German students want more content on sustainability in higher education

Olesa Schleicher-Dies, Vanessa Lüder, Carola Strassner, Diana Ismael, Ute Gilles, Angelika Ploeger

Abstract

The European project SUSPLUS deals with sustainable food systems (SusFood) and innovative education. This article examines the extent to which universities contribute to sustainable development. An online survey carried out between 17 February and 31 May 2017 questioned 120 students from the University of Kassel and 171 students from the Münster University of Applied Sciences (FH Münster) on the following topics: values when shopping for food, understanding of SusFood, expectations of topics covered in higher education courses and the teaching methods employed. Overall, it was possible to establish an interest in SusFood (Kassel 84%, Münster 71%). The students also believed that the topic could be helpful in a future career (Kassel 91%, Münster 76%). Excursions, interactive workshops and discussions were favored over classic subjects like organic food. Based on these results, strategies are to be developed to increase students' chances on the job market.

Keywords: food system, teaching methods, sustainability, Education for Sustainable Development (ESD)

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Introduction

Sustainability is an international field of activity formulated in the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development. Global challenges like climate change, loss of biodiversity, the rise of poverty and hunger as well as diminishing resources demand a solution and this must take account of social, environmental, and economic aspects in order to ensure that future generations can maintain the basis for life [1]. In the EU Strategy for Sustainable Development from 2006 education is seen as the basis for implementation of this [2]. Higher Education and Research for Sustainable Development (HESD) has the task of overseeing and changing the structures of research, teaching and learning [3].

Universities contribute to regional sustainable development by teaching students competences in the field of sustainability. They also form a bridge for the collaboration of actors from research and practice in the development of up-to-date solutions, while also qualifying students as future-oriented employees [4]. Since 2015 UNESCO has been working on behalf of the United Nations (UN) towards the goal of firmly integrating "Education for Sustainable Development" (ESD) into all stages of education. In higher education it can be incorporated into the teaching of competences and skills with the intention of ensuring that students are better equipped to deal with future challenges [5]. There is a need for innovative teaching oriented towards the employment market. For this it is important to develop strategies which on the one hand cover content across the whole value chain relative to sustainability and on the other hand use teaching methods with integral elements of practice.

In the fast-growing field of sustainable development many new study programs have been created [6]. According to the German Council

of Science and Humanities (*Wissenschaftsrat*, WR) employment market relevance in higher education courses is created by a focus on the communication of teaching, development, and innovation skills. The acquisition of a detailed understanding of methodology and competences like the ability to analyze and reflect, as well as project organization skills, etc. can ease entry into a professional career [7]. According to Hilimire [6] the study programs that are successful (in this case with regard to sustainable agriculture and food systems) are those with an interdisciplinary focus and systemic approach where there is also a balance between the teaching of theoretical and practical content. Students who learn on this basis develop a profound ability for critical thinking on controversial value-based topics and are able to identify solutions to complex problems in food systems [8]. The European project SUSPLUS builds on this knowledge and aims to equip students with knowledge and competences on sustainable development in the food system through interdisciplinary cooperation between education, science, and industry. These competences are what they need to become successfully integrated into the employment market.

The **project SUSPLUS** (Innovative Education towards Sustainable Food Systems) analyses students' understanding of the sustainable food system and their expectations of education in this field. Innovative teaching content is developed, including e-learning and an intensive study program. Students develop presentations for the target group of secondary schools and carry out small research projects for companies which support a sustainable food industry. A specialist network of students and graduates is being established. In addition, a brochure is to be prepared on the concept of "Sustainable Food Systems". Eight European universities are involved in Denmark, Germany (2), Estonia, France, Italy, Poland and Spain. The project is part of the international Organic Food System Program and is financed by ERASMUS+.

Research question

The most important abilities and skills that European employers look for according to a report by the EU Commission [9] are branch-specific knowledge and competences, but also proficiency in communication, team work, analysis and problem solving, foreign language skills, and the ability to adapt to new situations and take action. An analysis of the organic sector showed that more than 60% of employers are not satisfied with the level of knowledge and abilities of university graduates and that innovation is needed in teaching methods [10]. The focus of this article is the expectations students themselves have of higher education courses in the stated field. In order to ascertain this, the students were questioned on topics such as values when shopping for food, understanding and importance of sustainable food systems (SusFood), and preferred content and teaching methods in higher education. The elements of a sustainable food system are taken from Allen und Prosperi [11]. The potential specialist content offers workable alternatives to dominant aspects of the food system. The results are intended to form the basis for development, implementation, and dissemination of innovative education materials and methods on the topic of SusFood.

