of sustainability competences in teacher training (Cebrián and Junyent, 2015). Also in the context of engineering education, different competences, learning outcomes and pedagogical approaches have been discussed in the literature, in order to guide engineering universities in implementing sustainability in their study programs (Segalàs et al., 2009, 2010; Mulder et al., 2012).

Specifically in the context of management education, sustainability competences have been analyzed as well, focusing on the competences of (corporate) change agents for sustainability (Hesselbarth et al., 2015). Within an analysis of bachelor programs in business management, Lambrechts et al. (2013) concluded that competences related to systems thinking, future thinking, action skills and personal involvement were only integrated partially and implicit. As a key dimension of competences, knowledge related to sustainability values should be integrated as well (Biberhofer et al., 2018). Lans et al. (2014) address the connection of sustainability and entrepreneurship, and concluded that in entrepreneurship education, normative competence is often not seen as a characteristic aspect (Lans et al., 2014). This is in contrast with research in a business context by Osagie et al. (2016), presenting individual competences for corporate social responsibility (CSR), in which personal value-driven competences are included, comprising (i) ethical normative competences; (ii) balancing personal ethical values and business objectives; (iii) realizing self-regulated CSR-related behaviors and active involvement. Such value-driven competences were specifically highlighted by interviewed CSR professionals in a business environment (Osagie et al., 2016).

The conceptual debate about individual sustainability competences further evolves. A study by Blok et al. (2015) framed normative competence and action competence within a virtue ethics perspective. Normative competence and action competence are moral competences, as they provide norms, values and beliefs, define what is right and wrong, and enable an individual to take the right decisions in a sustainability context. However, given the complexity and uncertainty of sustainability, this poses new questions: do we know what is the right thing to do in a sustainability context? Which normative perspectives do we need to pursue? What kind of action do we need to take? A virtue ethics perspective allows to take the specific characteristics of sustainability issues into account, and leads toward a virtuous competence for sustainability, defined as follows: "virtuous competence is the personal engagement of a professional in the transformation to good character by applying virtues in the production of sustainable internal goods together with multiple stakeholders (corporate sustainable behavior), and by perfecting his or her good character by the internalization of the production of these sustainable internal goods" (Blok et al., 2015, 318).

2.3. Students' perspectives

The perspective of the student is often neglected within the discourse of defining competences or curriculum innovation. Nonetheless, student perceptions on environmental and sustainability issues are often the focus of separate studies (i.e. without explicit connection to the consequences for competences and curricula). Contributions in the literature show a variety of approaches and characteristics. In some cases, the integration of

environmental issues into an individual university's campus operations have been a starting point to survey student opinions (Bahaee et al., 2014; Nejati and Nejati, 2013; Yuan and Zuo, 2013). Other cases focused on demographic and psychosocial aspects of student attitudes toward sustainability issues (Kagawa, 2007; Ng and Burke, 2010), or tried to find differences in attitudes between students of different universities (Emanuel and Adams, 2011).

Generally, it is stated in the literature that students have very low understandings of sustainability (Chaplin and Wyton, 2014) or reduce sustainability issues to environmental issues, thereby lacking a systemic perspective (Clark and Zeegers, 2015; Nicolau and Conlon, 2012; Perera and Hewege, 2016). Yet the environmental dimension of sustainability is most frequently identified and described in the literature (Cotton and Alcock, 2013).

Regarding student engagement in sustainability, it is clear that values (Whitley et al., 2018) as well as attitude shaping (Zsóka et al., 2013) are important for sustainability behaviors. However, a value-action gap is perceived: while students believe sustainable living is important, they are hesitant to take personal action, mostly due to the displacement of responsibility to other people or organisations (Chaplin and Wyton, 2014) and reluctance to think about lifestyle changes in favor of sustainability (Eagle et al., 2015). Research by Zsóka et al. (2013) pointed out that students from Hungarian high schools and universities could be clustered in five groups, according to their environmental perceptions: hedonist, techno-optimist, active environmentalist, familiar, and careless (Zsóka et al., 2013).

