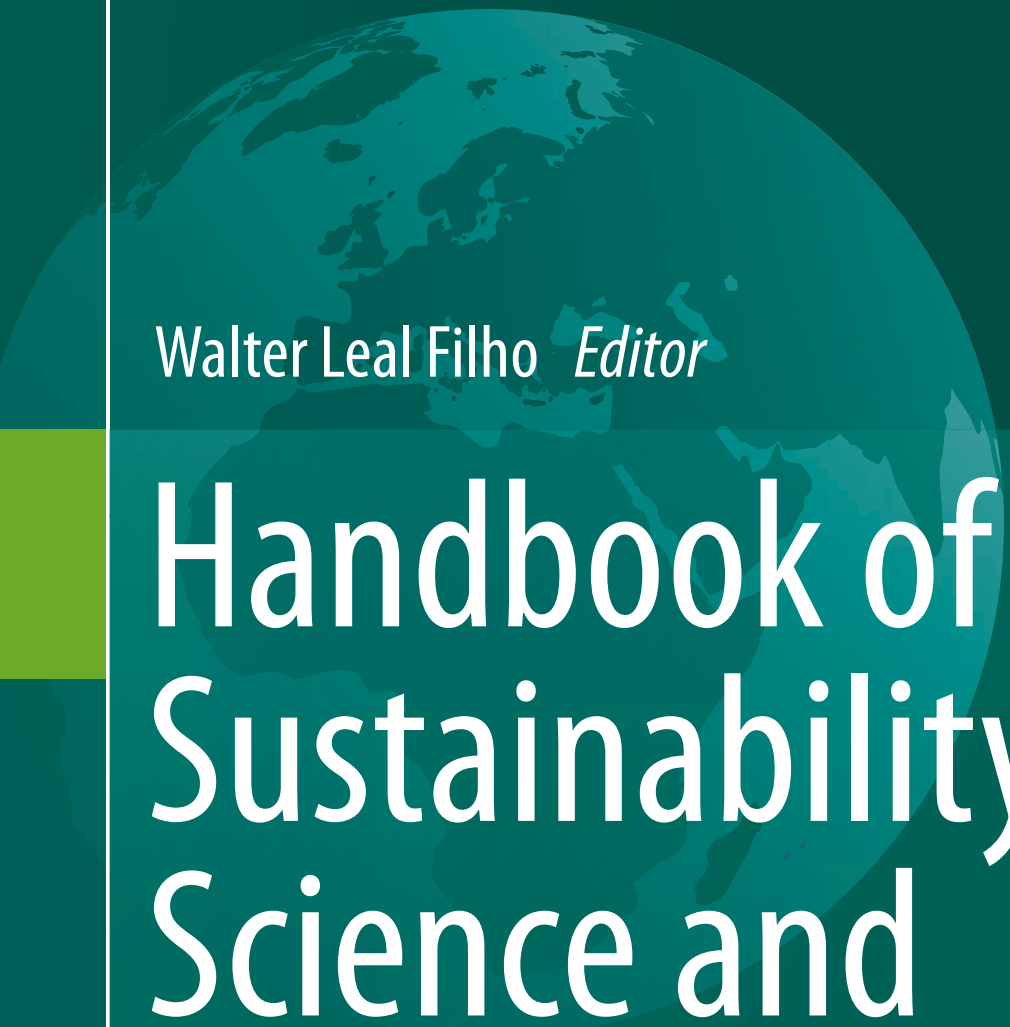
World Sustainability Series



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Handbook of Sustainability Science and Research

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Preface

The United Nations Summit, held on 25–27 September 2015 in New York, adopted the post-2015 development agenda and a set of Sustainable Development Goals (SDGs) which are outlined in the document "Transforming our world: the 2030 Agenda for Sustainable Development". This Agenda, according to the UN, is a plan of action for people, planet and prosperity, which seeks to strengthen universal peace in larger freedom. It contains 17 Sustainable Development Goals and 169 targets, which demonstrate both a vision and an ambition. It seeks to build on the Millennium Development Goals and complete what these did not achieve. The document "Transforming our world: the 2030 Agenda for Sustainable Development" also clearly shows the need for an integrated handling of the three main dimensions of sustainable development: the economic, social and environmental.

There is a world consensus in relation to the fact that Sustainability Science—i.e. a branch of science concerned with an integrated view of the three main dimensions of sustainable development—can provide an important contribution in order to achieve the Sustainable Development Goals. Even though in the past, the potential of Sustainability Science has been largely overlooked—some say underestimated—it is clear that it can provide a key contribution to the implementation of the Sustainable Development Goals (SGS) and, more specifically, the realisation of the vision set at the 2030 Agenda for Sustainable Development.

It is based on the perceived need to explore and present concrete case studies which illustrate how Sustainability Science and Research can help to achieve the many goals listed in the document "Transforming our world: the 2030 Agenda for Sustainable Development", that the "World Symposium on Sustainability Science and Research: Implementing the 2030 United Nations Agenda for Sustainable Development", that this "Handbook of Sustainability Science" has been prepared.

The book contains a set of papers presented and discussed at the first "World Symposium on Sustainability Science: Implementing the UN Sustainable Development Goals", jointly organised by the Hamburg University of Applied Sciences (Germany) and Manchester Metropolitan University (UK), in cooperation with various UN bodies, government offices and authorities, universities, enterprises, NGOs and grassroots organisations from across the world.

This book is structured in three main parts. Part I addresses the political, social and economic dimensions of sustainable development, and provides a

comprehensive overview of the many influences these areas provide to the global sustainability debate.

Part II is concerned with the environmental, social and technological dimensions of sustainable development. Here, an emphasis is given to the connections between environmental technologies and environmental protection efforts on the one hand, and the social implications of their implementation on the other.

Part III focuses on holistic approaches, stakeholders engagement and education for sustainable development, combining three important elements sustainability science, and illustrating how effective they may be. One chapter, prepared by the team working at the UN Development Goals Secretariat in New York, describes how Private–Public Partnerships may assist in the implementation of the Sustainable Development Goals, with experiences from the SDG Fund.

A short, final chapter, presents some perspectives on sustainability science and introduces the World Sustainable Development Research and Transfer Centre, outlining its activities for the period 2017–2030. All in all, this handbook provides a timely contribution towards fostering awareness and offers basic knowledge on sustainable development, and on both individual and organisational sustainability and responsibility. We hope this may prove useful in supporting organisations to pursue one or more of the Sustainable Development Goals.

We thank the authors for their willingness to share their knowledge, know-how and experiences, as well as the many peer reviewers, which have helped us to ensure the quality of the manuscripts.

Enjoy your reading!