Methodology and Cohorts

The surveys were administered at the Münster University of Applied Sciences (FH Münster) by the Department of Food – Nutrition – Facilities and at the University of Kassel by the Faculty of Organic Agricultural Sciences, Department of Organic Food Quality and Food Culture. The goal of each university was to obtain at least 100 responses from the students on nutritional, environmental, and agricultural courses, i.e. the consortium members, and as a contrast an additional 100 responses from students on other courses. The questionnaire for the online survey was provided in English by the project partner University of Copenhagen, translated into German by the Münster project group and posted onto the online survey tool (QuestionPro). A link to the questionnaire was sent to potential participants by email. The questionnaire was divided into five sections: current attitude, your understanding, your background knowledge, expectations for the future, and general information. The questionnaire contained closed and half-open questions with three-level evaluation or interest scales and open questions.
In the first round of surveys in February/March 2017 contact was made with a total of 355 first semester students from the Department of Food – Nutrition – Facilities and the Münster School of Business at FH Münster. 51 students from Food – Nutrition – Facilities and 25 from Münster School of Business took part. In order to achieve the response goal, in May 2017 a second round of the survey was started, where all semesters were approached. Overall a total of 291 students took part in the survey between the period 17 February and 31 May 2017, in Münster 171 students from the Department of Food – Nutrition – Facilities and the Münster School of Business and in Kassel 120 students from the Faculties of Organic Agricultural Sciences, Economics and Management, and Social Sciences. The average age of the respondents was 23 years (Münster) and 26 years (Kassel). They were predominantly female (75%; Münster 81%, Kassel 66%) and Bachelor students (75%; Münster 86%, Kassel 59 %). The proportion

	Overall sample n = 291		
	Sample FH Münster (n = 171; 58.8%)	**Sample Uni Kassel** (n = 120; 41.2%)	**Overall sample** (n = 291; 100%)
Gender	171 (100%)	120 (100%)	291 (100%)
of which male	33 (19.3%)	41 (34.2%)	74 (25.4%)
of which female	138 (80.7%)	79 (65.8%)	217 (74.6%)
Internationality	6 (3.5%)	23 (n = 116; 19.8%)	29 (n = 287; 10.1%)
Intended qualification			
of which Bachelor (BA)	147 (86.0%)	71 (59.2%)	218 (74.9%)
- agricultural science[a]	n/a	71 (59.2%)	71 (24.4%)
- food science[b]	107 (62.6%)	n/a	107 (36.8%)
- environmental science	n/a	0	0 (0%)
- business studies	40 (23.4%)	0	40 (13.7%)
of which Master's (MA)	24 (14.0%)	42 (35.0%)	66 (22.7%)
- agricultural science[a]	n/a	15 (12.5%)	15 (5.2%)
- food science[b]	23 (13.5%)	11 (9.2%)	34 (11.7%)
- environmental science	n/a	3 (2.5%)	3 (1.0%)
- business studies	1 (0.6%)	4 (3.3%)	5 (1.7%)
- other	0 (0%)	9 (7.5%)	9 (3.1%)
of which PhD	0 (0%)	7 (5.8%)	7 (2.4%)
- agricultural science	0 (0%)	5 (4.2%)	5 (1.7%)
- environmental science	0 (0%)	2 (1.6%)	2 (0.7%)
Study discipline			
of which agricultural science[a]	0 (0%)	91 (75.8%)	91 (31.3%)
of which food science[b]	130 (76.0%)	11 (9.2%)	141 (48.5%)
of which environmental science	0 (0%)	5 (4.2%)	5 (1.7%)
of which business studies	41 (24.0%)	4 (3.3%)	45 (15.5%)
of which other	0 (0%)	9 (7.5%)	9 (3.1%)

Tab. 1: **Distribution of the student cohorts by course and other characteristics**
[a] horticulture and agriculture; [b] food and nutritional sciences; n/a = not applicable or not offered

of international participants was larger in Kassel, but overall, still quite low (◆ Table 1).

Results

Values – Attitudes

In order to ascertain the attitudes of survey participants to their own nutrition patterns, questions were first asked on their habits when cooking and food shopping. 44% of respondents in Kassel (Münster 63%) stated that they cooked 2–3 times a week and 52% (Münster 5%) of them every day. The majority of the respondents (Münster 60%, Kassel 49%) reported that they were responsible for buying food in their household and bought food 2–3 times per week (Kassel 73%, Münster 64%). Both survey groups considered values such as "health", "taste" and "animal welfare" very important (◆ Figure 1).

The percentage shown reflects the value which appeared very important to the respondents. The missing/remaining percentages are divided between "moderately important" and "not at all important".