Gender might play a role in pro-sustainable behavior, as some studies point out that females were more interested in sustainability issues and displayed higher levels of ecocentric values (Awan and Abbasi, 2013; Sahin et al., 2012), however these results are contested in other studies (Sammalisto et al., 2016). Furthermore, it appears that university attendance has a positive impact on pro-environmental behavior on the long run (Cotton and Alcock, 2013), and universities should encourage student participation in on-campus sustainability initiatives (Figueredo and Tsarenko, 2013; Sahin et al., 2012) as well as in curriculum development and assessment (Watson et al., 2013).

Business students have also been the subject of specific studies on attitudes and perspectives (Ng and Burke, 2010; Sharma and Kelly, 2014). In their study on business students' attitudes toward sustainable business practices, Ng and Burke (2010) point to the negative stereotypes surrounding business students, i.e. that they would be only interested in the bottom-line and that they are self-serving business types (see also Lopez et al. (2005) on this issue). Their research pointed out that individual characteristics have a great influence on the students' attitudes, hence it is hardly justifiable to speak of 'the' business student as if they form a coherent group of like-minded individuals. Within a sample of 248 business students, Ng and Burke found a significant group of business students with pro-environmental attitudes (Ng and Burke, 2010).

The student perspective in business management study programs is often linked to a focus on the bottom line and self-serving characteristics, instead of the triple bottom line, commonly used in CSR settings. However, students show a diversity of characteristics, and therefore this article aims to provide a more sophisticated view on whether business management students show certain sustainability attitudes. To this end, a segmentation study has been developed, in order to frame the variety of student dispositions of sustainability attitudes.

3. Method

The specific profile of business students is at the center of this paper's research objective. Within an effort to integrate sustainability competences in the study program of business management/marketing at University Colleges Leuven-Limburg, one of the main concerns was the perspective of the students themselves. In order to analyze their perceptions, a survey was developed, focusing on environmental and sustainability issues, responsibility, and personal efforts. This HEI provides professional bachelor programs (three years) in business management/marketing (for more information about the HEI, see Lambrechts et al., 2013; Lambrechts, 2015; Verhulst and Lambrechts, 2015).

The survey consisted of twenty statements, based on the UK governmental Department of Environment, Food and Rural Affairs' studies (DEFRA, 2007, 2008), scales were further elaborated by Whitmarsh & O'Neill (2010) and Whitmarsh (2011). The reason to design a survey based on the DEFRA framework is twofold. First, although focused on specific issues at stake in the United Kingdom, DEFRA is regarded as a frontrunner for its groundbreaking work on segmentation of consumers based on their framework for pro-environmental behavior, linked with the '4E-model' (Enable; Encourage; Exemplify; Engage) (Cotton et al., 2015). Second, the DEFRA framework and 4E-model have been used in other studies focusing on higher education and perceptions of students, as a basis for further research, or to compare and discuss findings of specific student surveys (e.g. Cotton and Alcock, 2013; Cotton et al., 2015). In order to align with other studies on student perceptions and ensure validity, reliability and comparability of the results, it was therefore decided to follow the DEFRA framework for this study as well.

Students participating in the survey were asked to answer the statements on a 5 point Likert scale: (1) strongly disagree; (2) disagree; (3) neither agree nor disagree; (4) agree; (5) strongly agree. Additionally, students could choose for a sixth answer category, separated from the Likert scale, which was 'I don't know'. This option is important as it provides information about the understanding of sustainability issues. Furthermore, Zsóka et al. (2013) pointed out that their cluster of 'careless' respondents often made use of the 'I don't know' option. A pre-test was developed in which two independent researchers answered the survey and provided feedback on the understandability of the questions.

Survey participation was integrated in the 'Information and Communications Technology' classes in 2013–2014, at the beginning of the first semester and the end of the second semester: during class time and under supervision, students were asked to fill in the questionnaire. This ensured a good response rate: 76% of all students enrolled in the business management/marketing study program completed the survey. This approach also avoids self-selection bias, as all students (including the ones more skeptical toward sustainability) filled in the questionnaire. Non-response resulted from absence due to participation in internships or semester projects.

