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understanding and attitudes towards sustainability“

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Abstract

As our world is currently facing multiple environmental challenges due to anthropocentric activities, the term ‘sustainability’ has become a hyped expression for trying to manage the change needed to prevent further damage. Definitions are often vague and used within different contexts and purposes. Constant efforts towards human development towards sustainability are made by the United Nations (UN) as well as the United Nations Educational, Scientific, and Cultural Organization (UNESCO) with the objective of balancing the three spheres of sustainability: society, environment, and economy. Sustainable development is a process and a societal change where the needs of present generations can be fulfilled ‘without compromising the ability of future generations to meet their own needs’ (WCED 1987:41). The importance and the power of education have been realized by UNESCO and promoted with the implementation of the Decade for Education for Sustainable Development and the Global Action Programme on Education for Sustainable Development.

In this master thesis, 477 school students attending four different schools were surveyed regarding differences with respect to value dimensions underlying sustainability. Those values are respect for nature, including biocentric and anthropocentric attitudes, as well as solidarity and equality values. Furthermore, the sources of the students’ knowledge, their understanding of sustainability and self-assessment with respect to sustainability were investigated. Additionally to this quantitative approach, findings were supported with a qualitative method with particularly one school being involved: a teacher interview and a group discussion with some of the surveyed students were realized. In a second step a workshop concerning the topic ‘21st Climate Change Conference’ was held with 125 students of one of the participating schools.

The results show significant differences related to gender and school. However, when correcting the school differences for gender, statistically significant differences in respect to different schools could only be found for the value group ‘respect for nature’. A distribution of value attitudes towards sustainability according to the type of school (categories: commercial high school (HAK) versus academic high school (GYM)) could not be found. However, statistically significant gender differences could be calculated in values towards respect for nature. In this study female students show a more favorable attitude towards the preservation of nature and a greater rejection of the utilization of nature than male students. A trend for gender differences with respect to solidarity and equality attitudes could also be found. Female students tend to show a more favorable attitude towards solidarity and equality values than male students.

Regarding the source of knowledge about sustainability, more than 90% of the students stated having heard about this topic in school lessons. Interdisciplinary approaches in teaching are reflected by the variety of answers ranging from natural sciences to languages.

A definition of sustainability according to Birdsall (2014) was used to categorize and compare school students' understanding of this topic. The students' 'good' to 'moderate' self-assessment of their knowledge of sustainability did not necessarily match the results generated from the evaluation of the students' understanding of sustainability. Most students explained the meaning of sustainability only by using the environmental component of the definition instead of describing a complex concept. Additionally, the most frequently mentioned words associated with sustainability – like recycling, environmental protection, and nature – as well as students' definitions, were focused mainly towards the environmental sphere. Within this thesis it is argued that students mainly understand and associate sustainability with goods that need to be sustained (e.g. nature and life support systems) and not with goods that need to be developed (e.g. people, economy, society). Further evidence of a low respectively restricted level of understanding was illustrated by 23% of the students not giving an accurate answer and 60% only referring to the environmental component of the concept.

The outcomes of a workshop show a high interest of school students in climate change. The need for action is realized as well. This indicates that it is unlikely that there is a real lack of information about the issue. The real problem arises from the question how this knowledge can actually lead to behavioral change in order to transform structures of economy and society.

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List of Abbreviations

ANOVA	Analysis of variance
BMLFUW	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft
CCE	Climate Change Education
DESD	Decade of Education for Sustainable Development
EE	Environmental Education
ESD	Education for Sustainable Development
GAP	Global Action Programme on Education for Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
MEV	Model of Ecological Values
K-S test	Kolmogorow-Smirnow-Test
MSV	Model of Social Values
NEP	New Ecological Paradigm
NGO	Non-Governmental Organization
PCE	Parliamentary Commissioner for the Environment
SD	Sustainable Development
SDGs	Sustainable Development Goals
TEQ	The Environmental Questionnaire
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. Introduction

1.1. Statement of the problem

Planet earth is constantly changing and currently facing challenges due to environmental problems and global warming. Rapidly increasing atmosphere and ocean mean temperatures, the reduction of snow and ice areas as well as a rise of the mean sea level have been observed within the last centuries. Climate change has impact on very delicate natural systems on Earth. With biodiversity and habitat losses and a higher risk for extreme weather events as feasible consequences, the world is facing several challenges (IPCC 2014). There is a concept from system theory that describes the capability of a system to be ‘resilient’ by possessing the ability to regain its initial state after disturbance without losing its basic function and structure (Walker et al. 2006).

According to the findings of the IPCC’s Fifth Assessment Synthesis Report, our world is facing serious changes due to human influence and the question arises if system earth will be capable of obtaining a world that is appropriate for the life of human beings. Since the pre-industrial area, the concentration of greenhouse gases like carbon dioxide, methane and nitrous oxide in the atmosphere has increased and is considered as primary cause for the observed warming (IPCC 2014). Since climate change and the associated risks as well as the search for mitigation and adaption strategies constitute to the most challenging objectives of our time, one of the resolutions, passed at the 21st UN climate change conference in Paris in 2015, is to minimize the increase of the global mean temperature to 2°C - if possible 1.5°C - compared to pre-industrial time (UNFCCC 2015). As the risk of irreversible and abrupt consequences of climate change increases with the progression of global warming, it is very important to achieve the legally binding and globally agreed 2°C goal. Therefore a reduction of anthropogenic greenhouse gas emission to zero by the end of this century is inevitable. Adaption progress is slow as the process is complex and depends on various factors like the contribution of governments and institutions as well as inventions, innovations and investigations for implementing a more sustainable lifestyle.

To reach a stage where needs of current generations can be fulfilled without compromising the ability of prospective generations to satisfy their own needs is the overall goal and therefore it is essential to combine solution approaches and mitigation processes with concepts for development towards a more sustainable society (IPCC 2014; WCED 1987). ‘Sustainability’ describes a paradigm of thinking where social, economic and environmental elements are balanced in combination with the ambition of progress and an improved quality of life

(UNESCO 2012). Much damage has been caused by social and economic structures such as the growth oriented economic system which can no longer be accepted, as UNESCO writes in 2012. ‘Sustainable development’ is the overall mission of the United Nations and can be described as the process of achieving sustainability (UNESCO 2012). According to Birdsall (2014), it is impossible to reach an end point where sustainability can be achieved as ultimate aim. Evolution undergoes uncertain changes connected with adaption strategies which imply further changes. The ecological concept of resilience may help to understand this temporal paradox of sustainability as it describes the possibility of a system being able to cope and recover from uncertain impacts and drastic changes by dynamically fluctuating between change and stability (Birdsall 2014). Sustainability can be seen as the capacity of a system to create and maintain these adaptive capabilities (Holling 2001) and therefore should become a leading principle in everyday life choices and in the behavior of every human being. However, this change requires many necessary, sometimes even inconvenient and effortful behavioral changes (Arbuthnott 2009). This modification of society would be absolutely unique in humanity’s stay on Earth and is considered necessary to move nations and people towards sustainability (Kajikawa 2008).

1.2. Sustainability and Sustainable Development (SD)

There are various definitions for the word ‘sustainability’, depending on the context and area of interest (Birdsall 2014). In the following chapter there will be a discussion about selected definitions. Economists study this topic with a focus on the scarcity of resources and the possibility to retain economic growth as their major concern (Kuhlman et al. 2010; Birdsall 2014). Sustainability also belongs to the main principles in the context of environmental and natural sciences as well as educational, philosophical, political and social disciplines and occupies an important place in environmental thinking. A definition of the term used in context of this study will be provided in chapter ‘1.4 Sustainability in context of this study’.

Ehrenfeld (2008) defines sustainability ‘as the possibility that humans and other life will flourish on the Earth forever’ (Ehrenfeld 2008:49). Bonevac (2010), a philosopher, discusses the misconceptions of sustainability in the work of many environmentalists with an infinite approach and understanding. He calls it ‘the finitude fallacy’ and describes a paradigm where infinite sustainable growth applied to material things is a contradiction due to the finite size of resources, the earth and the sun itself. Bonevac also claims that for the use of the sustainability concept it must be restricted to a period of time where justified assumptions can be made (Bonevac 2010). To understand and discuss the applied meaning of sustainability we need to talk about sustainable development. Sustainability and sustainable development complement each other:

‘Sustainability is the capacity to [...] maintain adaptive capability. Development is the process of [...] maintaining opportunity. [...] ‘Sustainable development’, thus refers to the goal of fostering adaptive capabilities and creating opportunities. It is therefore not an oxymoron but a term that describes a logical partnership’ (Holling 2001:390).

The idea of sustainable development has already been used in the forestry sector in central Europe in the late Middle Ages and the Early Modern Age, for securing and regulating a long lasting forestry. A sustainable forestry was described as one where the harvest of one year never exceeded what the forest could reproduce in the same time period (Häberli et al. 2002, Kuhlman et al. 2010). Also Marquardt (2005:243) states that ‘the concept of sustainability [...] is a rediscovery of an old tradition of European legal history.’ He further describes that this concept was widespread in Central Europe and regulated by law to prevent an overuse of agricultural systems, forestry and pastures. The breakdown of this tradition was initiated by the modern concept of individualized property since around 1800 when infrastructure, land and energy use emerged mainly in absence of public environmental laws (Marquardt 2005). Economic growth of the modern age promised wealth and a high standard of life. As time went on, concerns arose regarding the tension between human aspirations towards a better life and the limitations imposed by nature.

According to Häberli (2002), the concept of ‘weak sustainability’ implies that nature can be replaced by human capital. Examples are the use of cars in place of horses, or artificial avalanche barriers instead of natural protective forests. ‘Strong sustainability’ in contrast describes a concept where nature and capital are contrary and not interchangeable (Häberli et al. 2002). In the long term, humankind might realize that nature overall cannot be substituted by human capital. The Commission on Environment and Development reactivated the old idea of sustainable development (Kuhlman et al. 2010). With the publication of ‘Our Common Future’ in 1987, the reassessment of critical problems concerning issues of environment and development were for the first time discussed on a political level. The purpose was to provide realistic proposals for solving those issues, as well as to improve understanding (WCED 1987).

In 1992, the United Nation Conference on Environment and Development (UNCED) in Rio emphasized governmental support for an ‘Earth Charter’ with specific action plans and principles for sustainable development, called Agenda 21, to enhance sustainable development at all levels (UN 2010). Further, a civil society process emerged as part of ‘a growing worldwide people’s movement pursuing major challenges in our values and institutions in order to ensure a better future for all’ (Osano et al. 2009:23).

Sustainable development has become the guiding principle for long term development in a global perspective and emphasizes a convergence between economic development, social equality and environmental protection (UN 2010). UN Sustainable Development concepts and principles combine three spheres of sustainability: the economy, the society including culture and the environment (UNESCO 2012).

On the one hand sustainable development often focuses on economic growth by addressing consumer behavior of developed and fast developing countries. On the other hand sustainable development is often addressed as an environmental problem and environmental issue only (UN 2010). However, all three spheres have to be tackled simultaneously and more importantly also have to be balanced, as sustainable development ultimately depends on the conditions of the natural environment (IUCN 2004).

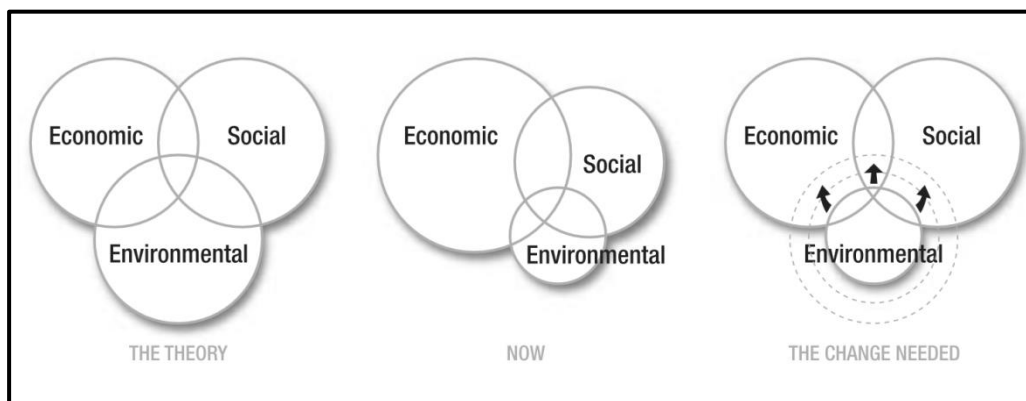


Figure 1: The three columns of sustainable development (IUCN 2004:9).

As figure 1 shows, in theory all three columns are equally balanced but in practice humans concentrate on economic growth mostly disregarding environmental issues. The required change needs the appreciation of the environment, therefore it is also important to minimize the impact of the economic aspect. The basic argument for concerns about the environment is seen in the context of human well-being and not related to an intrinsic value of nature. The main purpose to care for the environment is to reduce damages of natural environment caused by humans and the economic system, to ensure future stable functionality of natural systems (Häberli 2002) and to preserve resources for future generations (Kuhlman et al. 2010).

Principles and values that underlie sustainable development include equity among generations, peace, tolerance, poverty reduction, environmental preservation, resource conservation, and social justice (UNESCO 2012:5). These principles are meant to address the three spheres on a local context, implying that sustainable development will take many different forms around the world (UNESCO 2012). This sustainable development concept has been criticized by several authors with respect to its complexity and lack of commonly defined indicators and

measurements. Some critics state that the concept is at risk of becoming irrelevant to policymakers (Osano et al. 2009; Holden et al. 2014).

‘There is a huge gap between the multilateral processes, with their broad goals and policies, and national action, which reflects domestic political and economic realities. [...] Deep structural changes are needed in the ways that societies manage their economic, social, and environmental affairs; and hard choices are needed to move from talk to action’ (UN 2010:2).

This shows the variety and the extent of the term sustainability and sustainable development and the urgent need for structural changes and further action within society.

1.3. Education for Sustainable Development (ESD)

The question arises how to achieve those structural changes within society. Education for sustainable development in order to improve consciousness about this issue is an important task, also in Austria. Throughout the progress of sustainable development one recognizes that humans are agents who, within certain boundaries, create their economic, social and ecological environment. Sustainable development can only be created by changing habits, beliefs, circumstances, laws and by initiating conditions for greater social, economic and particularly environmental good. Therefore, education and learning in the context of sustainable development for a more sustainable livelihood is of great importance. Education for sustainable development is not a fixed entity but a complex education and learning construct seeking to balance human actions towards sustainability. This includes e.g. peace education, gender equality and respect for human rights, health education, education for protecting and managing natural resources and education for sustainable consumption (Lenglet et al. 2011; Wals et al. 2010). ‘Education [...] is [...] one of the most powerful instruments we have for bringing about the changes required to achieve sustainable development’ (UNESCO 2005:3).

The term ‘environmental education’ as policy instrument for developing long term solutions for environmental problems has been used in German literature since the 60ies. Throughout the time the concept was extended to new perspectives such as environmental ethics and in 1979, environmental education has been incorporated into the legislation of the Austrian education system by becoming an interdisciplinary instruction principle in schools for developing ecological action competence for students attending grades 5 to 12. School projects, some realized with the involvement of external organizations, with the purpose of transmitting positive connections for the environment became popular (Rauch et al. 2006).

Since the Earth Summit, UN Conference on Environment and Development, in Rio de Janeiro in 1992 the term ‘environmental education’ has shifted to the phrase ‘education for sustainable

development’, abbreviated as ESD (Rauch et al. 2006). ESD can be associated with e.g. climate change or environmental education, but cannot be equated with one particular discipline or method (UNESCO 2012b; Lenglet et al. 2011). ESD is a constantly evolving concept and surely includes environmental education. Aside from ecological concerns, ESD reaches out for a higher, normative level and towards a larger audience, by including global, social, philosophical, cultural, political and economic dimensions to the natural and physical world (PCE 2004; UNESCO 2005; Rauch et al. 2006). Furthermore, since the World Summit on Sustainable Development in Johannesburg in 2002 and the initiation of the UN Decade of Education for Sustainable Development (UN DESD) from 2005 to 2014 with UNESCO as the lead agency for implementation, ESD has been promoted worldwide. The national strategy for sustainable development was approved by the Austrian government in 2002, including achievements through research and education (Rauch et al. 2006). Regarding the UN decade in Austria, 201 projects related to the UN DESD 2005 – 2014 have been honored by the Austrian UNESCO Commission. Individuals, NGOs, administrations, social communities and associations, national parks, companies, educational institutes like schools and universities contributed and still contribute to raising public awareness, attitude change and a structural implementation of ESD in Austria (Austrian UNESCO Commission 2014).

‘The UN Decade of Education for Sustainable Development promotes a more sustainable world through different forms of education, training and public awareness activities. It is an opportunity to rethink considerably our approach to global challenges’ (UNESCO 2012b:9).