Understanding of "sustainable food systems"

The respondents' understanding of SusFood was established by asking the students what statements they felt were contained within the term. Here the respondents classified statements as "very important", "moderately important" or "not at all important". Both survey groups classified the following statements, which are considered elements of SusFood here, as very important overall:

- protects biodiversity
- is economically viable
- considers animal welfare
- is humane and just
- protects farmers
- supports local production and sales structures
- has minimal negative effects on the environment
- respects the needs of future generations
- sustains ecosystems and keeps them healthy
- ensures that nutritious food is available, accessible and affordable for everyone

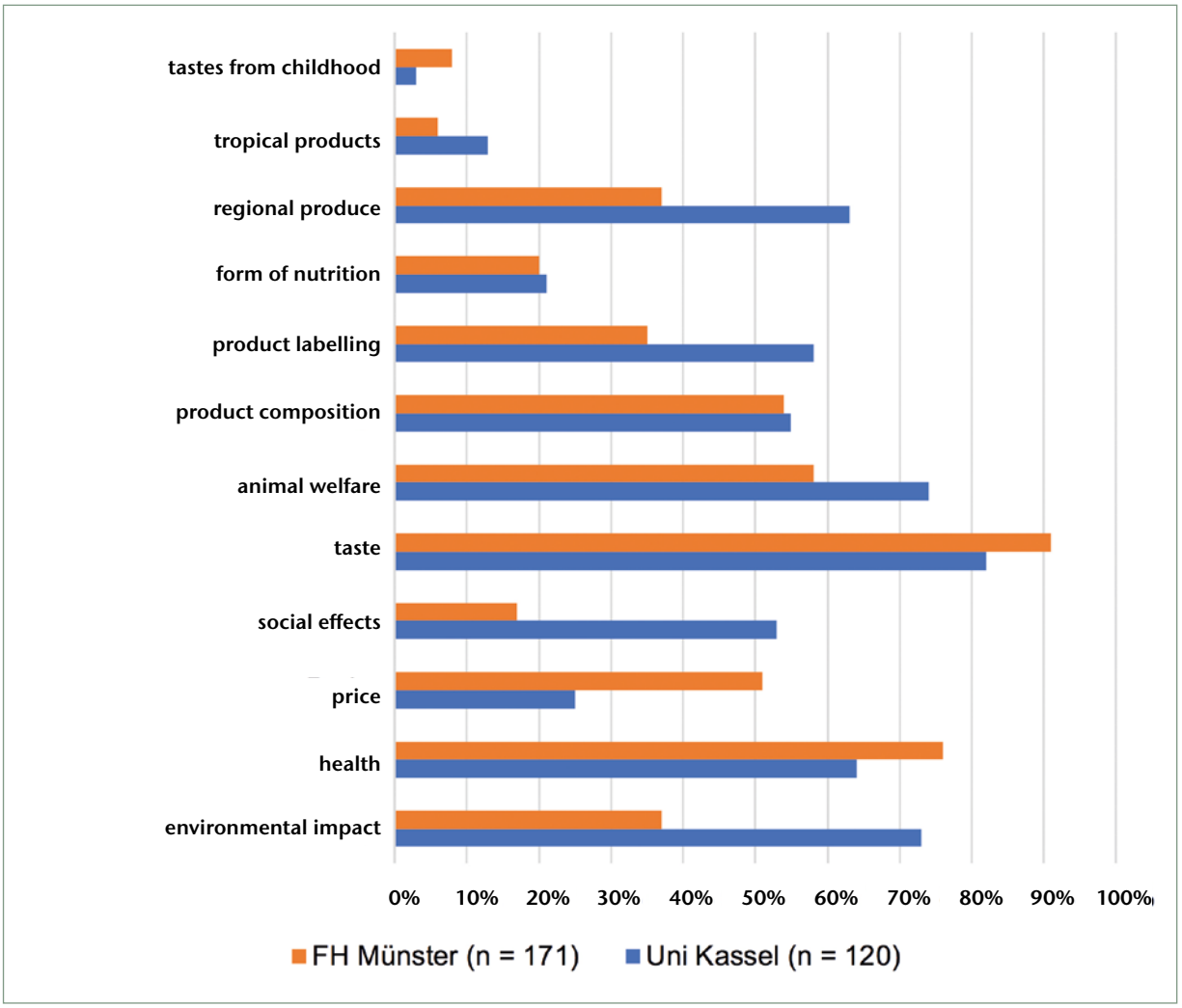

Fig. 1: **Values and motives when shopping for food and making consumer decisions**
The percentage shown reflects the value which appeared very important to the respondents. The missing/remaining percentages are divided between "moderately important" and "not at all important".

However, more participants in Kassel than in Münster decided that the elements of SusFood were very important to them. It is interesting here to take a closer look at the results of the cohorts from Münster, which are made up from the Department of Food – Nutrition – Facilities and the Münster School of Business. Students of business studies judged the elements of SusFood less important than the nutritional sciences students.