Within the context of (social) marketing, segmentation studies are widely used, e.g. in order to study the characteristics of so called "green" consumers (Finisterra do Paço et al., 2009). An example of such segmentation studies is the UK governmental Department of Environment, Food and Rural Affairs' (DEFRA) framework for pro-environmental behaviours. Different segments of consumers are depicted in a framework along two axes: ability to act (high versus low) and willingness to act (high versus low) (DEFRA, 2008).

However derived from market research, the segmentation study method is also useful to analyze groups of students in a HEI setting, as in this case students are the 'consumers' and SD in higher education is the 'product'. The segmentation study described in this aticle is based on a factor analysis, following the Principal Component Analysis extraction method (PCA). Components are further rotated according to the Varimax with Kaiser Normalisation rotation method, leading to different groups of components. In a next step, a cluster analysis using Ward's method enables to link

groups of respondents to the groups of components. In order to analyze differences between group means and variation among and between the groups, and testing statistical significance, Analysis of Variance (ANOVA) is used.

A total of 458 students participated in the study, representing a mixed group of the first, second and third year in the bachelor program business management/marketing. Table 1 provides the demographic characteristics of the sample. The gender ratio is 48% female and 52% male. 34% of the students are enrolled in the first year, 40% in the second year, and 26% in the third year. The majority of students were aged between 19 and 21.

4. Results

This section provides a detailed description of the outcomes of the survey, both the descriptive statistics and the results of the segmentation study.

4.1. Descriptive statistics

Students were asked to answer each of the statements according to the 5 point Likert-scale. Table 2 provides a detailed overview of the descriptive statistics of the statements, presenting the mean and standard deviation for each statement.

The results of several statements point out that business management/marketing students show pro-environmental attitudes. Students pay small contributions when it comes to sustainability ("I remember to turn off the lights when I leave a room", mean = 4,2622) however they think a large part of responsibility lies with the government and companies ("The government should do more to ensure that companies take into account the environment", mean = 4,1432). In light of the presumable focus on the bottom line, it is quite remarkable to see that students ask for governments to enforce companies to act more sustainable.

The majority of the respondents disagreed or strongly disagreed (total of 76%) with the statement "All this fuss about global warming is exaggerated", indicating that students are aware of sustainability issues and consider these issues important. Student opinions differ strongly on the statement "Climate change is already so bad that the damage is irreparable": 36 percent disagrees or strongly disagrees, while 37% agrees or strongly agrees with this statement. Regarding the statement "Humans are able to solve the global environmental problems", the majority of respondents agrees or strongly agrees (74 percent). It points out that students have a nuanced view on environmental issues: while they might think climate change is irreversible, other environmental problems (e.g. pollution) are more likely to be solved by humans. Students are strongly aware of the influence of their behavior and of the ecological footprint of their lifestyles, as the majority of 89 percent disagrees or strongly disagrees with the statement "I do not believe that our behavior has an impact on the environment". However, 46 percent have difficulties in acting environmentally friendly.

Regarding the statement "I can be as happy with a more sober lifestyle", opinions of respondents vary: 30 percent agrees or strongly agrees, 35 percent disagrees or strongly disagrees, while 27 percent neither agrees nor disagrees. It shows the difficulty of this issue, which touches right at the core of the lifestyle and the difficult question of willingness to be more sober if it means less harm to the environment. Still, a majority of 76 percent of respondents agrees or strongly agrees with the statement "I am willing to make efforts for a better world". This indicates that students are willing to take efforts, but not at all price.

Table 1
Characteristics of the sample (N = 458).

	N	%
Gender		
Male	239	52,2
Female	219	47,8
Academic year		
First	156	33,8
Second	184	39,7
Third	118	26,0
Age		
17	13	2,8
18	59	12,9
19	105	22,9
20	114	24,9
21	91	19,9
22	50	10,9
23	18	3,9
24	0	0,0
25	3	0,7
26	3	0,7
NA	2	0,4

4.2. Segmentation study

One of the goals of the survey was to identify different segments in the student population. First a factor analysis was done, aiming at defining basic dimensions in the perceptions of the students. The PCA and rotation method resulted in five pillars: (1) there is a clear problem with the environment and we should do something about it together; (2) through the use of vegetarian, organic and fair trade products I can act environmentally friendly in an easy way; (3) I avoid over-consumption and I try to save energy; (4) I am interested in environmental issues. I read and I talk about it; (5) humans are able to solve the global environmental problems. Table 3 presents the rotated component matrix.