Hamburg, Germany;
Manchester, UK
Winter 2017/2018

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Cooking Courses in Higher Education: A Method to Foster Education for Sustainable Development and Promoting Sustainable Development Goals

Uwe Neumann

Abstract

Since October 2011, we offer an optional course "CookUOS—Cooking in context of health literacy and education for sustainable development" at University of Osnabrueck assuming, that cooking and eating is a feasible method to convey ESD by combining theory with an emotional activity everybody knows (Neumann et al. 2016). CookUOS works as a "bus" to pitch science to the participants. They develop figurative and decision-making competencies, self-responsibility and self-efficiency by practice-related tasks. During interdisciplinary colloquia, CookUOS initiates by means of an obligate transdisciplinary change of perspectives a multiprofessional and interdisciplinary exchange between the participants. This paper votes for the implementation of more theory practice-based approaches in higher education to recruit multipliers. A cooking course following theoretical lectures in the curricula of higher education fosters knowledge, competencies and skills we need now and in the future to achieve ambitious agenda 2030 aims. An overview of a 6-year experience analyses pitfalls and succeeding. It furthermore points out opportunities for research as well as options to promote a transfer of knowledge within this process to society to society and vice versa.

Keywords

Kitchen · Cooking · Competence · Cooking course · Sustainability · Higher education · CookUOS · Practical implementation · Nutrition sovereignty Health literacy · Situated learning

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1 Introduction

Nutrition itself has become one of the most important, but also complex, anthropogenic issues in regard to climate change as well as the challenge of increasing expenditures in health-care systems. Although results in research are not consistent yet, the responsibility of nutrition for greenhouse gases (GHG) emissions can be set at an overall minimum of 16–22% (Grünberg and Julia 2010; Koerber et al. 2009) just only for Germany. It is further well reported that social and health policy-related challenges by increasing expenditures in the treatment of nutrition-related or-associated Non-Communicable Diseases (NCD) are obvious (Meier et al. 2015).

There is a broad scientific consensus that food and nutrition both address to Public Health and Sustainability but in opposite feasible policy, governance or educational strategies are outlined but still missing (Reisch 2013; Lang and Barling 2013; Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 2015). In the framework of policy instruments to promote sustainable food systems, self-committing is identified as one of the relevant issues besides information-based, market-based and regulatory instruments (Reisch 2013).

The German Conference of Secretaries of Education (KMK) advised embed ESD continuously in all curricula of all school forms. For cooking courses, a scientific rationale can be seen in medicine mostly as a dietary intervention or prevention programme. The settings vary from addressing specific groups with high risk for diabetes or obesity (Tarro et al. 2014), over local or regional concepts within Public Health action processes to supply school kids with healthy food and basic nutrition literacy (Ellis et al. 2013; Fieldhouse and Thompson 2012).

In June 2016, Rockström and Sukhdev from the Stockholm Resilience Centre concluded that actually all the sustainable development goals are directly or indirectly connected to sustainable and healthy food (Rockström and Sukhdev 2016), and therefore a paradigm change in action processes is necessary. Resource management and environmental impacts of the food and agriculture sectors as well as nutrition itself are serious threats, which should get more in the focus of attention and a scientific proofed action process to reach the goals of the 2030 agenda. Undoubtfully, it urges to counteract those problems caused by increasing inequities, obesity and malnutrition or starving. A paradigm change from a curative, therapeutic point of view to a salutogenic, preventive strategy is mandatory.

Cooking courses for university students are predestined to create multipliers who later play an important role in conveying knowledge and competencies on health, nutrition and sustainability to a wide audience (Neumann 2012). Objectives of cooking courses aim to empower individuals to understand imbalances of food-availability and -distribution, surplus versus waste, shortened and ending resources as well as cooking skills as a sociocultural heritage and duty. Later it can initiate, e.g. a progress in counteracting nutrition-associated diseases or reducing waste of food and resources in private, educational, or occupational environment.

Due to global responsibility, it triggers a commitment towards Education for Sustainable Development (ESD) (Koerber et al. 2016).

The aim of this paper is to introduce CookUOS and to discuss whether it is a feasible method to foster ESD in higher education by the means of a lecture-accompanied cooking course and a portfolio of teaching and learning formats within the matrix of higher education and society impact in relation to expert knowledge and ESD knowledge. The food and nutrition-related setting and collaboration with regional stakeholders transfer a broad range of issues linked to the Sustainable Development Goals (SDG's). It further votes for the opportunity to engage students as a creative revolving capacity in the process of conception and administration of such a portfolio and for open discourses towards a permanent incorporation in all formal or non-formal educational sectors and a better support by policy and research funding.

2 How Nutrition, Cooking and Culture Connect to Sustainability

Since the discovery and control of fire, cooking has become one of the greatest cultural achievements of mankind and has determined the value of food and prepared meals (Wrangham 2009). On the other side, we see a rising tendency to use highly processed food (Gehlhar and Regmi 2005) going along with a decline in cooking skills (Lichtenstein and Ludwig 2010) beside for the past 60 years.

In the industrialised countries expenditures for food dropped from approximately 50–60% of the net household income over the last 100 years to, since 1990 relative stable, 7–14% (Statista 2016). In opposite to this, official facts and figures of the developing and emerging countries still tell another story (Regmi and Gehlhar 2001), (International Food Policy Research Institute, Welthungerhilfe and Concern Worldwide 2015). Hunger and high percentage of expenditures of household's income for food point out where and how to act.

Austerity and shortage at the very beginning of the twentieth century have changed to superabundance and low esteem, seen for example in wasting food. At this time, there may be a chance in cooking, bringing a new ethic of nutrition and responsibility closer to the low estimation of eating (Hirschfelder et al. 2015) (Fig. 1).

The idea of transporting education and social responsibility by cooking or gardening is not new. Since the serendipity of fire and consecutive its mastering, for our ancestors it was essential for survival and evolution to teach and empower their next generations with knowledge of preparation, recipes and value of food. It is also in discussion that cooking was a rationale to develop speech and writing (Wrangham 2009; Was der Mensch essen darf 2015; Glöckl and Breithecker 2014).