Interest in "sustainable food systems"

There is great interest in SusFood, somewhat greater in Kassel (84%) than in Münster (71%). Although half the respondents in Münster and Kassel have already had some teaching on SusFood in their courses, the others would like to see a seminar dealing with "sustainable food systems". Throughout their studies to date in one whole course of at least 15 hours students in Münster saw less coverage than those in Kassel of topics such as "organic foods" (Münster 15%, Kassel 50%), "conventional farming" (Münster 8%, Kassel 23%) or "organic agriculture" (Münster 9%, Kassel 69%). SusFood topics are taught significantly more often within 1–4 lectures, although here too students in Kassel have covered more of these topics: "UN sustainability goals" (Münster 30%, Kassel 51%), "food safety" (Münster 36%, Kassel 63%), "Fairtrade" (Münster 49%, Kassel 55%) among others. Lastly, a high proportion of the students reported that many SusFood topics were not offered at all, e.g. "UN sustainability goals" (Münster 64%, Kassel 39%), "Slow Food" (Münster 76%, Kassel 68%), "Fairtrade" (Münster 46%, Kassel 39%) or "food sovereignty" (Münster 82%, Kassel 28%) (◆ Figures 2 and 3).

Around 76% of the participating students from Münster and 92% from Kassel believed that a course on SusFood could be helpful in their future career. Here they found topics like "Fairtrade", "organic food" or "UN sustainability goals" very interesting (◆ Figure 4) and topics like "protected designation of origin" (PDO) or "veg box schemes" not at all interesting. In addition, the students suggested some interesting topics which would be helpful for their future careers, including the following:

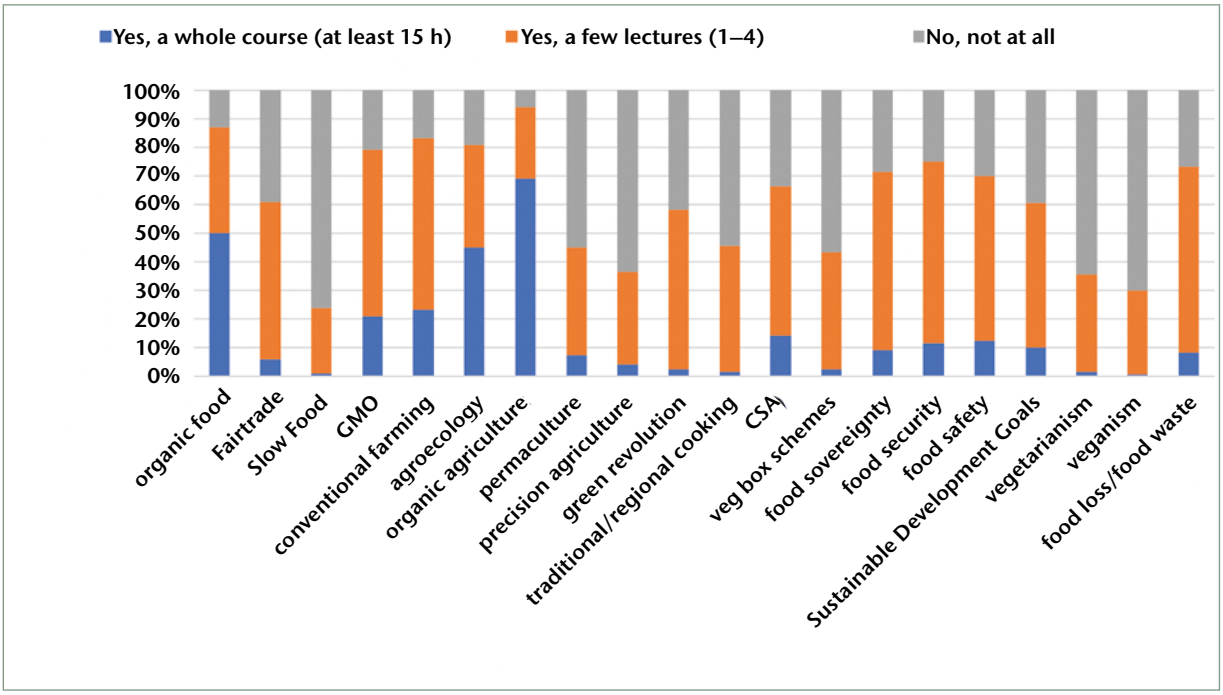

Fig. 2: **Results for the question "Was one of these topics covered in your higher education?" at the University of Kassel (n = 120)**
CSA = community supported agriculture; GMO = genetically modified organisms; h = hours