Based on this factor analysis, a cluster analysis was done to identify groups (or segments) of respondents who have the same opinion about the five pillars defined in the factor analysis. The cluster analysis resulted in four segments, as shown in Fig. 1.

The first segment (26%) thinks humans are able to solve environmental problems. Respondents in this segment are interested in environmental issues and read and talk about it. Nevertheless they don't avoid over-consumption and they are not saving energy. Their efforts toward sustainability are oriented toward food. Furthermore, they think everyone should contribute to sustainability. This segment can be labeled as the "Moderate problem solvers".

The second segment (22%) is rather pessimistic, as they think that environmental issues cannot be solved. The respondents within this segment are not interested in environmental issues and are not willing to take efforts to be sustainable, they do not expect this from other people either. This segment can be labeled as the "Pessimistic non-believers".

The third segment (36%) is rather optimistic about the possibilities of humans to solve environmental issues. Respondents within this segment do not read or talk about environmental issues but they deliver efforts to be sustainable: they avoid over-consumption, they save energy and they try to eat sustainable. Furthermore, they think everyone should pay efforts to be more sustainable. This segment can be labeled as the "Optimistic realists".

The fourth segment (16%) thinks humans could solve environmental issues. Respondents within this segment are very interested in environmental issues, and read and talk about it. They are sustainable in trying to avoid over-consumption and saving energy, but don't do efforts regarding food. Also, they do not expect everyone to contribute to the sustainability transition. This segment can be labeled as the "Convinced individualists".

Table 2
Descriptive statistics.

Nr.	Description of statement	N	Min	Max	Mean	St.Dev.
19	"I remember to turn off the lights when I leave a room"	450	1,00	5,00	4,2622	,87664
5	"The government should do more to ensure that companies take into account the environment"	454	1,00	5,00	4,1432	,81878
3	"Humans are able to solve the global environmental problems"	438	1,00	5,00	3,8105	,90419
10	"I am willing to make efforts for a better world"	450	1,00	5,00	3,7822	,75606
6	"I worry about the environmental problems that arise"	456	1,00	5,00	3,5307	1,00282
11	"I feel guilty when I'm doing damage to the environment due to my behavior"	452	1,00	5,00	3,2611	,99131
8	"I find it difficult to act environmentally friendly"	456	1,00	5,00	3,1557	,99222
20	"I use my bike for journeys of less than 5 km"	452	1,00	5,00	3,1504	1,34985
2	"Climate change is already so bad that the damage is irreparable"	426	1,00	5,00	3,0446	1,02228
18	"When I buy something new, I first ask myself whether I really need this"	457	1,00	5,00	2,9847	1,22375
9	"I can be as happy with a more sober lifestyle"	422	1,00	5,00	2,9147	1,02107
12	"I read about environmental issues"	457	1,00	5,00	2,8009	1,20022
17	"I buy a new phone before my old one is worn out"	447	1,00	5,00	2,7852	1,25761
13	"I discuss environmental issues with friends and family"	454	1,00	5,00	2,7489	1,22463
4	"Scientists will find a solution to global warming so that people do not have to change their lifestyles radically"	421	1,00	5,00	2,5368	1,00318
16	"I buy organic and/or fair trade products"	451	1,00	5,00	2,4922	1,22449
14	"A green lifestyle is something for a small group of alternative people"	453	1,00	5,00	2,4857	1,02960
15	"I eat at least one meal a week vegetarian"	452	1,00	5,00	2,3496	1,42419
1	"All this fuss about global warming is exaggerated"	454	1,00	5,00	2,1740	1,01125
7	"I do not believe that our behavior has an impact on the environment"	458	1,00	5,00	1,7904	,88493

Fig. 2 provides insights in the opinion of the four segments regarding each of the twenty statements.