ESD wants to achieve an improvement of current quality of life with consideration of future generations. Improving the overall quality of life with respect for different people, cultures, religions, regions, countries and continents in various situations, requires an approach with specific and adaptive aims. As UNESCO states, collaboration of various actors is needed to achieve those goals. ‘No single continent, government, institution or individual, however, can attain this alone because the nature of the challenges to overcome requires a global, collective, and individual commitment’ (UNESCO 2005:3).

1.4. Sustainability in context of this study

Despite the complexity and variety of definitions described before, it is necessary to determine a definition of sustainability used for this study. The researcher uses a definition of sustainability according to Birdsall (2014). The concept is visualized in figure 2.

‘Sustainability is made up of three interrelated components: environmental, socio-cultural and economic. These components interact in ways that are unpredictable and co-evolutionary that effect

further change with unforeseen outcomes. Sustainability is a dynamic process but not the end point when working to resolve an issue' (Birdsall 2014:816).

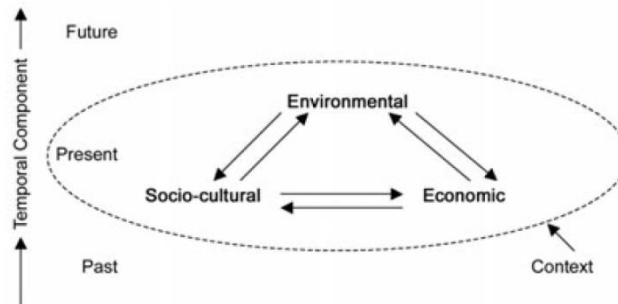


Figure 2: Definition of sustainability in context of this study (Birdsall 2014:818)

The three columns of sustainability, as discussed in chapter '1.2 Sustainability and Sustainable Development (SD)', are illustrated without boundaries and are linked with arrows indicating their interdependence, connection and interaction. The words 'past', 'present' and 'future' represent the temporal component, which describes sustainability as a dynamic process without an endpoint. The line around the three pillars implicates that the concept of sustainability needs to be set into a certain 'context'. In terms of system theory, different contexts interact and overlap and also evolve over time. That is why the line is dotted. One element of the temporal component is incorporated into the dotted line, as 'the present' describes the definition of sustainability at a certain time but does not represent the end point of the concept (Birdsall 2014). This definition was chosen for the thesis because it combines all important aspects as discussed in the chapters before. Not only in the theoretical part, but also in the empirical part this definition will be used.

1.5. Motivation

In order to draw attention to the problems described before in chapter '1.1 Statement of the problem' and with the intention to achieve progress within the process of sustainable development, 17 Sustainable Development Goals (SDGs) have been adopted by the UN Resolution in September 2015 and became effective on 1st January this year. 'Transforming our world' is the title of the 2030 agenda with a call for action and the major purpose to end poverty, to protect the planet and to ensure prosperity for all (UN 2015). The 17 Sustainable Development Goals can be seen in the figure below.



Figure 3. UN Sustainable Development Goals. 17 Goals to transform our world (UN 2015)

Cloud (2000) states that by dreaming about the future, most people would think about a rosy picture of their lives with prosperity, successful careers, well-being and sometimes even about a better life for their children. People work hard to secure the dream of a wealthy, healthy and meaningful future but ironically there has been a drastic value inconsistency with the behavior of polluting the air, poisoning food or exploiting natural resources. Due to the increasing awareness of the consequences of this individual and collective behavior, the big question – how to reconcile behavior and habits with a more sustainable society – arises. Education for sustainable development helps to create optimistic visions of a community with the capacity to realize that change (Cloud 2000).

Sustainable development describes a never-ending development and learning processes that cannot be acquired and shared by predefined procedures or behavior. Therefore ESD should not only lead to knowledge gain but also to a change in behavior (Vare et al. 2007). The complexity of such a developmental process is obvious. Much hope and effort is directed towards the educational sector to enhance ESD in schools worldwide. Education might not be the entire answer to future challenges but it needs to play an important part in creating a broader consciousness for people showing more respect towards environmental needs (UNESCO 1997). Article 12 of the Paris Agreement, outcome of the 21st Climate Change Conference, states:

‘Parties shall cooperate [...] to enhance climate change education, training, public awareness, public participation and public access to information, recognizing the importance of these steps with respect to enhancing actions under this Agreement’ (UNFCCC 2015:28).

This shows once again the importance of education in progressing sustainable development to live a more sustainable life and to create a more sustainable future by balancing ecological, social and economic factors. This form of learning requires acquiring self-reflective skills for observing, analyzing and evaluating situations (Rauch 2004). The overall concept of ESD combines an interdisciplinary learning and teaching approach with social and global aspects that should be enhanced in any kind of school or educational institution regardless the age nor the focus of the training (Torbjörnsson et al. 2011).

‘Most environmentally focused ESD groups and programs have as their mission the goal of changing citizens’ attitudes and values toward the natural environment. For many this is their declared ultimate goal. They envision a world in which people individually and collectively consider their actions based on its long-term consequences for ecosystem health’ (Arbuthnott 2009:153).

ESD is not limited to the school context as it is understood as a life-long learning process for people of all ages with many different projects and approaches taking place in countries all over the world. The purpose of this work is to examine differences in attitudes towards sustainability in students of different school types in Austria. Furthermore the thesis tries to reveal how topics related to sustainability aspects are taken up and understood by these students. Additionally, a project has been realized within the context of this master thesis to actively enhance ESD. The project, six workshops which were held in context of this research, aims at contributing to the global call for action which is dedicated to accomplishing the UN Sustainable Development Goals. The research questions are more precisely stated in ‘1.7 Research questions’.

1.6. Object of investigation

This master thesis seeks to contribute to environmental and sustainability sciences by applying an interdisciplinary approach, as aspects of environmental, educational, social and psychological research are combined. Sustainability science and its’ interdisciplinary, multidisciplinary and transdisciplinary characteristics have been addressed and discussed by various authors (Kajikawa 2008). Clark (2007) pointed out, that sustainability science can be seen as ‘use-inspired basic research’, as it can neither be considered as ‘basic’ nor ‘applied’. It combines the quest for fundamental understanding and the considerations of use (Clark 2007).

Within this thesis this understanding of sustainability science was taken as inspiring approach. Objects of investigation of this research are students’ attitudes, their knowledge, connotations and self-assessment concerning sustainability, as well as the reflection of the workshop. These aspects constitute the main focus of this master thesis.

1.7. Research questions

The focus of this study is guided by the following two main research questions as well as workshop specific questions:

1.7.1. How do attitudes towards sustainability differ among young people attending different schools?

In the context of this thesis, this first question refers particularly to 11th and 12th grade students attending four different schools of two different school types in Lower Austria.

1.7.2. How do these young people understand the term ‘sustainability’?

This second question refers more specifically to the following research guiding questions: How do these students describe the meaning of sustainability and which words are associated with this topic? How do the students self-evaluate their knowledge about sustainability and where have they learnt about sustainability?

1.7.3. Workshop-specific research questions

The aim of the workshops that have been conducted in the context of this thesis is in accordance with the efforts of the projects rewarded by the Austrian UNESCO Commission within the Decade for Education for Sustainable Development and the goals connected with the UNESCO Global Action Programme (GAP) on ESD. The workshop conducted with school students about the topic ‘21st Climate Change Conference’ contributes to the vision of developing a more sustainable world with climate change education for sustainable development. The related research questions are: Are young people interested in the topic ‘climate change’? Do they feel jointly responsible for climate change, and do they realize the importance for action?

1.8. Overview about the content of this thesis

The introductory part includes the statement of the problem as well as theoretical elaboration about the concepts ‘sustainability’, ‘sustainable development’ and ‘education for sustainable development’. Further, the term ‘sustainability’ as used in context of this study has been defined. The motivation of the author, including the purpose of this work, as well as the object of investigation and the defined research questions are part of the introduction section. After clarifying the used methods, empirical results are presented. The discussion considers the results of this study by putting it in the context of further literature. In the conclusion part, the research questions are answered and final conclusions are presented.

2. Method

This chapter describes the research process and justifies the methodological and the scientific approach as well as the used methods of this master thesis. The empirical methods used are a quantitative questionnaire with open and closed questions, qualitative interviews and an interactive workshop with the use of a feedback form as descriptive survey tool.

2.1. Research process

The idea of writing a master thesis referring to sustainability and environmental issues in combination with an educational topic emerged from the fact that the researcher wanted to combine her two interests: the master program Environmental Sciences, where this work is presented as master thesis, and the teacher program Biology, which the researcher is also studying with great interest. The idea was to conduct a survey with school students about their attitudes towards sustainability and then compare those students with respect to the different schools attend. Further, the researcher wanted not only to compare empirical results by doing an empirical research, but also to get actively involved and in touch with the students about environmental and sustainability related issues.

The first stage of the research process was characterized by a theoretical examination and the preparation of the research design, which has a questionnaire as core part. A presentation with a following discussion in the master seminar of the anthropology department made the researcher revise the questionnaire and exclude a part where students were asked to draw a concept map on the topic sustainability.

Access to survey students was given by the headmasters of each school of interest, which have been contacted by phone, by email or personally. The survey has also been approved by the education authority of Lower Austria, LSR für Niederösterreich. The headmasters of the schools either provided the researcher with contact information of teachers in charge of the school subjects biology or geography, or the researcher already knew the teachers personally from professional contexts. With the help of those teachers the researcher was able to get in contact with the students.

After data collection and analysis, the empirical results could be interpreted and discussed. One school was chosen for a closer examination with a qualitative approach, which included a teacher interview as well as the presentation of some questionnaire results in two of the surveyed classes.

Participating in the university project ‘UN KlimareporterIn 2015’ inspired the researcher to realize a workshop about the 21st climate change conference with some students of one school

and also to evaluate and discuss this project in the context of this master thesis. After having won the first prize in the category ‘education’ in the tender for the eco-social master thesis in cooperation with the Austrian UNESCO-Commission as well as the BMLFUW, it was clear to dedicate this work to ESD. The workshop was permitted by the headmaster of the school and arranged with the support of two Biology teachers.

2.2. Methodological approach of the study

The theoretical elaboration of the paradigm ‘sustainability’ and the empirical data analysis are the two major parts of this master thesis. Referring to anthropologic, psychological, philosophical and educational theories and literature, the results will be discussed.

A quantitative approach with a preferably high number of participants is used for the empirical data analysis in order to be able to compare school students of different school types. Students completed a pencil based questionnaire with standardized statements as well as standardized open questions.

Additionally, one school was chosen for a qualitative approach including a teacher interview and the presentation of some selected questionnaire results with a group discussion in two of the participating classes. Furthermore, the researcher realized a workshop for school students within this school. For analyzing the workshop, a feedback form was used as assessment tool to illustrate the results of the project as well as to answer the research questions. However, this is used as descriptive and illustrating tool only.

2.3. Quantitative method: questionnaire

Quantitative methods use standardized survey instruments in order to count, compare and correlate the results (Söckefeld 2003). In this study, a standardized and paper based questionnaire with a combination of open and closed questions has been used as survey instrument in order to answer the research questions. The questionnaire resembles a quantitative approach and a quantitative analysis of the data. The quantitative data has been processed with IBM SPSS Statistics Version 23. The open questions contribute to the qualitative part of the survey and will be analyzed by descriptive statistics and categorization.

The questionnaire was set up in German language and was completed by participants within 10 to 15 minutes. The questionnaire was divided into the sociodemographic data section (school, class, specialization, gender, age, current residency), part A and part B. Part A was adapted from Torbjörnsson et al. (2011) and consists of 28 statements concerning three attitude values: respect for nature (biocentric and anthropocentric attitudes), solidarity and equality. The statements had

to be answered on a five-point rating scale ranging from 1 = strongly agree to 5 = strongly disagree. Part B was adapted from Birdsall (2014) and included a self-assessment about the knowledge about sustainability, questions about the knowledge gain concerning this topic as well as three open questions addressing other keywords associated with sustainability and the meaning of sustainability.

2.3.1. Measuring attitudes regarding sustainability

Freedom, equality, solidarity, tolerance, respect for nature and shared responsibility are essential values declared by the UN Millennium Declaration that need to be brought into action within international relations within the 21st century (UN 2000). These values can also be referred to as key values for enhancing development towards sustainability (Torbjörnsson et al. 2011).

Adapted from a Torbjörnsson et al. (2011) study, 28 statements relating to three of these key values had been translated into German to measure young people's attitudes. These values are: respect for nature, solidarity and equality.

After data collection, the 28 statements have been grouped into four scales for further analysis of the data. For ensuring internal consistency, reliability analysis was conducted (Field 2009). This proceeding allowed to eliminate statements which are not used for the scales as they are negatively influencing Cronbach's Alpha. Such items are indicated as they are crossed out in table 1 and table 2. This step will be explained and discussed in chapter '2.3.2 Statistical Analysis' in the section 'Analysis of reliability'.

Respect for nature (biocentric and anthropocentric values)

The attitude towards respect for nature is measured with the first 16 statements of the questionnaire (S1 - S16) addressing biocentric and anthropocentric attitude values. Items are taken from the Torbjörnsson et al. (2011) study and have been translated into German for the use of this master thesis. These 16 statements are called the Environmental Questionnaire; they have been introduced by Johnson and Manoli (2008) and originate from the one dimensional New Ecological Paradigm scale by Dunlap et al. (2000) where respondents are placed between two endpoints, either being ecologically concerned or having an anthropocentric worldview. Wiseman and Bogner (2003) however consequently generated the Model of Ecological Values by expanding the New Ecological Paradigm scale into two dimensions. Thus, biocentric and anthropocentric attitude values receive separate attention, as one does not necessarily exclude or implement the other. The Model of Ecological Values assumes that both, anthropocentric and biocentric attitudes, contribute to values of respect for nature. Biocentric attitude values reflect the desire for protecting and conserving nature. A so called positive biocentric attitude implies

‘being in favor for protecting nature’ whereas a so called negative biocentric attitude implies ‘being against or not caring about the preservation and protection of nature’. Anthropocentric values reflect the attitude concerning the utilization of natural resources and a so called positive anthropocentric attitude would mean ‘being in favor of exploiting nature for human needs’ and a negative attitude for utilization would mean ‘being against nature’s exploitation’ (Torbjörnsson et al. 2011).

The New Environmental Paradigm scale together with the Model of Ecological Values contributes to The Environmental Questionnaire, adapted for this study (Wiseman et al. 2003; Torbjörnsson et al. 2011). Table 1 shows the statements of the questionnaire regarding biocentric and anthropocentric attitudes.

Table 1: Statementments of the questionnaire (S1 - S16)
Biocentric and anthropocentric values (Torbjörnsson et al. 2011)

Biocentric values, attitudes towards preservation
S1 If I have extra money, I will give some to help protect nature.
S2 I would help raise money to protect nature.
S3 I try to tell others that nature is important.
S4 To save energy in the winter, I make sure the heat in my room is not on too high.
S5 I always turn off the light in my room when I don’t need it anymore.
S6 I try to save water by taking shorter showers or by turning off the water when I brush my teeth.
S7 In the summer, I really enjoy seeing butterflies fly and hearing birds sing.
S8 I really enjoy the possibility of moving freely in nature.
S9 I feel good in the silence of nature.
Anthropocentric values, attitudes towards utilization
S10 People have the right to change nature.
S11 I like a grass lawn more than a place where grass and flowers grow on their own.
S12 To feed people, nature must be cleared to grow food. Item has been eliminated, see chapter ‘2.3.2 Statistical Analysis’ section ‘Analysis of reliability’.
S13 Weeds should be killed because they take up space from plants we need.
S14 Building new roads is so important that trees should be cut down.
S15 Because mosquitoes live in marshes and swamps, it would be better to drain these and use them for farming.
S16 People are supposed to rule over the rest of nature.

Solidarity and Equality

Attitudes towards solidarity and equality are listed in table 2 and were measured with the Model of Social Values, a set of 12 statements (S17 - S28) that was introduced by Torbjörnsson et al. (2011). The statements have been adapted in the use of this study for Austrian school students (statements referring to Sweden have been generalized or have been related to Austria) and were translated into German.

Table 2: Statements of the questionnaire (S17 - S28)

Values of solidarity and equality (adapted from Torbjörnsson et al. 2011)

Values of solidarity
S17 I can imagine donating money to help poor people in a country far away.
S18 I can think of helping raising money for poor people in a country far away.
S19 I am willing to donate 2€ per month of my pocket money if the money goes to building schools in India.
S20 I think it is more important to help people that live near me than people that live far away. Item has been eliminated, see chapter '2.3.2 Statistical Analysis' section 'Analysis of reliability'.
S21 The best way is to let each country to solve its own problems. Item has been eliminated, see chapter '2.3.2 Statistical Analysis' section 'Analysis of reliability'.
S22 We, who are living in Austria, have a responsibility to help people in poorer countries.
Values of equality
S23 Large wage differences are good because they motivate people to work harder.
S24 I believe that all workers should have approximately the same pay.
S25 Differences between rich and poor are needed because this gives the poor something to fight for.
S26 To share with others is important to me because it makes me feel good.
S27 It is more important that all children in the world go to school than school meals are free for students in Austria.
S28 If I become rich or poor in the future depends on myself. Item has been eliminated, see chapter '2.3.2 Statistical Analysis' section 'Analysis of reliability'.