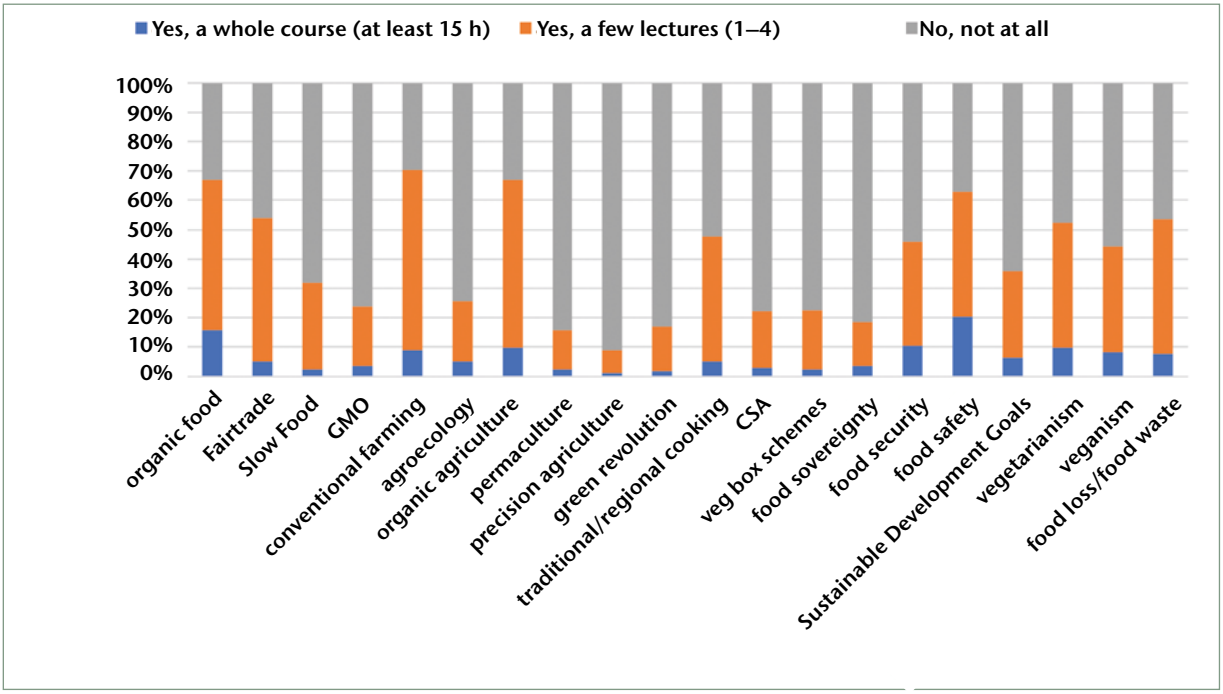

Fig. 3: **Results for the question "Was one of these topics covered in your higher education?" at the FH Münster (n = 171)**
CSA = community supported agriculture; GMO = genetically modified organisms; h = hours

- effects of consumption
- sustainable food in other cultures
- sustainable lifestyle
- economy for the common good
- the status and perspectives of food education in society
- alternative marketing strategies

Here the statements of the business studies students from Münster are particularly interesting: 56% of this "non-food related" group of participants was interested in the nutri-