The gender characteristics of the different segments are shown in Table 4. Each segment shows a mix of male and female members, however the third segment ("Optimistic realists") has considerably more female members, while the fourth segment ("Convinced individualists") has more male members. Table 5 shows the results regarding the academic year in which the respondents of each segment are enrolled.

5. Discussion

Results of the segmentation study reveal that there is no universal students' perspective on sustainability. Within the group of business management/marketing students, four different segments could be identified, each with specific attitudes toward sustainability. The four segments could be compared to the clusters as presented by Zsóka et al. (2013): the 'pessimistic non-believers' segment in this study shares characteristics with the 'careless' and 'hedonist' clusters; the 'moderate problem solvers' segment shares characteristics with the 'familiar' cluster; the 'optimistic realists' segment with the 'active' cluster; and the 'convinced individualists' segment with the 'techno-optimist' cluster.

Students show complex, layered and multi-dimensional attitudes toward sustainability. The results of the survey point out that students' perceptions on sustainability are sophisticated, and it seems that their understanding of these issues is higher than what would be expected from the literature (e.g. Chaplin and Wyton, 2014). However, it might also be a specific characteristic of the students in this study, as they have been involved in several sustainability initiatives during their study program in which the campus served as a living laboratory (Lambrechts et al., 2015; Lambrechts and Van Liedekerke, 2014).

Moreover, the results of the segmentation study approve the findings of previous research stating that individual characteristics are decisive when it comes to sustainability attitudes, more than demographic characteristics or the study program in which students are enrolled (Ng and Burke, 2010). Gender does not play a role in sustainability attitudes, which is in line with the research among students reported by Sammalisto et al. (2016). Regarding the perceived value-action gap in the literature, the results of this study indeed point out that students have difficulties in questioning their own lifestyle which might be unsustainable, and considering sustainable lifestyles. This result is in line with the study of Eagle et al. (2015).

Fig. 3 provides a schematic overview of the segmentation of business management/marketing students (n = 458). The segments can be positioned according to their opinion about environmental issues (optimistic versus pessimistic) and the perceived responsibility toward solving these issues (individually versus collective). Segment 3 is optimistic and collectivistic oriented, while segment 1 is less optimistic, but still collectivistic. Segments 2 and 4 are clearly individualistic oriented, although their opinion about environmental issues differ.

The segmentation study points out that some segments are more oriented toward collective goals and challenges, while other segments are more individually oriented. This is in line with the results of the study of Ng and Burke (2010) who found out that students who are more collective-oriented, tend to be more supportive of sustainable business practices. Furthermore, the segmentation study results show that these groups of collectivist oriented students also show subtle differences in their characteristics, i.e. they think everyone should contribute to sustainability, but the way how they do it themselves is still very individualistic in nature. It gives the impression that, when it comes to sustainability issues, students tend to like an "a la carte"-mentality, in which they can choose between different options, depending on their preferences at that moment.

It is possible to frame the results of the segmentation study in the context of the heuristic model of Jickling and Wals (2008) on the one hand, and the DEFRA framework (DEFRA, 2008) on the other hand. Fig. 4 provides an overview of this framing. It shows that the different segments of students are situated in different quadrants of both models.

Within the context of HESD, the survey and segmentation study results add the multi-layered students' perspective to the discourse. The survey results show that students think that governments bear a profound responsibility toward sustainability, while others (scientists, companies, consumers) also should contribute to the transition toward sustainable societies. From a business management perspective, this goes far beyond the bottom line, and the majority of students also expect companies to act responsible. This calls for a thorough SD integration beyond the barriers as defined in the literature: barriers related to interest of students and related to the concept of SD which is seen to be not relevant to a certain discipline (in this case business management/

Table 3
Rotated Component Matrix[a].