But cooking is also the birth time of the division of labour, social coexistence and ultimately the family (Perlès 1979). Through the division of food procurement, cultivation of agricultural products, processing and storage of food as well as the

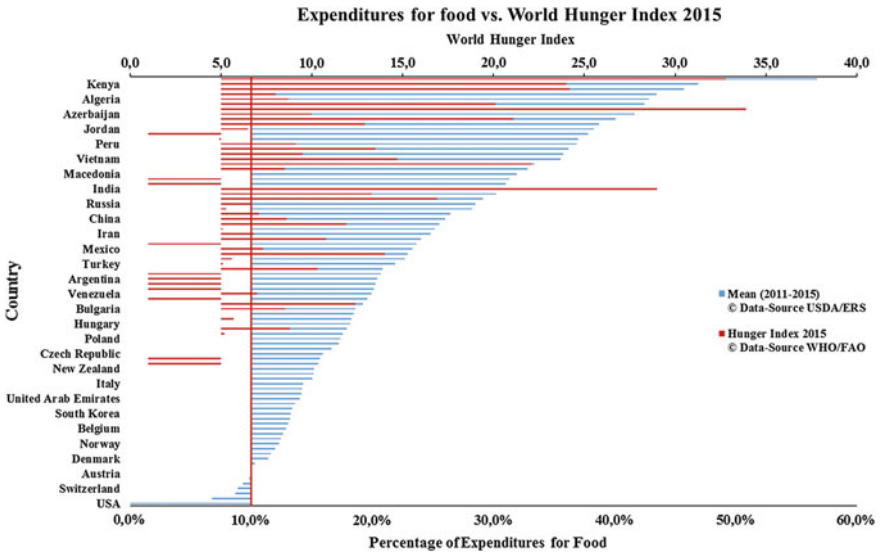

Fig. 1 Expenditures for food in relation to World-Hunger-Index

distribution or trade with it, humankind could raise to a social being. Humans Nutrition- sovereignty is reflected in the fact, that wholesome nutrition is rather more than ingesting or getting calories.

In excess nutrition is a very important economic factor. The food and nutrition industry is even bigger than automotive or computer industry (Lemke 2012). The dictum "Humans are, what they eat" (Feuerbach 2016) dated 1850, underlines the impact and the social, economic, politic, ecologic, health and cultural dimensions of nutrition. All the dimensions are in common with the goals from Education for Sustainable Development (ESD) and further the Sustainable Development Goals (SDG's).

It is not surprising that the knowledge about the value and benefits of food is of high priority. The close relationship of Nutrition–Health–Education for Sustainable Development (ESD) can be easily brought to the ground that someone who eats properly promotes his health and develops a practice-driven attitude towards sustainability and social responsibility (Zelený 1997). Cooking courses open basic pathways to sustainable competencies by autopoietic learning (Kohlberg and Eichelberger 2007). The combination of learning combined with flavour, savour and pleasure generates sustainable knowledge and empowers personal skills and resources by a contextual, an emotion- and flavour-associated approach (Shepherd 2013). Further, it mediates "Education for Sustainable Development" (ESD) and creates a "sense of coherence" feeling (Fig. 2).

Education regarding and communicating the whole process from the production and the consumption of food, forms skills and competencies about nature, science and the environment. It is intended to develop sustainable attitude and social

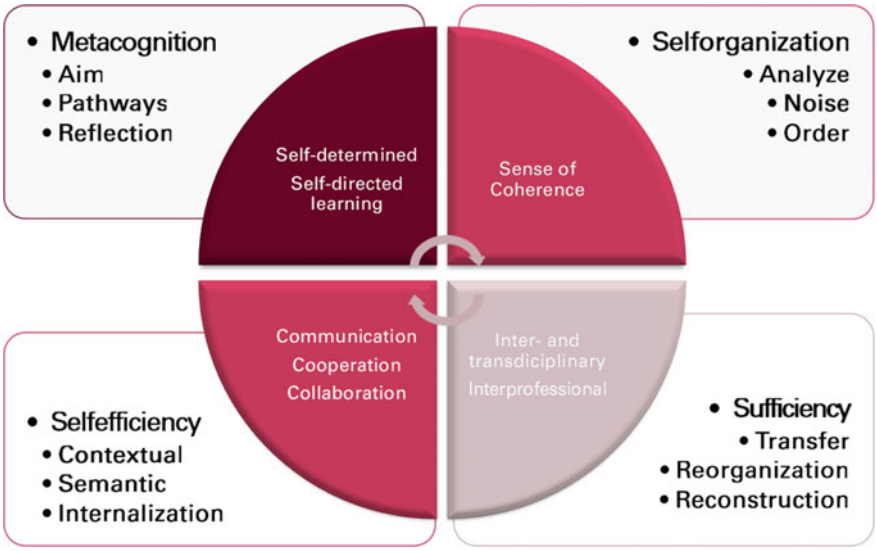

Fig. 2 Matrix of autopoietic learning [according to (Kohlberg 2012)]

responsibility (Dewey 1990, 2012) as well as becoming a valuable member of the society (Kerschensteiner 1931). Once it has been internalised it requires only little trigger to revitalise those capabilities dozing in us. Subsequently, interdependencies of nutrition and food waste, climate change and resource conservation become tangible, comprehensive and personally.

By a change of perspective, the participants take part in a reflective discussion on conditions of production, the abundance and the unequal distribution and food's impact on the environment just while buying, preparing and eating the goods. In addition to the pure nutritional value, food's addresses also other values such as compassion, justice, fellowship, participation, respect and responsibility, but also joy, enjoyment, creativity and power of innovation.

2.1 CookUOS

Homo sapiens (from *lat. homo* = man and *sapere* = savour, taste), brings it to the clue that if we raise as a savouring, scintillatingly witty species why not should we use flavour and savour to transport sustainability and its goals?

Sustainability and appreciation are inextricably linked to one's own attitude and actions. Therefore, if you want to teach and learn sustainability, it is primarily about sharpening your awareness of How To recognise and achieve values. That is exactly what CookUOS is dealing with in its portfolio, e.g. seminars, campaign days and edutainment (Neumann 2014).

To make visible that nutrition and cooking connect all the dimensions of ESD and all SDGs, an integral approach, like CookUOS, is useful to identify and characterise elements of the chain from production to consuming and waste production. In a first step, we link the SDGs to the most corresponding ESD dimensions Ecology, Society and Economy. Secondarily we address issues of the whole process of nutrition to corresponding SDGs. For example, industrial livestock animal farming harms the Biosphere and has an impact on Biodiversity. A reflective view on a cooked meal sharpens the look on land or soil management, animals or plants, as well as on the resource water and the production of greenhouse gases. As cooking needs energy, questions of innovative technologies and clean energy get into the focus. Consuming regional and seasonal food or reducing food waste helps to understand economic consequences of a responsible consumption and production as well as inequalities.

One of the main rationales was to create a learning situation and environment combining theory and practice. Kitchen and Cooking and Eating do so by bearing individual meaningfulness and relevance for the own lifestyle. Through CookUOS, competences get a practical and cultural reference and a discourse about values is initiated. CookUOS creates and trains multipliers who later will play an important role in spreading scientific knowledge and competencies into society.