2.3.2. Statistical Analysis

Analysis of reliability

For measuring internal consistency, Cronbach's alpha (α) was used to determine to what extent the questions assembled to one value group work as a reliable set of indicators. Cronbach's alpha is the most common measure of scale reliability and values of at least 0.7 are considered acceptable for α whereas lower values indicate an unreliable scale (Field 2009).

Within the first attitude group **biocentrism** a satisfactory internal consistency of 0.705 (α) was identified.

For the second attitude group **anthropocentrism** internal consistency could be improved from 0.647 (α) to 0.702 (α) by excluding the item S12.

The third attitude group **solidarity** could be improved from 0.404 (α) to 0.799 (α) by excluding the items S20 and S21. Those two statements refer to helping people; one dealing with the question if it would be better to let every nation solve its own problems. These two statements somehow disturb the consistency within the students' 'solidarity' answers. The current refugee crisis could be an explanation for those statements not being suitable for being included into the solidarity scale.

The fourth attitude value group **equality** could only be improved from 0.446 (α) to 0.573 (α) by excluding item S28. Table 3 shows the internal consistency for each attitude value group.

Table 3: Internal consistency

Attitude group	Items	Number of items	Internal consistency (α)
biocentrism	S1-S9	9	0.705
anthropocentrism	S10-S11, S13-S16	6	0.702
solidarity	S17-S19, S22	4	0.799
equality	S23-S27	5	0.573

Analysis of variance (ANOVA)

Analysis of variance is a statistical method which allows comparing more than two groups of participants with respect to a dependent variable. In this study, four groups – the four schools – shall be compared with respect to values related to sustainability. The four dependent variables, which will be analyzed subsequently, are: biocentrism, anthropocentrism, solidarity and equality.

For applying one way ANOVA the following assumptions have to be met: the dependent variable has to be measured on an interval scale, within groups this dependent variable is normally distributed and the variances in each experimental condition need to be similar (Field 2009).

This study uses the Environmental Questionnaire respectively adapts the Model of Social Values, both established questionnaires based on five-point Likert scales (Torbjörnsson et al. 2011). An interval scale can be assumed due to the homogenous distances between the rating points of the statements.

In order to test if the data is normally distributed the Kolmogorow-Smirnow-Test (K-S test) was applied. The K-S test compares a normally distributed set of scores with the scores in the sample. For a normal distribution the results of the K-S test need to be non-significant and therefore $p > 0.05$, which means that the distribution of the sample does not significantly differ from a normal distribution (Field 2009). For all four values, scores of the K-S test showed significant results, indicating that distributions are not normal. However, when sample sizes are as large as in this study ($N = 477$) a violation of the normal distribution can be ignored due to the central limit theorem. It is acceptable to continue with ANOVA, as this statistical test is considered as robust to violation of normality (Field 2009). The data has also been plotted to further estimate the extent of non-normality and to support the decision to proceed with the analysis of variance.

Levene's test was applied for testing the hypothesis that the variances of the values are equal between the four schools. If Levene's test shows significant results with $p < 0.05$, this means that

the variances differ significantly from each other, whereas if Levene's test results are non-significant with $p > 0.05$ variances are approximately equal (Field 2009). As table 4 shows, all four value group scores of the Levene's test are non-significant, meaning that the variances are similar and the core assumption of the ANOVA is met.

Table 4: Levene's test

Attitude value group	Levene's test (p)
Biocentrism	0.839
Anthropocentrism	0.722
Solidarity	0.951
Equality	0.782

After having verified these three preconditions, ANOVA could be applied to see whether statistically significant differences between the four schools can be found.

2.3.3. Characterizing the understanding of sustainability

For exploring young peoples' understanding of sustainability, the second part of the questionnaire addresses – mainly with open questions – the students' perception and understanding of sustainability. This questionnaire was adapted from a study of Birdsall (2014) and translated into German. Data analysis is based on descriptive statistics and qualitative descriptive approaches (Birdsall 2014).

Self-assessment

The first question of part B of the questionnaire requests the students to rate their knowledge about sustainability on a homogenous five-point Likert-type scale ranging from very good to insufficient – with 1 indicating a very good understanding and 5 an insufficient understanding of sustainability (Birdsall 2014). Results of the four different schools regarding self-assessment were compared using descriptive statistics as well as ANOVA.

Knowledge gain

For identifying sources of information about sustainability, students were asked to indicate following possible answers: school lessons, any other presentations or workshops, media, or in discussions and conversations with e.g. family and friends. Multiple answers were possible and the students were additionally asked to give specific examples (Birdsall 2014). Results were summarized and discussed using descriptive statistics.

Keywords associated with sustainability

Given an open ended response box with space for ten keywords, the students were asked to write down as many keywords, but a minimum of four, which they can possibly associate with the topic sustainability. For evaluation the amount of keywords was calculated by school and gender. Further, equal keywords given by students were counted and visualized with the computer program 'Wordle' (for further information see www.wordle.net) As a last step the keywords were categorized into component groups according to Birdsall's definition of sustainability (Birdsall 2014).

Understanding of sustainability

In order to identify students understanding of sustainability they were asked to supply a definition: What do you think sustainability means? Describe in whole sentences what is meant by this term! This question was asked to get an overview regarding the students' understanding of this topic and to compare their perception with the definition of sustainability used in this master thesis. Birdsall's (2014) definition of sustainability was used by the researcher to analyze the student's definition of sustainability in terms of student's ideas including certain components of the sustainability concept. This approach of thematic analysis is 'a widely-used but rarely-acknowledged method, as it offers an accessible and theoretically-flexible approach in analyzing qualitative data' (Braun et al. 2006:79). Student answers were categorized into component categories of the definition according to Birdsall (2014). Selected examples of students' answers are listed for each component category in the results part of this thesis and are indicated with 'ST' for 'student' and the number of the student according to the questionnaire data sheet (ST_1, ST_2, ST_3, etc.).

2.3.4. Sampling design

In Lower Austria 477, 11th and 12th grade school students of four schools and two different school types participated in the study. A description of the different school types used in this study follows:

The two schools GYM Baden and GYM Mödling are both public academic high schools (*allgemein bildende höhere Schulen (AHS)*) which offer graduation for a higher education entrance qualification. There is a division within this school type into three categories: (1) classical secondary academic school with a focus on a broad general education and languages (*Bundesgymnasium (BG)*), (2) secondary academic school with focus on mathematics and science (*Bundesrealgymnasium BRG*) and (3) secondary academic school with focus on economics (*Wirtschaftskundliches Realgymnasium*) (EURORAI 1992, Euroguidance

Österreich 2014). All three types are presented in both of the participating upper secondary academic schools.

HAK Baden and HAK Mödling are two commercial high schools, a form of vocational school (*berufsbildende höhere Schulen (BHS)*) which specializes in business and additionally offers the graduation of a higher education entrance qualification (EURORAI 1992, Euroguidance Österreich 2014). HAK Baden is a public school whereas HAK Mödling is a private school and also offers special classes called ‘HAK plus’, for particularly interested and dedicated students.

11th and 12th grade students have been chosen as those students have almost reached the end of their school career and therefore experienced the education according to the school attended. In advance of the inquiry, school students had been informed that their participation is strictly voluntary and the school students’ and teachers anonymity will be preserved throughout the entire process of this study. The date of the survey for the schools HAK Mödling and HAK Baden was June 2015, for schools GYM Mödling and GYM Baden data collection was fulfilled in December 2015.

2.4. Qualitative method: Problem centered interview with teacher

Qualitative methods as tools for describing special individual and unique aspects are described as inductive (Mayring 2008) and are used in this study to contribute to a better overall analysis and understanding of the research outcomes. For a more specific and qualitative approach concerning the research topic, one school (HAK Mödling) was chosen for an interview with one of the teachers. This interview was a problem centered interview that helps to increase the researcher’s knowledge, as it is a theory generating method (Witzel 2000). For anonymization, the interview partner will be abbreviated with ‘Teacher 1’ in the context of this thesis. The interview was held in June 2015 in a seminar room at HAK Mödling and recorded for later transcription and further analysis. Full interview transcription was done using the computer program ‘f4’. Interpretation of the interview was accomplished with the guidelines of the qualitative content analysis adapted from Mayring (Mayring 2008).

2.4.1. Interview guideline

The interview was guided by the following ten questions:

1. Are your students interested in sustainability, environmental or biological related topics?

For example, are there discussions among students (e.g. with different environmental perceptions) during school-lesson?

How do you know that they are interested?

2. Do you actively try to raise interest on sustainability, environmental or biological issues among your students?

If yes, how do you do it?

Do you try to enhance interest of obviously uninterested students? Are there any environmentally related projects realized by students attending your school?

3. Do you address the issue 'sustainability' explicitly in class?

If yes, what kind of examples and issues do you discuss?

4. Does the school curriculum include the topic 'sustainability'?

5. Do you think other teachers, i.e. your colleagues, include the issue of sustainability in their teaching in an interdisciplinary way?

In what kind of school subjects do you think sustainability is taught in your school?

6. Are there any projects related to sustainability realized in your school?

7. Do you think there are differences between the regular HAK classes and HAK plus classes in your school? (See chapter '2.3.4 Sampling design')

If yes, how would you describe these differences?

Is there a difference concerning the enthusiasm referring to sustainability, environmental or biological issues?

8. Do you think there is a difference between the different school types in the area of Mödling and Baden with regard to how the topic sustainability is taught?

9. Do you think students of different schools in the area of Mödling and Baden have different attitudes and perceptions about sustainability?

10. Is there anything else you would like to say?

2.4.2. Interview analysis

Analysis of written, qualitative interview protocols - in this case the transcribed audio records - contribute to qualitative text interpretation, a form of content analysis (Spöhring 1989). For the interview interpretation with the guidelines of the qualitative content analysis according to Mayring the transcript first was summarized and reduced by paraphrasing and then structured and analyzed with the use of inductive aspects by creating analyzing categories (Mayring 2008).

The analyzing categories were as follows:

1. School student interest
2. School related projects

3. School curriculum
4. Sustainability in natural science school lessons
5. Interdisciplinary approaches to sustainability
6. School differences

The interview was held in German language and citations will be translated and embedded within the discussion section of this thesis and indicated with ‘Teacher 1’.

2.5. Qualitative method: School student group discussion

For a more specific and qualitative approach concerning the research topic, two of the surveyed classes of HAK Mödling were chosen for a presentation of some questionnaire results and a group discussion in June 2015.

2.5.1. Group discussion procedure

The presentation and group discussion took place within two school lessons, one teaching lesson for each class, one week after the survey in June 2015.

The class results of the questionnaire built the basis of the presentation and discussion in class. With a power point presentation some of the students’ answers were shown on an overhead projector for each class individually.

First the students’ keywords connected with the topic sustainability were shown and discussed. The words have been summarized, counted and visualized with ‘Wordle’. In a next step some of the students’ definitions of sustainability were shown and the meaning of sustainability was further discussed. Also students’ answers from their self-assessment with respect to knowledge and knowledge gain were visualized and discussed. Additionally some statements regarding their attitudes towards this topic were presented separately to each class for discussion.

The presentation ended with an open discussion about the importance of sustainability and school students were encouraged to calculate their own ecological footprint which also introduced an interesting conversational topic.

2.5.2. Group discussion analysis

The process was recorded for later transcription and further analysis. With the use of the computer program ‘f4’ the audio recording was transcribed. The group discussion was analyzed according to Mayring with the guidelines for qualitative content analysis (Mayring 2008). Students’ answers were grouped into the following categories for better characterization:

1. Keywords associated with sustainability

2. Meaning of sustainability
3. Values and attitudes with respect to sustainability
4. Importance of sustainability

The discussion with the students was performed in German language, thus citations have been translated. Selected statements will be included in the discussion section of this thesis and indicated with ‘Student’ and the according number of the transcript (Student 1, Student 2, Student 3, etc.).

2.6. Project: Workshop

This part of the master thesis focuses on a workshop, conducted with students from HAK Mödling in January 2016. The idea emerged from a university seminar attended in winter semester 2015, regarding the 21st UN climate change conference in Paris. Making a contribution to raising the awareness of young people regarding the urging problems of climate change and the need for action was the main aim of this project. Climate change education (CCE) with the purpose to address and respond to climate change and CEE as a strategy to mitigate and adapt to climate change is increasingly recognized in the context of ESD (Mochizuki et al. 2015).

The workshop will not be analyzed in the context of a complete qualitative approach including the recording and transcription of the whole process, as this procedure would go beyond the scope of this master thesis. However, outcomes of the project ‘workshop’ will be analyzed using feedback forms in order to contribute to answering the research questions.

2.6.1. Sampling design

The workshop was conducted with the HAK Mödling school students who have been interviewed about their attitudes towards sustainability. At the time of the workshop students were in their 12th and 13th academic year. Additionally another class of school students in their 11th academic year attended the workshop. Overall 125 school students from six different classes took part in the project.

2.6.2. Workshop content and progress

The workshop was scheduled for three school lessons and was repeated for each class individually. The process of the workshop was exactly planned in advance. First the students were welcomed and the content of the workshop was introduced. The topic of the workshop was called ‘21st Climate Change Conference’. In order to raise the students’ interest, their attention was drawn to the aspect of ‘negotiation’. The idea was to let students experience the complexity of negotiations in a simulation game. This concept was taken from the university seminar: ‘Paris,

ca va?! Simulation und Kommunikation der 21. UN-Klimakonferenz'. The students were separated in groups and had to produce identical hats with restricted communication. After talking about different forms and the purpose of negotiations the class was divided into five groups and the simulation game was explained as followed:

'The game lasts one hour and the aim is to build identical hats using the given materials like paper sheets, paper plates, straws and e.g. ribbons of different colors. The groups are physically separated and are not allowed to communicate, except for five negotiation meetings. The negotiation meetings last for only three minutes and the first meeting takes part 10 minutes after the game starts. Further meetings are arranged on agreement by the group members at the end of negotiation meetings. Only one member of each group is allowed to participate and each negotiation meeting has to be performed by another member of each group.'

Next, the material was distributed among the groups and the groups were evenly split in different rooms. During the simulation game the teacher and the researcher rotated between the different locations of the groups to make sure everyone observed the rules. During the negotiation meetings, instructions were given to prevent communication against the rules.



Figure 4: Workshop hats of different school classes © Alexandra Kreppel

After the fifth and last negotiation meeting the groups came back together into the classroom for presenting and comparing the results of the game, the hats. After taking pictures for the school homepage and for further use of the project, there was a group reflection of the whole process with different questions for evaluation: Do you think the task was fulfilled successfully? How satisfied are you with the result? How far could you include your own ideas into the process? Who realized his/her ideas and whose ideas prevailed? What part of the process did you consider

as difficult and what was easy? How would you describe the communication climate during the negotiation meetings?

The students had time to answer those questions within their groups and in a next step the questions were discussed in the students' assembly.

After a break, the workshop continued with a theory input and a part related to environmental issues. The workshop was held in a very interactive way. After a short video about climate change, the topics climate, climate change, global warming, consequences of global warming as well as outlooks and approaches to these problems were discussed. Further, the 21st climate change conference in Paris as well as the project 'UN Klimareporter' were introduced. Results of the Paris Agreement were then discussed, and to summarize, a short video called 'Earthbook' was shown. For recapitulation, a short quiz with open questions was introduced to the class and everyone was invited to contribute to the discussion. In the end the appreciation towards the students' participation was expressed and finally the feedback forms were handed out and answered by the students.

Table 5: Workshop concept

Time lesson 1.-3./4.-6.	Duration minutes	Description procedure	Further information (material, location, etc.)
7.55/10.55	10 min	introduction explanation simulation game	power point, classroom power point, classroom
8.05/11.05	10 min	group classification material distribution among groups group distribution among rooms	cards, classroom game materials room list
8.15/11.05	60 min	simulation game aim: construct identical 'HAK Mödling' hats requirements: all material has to be used to some extent realization: time period of the game is 1 hour, no communication in- between the groups except for 5 negotiation meetings lasting for 3 minutes. For every negotiation meeting another person from each group has to show up. negotiation meetings: first meeting 10 minutes after game starts, other meetings on agreement	classroom = room for negotiations + 5 additional rooms for different groups Game materials per group: ✓ scissor ✓ glues stick ✓ paper sheet A3 white ✓ paper sheet A4 color 1 ✓ paper sheet A4 color 2 ✓ balloon ✓ paper plate ✓ thread color 1 ✓ thread color 2 ✓ straw ✓ crepe tape ✓ colorful ribbon ✓ wooden stick color 1 ✓ wooden stick color 2
9.15/12.05	5 min	presentation of created hats - taking pictures	classroom classroom
9.20/12.10	10 min	group reflection with posters ✓ Do you think the task was fulfilled successfully? ✓ How satisfied are you with the result? ✓ How far could you include your own ideas into the process? ✓ Who realized his/her ideas and whose ideas prevailed? ✓ What part of the process did you consider as difficult and what was easy? ✓ How would you describe the communication climate during the negotiation meetings?	classroom flip chart paper flip chart pencils
9.30/12.20	15 min	break	
9.45/12.35	50 min	video about climate change: 'WissensWerte Klimawandel' interactive school lesson about climate change video: 'Earthbook' quiz: summary, discussion, answering questions - reflection	class, video class, power point class, video class, power point class, feedback form
10.35/13.25	-----	END of workshop ----- --	-----

2.6.3. Data collection and analysis: Feedback form

The feedback form, containing nine questions, was used as a tool for recapitulating the workshop with the students as well as to be able to answer the research questions. Directly after the workshop, the students had about five minutes to fill in the pencil based feedback form. The first six questions were statements and had to be answered on a five-point rating scale (ranging from 1 strongly agree, 2 mildly agree, 3 unsure, 4 mildly disagree to 5 strongly disagree):

1. The workshop was fun.
2. Now I know more than before.
3. I am interested in the issue 'global warming'.
4. The topic of the workshop was interesting.
5. I would like to get to know more about this problem.
6. I am (e.g. due to my high standard of life) jointly responsible for climate change.