Statement	Component				
	1. There is a clear problem with the environment and we should do something about it together	2. Through the use of vegetarian, organic and fair trade products I can act environmentally friendly in an easy way	3. I avoid over-consumption and I try to save energy	4. I am interested in environmental issues. I read and I talk about it	5. Humans are able to solve the global environmental problems
1 "All this fuss about global warming is exaggerated"	-,648	-,034	,001	-,391	-,063
5 "The government should do more to ensure that companies take into account the environment"	,629	,174	,083	-,014	,089
6 "I worry about the environmental problems that arise"	,620	,376	,021	,176	,067
4 "Scientists will find a solution to global warming so that people do not have to change their lifestyles radically"	-,603	,064	-,064	-,071	,405
7 "I do not believe that our behavior has an impact on the environment"	-,596	,136	-,091	-,027	-,042
10 "I am willing to make efforts for a better world"	,593	,324	,218	,114	,203
14 "A green lifestyle is something for a small group of alternative people"	-,515	-,150	-,325	-,102	,119
15 "I eat at least one meal a week vegetarian"	,069	,714	-,014	,230	-,028
16 "I buy organic and/or fair trade products"	,017	,570	,075	,344	-,057
11 "I feel guilty when I'm doing damage to the environment due to my behavior"	,411	,480	,158	,197	,086
2 "Climate change is already so bad that the damage is irreparable"	,182	,472	-,292	-,220	-,399
8 "I find it difficult to act environmentally friendly"	,028	-,471	-,291	,093	-,452
9 "I can be as happy with a more sober lifestyle"	,275	,405	,365	-,066	,151
17 "I buy a new phone before my old one is worn out"	-,186	,077	-,616	-,140	,220
18 "When I buy something new, I first ask myself whether I really need this"	,061	,032	,588	,212	,031
20 "I use my bike for journeys of less than 5 km"	,002	,218	,550	,071	,054
19 "I remember to turn off the lights when I leave a room"	,226	-,051	,542	-,127	,231
12 "I read about environmental issues"	,172	,202	,122	,758	,065
13 "I discuss environmental issues with friends and family"	,180	,166	,156	,751	,105
3 "Humans are able to solve the global environmental problems"	,166	-,033	-,030	,177	,750

Extraction Method: Principal Component AnalysisRotation Method; Varimax with Kaiser Normalisation.
[a] Rotation converged in 10 iterations.

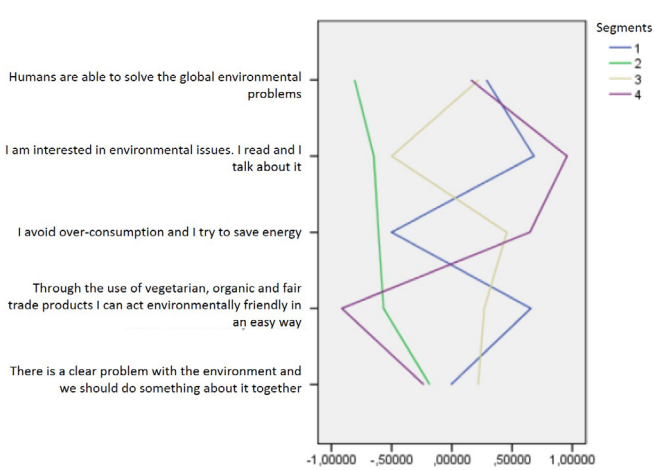

Fig. 1. Positioning of the four segments (n = 458).

marketing). At least this study counters the supposedly barrier for SD-integration that students are not interested in sustainability issues (Verhulst and Lambrechts, 2015).

Regarding competence-based HE and individual sustainability competences, the segmentation study points out that students not only differ in their understanding of sustainability, but also in their attitudes and willingness to act toward more sustainable lifestyles. Hence, how students are approached, and how they are encouraged to acquire sustainability competences, requires considerable attention. Students in segment 2 ('pessimistic non-believers') will probably not be enthused by transformative approaches, while students in segment 4 ('convinced individualists') will presumably be less interested in participatory approaches. The question is then how these students can be triggered and encouraged for transformative and collaborative learning in light of sustainability, or beyond sustainability.