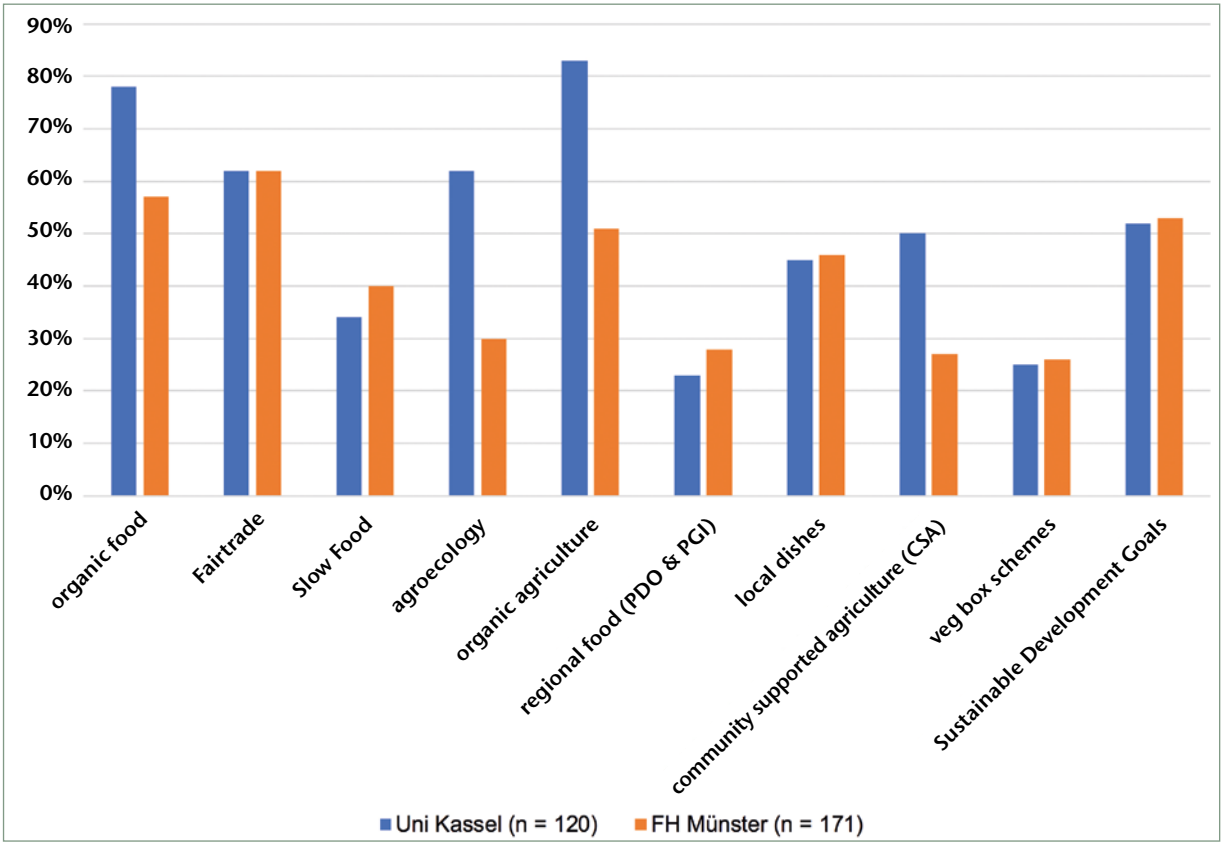

Fig. 4: **Results for the question "How interesting do you find the following topics for a future course?"**
The percentage shown reflects the value which appeared very interesting to the respondents. The missing/remaining percentages are divided between "moderately interesting" and "not at all interesting".
PDO = protected designation of origin; PGI = protected geographical indication

tion-related topic of SusFood and 37% of them believed it could be important for their future career.

Teaching Methods

In response to the question as to what scope students would prefer for the topics, in Münster 70% were in favor of "a few lectures in a module" and only 30% for "a whole module with 15 hours" on SusFood topics. In Kassel it was the opposite, here 55% of the students favored a whole module and only 45% a few lectures. Although the Münster students wanted to be informed on the topics, only 30% of respondents wanted to go into detail. On the teaching methods, however, the Münster and Kassel students are agreed: the preferred teaching methods selected were "excursions" and "workshops", but also classic teaching methods like "lectures with discussions" (◆ Figure 5). "e-learning" was "not at all interesting" for the students.
The percentage shown reflects the value which appeared very interesting to the respondents. The missing/remaining percentages are divided between "moderately interesting" and "not at all interesting".

Discussion

Many of the surveyed students cook at home, although the tendency to eat outside the home has increased in recent years [12]. They shop regularly and their standards as regards food are predominantly high. Among the Münster students there is a slight tendency towards motives related to the self – such as "price", "taste", "health" (except "animal welfare"). Values with an altruistic motivation, such as "tropical products" or "social effects" are not important or only moderately important to the respondents. Similar results were obtained in the study by Hilimire, in which the aspects "health" and "price" were shown to be the decisive arguments for purchase decisions [12]. Another study in Lüneburg investigated the topic of "selection criteria for the purchase of food on campus". In this case the criteria of "price" and "taste" scored highest. Here the participants' understanding of sustainability and competences for interdisciplinary learning and selection criteria for food consumption were examined [3].

The students from Kassel, in particular when compared to those from Münster, placed importance on the aspects of "regional produc-