The last three questions were open questions in which the students were asked to answer in full sentences:

7. What have you learned today?
8. For you personally, what was the most important aspect today?
9. Would you like to say anything else?

The feedback form was analyzed using descriptive statistics for the first six questions and by categorizing the open answers for question seven (Braun et al. 2006). Question eight and nine were summarized and will be considered in the discussion section.

3. Empirical Results

This chapter presents results of the questionnaire - including descriptive statistics of the sample, the analysis of attitude differences and the analysis of the understanding of sustainability – as well as the analysis of the workshop feedback form.

3.1. Presentation of the questionnaire results

3.1.1. Descriptive Statistics

In the survey, 145 students participated from GYM Baden, 100 students from GYM Mödling and 116 students each from HAK Baden and HAK Mödling. Table 6 shows the participant distribution among schools.

Table 6: Participant distribution among schools

School	Frequency	Percent
GYM Baden	145	30.4
GYM Mödling	100	21.0
HAK Baden	116	24.3
HAK Mödling	116	24.3
Total	477	100.0
Excluded	0	

Figure 5 visualizes the distribution of participants among the four schools GYM Baden, GYM Mödling, HAK Baden and HAK Mödling. Only slight differences in sample sizes concerning the participants occurred. Most students represented in the survey attended GYM Baden.

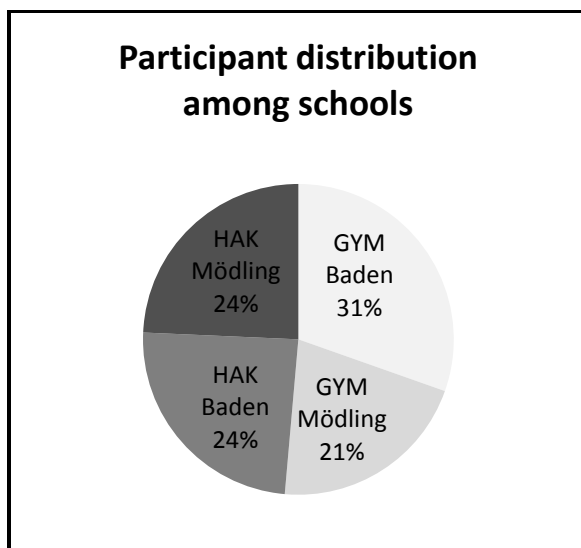


Figure 5: Participant distribution among schools

In terms of **gender**, 291 (61.3%) female and 184 (38.7%) male students participated, only two students did not reveal their gender. The table below shows the participants' gender distribution.

Table 7: Participants' gender distribution

Gender	Frequency	Percent
Female	291	61.3
Male	184	38.7
Total	475	100.0
Excluded	2	

In GYM Baden, 68% of the students were female (n= 99) and 32% male (n = 46) and in GYM Mödling 67% of the students were female (n = 66) and 33% were male (n = 32) students. HAK Baden showed a gender distribution of 59% female (n = 69) and 41% male (n = 47) students. In HAK Mödling, 49% female (n = 57) and 51% male (n = 59) students participated.

The following table shows the gender distribution by school.

Table 8: Gender distribution by school

School	Gender	Frequency	Percent
GYM Baden	Female	99	68.0
	Male	46	32.0
	Total	145	100.0
GYM Mödling	Female	66	67.0
	Male	32	33.0
	Total	98	100.0
HAK Baden	Female	69	59.0
	Male	47	41.0
	Total	116	100.0
HAK Mödling	Female	57	49.0
	Male	59	51.0
	Total	116	100.0

In GYM Baden (68%) and in GYM Mödling (67%), roughly a third of the students were females. HAK Baden (59%) also had a higher number of female student participants. HAK Mödling (49%), was the only school with a lower number of females compared to male students. Figure 6 visualized the gender distribution for each school.

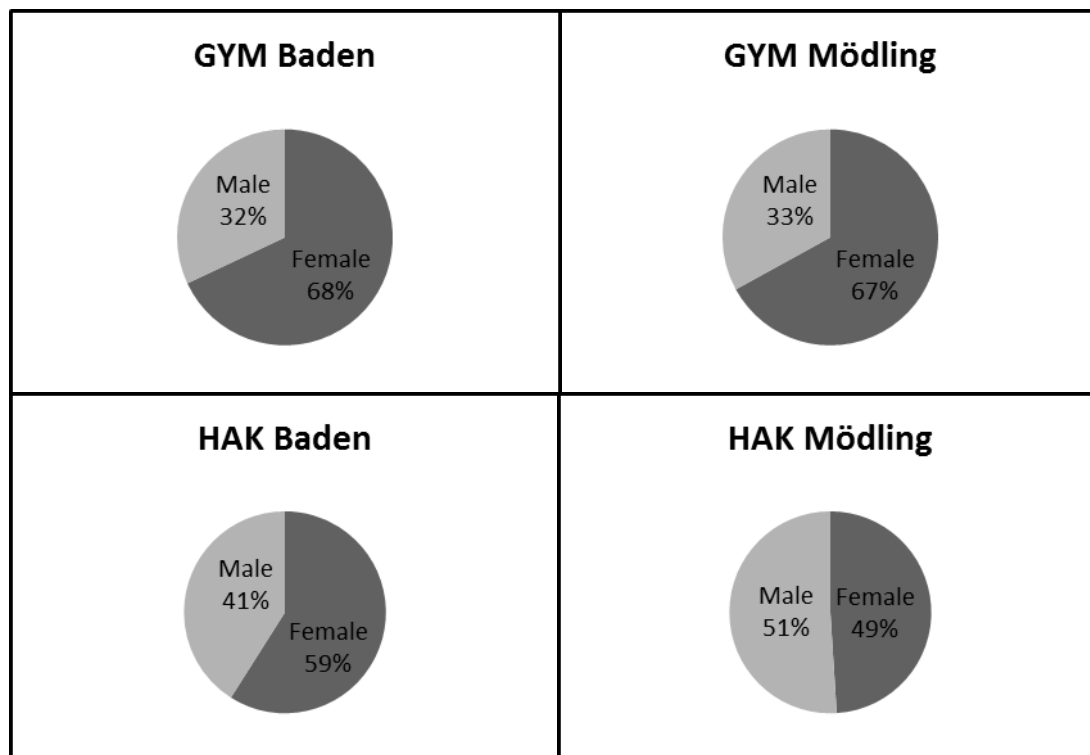


Figure 6: Gender distribution by school

The minimum **age** was 16 and the maximum age 21. The average age of the school students was 17.51 years with a standard deviation of 1.058. The proportion of 17 years old students is the highest (34.8%), followed by 18 years olds with 31.4% and 16 years olds with 17.6%. Only 15 students (3.2%) reached the age of 20 and three students (0.6%) were already 21 years old. The following table shows the age distribution.

Table 9: Age distribution

Age	Frequency	Percent
16	83	17.6
17	164	34.8
18	148	31.4
19	58	12.3
20	15	3.2
21	3	0.6
Total	471	
Excluded	6	

Figure 7 shows the gender and the age distribution of the school students who participated in the survey. The average participant was between 17 and 18 years old.

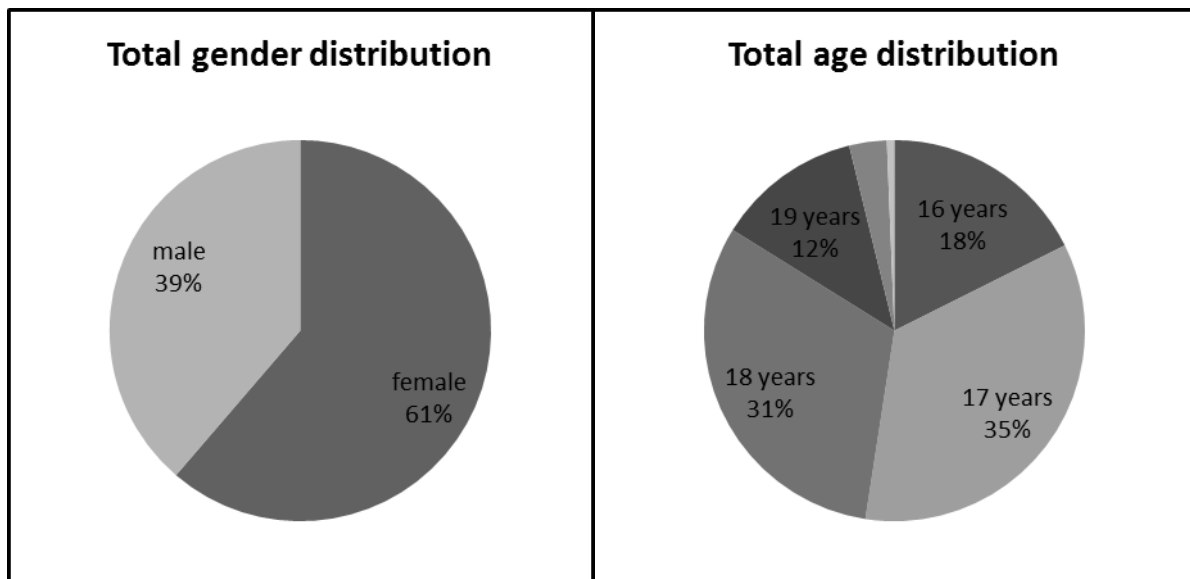


Figure 7: Gender and age distribution

3.1.2. Analysis of the attitudes regarding sustainability

In a first step the differences of the observed attitudes towards sustainability (biocentrism, anthropocentrism, solidarity and equality) are analyzed by school. As the literature indicates, gender differences are very important (Torbjörnsson et al. 2011). Therefore a second analysis – a two factorial ANOVA – has been realized using gender as a control variable and also considering the interaction between school and gender. Generally this would be the preferred type of analysis. However, several problems arose with respect to equality of variances, therefore not all research questions could be answered reliably by this second type of analysis. Thus, both calculations (without and with consideration of gender as control variable) will be presented in the following chapter.

Attitude differences between schools

The differences in attitude values by schools were calculated using one way ANOVA with the four schools as independent variables and the scores of the subscales (biocentrism, anthropocentrism, solidarity and equality) as dependent variables.

For all ANOVAS; the assumptions interval scale, normality and equality of variances were considered.

Statistically significant differences between the schools in attitudes towards respect for nature, solidarity and equality could be found.

For a more detailed comparison between the students from different schools, a post hoc test was applied for pairwise comparison of all different combinations of the schools. Following the recommendations of Andy Field (2009), the Gabriel test was applied, as variances are similar but sample sizes for GYM Baden (N = 145), GYM Mödling (N = 100), HAK Baden (N = 116) and HAK Mödling (N = 116) are slightly different.

The following figure shows the descriptive statistics of the scale means by schools.

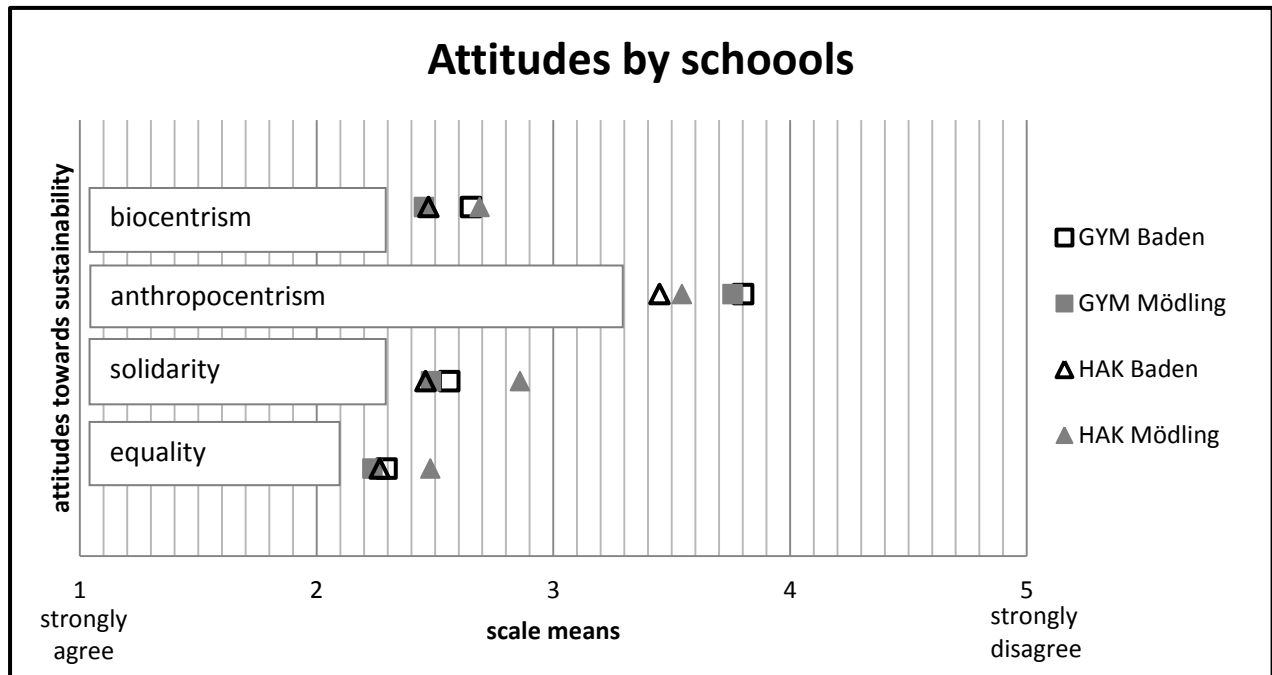


Figure 8: Attitudes by schools (scale means)

For **biocentric attitudes**, the ANOVA showed a significant difference between school types ($p = 0.004$, $R^2 = 0.028$ and adj. $R^2 = 0.022$). However, the explained variance is very low, therefore the following results should be interpreted with caution.

Table 10: Mean biocentric attitudes by schools

School	Mean	N	Std. deviation
GYM Baden	2.65	145	0.615
GYM Mödling	2.45	100	0.593
HAK Baden	2.47	116	0.635
HAK Mödling	2.69	116	0.592
Total	2.58	477	0.617

According to the post hoc test there is a statistically significant difference between students attending the schools HAK Mödling and GYM Mödling ($p = 0.028$) and for HAK Mödling and HAK Baden ($p = 0.040$) concerning biocentric values. Students in HAK Mödling (mean = 2.69) had a slightly less favorable attitude about the preservation of nature than students in GYM Mödling (mean = 2.45) and HAK Baden (mean = 2.47).

Also for **anthropocentric attitudes**, a statistically significant difference between students from different school types could be calculated using the univariate ANOVA ($p = 0.00032$ $R^2 = 0.048$, adj. $R^2 = 0.042$).

Table 11: Mean anthropocentric attitudes by schools

School	Mean	N	Std. deviation
GYM Baden	3.80	145	0.680
GYM Mödling	3.76	100	0.658
HAK Baden	3.45	116	0.609
HAK Mödling	3.54	116	0.680
Total	3.64	477	0.673

The post hoc test shows a statistically significant difference between the students attending GYM Baden and HAK Baden ($p = 0.000$), GYM Baden and HAK Mödling ($p = 0.011$) as well as GYM Mödling and HAK Baden ($p = 0.004$) in reference to anthropocentric values. Students attending GYM Baden (mean = 3.80) were more favorable towards the utilization of nature than students attending HAK Baden (mean = 3.45) and HAK Mödling (mean = 3.54). Furthermore, students attending GYM Mödling (mean = 3.76) were more in favor of the utilization of nature than students attending HAK Baden (mean = 3.45).

For **solidarity attitudes**, a statistically significant difference between students of the four different school types could be calculated ($p = 0.008$ $R^2 = 0.025$, adj. $R^2 = 0.019$).