Based on the first concept of a lecture accompanying cooking course within the last 5 years several other derived formats and activities have been established, e.g. field trips to get some incitation from nature or museums. To promote and to discuss the results of the students' contributions to the course with the public, a Sustainability Day with major key-note speakers, an edutainment format «T^3-scientific cooking-show», and several single-day cooking activities at the farmer's market enrich the wholesome portfolio. A homepage with blogs and social media activities broadens the recognition of the project beyond the region of origin.

Overall, CookUOS' s entire portfolio aims to elate students for ESD and more to participate as a *creative revolving capacity* and encouraged *change agents* for Sustainability in higher education and encouraging society to take part in scientific discussion and research, actually promoted as *Citizen Science*.

The setting of our course ensures, that students not only learn (*what*) is sustainability, they also develop skills (*how*) to achieve a sustainable lifestyle and finally yet importantly they understand the necessity of their role as multipliers in education (*do*)ing sustainability itself (Fig. 3).

2.2 Main Aims and Issues of CookUOS

The Dutch renaissance humanist Erasmus from Rotterdam (1465–1536) recognised, Socrates's 'thesis ... *the most learns who likes to learn*...', and imagined, logically and in consequence, that *learning will succeed best when having been taught with passion*. He identified indispensable elements of learning: communication–motivation–emotion and interaction.

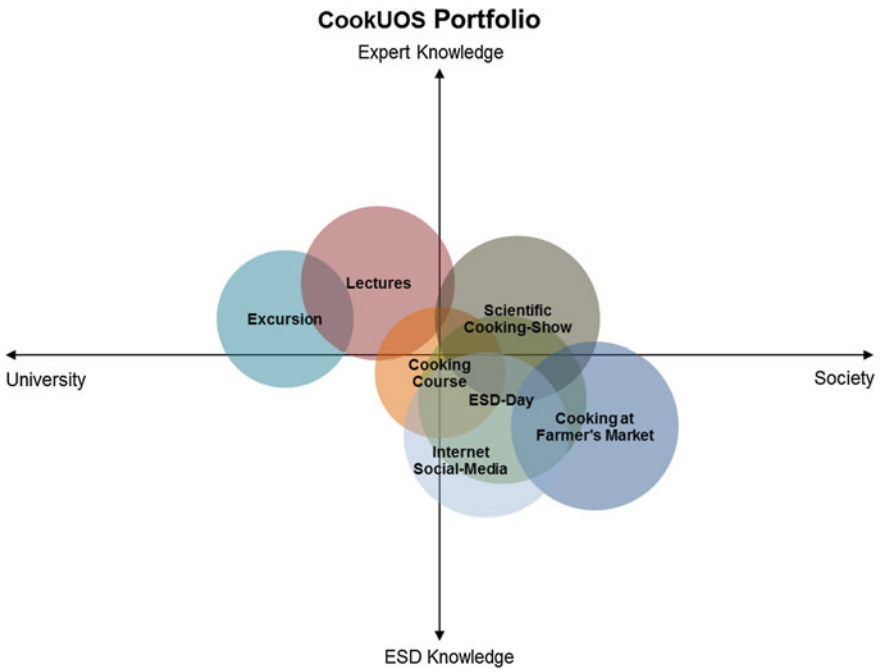

Fig. 3 Entire Portfolio conveying ESD and SDG's by the means of nutrition and cooking

In all cultures, these learning modulators are present and contribute significantly to the establishment of social norms resulting in ethical principles (morals) for thousands of years. Teaching and learning are unmistakably a deeply human issue. Today industrialised countries are strongly meritocratic oriented and specialisation, efficiency or economic reasoning often disguises the look for correlations and cross-curricular learning. This also applies to sustainability.

However, young people, especially children show a strong interest in imparting knowledge and growing competences for sustainable action. By acquiring these competencies, they will be enabled to shape and change their environment and their lives sustainably (Koh 2013; Williams and Brown 2012). Professional knowledge only leads to skills if the learners can recognise a relationship of knowledge and life with practical references.

Through the CookUOS project, we developed new ESD oriented teaching strategies in the sense of interdisciplinary situated learning. The active participation supports gaining other objectives, like the thematic focus on social competence, environmental competence, competencies in the fields of nutrition and consumption (Lavelle et al. 2016; Sepp and Hoijer 2016; Wolfson et al. 2016). They comply with competences specified during the UN Decade of Sustainable Development (United Nations Economic Commission for Europe Strategy for Education for Sustainable Development 2012) (Fig. 4).

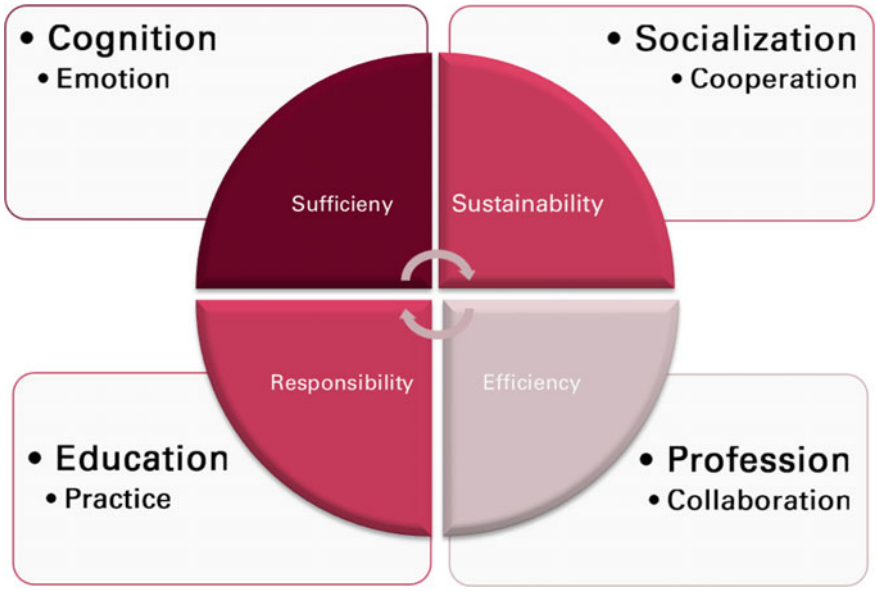

Fig. 4 Model of shaping and affecting sustainable behaviour

2.3 Setting

The CookUOS Project was born in 2010 as a collegiate project. Design, administration and mentoring of participants are the responsibility of students of the Institute for Health Research and Education of the University of Osnabrueck. A scientific advisory board supervises the Project, which is in responsibility for future research activities. Experienced senior fellows and top ranking scientists hold interdisciplinary lectures and seminars every two weeks preferably in the winter semester. On Saturdays from 8:30 am to 6:30 pm on a total of nine days, courses start with lectures and presentations. After theory follows shopping on the weekly farmer's market, cooking, eating and the joint cleaning up. The sequence intentional has parallels to a regular working day.