This requires a differentiated learning approach, in which different groups of students can acquire sustainability competences

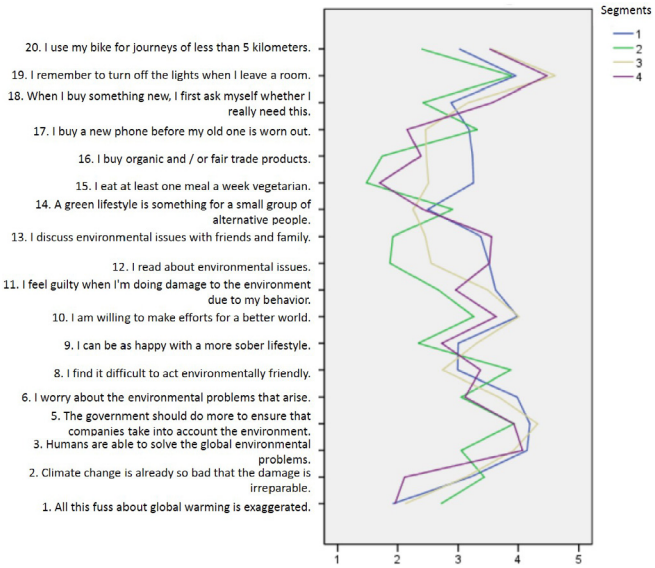

Fig. 2. Opinion of the four segments on the statements (n = 458).

Table 4
Gender distribution in segments.

			Gender		Total
			Female	Male	
Ward method	1	Count	62	57	119
		% within gender	28,3%	23,8%	26,0%
	2	Count	49	53	102
		% within gender	22,4%	22,2%	22,3%
	3	Count	96	70	166
		% within gender	43,8%	29,3%	36,2%
	4	Count	12	59	71
		% within gender	5,5%	24,7%	15,5%
Total		Count	219	239	458
		% within gender	100,0%	100,0%	100,0%

in different activities and at different paces. Such approaches are in line with the need for more self-regulated learning in light of sustainability (Steiner and Posch, 2006). Current competence-based approaches in HE are characterized by an incoherent integration in which the new competence concept is introduced in the traditional approaches (Lambrechts and Van Petegem, 2016). A systemic innovation in the educational system, taking into account differentiated learning paths and opportunities for students, is needed, but difficult in such a context.

Furthermore, in light of the contemporary context of the post-truth era, critical thinking skills and information literacy are key

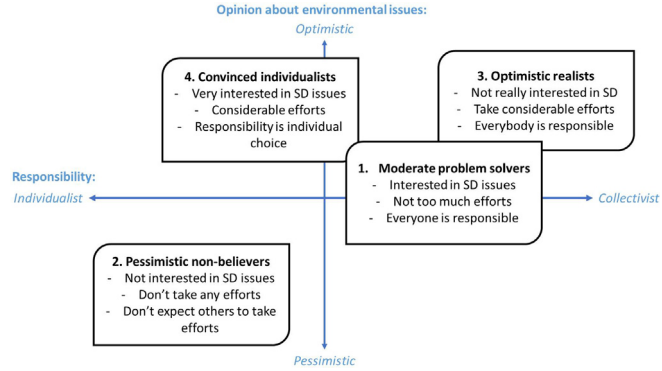

Fig. 3. Schematic overview of segmentation of business management/marketing students.

issues to be integrated in HE (Johnston and Webber, 2003; Peters, 2017; ten Dam and Volman, 2004). As such, critical inquiry should be framed within the context of wicked sustainability issues, characterized by their complexity and uncertainty (Lambrechts and Van Petegem, 2016). Therefore, rather than introducing knowledge-based sustainability education, the self-regulated learning approaches described above should be combined with an extensive focus on developing critical and interpretational competences.

6. Conclusion

The results of the survey show that it is hard to talk about 'the' student perspective, and that it is possible to discover subtle differences between different groups of students, even if they belong to the same university or study program. Within the sample group of business management/marketing students, four different segments are identified, each with specific characteristics and opinions toward environmental and sustainability issues.

The first segment (26%) can be labeled the "Moderate problem solvers". They are interested in environmental issues, talk and read about it, but do not take a lot of initiatives to be more sustainable. The second segment (22%) can be labeled as the "Pessimistic non-believers". They are not interested in environmental issues, they think environmental issues cannot be solved, and they do not want to take any initiatives toward sustainability. The third segment (36%) can be labeled as the "Optimistic realists". However they do not read or talk about environmental issues, they take several initiatives toward sustainability and think everyone should take responsibility. The fourth segment (16%) can be labeled as the "Convinced individualists". They are very interested in environmental issues, read and talk about it. They try to make efforts to

Table 5
Academic year distribution in segments.