Table 12: Mean solidarity attitudes by schools

School	Mean	N	Std. deviation
GYM Baden	2.56	145	0.987
GYM Mödling	2.48	100	0.950
HAK Baden	2.46	116	1.010
HAK Mödling	2.86	116	0.985
Total	2.60	477	0.994

Results of the post hoc test indicate a significant difference between the schools HAK Mödling and HAK Baden ($p = 0.013$) as well as between HAK Mödling and GYM Mödling ($p = 0.031$). Students from HAK Mödling (mean = 2.86) had a less favorable attitude towards solidarity than students from GYM Mödling (mean = 2.48) and HAK Baden (mean = 2.46).

For **equality attitudes**, the ANOVA shows that there is a statistically significant difference between school types ($p = 0.015$ $R^2 = 0.022$, adj. $R^2 = 0.016$).

Table 13: Mean equality attitudes by schools

School	Mean	N	Std. deviation
GYM Baden	2.30	145	0.637
GYM Mödling	2.24	100	0.590
HAK Baden	2.27	116	0.618
HAK Mödling	2.50	116	0.647
Total	2.32	477	0.630

According to the Gabriel post hoc test, there is a significant difference between the students attending GYM Mödling and HAK Mödling ($p = 0.025$). Students attending GYM Mödling (mean = 2.24) had a more favourable attitude towards equality values than students attending HAK Mödling (mean = 2.50). There can also be seen a trend with no statistical significance between HAK Baden and HAK Mödling ($p = 0.056$). Students from HAK Baden (mean = 2.27) also tend to be more positive about values of equality than students from HAK Mödling (mean = 2.50).

Attitude differences by gender

The differences in attitude values towards sustainability by gender were calculated using two-factorial ANOVA with the four schools as well as gender as independent variables and the scores of the subscales as dependent variables. Total gender differences are illustrated in figure 9, as the results show interesting outcomes.

Statistically significant gender differences in attitudes towards respect for nature could be found. There is also a trend for gender differences with respect to solidarity and equality attitudes. The descriptive statistics of the mean attitude differences by gender are visualized for the four attitudes in the following figure.

**Figure 9: Attitudes by gender (scale means)**

For **biocentric attitudes** (N = 475), the ANOVA including school and gender shows a slightly higher amount of explained variance ($p = 0.000$, $R^2 = 0.083$, adj. $R^2 = 0.069$). The following table shows the descriptive statistics of the scale means.

Table 14: Mean biocentric attitudes by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	2.60	99	0.579
	Male	2.77	46	0.677
	Total	2.65	145	0.615
GYM Mödling	Female	2.39	66	0.618
	Male	2.59	32	0.538
	Total	2.45	98	0.599
HAK Baden	Female	2.28	69	0.556
	Male	2.75	47	0.644
	Total	2.47	116	0.635
HAK Mödling	Female	2.57	57	0.560
	Male	2.81	59	0.603
	Total	2.69	116	0.592
Total	Female	2.47	291	0.591
	Male	2.75	184	0.622
	Total	2.58	475	0.618

A statistically significant difference between the genders could be found ($p = 0.000$). Overall, girls (mean = 2.47) show a more favorable attitude towards the preservation of nature than boys (mean = 2.75).

For **anthropocentric attitudes** (N = 475), the explained variance could also be improved by including gender ($p = 0.000$, $R^2 = 0.123$, adj. $R^2 = 0.109$).

Table 15: Mean anthropocentric attitudes by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	3.89	99	0.505
	Male	3.62	46	0.937
	Total	3.80	145	0.680
GYM Mödling	Female	3.94	66	0.597
	Male	3.43	32	0.648
	Total	3.78	98	0.656
HAK Baden	Female	3.60	69	0.584
	Male	3.23	47	0.582
	Total	3.45	116	0.610
HAK Mödling	Female	3.73	57	0.609
	Male	3.37	59	0.702
	Total	3.54	116	0.680
Total	Female	3.80	291	0.579
	Male	3.41	184	0.741
	Total	3.65	475	0.674

A statistically significant difference by gender could be found ($p = 0.000$). Male students (mean = 3.41) were more in favor about the utilization of nature than females (mean = 3.80).

For **solidarity attitudes** (N = 475), the explained variance could be improved ($p = 0.000$, $R^2 = 0.124$, adj. $R^2 = 0.111$) but a significant Levene's test indicates inhomogeneous variances and thus a violation of a critical assumption of the ANOVA.

Table 16: Mean solidarity attitudes by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	2.26	99	0.806
	Male	3.21	46	1.040
	Total	2.56	145	0.987
GYM Mödling	Female	2.38	66	0.969
	Male	2.69	32	0.914
	Total	2.48	98	0.957
HAK Baden	Female	2.26	69	0.840
	Male	2.76	47	1.163
	Total	2.46	116	1.010
HAK Mödling	Female	2.57	57	0.877
	Male	3.14	59	1.009
	Total	2.86	116	0.985
Total	Female	2.35	291	0.870
	Male	2.98	184	1.058
	Total	2.59	475	0.996

Thus, the significant difference by gender ($p = 0.000$) can only be described as a trend and has to be interpreted with caution as a significant Levene's test limits the force of expression. Girls (mean = 2.35) tend to show a more favorable attitude towards solidarity than boys (mean = 2.98).

For **equality attitudes** ($N = 475$), the explained variance could be improved ($p = 0.000$, $R^2 = 0.110$, adj. $R^2 = 0.097$). Unfortunately, here as well a significant Levene's test indicates inhomogeneous variances and thus, the results have to be interpreted carefully.

Table 17: Mean equality attitudes by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	2.23	99	0.534
	Male	2.44	46	0.804
	Total	2.30	145	0.637
GYM Mödling	Female	2.12	66	0.561
	Male	2.48	32	0.599
	Total	2.24	98	0.595
HAK Baden	Female	2.06	69	0.536
	Male	2.57	47	0.613
	Total	2.27	116	0.618
HAK Mödling	Female	2.26	57	0.473
	Male	2.70	59	0.718
	Total	2.48	116	0.647
Total	Female	2.17	291	0.532
	Male	2.56	184	0.699
	Total	2.32	475	0.631

A difference between the genders ($p = 0.000$) can only be described as a trend, as a significant Levene's test indicates inhomogeneous variances and furthermore the results are statistically not significant. Female students (mean = 2.17) tend to show a more favorable attitude towards solidarity than male ones (mean = 2.56).

Attitude differences between schools, corrected for gender

In order to control the differences between schools for gender, a two factor variance analysis was done for school corrected for gender including the interaction of school and gender. This type of ANOVA was conducted for all four attitudes: biocentrism, anthropocentrism, solidarity and equality. Analysis was not possible for every attitude type, as inhomogeneous variances appeared and the post hoc test, which is appropriate for unequal variances (the Games-Howell test), is not available in SPSS Statistics for the two-way-ANOVA. Thus, results for biocentric and anthropocentric attitudes can be treated with great statistical evidence whereas the results for solidarity and equality attitudes for this analysis have to be interpreted with caution.

With respect to **biocentric attitudes** ($p = 0.000$, $R^2 = 0.083$, adj. $R^2 = 0.069$), with an insignificant Levene's test, the following statements can clearly be interpreted from the ANOVA results. Both, gender ($p = 0.000$) and school ($p = 0.018$) contribute to significant differences with

respect to biocentric attitudes. The interaction between gender and school is not significant ($p = 0.226$).

The post hoc test showed following significant differences between schools: Students attending HAK Mödling showed differences in biocentric attitudes compared to GYM Mödling ($p = 0.024$) and HAK Baden ($p = 0.034$).

For **anthropocentric attitudes** ($p = 0.000$, $R^2 = 0.123$, adj. $R^2 = 0.109$) with an insignificant Levene's test the assumption of equality of variances is fulfilled and according to ANOVA, the following statements can be generated. School ($p = 0.000$) and gender ($p = 0.000$) influences on anthropocentric values are both significant. The interaction between gender and school is not significant ($p = 0.601$).

After applying the post hoc test, the following schools showed significant differences referring to anthropocentric attitudes:

GYM Baden differs from HAK Baden ($p = 0.00$) and HAK Mödling ($p = 0.007$); GYM Mödling differs from HAK Baden ($p = 0.001$). HAK Mödling also shows an insignificant trend compared to GYM Mödling ($p = 0.052$).

With respect to **solidarity attitudes** ($p = 0.000$, $R^2 = 0.124$, adj. $R^2 = 0.111$), the significant Levene's test shows that the assumption of homogenous variances has been violated. Both school ($p = 0.018$) and gender ($p = 0.000$) contribute to significant value differences. More detailed assumptions about the differences of schools cannot be calculated, as the appropriate post hoc test (Games Howell) is not available in a two-factorial ANOVA in SPSS. The interaction between gender and school is not significant ($p = 0.084$).

For **equality attitudes**, the explained variance could be improved ($p = 0.000$, $R^2 = 0.110$, adj. $R^2 = 0.097$), but a significant Levene's test shows that assumptions have been violated. The attitude difference by school ($p = 0.108$) is not significant whereas the factor gender shows significant results ($p = 0.000$). Again further assumptions are not feasible, as the appropriate post hoc test (Games Howell) is not available in a two-factorial ANOVA in SPSS. The interaction between gender and school is not significant ($p = 0.252$).

3.1.3. Analysis of characterizing the understanding of sustainability

The results for students' self-assessment about their knowledge about sustainability, their knowledge gain, words associated with sustainability as well as their understanding about sustainability are presented in the following chapter.

Self-assessment of knowledge about sustainability

Regarding the self-assessment of students' knowledge about sustainability, the following differences in terms of schools and gender could be calculated (descriptive statistics).

Table 18: Mean self-assessment by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	2.63	99	0.828
	Male	2.39	46	0.906
	Total	2.55	145	0.857
GYM Mödling	Female	2.44	66	0.704
	Male	2.34	32	0.602
	Total	2.41	98	0.671
HAK Baden	Female	2.97	69	0.727
	Male	3.11	47	1.047
	Total	3.03	116	0.869
HAK Mödling	Female	2.86	57	0.854
	Male	2.66	59	0.958
	Total	2.76	116	0.910
Total	Female	2.71	291	0.805
	Male	2.65	184	0.957
	Total	2.69	475	0.866

The ANOVA shows the following model characteristics ($p = 0.000$, $R^2 = 0.078$ adj. $R^2 = 0.064$). Unfortunately, the significant Levene's test limits the validity of the model. School ($p = 0.000$) is significant whereas gender ($p = 0.223$) does not show significant results. The appropriate post hoc test (Games Howell) is not available in a two-factorial ANOVA in SPSS, therefore significant school differences cannot be further calculated and only be described as a tendency by using mean values:

The figure below visualizes the self-assessment on students' knowledge about sustainability using a school grade scaling system. Results are displayed in percent of total answers by school.

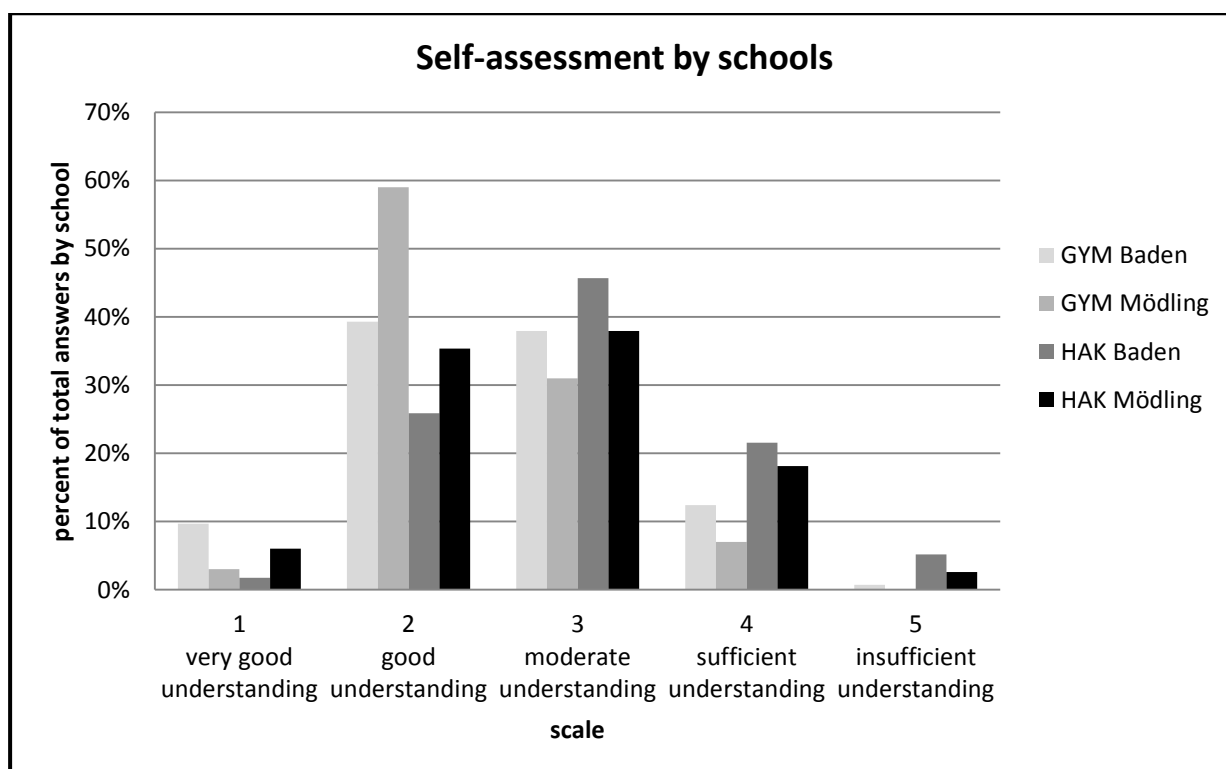


Figure 10: Self-assessment by schools

The total mean of self-assessment (mean = 2.69) lies in-between good and moderate knowledge. Boys in the three schools GYM Baden, GYM Mödling and HAK Mödling rated their knowledge about sustainability slightly better than girls whereas in HAK Baden the results are reverse. Students attending HAK Baden and HAK Mödling seem to have a poorer knowledge about the topic sustainability than those of GYM Baden and GYM Mödling.

Knowledge gain about sustainability

Multiple answers were possible by choosing the source of students' knowledge gain with respect to the topic sustainability. The table below lists the categories with frequency of answers and percent of total responses.

Table 19: Knowledge gain by category

Knowledge gain category	Frequency (N = 477)	% of responses
school lessons	436	91%
media	336	70%
discussions and conversations	236	49%
workshops and presentations	106	22%

Regarding the source of knowledge gain with respect to sustainability, 91 % of the interviewed students obtain knowledge about sustainability from school lessons, 70% stated having learned something about sustainability from media, 49% claimed a learning process based on discussions

and conversations and 22% report having obtained knowledge about sustainability from workshops and presentations. Students' knowledge gain is visualized in the diagram below.

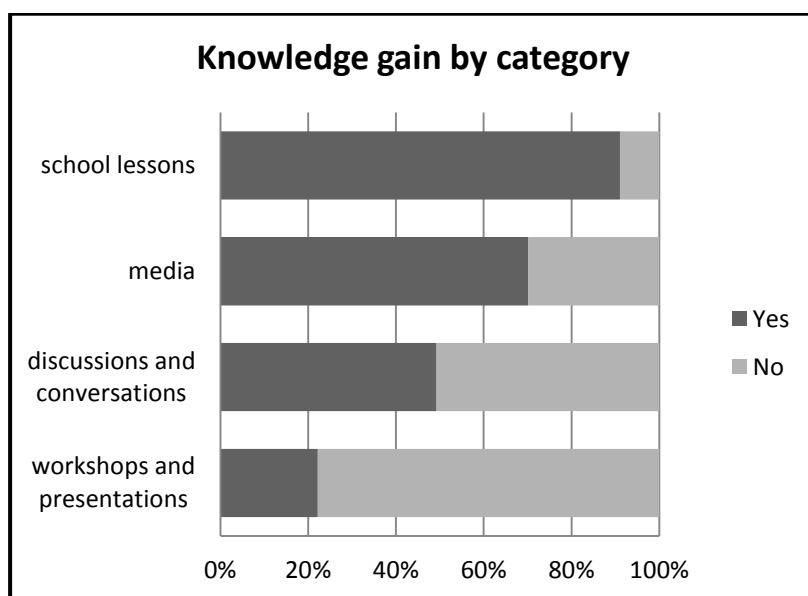


Figure 11: Knowledge gain by category

Students were also asked to give explicit examples in combination with these information sources. Answers are summarized in table 20.

Table 20: Student examples of knowledge gain by category.