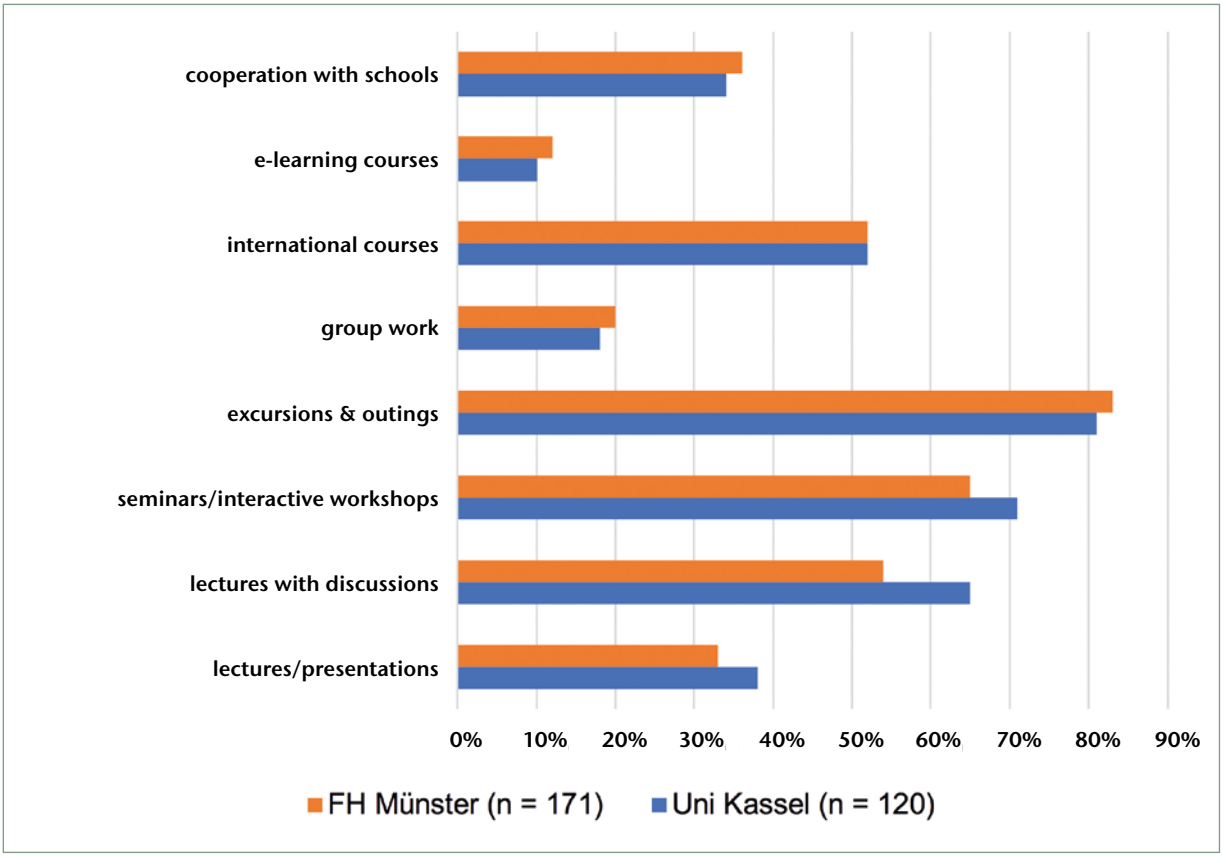

Fig. 5: **Results for the question "How interesting do you find the following teaching methods?"** The percentage shown reflects the value which appeared very interesting to the respondents. The missing/remaining percentages are divided between "moderately interesting" and "not at all interesting".

tion", "social tolerability" and "environmental compatibility". This may be related to the area of study: the participants from Kassel were on courses with a strong relation to agriculture, whilst some of the participants from Münster (24%) were on non-food related courses (business studies). The study from Lüneburg also found a varying understanding of sustainable development between different areas of study [3]. This raises the question of how to reach specialist cultures unconnected to sustainability.

Overall, the survey participants consider some aspects of SusFood before purchasing food. However, it should not be forgotten that this survey is based upon self-reporting by the participants. One possible measuring error in surveys is "social desirability" where respondents react according to the expectations of a social group [13].
The students classified all elements of SusFood as important with over 61%. This means that they predominantly evaluate elements of SusFood as relevant (◆ Figure 2) and according to their statements consider sustainability factors when shopping (◆ Figure 1). This indicates that the topic of SusFood is present. The results show that students have a prior knowledge or an idea of what the term means. This in turn provides indications as to which topics materials on SusFood could cover.

According to Hilimire teaching content is accepted by students if there is, inter alia, curiosity about the subject [8]. This is the case among participants in this study, they have a great interest in SusFood. The following examples from Kassel clearly show this: around 95% of students placed importance on "local products" when buying food. Although 54% stated that they had not attended a full course on this topic, 93% of the students stated that they were interested in future courses related to the topic of local production principles. 89% of the students look for certain labels when they shop, such as Fairtrade, no genetically modified organisms (GMO), Slow Food or organic. Between 87% and 95% stated the importance of future courses related to Slow Food and Fairtrade concepts. And finally, 79% of the students stated that a special diet, such as vegetarian or vegan, was an important motivation for their buying and consumer decisions. However, 64% and 70% of the students reported that they had not attended any university courses on vegetarianism or veganism. Overall, 52% of the students in Münster (although 71% are interested) and 50% of the students in Kassel (although 84% are interested) have as yet received little information on sustainable food systems in their study programs.