In the seminar section, participants listen to scientific lectures on topics such as health education and development, ecological sustainability, resource conservation and philosophical-ethical reflections. The subsequent practical courses (joint shopping, cooking and reflective table discussions) are intended to promote the willingness to transport the learned later into the professional activity and the design of own life-span.

Conscious shopping, cooking with fresh, regional and seasonal food and eating together means being active and dealing with ecology, economics and society in a critical and reflective way (Table 1).

The combination of learning and joy strengthens personal skills and resources through an experience-accompanying approach. This creates a sense of coherence.

Table 1 Main objectives of a combination lecture and cooking course

• Cooking and food as a stimulating social interaction and cultural good
• Recognise that enjoyment not excludes responsible food choices
• Cooking is an active contribution to cultural integration
• Measures for a more differentiated consumption and nutritional behaviour
• Recognition and esteem of the diversity of food and its equivalence
• Awareness of sustainable resource conservation
• Importance of regional and seasonal food offers
• Recognising links between climate and nutrition
• Esteem of food and getting back nutrition sovereignty
• Application of scientific principles for nutrition and food preparation
• Food preparation and nutrition as a health-promoting activity
• Contribution to ESD and SDG's
• Identifying benefits of cooking and the sharing of this knowledge
• Motivation of target groups to be multipliers in different venues
• Motivation to transfer knowledge into society
• Learning with all senses

What you have learned with commitment and joy someone will pass on with joy and appreciation.

Students can earn up to nine, graded ECTS-CP and a certificate of soft-skills/Diploma-Supplement. Teacher trainees, teachers and educators can receive a certificate of vocational training or further education. All other participants receive a confirmation of participation. The scalable framework can easily be tailored to various disciplines or target groups. Regardless of social status, ethnic, cultural or religious origin, CookUOS is gender and diversity compliant as well as inclusive and ready for life-long learning. Courses, events and workshops, for example, teachers, trainee teachers, educators, but also parents and scholars help to disseminate sustainable nutrition into society.

2.4 Food and Farmer's Market

Principal location for buying food is the Osnabrueck weekly farmer's market with its rich and diverse offer from local and regional producers. The choice of food focuses generally on the seasonal availability of regional products. On basis of the seasons in the autumn and winter, a form of artificial scarcity, arises. That however turns out, on closer examination, as a welcome opportunity. This supposed

limitation moves choices to unknown or in partly forgotten species and varieties of food.

As well, this apparent undersupply promotes creativity and experimentation in the selection of recipes and the preparation of menus. Old recipes of our parents and grandparents experience immediately wake up acting appreciation. The interplay of tradition, culture and modernity [including high-tech food processing methods] leads to edible and tasty results. Products and practical actions get into the foreground, meanwhile the price of goods moves into the background. The price is as it is and will negotiated only for goods from the day before or remainders in the optical quality. What is still usable can be bought slightly cheaper before thrown away, a winning situation for providers and consumers.

The course creates a holistic understanding of origin, production and consumption. The trading partners get faces, are alive and not anymore anonymous. A relationship of trust can be developed and established. The higher price of the fresh market offer is through a more enlightened purchase and the meaningful reduction of quantities and portion sizes almost completely compensated. Themes of meat consumption, fair trade and resource-saving will be addressed as unbiased as critical. During subsequent cooking and table discussions there will be plenty to talk about (Heindl 2016). Mindfulness on quality, origin and production conditions appear while purchasing and cooking.

2.5 Cooking and Service

CookUOS attaches special attention to the cooking as a central achievement of human cultural development (Methfessel 2005). After the visit to the market the choice of recipes and processing of the food are the next stages of the cultural journey through dining and food. The recipes ideally reflect the topics of the scientific lectures in the morning, for example, if the Lecture was about nutrition styles and their impact on health and environment, the students must prepare corresponding meals in vegan, vegetarian, or flexitarian style with meat as well as to taste the difference, compare and discuss pros and cons.

Centre of cooking is the teaching kitchen of a neighbouring vocational college with disciplines home economics and gastronomy. For each menu course the purchased goods are collected and sorted. Alternately, each group is responsible for a single part of the menu. Another group does not cook but operates as "Supporter" ancillary to the other teams, keyword: *Division of labour*. The group is responsible for design and decoration of the table and for procurement in the case of something has been forgotten or is not available in stock. This support has a meaning-bearing function with the same value as the cooking itself.

Under supervision and guidance of experienced chefs up to 3* Chef de Cuisine Thomas Bühner the students cook the corresponding recipes. They quickly organise themselves among the new location and the team members. They partly self-assign individual tasks that contribute to the success of the whole menu.

By the time, initial fears, stress and uncertainty shifts to a relaxing routine for steadily better time and organisation management. Meanwhile, answers are giving to any questions about food-knowledge and helpful tips to act with consideration.

The prevention of kitchen waste optimises the resources. Cutting waste or unused parts of food are beachcombed for the preparation to entrees, side dishes, or smoothies or pulverised for condiment. The value of food is looked in its entirety and a vegetable waste becomes a good basis for a broth. Organic waste drops to a minimum because they use almost everything, Taking care of wrapping reduces garbage almost to zero.

2.6 Meal and Table Talk

After the cooking, the next station of is the common meal. The non-cooking group sets up and decorates the table, which not only provides a basis for the ordinary placement of the participants. Rather, a stylish and valuable framing is composed and occasionally offers a conviviality ambience. The laid table also gives the appreciation of the efforts of the cooking groups preparing the mutual meal. Uniform crockery and cutlery, different glasses for different beverages and a decoration corresponding to the daytimes' theme will become self-evident components.

It is often the case, that even unused foodstuffs or parts thereof become stylish elements of the table decoration and raise the total value of the products. Course for course is now served and the ingredients, preparation and special features briefly presented by the teams. Even if it does not meet the taste of everyone, at least one is tried briefly and occasionally leads to an "aha" as an expression of a sensual experience. Any food intolerances are taken into consideration without comment. Personal nutritional styles or religion-based nutritional specialties are respected (Fardet and Rock 2014).

In relation to the food, conversations at the table serve the reflection of the day. The difficulties or simplicity of the preparation are discussed, as well as the quality and further processing possibilities of the foodstuffs.