Knowledge gain category	Student examples
school lessons	Biology, Geography, Physics, Chemistry, English, German, Spanish, French, Dietetics, Ethics, Religion, History
media	TV (ORF, ATV, NTV, ZIB, Thema, Report, im Zentrum, Universum, Welt der Wunder, Spiegel TV, Gallileo, Discovery Channel, documentaries), internet (Youtube, Social Media), books, newspaper and journals (Profil, Kurier, National Geographic, Bergwelten, Gallileo), radio, advertisements
discussions and conversations	family members, friends, teachers, schoolmates
workshops and presentations	Global 2000, Greenpeace, Fairtrade, Kinderuni, Zotter, Political Green Party, Scouts, Young Christians, Corporate Social Responsibility seminar, hunting seminar, Sonnentor, reduce seminar, seminar about ecological awareness, Rote Nasen

Scientific school subjects like Biology, Geography, Physics or Chemistry but also language subjects like English, German, Spanish or French as well as other subjects like Dietetics, Ethics, Religion and History are examples given by students contributing to knowledge about sustainability. In terms of media most students named television programs, documentaries or news as examples. Further discussions and conversations with family members, friends, teachers or schoolmates were also mentioned as examples for knowledge exchange. A Global 2000 presentation, a Greenpeace workshop, activities with the Scouts, a corporate social responsibility

seminar, an excursion to the Zotter factory were some examples of other activities given by the students.

Words associated with sustainability

With respect to the amount of keywords associated to the topic sustainability, no significant school or gender differences could be calculated using ANOVA.

Table 21: Mean amount of keywords by gender and schools

School	Gender	Mean	N	Std. deviation
GYM Baden	Female	4.87	99	2.064
	Male	4.00	46	1.886
	Total	4.59	145	2.043
GYM Mödling	Female	5.21	66	2.173
	Male	5.50	32	2.603
	Total	5.31	98	2.313
HAK Baden	Female	4.09	69	1.531
	Male	3.81	47	1.469
	Total	3.97	116	1.506
HAK Mödling	Female	4.72	57	2.059
	Male	4.46	59	2.344
	Total	4.59	116	2.203
Total	Female	4.73	291	2.006
	Male	4.36	184	2.156
	Total	4.59	475	2.071

The total mean of given words associated with sustainability is 4.59 and lies above the required number of at least 4 keywords. Girls tend to give more keywords than boys in the three schools GYM Baden, HAK Baden and HAK Mödling. In GYM Mödling, male students tend to give more answers than females. In GYM Mödling the highest number of keywords was given with a total mean of 5.31.

Ranging from ‘action’ to ‘WWF’, more than 400 different keywords associated with sustainability were listed by the students. The 40 most frequently mentioned are shown in the table below.

Table 22: The 40 most frequently used words associated with sustainability

Keywords	Frequency
recycling	129
environmental protection	70
nature	67
environment	66
to save	60
fair trade	54
waste separation	50
saving water	48
clearing woodland	41
forest, trees, rainforest	40
saving energy	39
resources	37
saving electricity	36
pollution	34
biological	34
solar energy	31
energy	29
nature protection	28
renewable energy	28
no plastic	26
agriculture	26
ecology	24
wind energy	22
ecological footprint	22
food	21
future	20
organic products	20
CO ₂ emissions, CO ₂ reduction, emission reduction	20
public transportation	19
water	18
animals	18
quality seal	17
human beings	17
globalization	16
environmentally friendly	16
fossil fuels	16
to give to charity	15
hydropower	15
e-car	15

[illegible]

Words further were categorized according to the definition of sustainability (Birdsall 2014): environmental component, economic component, socio-cultural component and temporal component. With respect to these categories, selected keywords are listed without ranking in table 23.

Table 23: Words associated with sustainability by category (Categories adapted from Birdsall 2014)

Categories	Keyword examples
Environmental component	nature, environment, biological, forest, trees, rainforest, resources, ecology, water, animals, soil, biodiversity, plants, climate, the earth, living environment, natural, bees, extinction, scarcity of resources, natural gas, weather, diversity, vegetation, greenhouse effect, biodegradable, sun, ozone layer, ecosystem, air, wildlife, meadows, regeneration, planet, ocean, crop plant, groundwater, forest functions, ice bear, pollution, climate change, garbage and waste, global warming, overfishing, agriculture, recycling, environmental protection, saving water, organic agriculture, protection, protection of resources, preservation, ecological footprint, food, environmentally aware, climate protection, maintain, conservation area, no monocultures, solar energy, wind energy, organic products, environmentally friendly, hydraulic energy, recovery, saving resources, species-appropriate husbandry, ecological thinking, forest protection, animal protection, saving bees, less meat consumption, no trashing of food, organic animal farming, use of resources, fossil fuels, clearing woodland
Economic component	to save, fair-trade, CO ₂ Emissions, globalization, economy, packaging, money, exploitation, trading, investments, industrialization, world of work, energy generation, industry, advertisement, world economy, profit, labor, China, research, no overproduction, control, regulations, product regulations, no child labor, no exploitation, less travel, less transport, no plastic, emission reduction, quality seal, e-car, reuse, regional products, no nuclear power, nuclear power
Socio-cultural component	public transportation, human beings, to give to charity, helping, to give, to share, fair, education, important, wastefulness, Greenpeace, responsibility, consideration, humanity, social interaction, equality, justice, development cooperation, to care, renewable, good, WWF, working together, human rights, nutrition, energy consumption, peace, throwaway society, healthy, superior, balanced, knowledge, to plan ahead, consumption, tourism, problems, luxury, to live, life, poverty, awareness, efficiency, mindfulness, solidarity, respect, wealth, privileges, values, lifestyle, discipline, thinking, Third World, developed countries, empathy, waste separation, saving electricity, saving energy, vegetarianism, no wasting, ride bicycle, walking, less car driving, do something, paper bag instead of plastic, Kyoto-Protocol, conscious consumption
Temporal component	future, generations, offspring, longevity, future oriented, surviving

The **environmental component** contains words such as nature, environment and wildlife as well as words connected to natural resources like water, food and organic farming. Also concepts like recycling, environmental protection, global warming or pollution are included into this category. With respect to the **economic component**, words like exploitation, money, industry, industrialization or overproduction but also the terms reuse, research and regulations are represented in this category. Words included in the category **socio-cultural component** are for example human beings, equality, mindfulness, solidarity, respect, empathy or working together. The **temporal component** category is among others represented by the words future, generations, offspring and longevity.

Understanding of sustainability

Results with respect to the students' understanding of sustainability are shown in table 24. Students' definitions are analyzed by categorizing the answers into component categories according to Birdsall (2014). The 'bold' figures for frequency and percent of responses in table 24 represent the total results with respect to the component categories. 'Non-bold' figures represent results for each sub-category. Selected examples of students' answers are listed for each category.

The 'environmental component' category contains the sub-categories 'resources', 'caring for the environment' and 'lifestyle choices' (Birdsall 2014). Only total frequency and percentage are given for the environmental component category, as students' definitions often included more than one sub-category of the environmental component. Almost 60% of the students explained sustainability using the environmental component of Birdsall's definition of sustainability.

The category 'irrelevant to definition' includes the sub-categories 'no response', 'ignorance' (answers like 'I don't know') and topic 'unrelated' answers (adapted from Birdsall 2014). 13.6% of the students did not give a definition at all, 2.9% stated that they could not explain the meaning of sustainability and 6.5% of students' answers were unrelated or un-contextualized. Therefore 23% of student answers were irrelevant to the definition of sustainability.

The 'temporal component' category consists of the sub-categories 'future planning' and 'intergenerational equity' (Birdsall 2014). 13.0% of the students' answers contained explanations addressing intergenerational equity and 3.4% could be categorized to the future planning sub-category. Thus, 16.4% of the school students explained sustainability by describing the temporal component of the sustainability definition.

The 'socio-cultural component' category as well as the category 'interrelationship of components' were each present with 0.4% of the students' answers.

Table 24: Students' understanding of sustainability by component categories (adapted from Birdsall 2014)

Component categories with <i>sub-categories</i> and examples given by students	Frequency (N = 477)	Percent of total responses
Environmental component <i>Resources</i> 'to use resources sparingly ...' (ST_146) 'no wasting of resources...' (ST_162) 'to only take as much from nature as can be reproduced' (ST_246) <i>Caring for environment</i> 'to have consideration for the environment...' (ST_187) 'to care about the environment and not to pollute nature' (ST_270) <i>Lifestyle choices</i> 'to live in a way that nature is not harmed...' (ST_160) 'to change lifestyle in a way that nature will be preserved...' (ST_209) 'not to destroy nature with human actions and to help to protect nature and animals...' (ST_458)	285	59.7%
Irrelevant to definition <i>No response</i> <i>Ignorance</i> 'I dont' know.' (ST_114) 'I can't explain it.' (ST_110) <i>Unrelated</i> 'if something still works after repeated reuse' (ST_129) 'cloth manufacturing in developing countries' (ST_379) 'sustainability principle' (ST_429)	110	23.1%
Temporal component <i>Intergenerational equity</i> 'obtaining the earth for future generations' (ST_303) 'to live in a way that future generations can live on the planet as well as we do' (ST_89) <i>Future planning</i> 'to ensure the ecosystem and quality of life for the future...' (ST_22) 'when clearing one tree you should plant two others, it's to care about the future and that the earth will exist for a long time' (ST_50)	78	16.4%
Socio-cultural component 'Sustainability is about people helping one another, and caring for each other. Also fighting for human rights, [...] and respecting other people and when there is no discrimination and so on.' (ST_395) 'Sustainability is important in the area of politics [...] because it is about decisions that should last for a long time.' (ST_13)	2	0.4%
Interrelationship of components 'the concept of using natural systems to ensure important functions for a long time within economical, ecological and social aspects' (ST_92)	2	0.4%

Component groups according to Birdsall's definition of sustainability that occurred in student answers of this study are the environmental component, the temporal component, the interaction of components, socio-cultural components and components irrelevant to the definition. The following figure shows students' understanding of sustainability in percent of total answers by component.

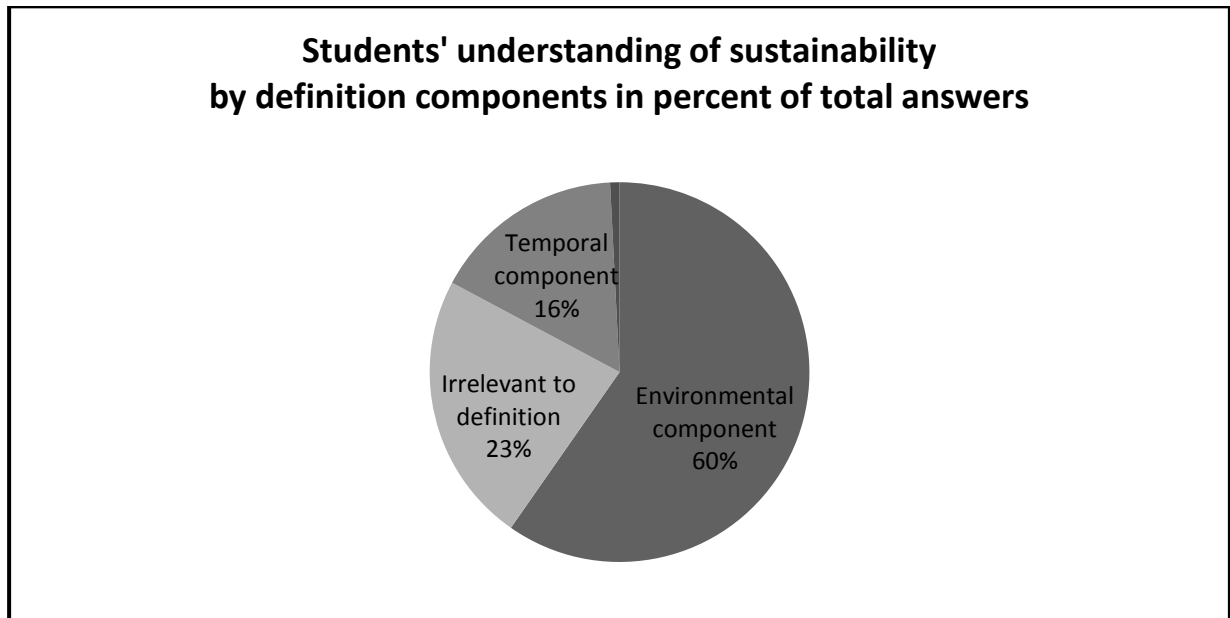


Figure 13: Students' understanding of sustainability by definition components in percent of total answers

3.2. Analysis of workshop feedback form

Analyzing the workshop feedback form in order to evaluate the students' interest about the topic climate change, firstly means and frequency of answers for the first six statements were calculated. Aiming to estimate if school students realize the importance of action, secondly the range of students' learning outcome was analyzed with a descriptive approach; results are shown at the end of this chapter.

3.2.1. Quantitative analysis

The mean results for statement 1 – 6 are listed in table 25 and will be visualized by frequencies in the figures 14 to 19. The statements had to be answered on a five-point rating scale (ranging from 1 = strongly agree, 2 = mildly agree, 3 = unsure, 4 = mildly disagree to 5 = strongly disagree).

Table 25: Feedback form: means of statements

Statement	Mean	N	Std. deviation
1. The workshop was fun.	2.19	125	0.913
2. Now I know more than before.	2.54	125	1.241
3. I am interested in the issue 'global warming'.	2.17	124	1.087
4. The topic of the workshop was interesting.	2.26	125	1.056
5. I would like to get to know more about this issue.	2.60	125	1.092
6. I am (e.g. due to my high standard of life) jointly responsible for climate change.	2.03	125	0.991

Statement 1 was answered with a mean of 2.19 (N = 125). 23% of the school students strongly and 45% mildly agreed in having fun during the workshop. It can be mentioned that none of the students strongly disagreed with this statement.

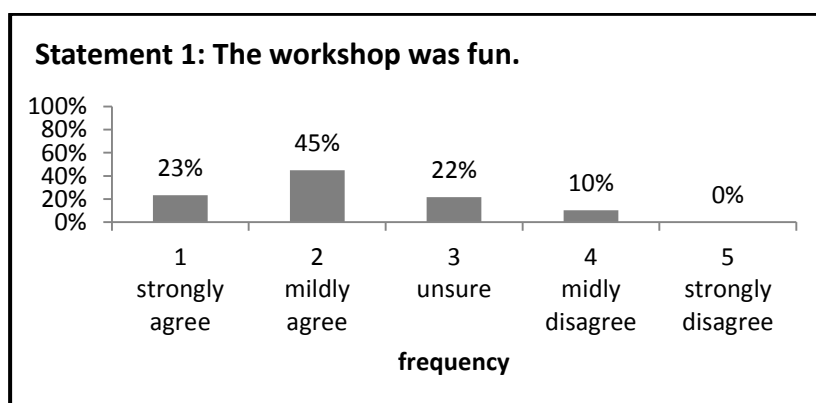


Figure 14: Feedback form statement 1 (frequencies)

In respect to statement 2, with a total mean of 2.54 (N = 125), 22% of the students strongly agreed and 33% mildly agreed in having gained knowledge through the workshop.

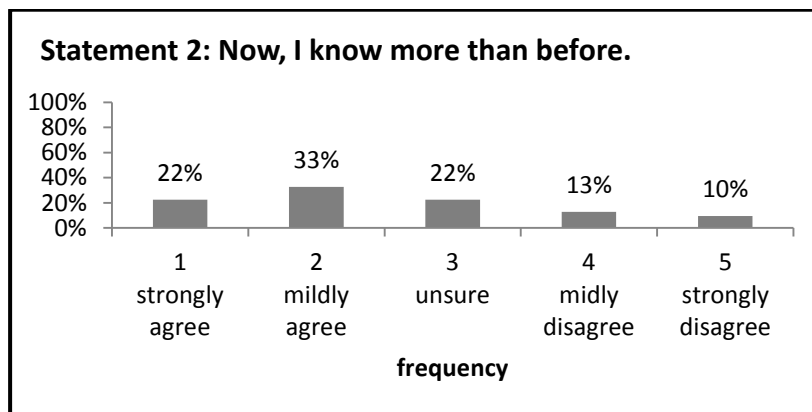


Figure 15: Feedback form statement 2 (frequencies)

Results about statement 3 with a mean of 2.17 (N = 124, 1 missing) suggests that more than two thirds of the students – 32% strongly and 36% mildly agreed –are interested in the issue ‘global warming’, whereas 20% are unsure. 8% mildly disagree and 4% strongly disagree with having interest in this topic.

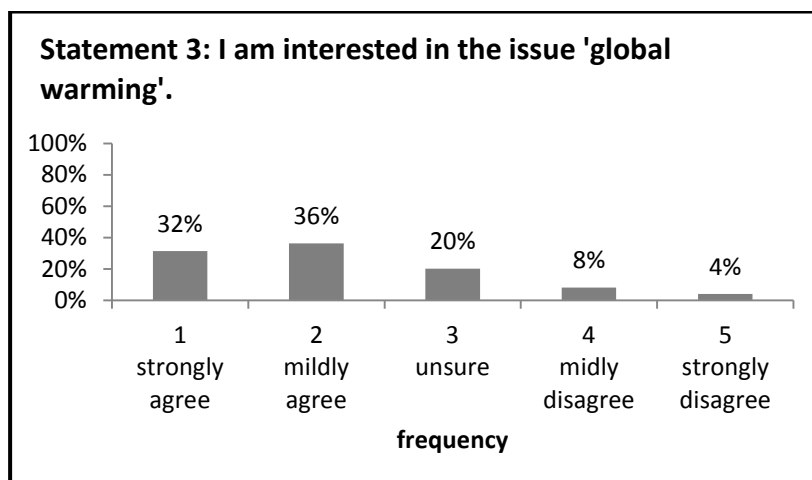


Figure 16: Feedback form statement 3 (frequencies).