From the data above we can establish a gap between the interests and motives of students in their daily consumer decisions and the educational topics offered by the university. Sustainability is multi-dimensional, i.e. all three areas of ecology, economics, and sociology must be covered. And this includes both undergraduates on food-related courses (agriculture and nutrition) and those studying non-food related subjects. In addition, a large proportion of the respondents (Kassel 59%, Münster 47%) are students in their first and second semesters. Named content interests may be brought by the school where they were touched/treated. Further impulses can be developed through public/media discussion and debate. In the first year of a bachelor's degree programme, natural and social science basics are generally read. The extent to which aspects of SusFood are linked to this remains to be seen.
The information on which topics interest students is, on the other hand, more conclusive. It is striking that the more specialist the subject, the lower the interest, e.g. "agroecology" or "CSA" (community supported agriculture) (◆ Figure 3). Classic topics like "organic food" are still popular. This knowledge can provide a basis for the content universities could offer. The scope of the content does not have to be a whole module. For a large proportion of the respondents, it would be sufficient if just a few lectures were provided on these topics. One possible solution would be the amalgamation of similar content into one module using the preferred teaching methods of "excursions", "interactive workshops" or "discussions".

For ESD in particular, innovative teaching formats, like planning games or project studies, are highlighted as well as the use of new media [4], although e-learning was considered the least interesting by the cohorts. One reason for this could be lack of previous experience. For Hilimire too interactive and practice-based methods are of great importance. The combination of experience, theory, and the practical acquisition of skills in the field of food systems enables a systematic analysis and reflection of the material learned [5]. Excursions and outings, which the cohorts considered most interesting, offer the ideal framework for this. It was established through running courses designed to be interactive that students developed profound critical thinking skills and were able to identify solutions to complex problems in food systems [8]. However, researchers recommend explaining the SusFood system approach right at the beginning so that students gain an awareness of the complexity. In addition, methods such as case studies, cooperative and experience-based learning, and discussion should be used. Case studies enable the linking of theoretical and practical concepts in the examination of food systems and the development of problem-solving skills. This can also be complemented by various models, e.g. written tasks, class discussion. In the case of cooperative learning teams consist of students and practice partners. Here the focus of learning is more on participative experience through other personal experiences with food systems. Finally, discussions bring out many new ideas and augment the knowledge acquired. Discussions on professional opportunities in the context of food systems should be particularly emphasized, according to Hilimire. In their course evaluations, students on Hilimire's courses identified this as one of the most important elements of the modules [8]. ESD is intended to enable people to be involved in shaping development. This can be achieved by encouraging independent exploration and identification of answers rather than by spoon-feeding particular mindsets and behavior patterns [14].

Conclusion and Outlook

The respondents take account of many values which are also applicable to SusFood. It is possible that simply engaging with the topic is already a step towards sustainable behavior patterns. Through their purchases they send a demand for sustainability to the market. However, it should not be forgotten that people do not always manage to achieve the things they set out to do.

Sustainable food systems are not only a topic for nutrition-related study programs. In other disciplines too, like business studies in this case, there is an interest and content on SusFood should become more established there. Even though, according to their statements, they have not covered this topic much up to now in their courses, certain aspects of SusFood do seem to have been unconsciously considered in their food shopping. This creates the hope of a positive prognosis for transformation to sustainable food systems in the future. The methods of teaching this knowledge could support this. In Singer-Brodowski it was stated that sustainability courses must be organized as problem-based and self-oriented to enable students to develop their competences across disciplines [5]. Hilimire [12] also investigated which competences students want to learn and which topics they find interesting. It was found that teaching units on the topic of "food systems" should be oriented towards sustainability. These results of similarly organized studies can in future also be used for teaching, with regard to the methods which students find interesting.

Overall, the surveys in Münster and in Kassel yielded interesting results which offer a basis for future interim goals of the SUSPLUS project. In order to find out whether the materials and teaching methods discussed here bring learning success for the participants, a survey on this should be conducted in the further course of the project. Based on these results it may be possible to see whether there is a connection between prior understanding of sustainability and the preferred teaching

methods. Conclusions can also be drawn from this on how students best learn. In addition, the results from Germany should be compared with those from other countries and the results incorporated into the planning of study programs and course content. Migliorini et al. [15] investigated the prior knowledge and consumer habits of students in the seven countries involved in SUSPLUS in this context.

The SUSPLUS survey firstly offers potential for additional quantitative but also qualitative surveys within the project on the following more detailed questions: What do universities have to do in order to be able to contribute to sustainable development? Students are demanding different content and teaching methods. Does this require adjustments to study regulations? Does this require a longer duration of study? Are there gaps in our education system or rigid entities standing in the way of sustainable development? How can students of other disciplines be integrated? Secondly, the SUSPLUS project can be developed and used as the basis for further research and for innovative methods, content in curricula or sustainable developments.

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Conflict of Interest
The authors declare no conflict of interest.

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