3 Results and Analysis

Due to the fact, that the project is co-funded with tuition fees, granted by the Central Study-Commission and the Institute's own Study-Commission, the project was obliged to undergo evaluation by the Teaching Evaluation Service Point of the Osnabrueck University. Student's opinions on, e.g. relevance or interestingness are very helpful to estimate feasibility and success of a course. Datasets I consist only of participants of the Lectures with accompanying Cooking Course, Dataset II is the Questionnaire presented to guests of the Sustainability Day and the Scientific Cooking-Show T^3, performed by an international renowned cast of 3* Chef de Cuisine Thomas Bühner, Soft Matter Food Scientist Prof. Thomas Vilgis and Nutrition Psychologist, Prof. Thomas Ellrott, MD.

3.1 Evaluation

Teaching Evaluation Service Point evaluated our courses with standardised questionnaire FUEB in paper form at the next-to-last day of the course. The entire evaluations from March 2012 to March 2016 were combined to a unique set (Dataset I, $n = 87$). For basic statistics and visualisation, we use EvASyS® Automation Software Solution.

The whole questionnaire consists of 37 items in nine categories. One item was for written comments and individual statements. We took a close look at the categories using Box–Whisker charts created with Excel® 2016.

Mostly all categories are located in the range between agree and strongly agree. This mirrors the excellent acceptance of the course as well as the relevance and interestingness. Attendees' participation and openness for intense discussion and successful learning were one of the key reasons for subsequent funding. Overall rating of the course was Grade A (Fig. 5).

3.2 Questionnaire

In addition, after each event of the portfolio, attendees could voluntarily participate in a short, unique questionnaire (Dataset II, $n = 288$). For December 2012, up to December 2015 we achieved a return-rate of approximately 28%. A very important question was which venue for lectures with an accompanying cooking course is

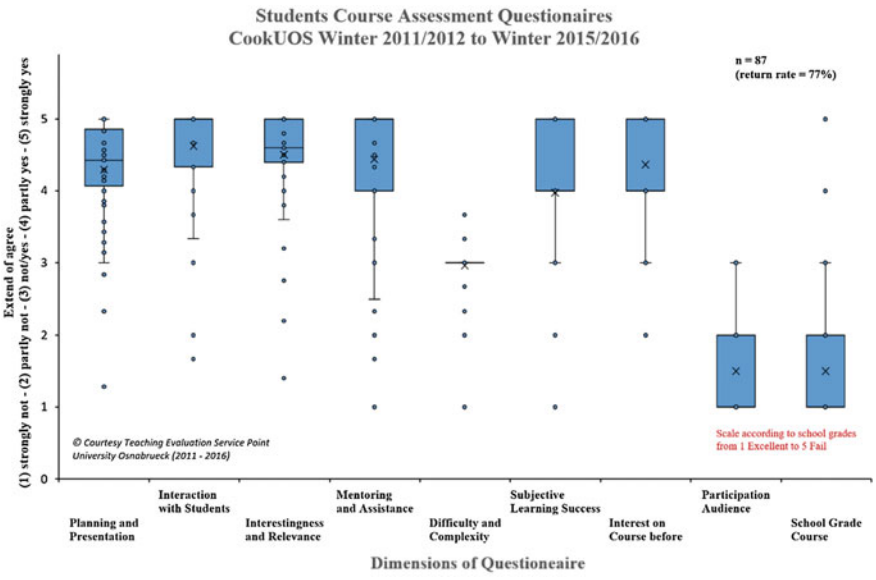

Fig. 5 Cumulative Evaluation FUEB of Courses from 2011 to 2015 (Dataset I)

preferred. For each location (Higher Education, in a school or by a private host) the participants could choose a degree of acceptance in the range of four appreciations from I strongly not agree, I do not agree, I agree to I strongly agree. Central tendency was avoided by the design of an even set.

The data sets were analysed by IBM SPSS® Ver. 24. Correlations between the three venues were compared using *t*-test. Mean values for venues Higher Education and school were significantly different from the mean value for the venue private host. Interpretation of the degree of acceptance leads to the conclusion that the location of choice for a lecture in combination with a cooking course is either in universities or in schools (Table 2; Fig. 6).

For a more detailed estimation of the CookUOS portfolios impact on ESD, a set of questions was developed and in later presented to the guests of the Sustainable Day and the «T3-Scientific Cooking-Show». Overall, the results were encouraging the team to follow the basic concepts line and to look forward in the process of upcoming challenges mainly in taking more human resources to manage and maintain the whole programme.

The given answers show demands for more practice in teaching ESD and the structural implementation in higher education and all curricula. Educational trainees and teachers are encouraged to transport ESD into their schools (Fig. 7).

3.3 SWOT Analysis

For quality assurance and self-reflection, we also analysed our team protocols to identify major items of strength, weakness, opportunities and threats for the project. In addition to the likelihood scale, we received valuable written comments. They varied from course to course.

Students attached great importance to a "non-missionary" style of lectures with adequate time for discussion and an appropriate tutor to students-ratio. As a first

Table 2 Statistical data for item "Preferred venue for Lectures and Events", Dataset II

Statistics (*t*-test)		$\bar{x}$	*n*	σ	SE	*p*
Pair 1	Lectures or event better located in higher education	3.63	254	0.639	0.040	**0.003**
	Lecture or event better located in private educational institutions	1.79	254	0.932	0.059	
Pair 2	Lecture or event better located in higher education	3.63	257	0.636	0.040	0.820
	Lecture or event better located in schools	3.09	257	0.880	0.055	
Pair 3	Lecture or event better located in schools	3.10	254	0.872	0.055	**0.002**
	Lecture or event better located in private educational institutions	1.79	254	0.932	0.059	

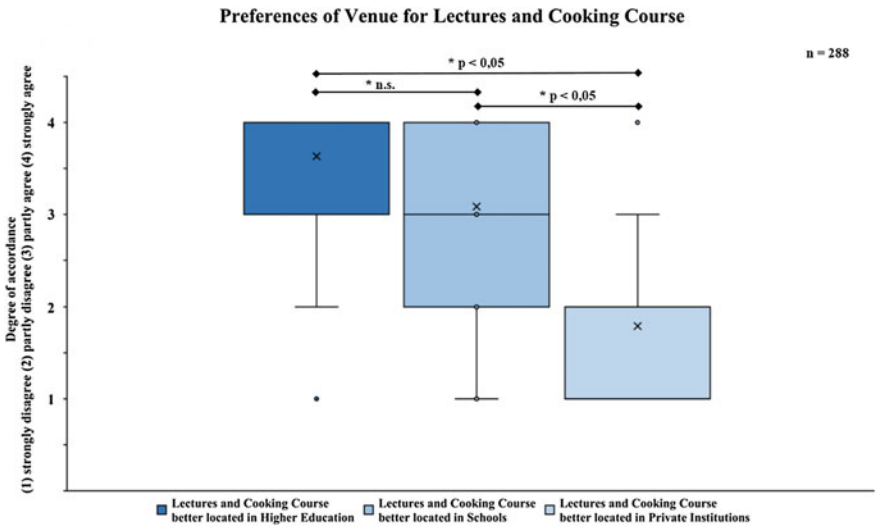

Fig. 6 Box-Plot degree of acceptance for preferred venue of the course

remedial action, we reduced the theoretical part from two to at least a single scientific speaker and took more attention to interdisciplinary exchange.