Concerning statement 4, with a mean of 2.26 (N = 125), more than half of the students – 26% strongly and 35% mildly agreed –find the topic of the workshop interesting whereas 29% were unsure and 5% mildly or strongly disagreed regarding this question respectively.

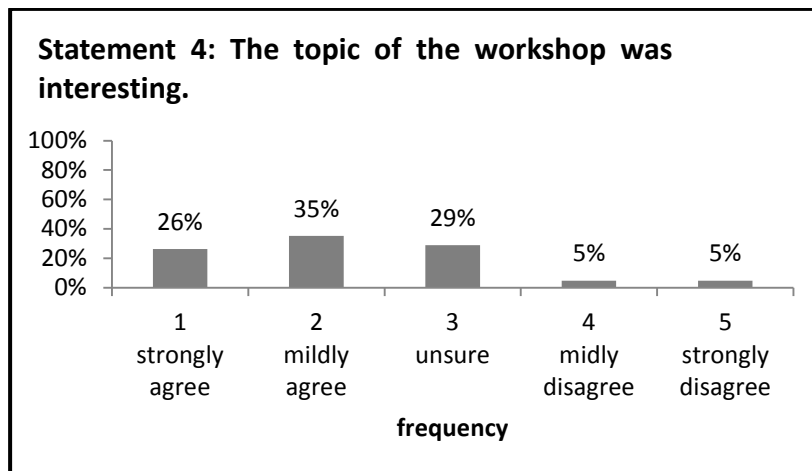


Figure 17: Feedback form statement 4 (frequencies).

Statement 5 has a mean of 2.60 (N = 125). The answers indicate that 45% of the students are unsure whether they would like to know more about global warming, 21% strongly and 19% mildly agreed with the statement and therefore would like to get to know more about this issue.

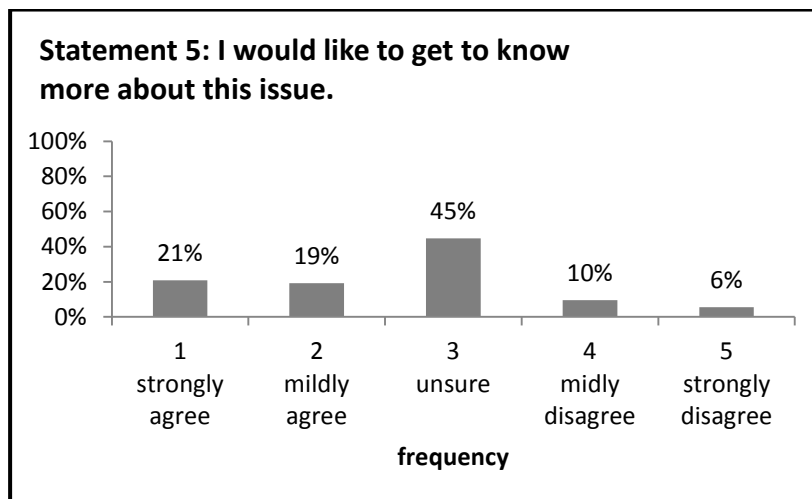


Figure 18: Feedback form statement 5 (frequencies)

With respect to the results for statement 6 with a mean of 2.03 (N = 125), three quarter of the students either strongly (34%) or mildly (41%) agreed on being jointly responsible for climate change. 17% are unsure about that question and only 6% mildly or 2% strongly disagreed.

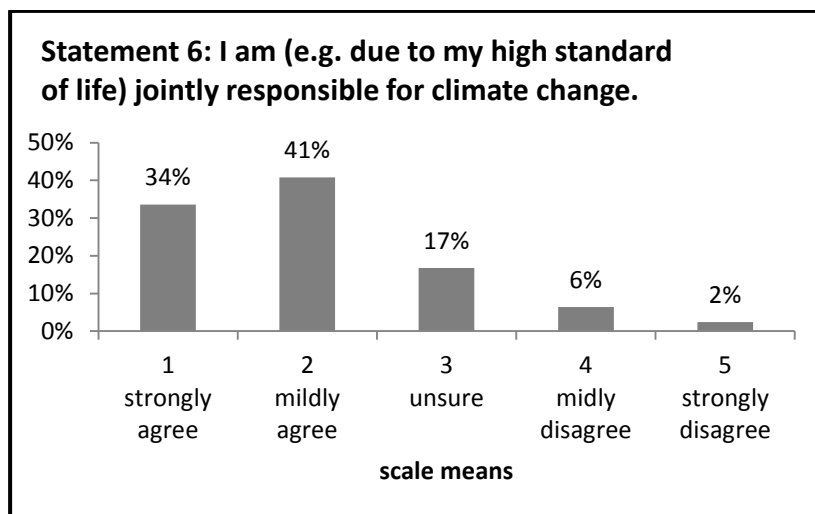


Figure 19: Feedback form statement 6 (frequencies)

3.2.2. Qualitative analysis

With the aim of investigating the range of students' learning outcome in the context of the workshop, six categories were developed from the student responses for question seven: 'What have you learnt today?' Students' answers were translated and respondents are abbreviated with ST.1, ST.2, ST3, ... etc. for the number of the student according to the row number in the analysis excel sheet.

Answers about content related knowledge gain represent 36% of the total student answers. 26% of the students stated to have learned something about the climate change conference and 17% of the students' statements involved answers about the need for getting active. No responses were given by 10% of the students, 8% of the students commented that they already knew everything before the workshop and 3% stated something else as learning outcome.

Categories and examples of students' answers are listed in table 26.

Table 26: Categories and examples for students' responses; frequency and percent of total responses

Researcher's categories	Examples given by students	Frequency (N = 125)	Percent of responses
Content-related	'how temperature rise can be slowed down and causes of global warming...' (ST.124) 'what global warming means' (ST.17) 'about climate change and its consequences...' (ST.73) 'that so many factors contribute to climate change' (ST.80)	45	36%
Climate change conference	'I could see things from the negotiator's perspective and know a lot more about climate change.' (ST.83) 'facts about COP 21' (ST. 79) 'It is time for a change, but because of the system of negotiations and different opinions of politicians, it is a slow process and that makes it very difficult.' (ST.104) 'I have learnt about the climate change conference and the processes connected to this topic.' (ST.70)	33	26%
Get active	'Today, I have learnt why global warming should be taken seriously and that everyone should take one's part in trying to stop it.' (ST.45) 'Be aware of your own energy consumption.' (ST.6) 'that people are responsible for global warming and should get active' (ST.45) 'We have to try not to exceed the 2°C goal!' (ST.31) 'Everyone is a little bit responsible for the state of condition and everyone must work on improving it.' (ST.26) 'That we should not only talk about it but also do something about it. Everyone can.' (ST.61)	21	17%
No response	-	12	10%
Already learned	'Nothing that I did not already know before.' (ST.114) 'I could recall things I have already heard about.' (ST.113) 'Actually this was a review of things we have already learnt.' (ST.46)	10	8%
Other	'to make hats' (ST.119)	4	3%

4. Discussion

In this chapter, most important and outstanding results will be discussed and supplemental theories will be integrated. Attitudes regarding sustainability show little to no differences concerning the type of school; but gender differences could be identified. In terms of school students' understanding of sustainability, the sources of knowledge gain, the meaning of sustainability, as well as words related to this term will be discussed. Furthermore, the outcomes of the workshop about climate change are considered in this chapter.

4.1. Attitude differences with respect to sustainability

The importance of values and attitudes with respect to sustainability has been mentioned in many studies by various authors (Leiserowitz 2006). In this thesis, attitudes towards three values that build a foundation for sustainable development have been measured. The three value groups are: 'respect for nature', which is divided into biocentric and anthropocentric attitudes, 'solidarity' and 'equality'. In the following two sections the results and differences concerning gender and schools are discussed.

4.1.1. Gender differences

Regarding gender, statistically significant differences could be found for the value group 'respect for nature'. Concerning biocentric attitudes, female students show a more favorable opinion towards the preservation of nature than male students, as well as a greater rejection about the utilization of nature regarding anthropocentric attitudes.

A trend can also be described for gender differences with respect to solidarity and equality values. Female students tend to show a more favorable attitude towards solidarity as well as equality than males. This clear gender difference was also described in the Torbjörnsson study and is a common finding among previous studies (Torbjörnsson et al. 2011). One explanation for women having a stronger commitment to environmental concerns might be 'traced back to the division of society into a production and a reproduction sphere and that women are more subject to the reproduction values with its closeness to life and thus also to future generations' (Torbjörnsson et al. 2011:114). Thus, women show more concern towards the environment because of an evolutionary aspect of caring and because they are responsible for reproduction as well as caring and giving life to future generations.

4.1.2. School differences

As the distribution of female and male students among the participating schools was not equal, attitude differences had to be corrected by the above mentioned gender influence. HAK Mödling had the highest part of male participants with almost half of the students being boys respectively young men. The other three schools, where roughly only one third of the students were male, had a higher proportion of female participants. The results regarding school differences in attitudes towards sustainability are – after correcting for gender – only statistically significant for biocentric and anthropocentric attitudes. These results as well have their limitation and should be interpreted with caution. For biocentric attitude differences, only 8.3% of the variance can be explained by the type of school. Also for anthropocentric attitude differences, only 12.3% of the variance can be explained by type of school.

With respect to biocentric attitudes, the scale means of HAK Mödling and GYM Baden indicated lower sympathy for nature preservation compared to the two other schools, HAK Baden and GYM Mödling. As described in the method section, some of the biocentric statements have been discussed with students from HAK Mödling in the context of the ‘school student discussion with the presentation of some results in class’, therefore some more detailed interpretations of the results are possible. Regarding the statements about giving pocket money to charity for ensuring environmental protection (S1 and S2), the students mentioned the following major reason for not fully agreeing with this statement: the uncertainty related with donations and not knowing if the money really arrives where it is needed.

‘If I give money to charity, I don’t really know if the money arrives where I want to help with my donation. I also don’t know if it will be used for the purpose my donation was intended to help. You never know.’ (Student 1)

Furthermore, regarding the statements about saving energy, electricity or water (S4, S5 and S6), the students from HAK Mödling stated not to do this actively with the purpose of saving those resources. They explained that it is obvious to turn off the light when leaving a room or turning off the water tap while brushing the teeth. Some students also stated that they would not actively change their behavior towards saving resources. This might explain that those answers for biocentric attitudes found less agreement among HAK Mödling students.

‘Not actively. I think this behavior is done automatically. Maybe it is the way my parents taught me. Of course I turn off the light when I leave the room. But I also wouldn’t change anything.’ (Student 3)

With respect to anthropocentric values, students from HAK Mödling and HAK Baden showed higher sympathy for the utilization of nature in the sense of perceiving nature as a source for

fulfilling human needs. Although students of HAK Möding were more in favor for utilization, in the discussion the students only mentioned reasons for protecting the environment as well as concerns that something unpredictable happens. They did not defend the opinion of having the right to exploit nature.

‘Nature should only be controlled to some degree e.g. for the use of agriculture. But if humanity would try to take control over nature, I think this would not work and would have serious consequences.’
(Student 5)

‘[...] and when something goes wrong, nature suffers.’ (Student 6)

With respect to solidarity values, HAK Mödling students’ showed less solidarity compared to students attending the other three schools GYM Baden, GYM Mödling and HAK Baden. Similar results could be found for equality values, as students from HAK Mödling showed less support for equality than students from GYM Baden, GYM Mödling and HAK Baden. However, as these results are not significant, they can only be seen as a trend.

School differences could be explained by the variety of schools chosen in this study. HAK Möding and HAK Baden, although belonging to the same type of school, are very different. HAK Baden is a public school whereas HAK Mödling is a private school. Furthermore, HAK Mödling offers a certain program for very gifted school students, called HAK plus. Regarding to the interviewed teacher, students attending HAK plus classes show an even higher economic interest than the other students but do not question content of school lessons as much as other HAK Mödling students.

‘HAK plus students normally have a higher performance potential and are usually more willing to work, but at the same time they question less than other HAK students. I think the economic interest is their priority and I would also say that they are less interested in environmentally related topics.’ (Teacher 1)

The overall impression of the interviewed teacher about the differences between students in the area of Mödling and Baden is that they are very similar concerning their interest on topics related to the environment. The teacher knows many colleagues teaching in this area of Lower Austria and he also teaches in more than one school. He believes that school students attending academic high school (GYM) maybe are a little bit more interested for environmental concerns than students attending commercial high school (HAK).

‘I would say the school students in the area of Mödling and Baden are rather similar. HAK school students probably have a stronger connection to topics related to economics and students attending GYM are probably a little bit more open concerning environmental

issues, but I don't think that there is a really big difference in attitudes.' (Teacher 1)

Summing up, no pattern of attitudes according to the school type categories 'HAK' and 'GYM' could be found. HAK Mödling and HAK Baden showed similar scale means compared to GYM Mödling and GYM Baden only for anthropocentric statements. It also has to be taken into account that the degrees of explained variances regarding school differences are rather low throughout the thesis and therefore the differences of values and attitudes can only partially be explained by school types.

4.2. Understanding of sustainability

Despite the fact that moderate school and more obvious gender differences concerning attitudes towards sustainability could be found, it might be interesting to discuss students' understanding of sustainability. In this study, the focus was placed on the learning 'about' sustainability as students' understanding was investigated. However, Education for Sustainable Development (ESD) tries to achieve learning and educating 'for' sustainability rather than 'about' it. Therefore in the following two sections the shift from learning 'about' sustainability towards learning 'for' sustainability will be discussed.

4.2.1. Education 'about' sustainability

It might be interesting to discuss where the participating school students **obtain their knowledge** about sustainability. As the analysis of characterizing the understanding of sustainability shows that 'sustainability' obviously has some meaning to most of the interviewed school students and the term is also included into school curricula (BMBF 2016). The researcher had the impression that the topic sustainability in general is included into school lessons of all four participating schools. The interviewed HAK Mödling teacher also states that sustainability is addressed in various school lessons.

'The topic sustainability is included to school curricula. For me personally, it contributes to my three major teaching subjects. Usually I discuss this issue in the second semester of the graduation year, as this topic is very sensitive and then the students can pay attention to it without pressure.' (Teacher 1)

Depending on the subject and the teacher in charge, every student should have heard more or less about sustainability or at least about related topics. The natural science subjects Biology and Geography as well as language subjects like English are the most common school subjects where students can learn about sustainability and related issues.

‘In Biology we learn about sustainability. We wrote down the definition in context with the topic forest.’ (Student 7)

‘We talked about sustainability in the English lessons. Also about the low oil price and how the collapse affects renewable energy sources.’ (Student 9)

Teachers try to communicate with each other in an interdisciplinary way and to include this topic into school lessons of various subjects.

‘Yes it is true. Students hear about sustainability and topics related to environment in other subjects, too. In Geography for example, current topics with environmental relevance are discussed and embedded into school lessons. Particularly English teachers take up issues like global warming or gene modification, and for complex topics they sometimes also ask us natural science colleges for explanations.’ (Teacher 1)

The influence of media was mentioned by the interviewed students as the second important source for gaining knowledge about sustainability or related issues.

Furthermore, almost half of the students reported having discussed sustainability or related topics with their family and friends or with their school mates. Among the students, there are discussions about events, news and circumstances related to sustainability. However, this issue does not belong to the major concerns of those young people.

‘Sometimes discussions between students arise during school lessons, yes, but also independently from school. [...] They see the relations to their everyday life but it is obviously not their main topic. There is honestly no reason to expect that.’ (Teacher 1)

Also, the presence and engagement of organizations like Greenpeace or Global 2000 as well as other related projects can also be seen as important contribution to increase young peoples’ knowledge about sustainability. The report ‘See change’ highlights the importance of different influences like family members or peer groups to develop preferred attitudes and values with respect to this issue. Also religion can play a certain role in shaping people’s attitudes and knowledge about sustainability, as ‘religions provide many people with a strong sense of meaning and can shape their sense of self’ (PCE 2004:107). Although rarely, some students mentioned Scouts and young Christian’s seminars and activities as source of knowledge gain with respect to sustainability.

In order to understand student’s **understanding and self-awareness** about sustainability, they were asked to evaluate their knowledge about sustainability. In this context, they were invited to explain their understanding of the term, as well as to mention words or concepts associated with this topic. Average scale means suggest a ‘good’ between ‘moderate’ self-assessment of students’ knowledge. In order to analyze students’ understanding of the term sustainability, the

approach of thematic analysis was used. Most of the students (60%) explained their perception of the topic by referring to the environmental component of Birdsall's (2014) definition. A lower level of a holistic understanding about the concept of sustainability could be identified, as 23% of the students were not able to give an explanation at all. The temporal component was reflected by 16% of the students' answers including concerns for future generations and future quality of life.