			Academic year			Total
			First year	Second year	Third year	
Ward method	1	Count	52	35	32	119
		% year	33,3%	19,0%	27,1%	26,0%
	2	Count	25	48	29	102
		% year	16,0%	26,1%	24,6%	22,3%
	3	Count	59	72	35	166
		% year	37,8%	39,1%	29,7%	36,2%
	4	Count	20	29	22	71
		% year	12,8%	15,8%	18,6%	15,5%
Total		Count	156	184	118	458
		% year	100,0%	100,0%	100,0%	100,0%

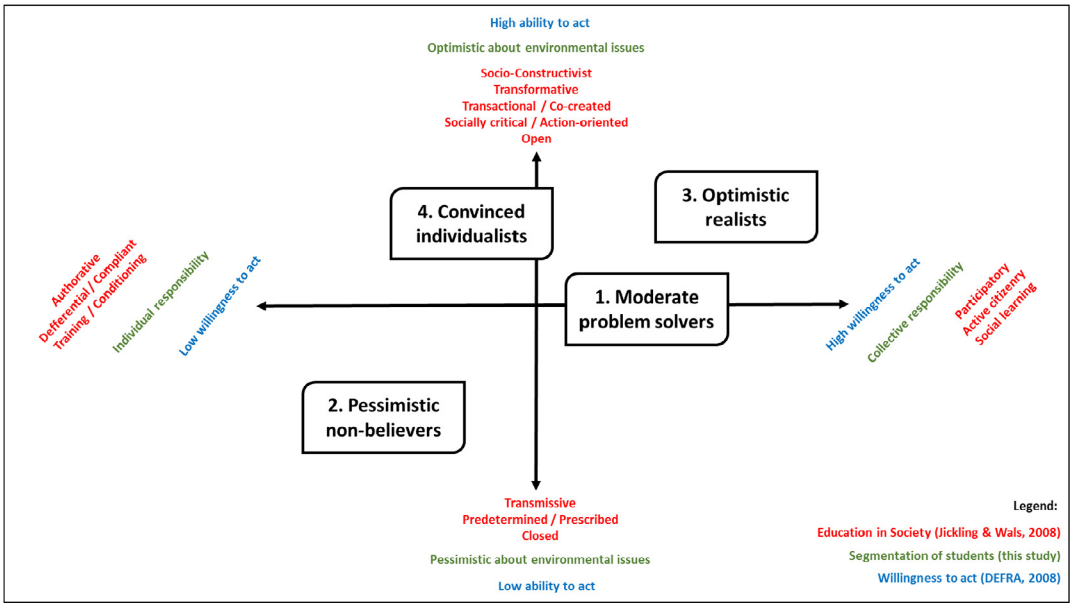

Fig. 4. Segmentation of business management/marketing students in perspective.

attain a sustainable lifestyle, however they see it more as an individual choice and do not expect others to do the same.

These segments of students show that it is hard to capture opinions on sustainability issues in general terms, and that a one-fit-for-all approach in acquiring competences for SD is not possible. This calls for a diversity in approaches to prepare students in dealing with the complexity and uncertainty of sustainability issues, oriented toward more self-regulated learning, and most important, focusing on developing critical and interpretational competences.

The researchers paid considerable attention toward developing the survey, but some limitations of the research need to be taken into account. A first limitation is that all data were collected through self-reported questionnaires, leaving the possibility of social desirability bias. Furthermore, the sample only contains students from one HEI, so no possibilities are available to compare to students from other HEIs, or other study programs. Further research could be oriented toward surveys in other HEIs, and other study programs, in order to compare different groups of students and to validate the segmentation study described in this paper. Other recommendations for further research are linking the results of the segmentation studies with personal leadership styles, as described by Ng and Burke (2010); linking the results with specific learning and assessment oriented toward the acquisition of sustainability competences; and linking the results between HEIs and efforts to integrate these competences in hiring strategies of companies.

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