The supervision by experienced cooks was an essential claim. Beside the theoretical information about edibles, the way of considerable preparation was important. Participants voted very positively about the overall concept and portfolio. At no time, the duration of up to ten hours per day was subject of complaints.

Many of the obstacles we faced. By the end of the day, they made the project more ruggedized and stable and were essential lessons. A valuable asset of the course is the excellent acceptance among students and growing network including other universities, schools and stakeholders $n = 288$ (Table 3).

3.4 Awards

From the very beginning CookUOS received great acceptance and was selected as an innovative concept and "good practice" project for promoting ESD, resource-saving and healthy nutrition by independent juries of German Ministries, UNESCO, Stifterverband, WWF. The awards were of high imaginary value and we understood them as esteem for the teams' efforts and commitment to ESD. They were helpful to raise at least some minimal funding among stakeholders and founders (Table 4).

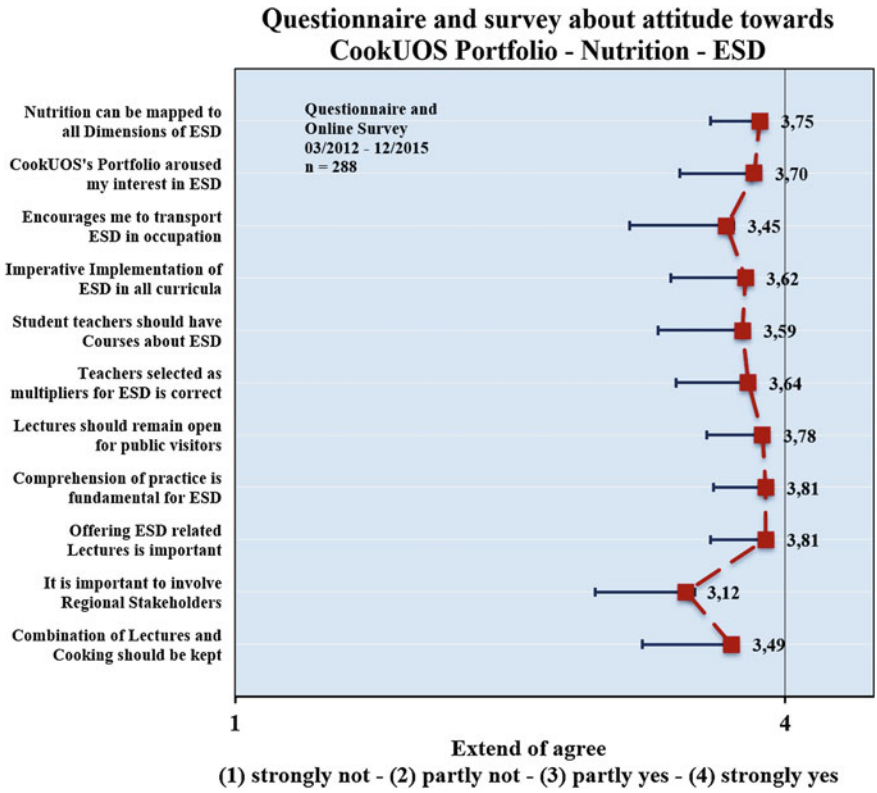

Fig. 7 Overview of results of questionnaire and online survey (Dataset II)

4 Discussion

ESD should be a strategic development objective in Universities. Natural and applied sciences, engineering, architecture as well as medicine discovered the worth and the avenue of cooking (Holzbaur 2013; Plappert 2011; Euler 2007; Holzbaur 2016; Rodman 2013). A few pedagogics see a renaissance of the educational theories of Comenius, Pestalozzi, Rousseau, Montessori and many more reincarnated in Education for Sustainable Development (Kohlberg et al. 2008; Kohlberg and Eichelberger 2007; Becker 2000, 2016).

The kitchen and cooking as a space and method to learn about healthy and sustainable lifestyle or social responsibility offer a wide range of innovative concepts. In accordance with The German Conference of Secretaries of Education (KMK) who advised to embed ESD in all curricula, cooking courses can support their claims.

Table 3 Overview of awards for CookUOS

• UN Decade Project 2012/2013, German UNESCO Commission 1st award (04/2012)[a]
• Ideas for the Germany's Future (04/2012)
• Innovative & New Learning, Young Academy and the Stifterverband (12/2012)
• Fair Trade® Award and Seal (11/2012)
• In-form support project, Germany's Federal Ministry of Health and German's Federal Ministry of Food and Agriculture (BMG/BMEL 10/2012)
• UN Decade Project of the Week 11/2013
• In-Form project of the month 12/2012–01/2013
• UN Decade Project 2014, 2nd award, German UNESCO Commission (02/2014)[b]
• Student prize of the Student Services office Osnabrück (02/2014)
• Identification as a "good practice" project World Wildlife Found (WWF Germany, 2014)
• 06/2014 Identification as a "good practice" project, BilRess, Wuppertal Institute, 2014)
• Citavi Grant innovative project (09/2014)
• "Hochschulperle" of the Stifterverband (09/2014)
• In-form project (permanently), Germany's Federal Ministry of Health and German's Federal Ministry of Food and Agriculture (BMG/BMLEV 07/2016)
• Selected and a good practice model presented at 3rd SISI/FONA Conference of Germany's Federal Ministry of Education and Research (BMBF 10/2016)

[a]Excerpt from the laudation of Prof. Dr. Lenelis Kruse-Graumann, UNESCO Commission, and carrier of BAUM Prize 2012 during the honour-ceremony for selected UN Decade Projects at the Federal President's office Bellevue Palace, Berlin on June 6th 2012. "…[The] project CookUOS has been proposed for the award by the top-class jury, because the interdisciplinary teaching of theoretical knowledge combined with a practical reference in Higher Education curriculum contributes to the obligatory implementation of education for sustainable development and from this, valuable multipliers will raise", so the laudatory speakers unanimously said. "The fact that the University of Osnabrück has succeeded in creating this innovative offer, especially for the courses of study "Education for Vocational Schools" of the Teaching Unit of Health Sciences and the Department of Biology, takes full account of current developments and focuses and therefore, it is a real step at the right time" Lenelis Kruse-Graumann pursued

[b]"COOKUOS has been showing impressively how future-oriented education can look like. The vote of the jury praises the project, because it conveys understandable how people can act sustainable", says Prof. Dr. Gerhard de Haan, chair of the National Committee and the jury of the UN Decade in Germany. *[translation by author]*

Table 4 SWOT-analysis of CookUOS

Strength	Weakness
S 1. Students driven from bottom up S 2. Fast response to changing resources S 3. Interdisciplinary course S 4. Excellent reputation S 5. Important non-material awards S 6. Testimonials proof the concept S 7. Expertise in nutrition—ESD S 8. Link to society and regional partners S 9. Portfolio of project S 10. Scientific advisory board	W 1. No own teaching kitchen W 2. High logistic challenge W 3. No monetary award W 4. No high impact or excellence funding W 5. Human resources need to be increased W 6. Limited time of students W 7. Embedded in a public authority structure W 8. Only few leading characters
Opportunity	**Threat**
O 1. Offer course to external participants O 2. Linking to other universities O 3. Cooperation with stakeholders O 4. Collaboration with NPOs O 5. Activities with UNESCO/UNDP O 6. Getting more scientific reputation O 7. Connection to schools	T 1. Funding is substantial for Implementation T 2. Not enough budget for growing T 3. Competition with private hosts T 4. Hierarchies and responsibility T 5. Leading characters leave the project

CookUOS with its holistic setting opens new sides of view. This is likely the behavioural approach by (Jarpe-Ratner et al. 2016) or the correlation of cooking, emotion and nutrition (Utter et al. 2016). A quiet similar student's-driven project was established at Pomona College (Cyr 2013) describing same incitement and aims as our project. An interesting setting linking cooking to several emotions was presented by Bermeitinger et al. (2012) and Bermeitinger (2016).

Our credo is not to impose one's will on eating right or sustainable, we offer diversity and quality of choice for regional and seasonal food. As the course takes at least four months, time works to internalise the worth of cooking without any pressure. We learned to avoid the critical words "healthy" or "sustainable" because they have been cannibalised for marketing and green-washing purposes.

We ideally see the course as a basic concept, reactivating nutrition sovereignty and more esteem for food. Regularly and permanently implemented there is a chance to develop frameworks for a wide range of target groups, such as schools and non-teaching centres or even companies who want to establish sustainable incentives for their employees (Schockemöhle and Stein 2015).

5 Conclusion

CookUOS as a seminar accompanying cooking course is an interdisciplinary and transdisciplinary method to promote health, nutrition, consumer and environmental education (Neumann 2014). In addition, it initiates, a basic understanding of the natural sciences biology, physics and chemistry and their connections. At the same

time, this opens by means of the reality of life food an ideology-free discussion with meaningful, practical references.

"Even if the linkages of everyday activities, such as food and cooking, with theoretical lectures and seminars are regarded as non-scientific by critical voices, in the future, those with a disparaging attitude towards food and nutrition, as non-scientific and an unethical way of thinking, are sure to be the odd ones out" (Lemke 2016).

Cooking courses in higher education work like situated learning. They arouse the potential of students to approach nature [about the food], to make use of the institution "kitchen" and to create things and values [crafts]. This process begins with the production and availability of the means to life and opens valuable spaces and emergent ideas for new and changing situations while at the same time appreciating our cultural identity.

Students are important and essential in shaping Higher Education towards ESD in the future. As change agents, they stand at the bottom line for sustainable development. (Singer-Brodowski and Bever 2016). There are more and more initiatives or projects which are developed and successfully operated by students (Nadine and Johannes 2016).

Since 2011, CookUOS offers important stimuli to transformation in Higher Education for obligation to ESD. In higher education (for example, in the fields of religious studies, medicine or education of teachers, or a general study) a cooking course provides innovative space for teaching and research and allows networked thinking on concrete practical references (Neumann 2014).

Therefore, one of the most impressive experiences was the overall little waste produced during the course. A first look at the results of an alumni questionnaire shows the willingness to put sustainable issues more often into discussions with family and friends. Their disposition to buy local and seasonal food on the farmers market increased too.

In opposite to a decreasing cooking frequency shown in the federal Nutrition-Report (Bundesministerium für Ernährung und Landwirtschaft (BMEL) Referat L3 2016) there is incidence that participants of CookUOS portfolio more often cook and eat at home. In a next follow up study, we will develop and present a more detailed questionnaire for the participants to identify key indicators of success and pitfalls for the course.

Actually, we intensify collaborating with teachers and more schools to set up projects under the assistance of course participants. During IdeenExpo 2015, we used the kitchen and cooking experiments to transport basic understanding of natural sciences and sustainability to teachers and scholars from vocational schools. Setup for 2017 IdeenExpo in Hannover succeeded with sophisticated *"Kitchen—Cooking—Competence!"* workshops and demonstrations for nearly 1.000 participants within nine days from June 10th to 18th 2017.

We will further encourage other national and international universities to adopt our portfolio. An international summer school with workshops, lectures and an "*international students-sustainable-cooking-contest*" should be a perfect platform to boost practice-based research on ESD (Fig. 8).

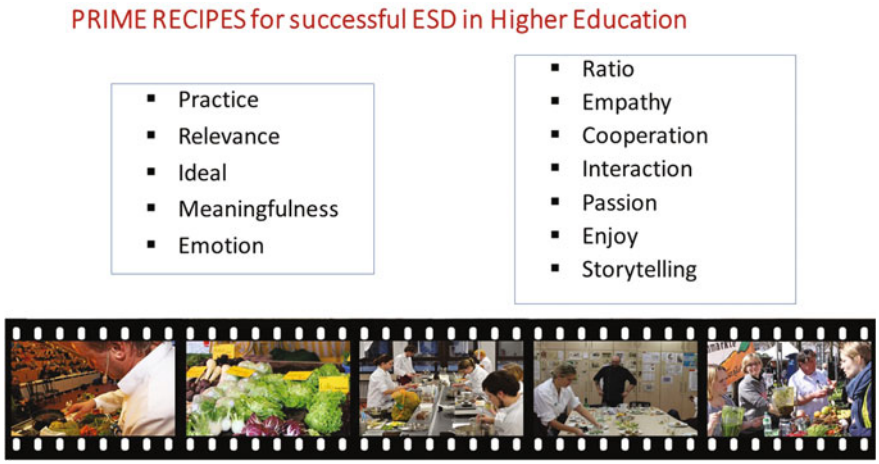

Fig. 8 Receipe for ESD in higher education

Sustainability in Higher Education is like apprenticeship of a Cook. Just reading even the best (cook) books does not teach enough to be a perfect Chef. Necessary beside any theoretical input is, and there is no doubt, practice (cooking) and again practice (sustainability).

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