The most frequently used **words in association with sustainability** again refer to the environmental component of the definition or show a relation to environment. Hence, the interviewed students particularly associate the ecological component of the definition with the term sustainability and see the preservation of resources and the natural function of the environment as their major concern. As well, the social and economic dimensions were addressed by the students' comments associated with sustainability. Concerning the economic component, commonly used terms like 'fair trade', 'globalization' or words related to 'CO₂ emissions' occurred. A lot of words were also produced for the socio-cultural component. Examples are: 'to give to charity', 'helping and to help', 'to give' and 'to share'.

'Recycling' is by far the most frequently used word mentioned by the students in the context of sustainability. According to some HAK Mödling students, this general topic is associated with sustainability because it is about the reuse of resources and this 'should be in everyone's concern'.

'Recycling is a general topic and concerns us all. We just know about it from everyday life, even the trash container tells you what to put into it and what not to put into it.' (Student 10)

Recycling is a term that might be used in order to justify (over-) consumption (Hofman 2015) and therefore is possibly associated with sustainability.

Furthermore, the reuse of 'resources', 'environmental and nature protection' as well 'nature' and 'environment' are among the most frequent words associated with sustainability. 'Forests', 'water', 'animals', 'food', 'agriculture' and 'clearing of woodland' are also frequently mentioned. As well, the verb 'to save' occurring alone as well as in various combinations like 'saving water', 'saving energy' or 'saving electricity' and the concepts 'renewable energy', 'wind, water and hydropower' are among them. These words match the description of issues commonly addressed by environmental education (Rauch 2006).

As well, the question arises if some of the words given by the students might be influenced by the questionnaire. The statements S1, S2, S17, S18, S19 in the questionnaire are about the willingness to give to charity; statements S4, S5 and S6 deal with the saving of resources;

statements S12, S13 and S14 concern the clearing of vegetation and wood for agricultural and infrastructural use; statements S20, S21 and S22 are about helping people and statement S26 deals with sharing. To minimize the potential of interference, it obviously would have been better to ask the students about the meaning of sustainability and associated concepts before asking them to rate the attitude statements.

As discussed earlier, school and education are major sources for knowledge gain about sustainability. Despite that, various intrinsic as well as extrinsic factors and impacts contribute to a person's knowledge, beliefs and interests regarding this topic. Unfortunately, media influence and modern marketing techniques with the purpose of 'selling' in order to maintain economic growth still contribute to the capitalistic society oriented towards economy. As long as young people are educated to compete and consume instead of care and conserve this consumerism behavior is going to be supported. 'So, far from being the universal solution favored by governments and NGOs alike, education is largely still part of the problem [...] and just as we have learnt to live unsustainably, we now need to learn how to live sustainably' (Sterling 2008:67). As long as (young) people are only educated 'about' sustainability, the system is probably far away from the kind of change urgently needed.

4.2.2. Education 'for' sustainability

The transition from education 'about' to education 'for' sustainability is a challenge, and sustainable development seems to be hard to integrate into education. In the process and progress of this work it became clear that the topic sustainability must be taught by using very sensitive methods. For addressing a broad audience, all kinds of students – even uninterested ones – can be involved in the learning process by using some other topic as so called 'hook up'. Teachers face the challenge to lead school students towards their own way of learning, understanding and deduction.

'Many students are very interested, but of course there is a relative majority of students that are not interested. If you are capable of finding the right approach, I do think that every student can be inspired. By talking about definitions and explanations they probably won't learn anything. The function of a teacher is to prepare the field and let the students do the last step. By taking the last step by themselves, students will really learn and understand in depth because the solution evolved from their own ideas and intuition. This way you can touch your students, but of course they have to allow this process to happen.' (Teacher 1)

Students should rather be involved in experiencing the environment and their own ideas and decisions in problem solving throughout the learning procedure (Posch 1993). Therefore, memorizing definitions 'about' sustainability can surely not be considered as appropriate

learning tool ‘for’ sustainability. In HAK Mödling environmental topics are incorporated into economic or business projects in order to awake student’s attention for issues related with sustainability.

‘I try to address topics related to biology and the environment in the context of economic issues. [...] In form of mini-projects, students can choose from a variety of different topics related to environmental, ecological, biological and sustainability and work on whatever topic they are interested in.’ (Teacher 1)

‘Aspects of sustainability are also included in the students’ final projects in HAK Mödling. Examples are the marketing of products for green companies like ‘Sonnentor’ or taking a closer look at environmental or charity organization. With a practical orientation this topic is well accepted among students.’ (Teacher 1)

When explaining sustainability, the interviewed students mainly referred to the environmental dimension of the concept. Therefore it has to be mentioned that in order to preserve nature and natural resources, people have to change and develop new habits for economy and society. Leiserowitz states that in the context of sustainability, there are three major goods to be sustained. These goods are: nature, life support systems and community (Leiserowitz 2006). Furthermore, it can be distinguished between ‘what has to be sustained’ and ‘what has to be developed’ as a consequence in order to sustain the before mentioned goods. According to Leiserowitz, people, the economy and society have to be developed in order to achieve sustainability (Leiserowitz 2006). Figure 20 gives an overview about the concept which just has been described.

What is to be sustained	What is to be developed
Nature	People
Earth	Child survival
Biodiversity	Life expectancy
Ecosystems	Education
	Equity
	Equal opportunity
Life support	Economy
Ecosystem services	Wealth
Resources	Productive sectors
Environment	Consumption
Community	Society
Cultures	Institutions
Groups	Social capital
Places	States
	Regions

Figure 20: What to ‘sustain’ and what to ‘develop’ in the context of sustainable development (Leiserowitz 2006)

The empirical results of this master thesis regarding the students' definitions of sustainability and the words associated with this topic also suggest that in the perception of the interviewed young participants, sustainability addresses mainly the goods 'nature' and 'life support systems' that need to be sustained within the concept of sustainability. This might explain the finding that the students defined sustainability mainly by the environmental component. However, the dimensions economy and society also do play a very important role in the sustainability concept as they need to be developed.

Kuhlman (2010) states that – in contrast to the definition used in this thesis – economy and society should be understood as belonging to the same sphere. This means considering the anthropocentric society and the anthropocentric economy as 'one side of the coin' – both are inevitably exploiting and using up natural resources, especially irreplaceable ones, which stands in contrast to preserving nature for future generations. Kuhlman argues that by distinguishing three spheres of sustainability, the environmental dimension is minimized, as social and economic interests are actually one and the same. Further he states that there is a fundamental contradiction between welfare for all and environmental conservation at the same time. A balance needs to be found between those two (Kuhlman et al. 2010).

The sustainability concept needs to be implemented by changing habits with respect to society and economy in order to preserve nature. Therefore society and economy should become the focus of change towards sustainability. Leiserowitz also talks about the strong tensions between economic development and social progress versus environmental protection (Leiserowitz 2006). A balance between human well-being for current and future generations concerning natural resources must be achieved. Besides knowing that natural resources are irreplaceable, humanity also generates capital, like knowledge, innovations and new technologies which may help to overcome this contradiction. He argues that 'weak sustainability' – standing for the thought that nature can be replaced by human capital – and 'strong sustainability' – implying nature and human capital are not interchangeable – 'do not need to be in opposition but complement one another' (Kuhlman et al. 2010:3436). Häberli discusses strategies to implement 'strong sustainability' with two essential strategy types: technical and socio-cultural progress (Häberli et al. 2002). Both refer to education for innovation and development as well as to the time component of the sustainability concept which reflects the unpredictable progress in the constantly evolving sustainability process.

Considering this, the importance and role of education once again comes into play. Education for Sustainable Development has a strong future orientation in encouraging students to 'understand their environments and realities and acquire the skills for making present and future choices that

will exercise a positive influence on the sustainability thereof' (Lenglet et al. 2011:96). ESD wants to raise understanding and to engage people in taking responsibility on an local, regional and global perspective in order to 'create conditions for longer-lasting effects, in such a way that future generations will work from a social, economic and ecological basis that is preferably better than what exists today' (Lenglet et al. 2011:96).

In order to achieve this improvement, predominantly the spheres society and economy – belonging to the value goods that need to be developed most in the vision of achieving sustainability – need to be addressed. The motivation for this master thesis – as well as the goal of many other projects, movements and events around the world addressing sustainable development – are the 17 UN Sustainable Development Goals for transforming our world with the aims: no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth; industry, innovation and infrastructure; reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice and strong institutions; as well as partnerships for the goals (UN 2015). In order to contribute to goal 13 called 'climate action', a workshop with the title '21st Climate Change Conference', as described in the method section, was held in the context of this master thesis.

4.3. Taking action

'To take urgent action to combat climate change and its impacts' is the UN task for goal 13 and one of its targets is to 'improve education and raise awareness of human and institutional capacity on climate change mitigation, adaption, impact reduction and early warning' (UN 2015b:20). As Mochizuki states, climate crisis needs – apart from political regulations or technological solutions – also be addressed by a transformation of the way people think, behave and act (Mochizuki et al. 2015).

Climate change involves both present and future generations, and once again education plays a crucial role. Unfortunately, knowledge gain about a certain topic does not necessarily mean having a certain attitude or behaving in a particular way (Leiserowitz 2006). For example, knowing about healthy food and proper nutrition does not necessarily result in actually having healthy eating habits. However, prior to a potential attitude or behavioral change often stands a gain of knowledge (Leiserowitz 2006). Most of the interviewed HAK Mödling students stated having had fun during the workshop and also claimed to be interested in the topic climate change. Some students also stated having gained only some knowledge as this topic had already

been discussed during school lessons and they already had heard most things before. Nevertheless, the overall feedback was quite positive and students seemed very interested and also participated actively throughout the workshop. Regarding the knowledge gain, the majority of the students claimed having learned a lot about climate change in general and facts about the climate change conference in particular during the workshop. Some students also mentioned the need for action as learning output. One student e.g. stated: 'Everyone is a little bit responsible for the state of condition and everyone must work towards improving it' (ST.26). This one statement among many others shows that students understand the connection between humans' high standard of life and anthropogenic activities causing global warming and therefore climate change. A majority of the students also claims feeling jointly responsible for climate change.

There are several studies that investigate the reasons why people, although knowing about climate change, unfortunately do not actively change their behavior. Most of them identify a lack of information or concern about global warming as possible causes for ignorance (Norgaard 2006). However, an anthropological study of Norgaard (2006) about people living in a Norwegian Village indicates that there that individuals perform an active strategy to hold information about climate change at a distance. The process is described as 'collective avoiding' despite knowing that climate change exists. In this process of collective avoiding by individuals, emotions do play a key role. The so called 'emotional management', a concept introduced by Hochschild (1983), allows the denying and avoiding of obvious facts. In order to avoid feelings of fear, guilt and helplessness, the emotional management strategies 'perspectival selectivity' and 'selective interpretation' were used by the individuals under investigation. With the help of these strategies, the inhabitants of the studied Village could legitimate their own ignorance and non-activity regarding global warming (Norgaard 2006).

The results of the workshop feedback form as well as the progress of this survey indicates that it is important not only to focus on the provision and transfer of information about climate change but to also initiate action and a change of personal behavior. This is exactly what Education for Sustainable Development tries to achieve. It can be the case that there is already an awareness of global warming and still this awareness does not influence the personal behavior. We are living in a society with plenty of information and facts available about climate change and topics related to environment and sustainability. Often we also are confronted with incidents which are a consequence of climate change. This indicates that it is unlikely that there is a real lack of information about the issue. The real problem arises from the question how this knowledge can actually lead to behavioral change in order to transform structures of economy and society.

5. Conclusion

This thesis gives an insight of young people's perception of sustainability. The findings may help teachers, and researchers to understand the way school students think about this topic. This can contribute to a development and further improvement in this field.

5.1. Answers to the research question

In this section the research questions as well as the project related research questions will be answered.

5.1.1. How do the attitudes towards sustainability differ among young people attending different schools?

In the context of this thesis, the first question refers to 11th and 12th grade students, attending HAK Mödling and HAK Baden as well as GYM Mödling and GYM Baden. Results show that statistically significant differences between schools occurred for the value group 'respect for nature'. However the explained variances are rather low, implying that the type of school has only little influence on the differences in attitudes. An expected value pattern related to the school types commercial high school (HAK) and upper secondary academic school (GYM) could not be verified. Similar scale means for anthropocentric statements can only be found in HAK Mödling and HAK Baden on the one hand and in GYM Mödling and GYM Baden on the other hand. These findings are satisfying from an educational point of view as they indicate that no systematic difference of attitudes towards sustainability can be found which depends on the type of school attended. Nevertheless, with respect to the values biocentrism, solidarity and equality, students of HAK Mödling showed poorer results than those of other schools. A possible underlying cause might be that this school is a private one. Overall, no generalization about differences in students' perceptions concerning sustainability among the two different school types can be made. Besides some slight differences which could be measured, students' attitudes towards sustainability among the investigated schools are fairly similar.

More remarkable were findings about the differences in attitudes towards sustainability concerning the students' gender. In this study, female students show a more favorable attitude towards sustainability than male students.

5.1.2. How do these young people understand the term 'sustainability'?

The students describe the meaning of sustainability mainly by using the environmental component of the sustainability concept as well as including the time component by talking

about future and future generations was a common among the students. Only few students were able to inter-relate the components. And some did not have an answer at all. Keywords associated with sustainability are also mainly focused on the environmental component. Words like recycling, environmental protection, nature and environment were among the most frequently mentioned words. The findings of this study suggest that students surely have some kind of knowledge and the term sustainability means something to most of them, but there is no complete and complex approach to this term. They see the environmental component and describe goods and values that need to be sustained. Some students also described the need for a behavioral change in society as well as the need for action.

On average, in terms of a self-assessment the students rated their knowledge of sustainability between 'good' and 'moderate'. In a further step, the source of knowledge about sustainability was investigated in this study. Findings suggest that school education plays the most important role as a crucial information provider along with media.

5.1.3. Workshop specific research questions

The workshop results indicate that the participating young people have knowledge about climate change and also have an interest in this topic. Some of them also feel jointly responsible for the current situation. By analyzing the feedback forms it became clear that they also realize the importance of action. Some students are even very interested or anxious to know how to change something or how to become active.

5.2. Closing words

The theory of education for sustainable development does not tell you how to change, how to behave or what to believe. The basis of this concept is an intrinsic change that of course can be supported or even triggered by external incidents. Summarizing all of the above, it can be said that sustainability is a very complex issue. Trying to define and understand it can be a very challenging act. Much research has been done in the field of sustainability science and with interdisciplinary approaches. Sustainable development as well as education for sustainable development should be placed within a specific context and adapted for local circumstances. This may help to achieve appropriate outcomes for diverse initial situations (Hofman 2015). This approach matches the definition of sustainability used for this master thesis and outlines the diversity of approaches and possible conceptions. As discussed in the introduction section of this master thesis, not only the context, but also the temporal component defines the objectives of the sustainability concept. By asking the question: 'What is education for sustainable development

supposed to achieve?’ the shift from learning ‘about’ sustainability towards learning ‘for’ sustainability is reached.

Anthropocentric greenhouse gas emissions with the consequence of global warming lead to climate changes that affect everybody. Therefore they have to be addressed with the greatest possible effort on a global level, including every nation, city, organization and individual worldwide. As opposing national and economic interests reduce the speed of achievements towards this one important aim of sustainability, only slow progress towards a more sustainable direction concerning climate change has been realized so far. Global consensual action towards this important goal is necessary for a fundamental change.

Humanity often needs to experience sudden and severe threshold events or breakdowns to realize the need for change and to understand that things cannot continue the way they used to be (Sterling 2010). There are also some theories suggesting that certain unsustainability issues that humanity faces are the results and product of the way people think and ‘therefore cannot be resolved by the same kind of thinking’ (Sterling 2010:521). This reluctance of change might result in fear, anxiety (Sterling 2010) and denial (Norgaard 2006). A shift has to be made from thinking unsustainably towards thinking sustainably. This requires educational systems that allow the development of the ability for change. Sterling (2010) claims that the expression education ‘for’ something (e.g. sustainability) needs to be replaced by the term ‘sustainable education’ itself as it better describes ‘the way we [should] see education and learning, based on a more ecological or relational view of the world. [...] It implies systemic change in thinking and [...] essentially a new paradigm emerging around the poles of holism, systemic thinking, sustainability, and complexity’ (Sterling 2008:65). According to Sterling, system thinking and its concept of resilience play an important part in the process of sustainable education, as there is a need for education towards resilience to ‘develop resilient social-ecological systems in the face of a future of threat, uncertainty and surprise’ (Sterling 2010:511).

6. Appendix

6.1. Zusammenfassung

Aufgrund des ökonomischen Fokus einer kapitalistischen Gesellschaft und dem daraus resultierenden unachtsamen Umgang mit der Natur steht unsere Welt vor der großen Aufgabe, mit den durch menschliche Aktivitäten verursachten Umweltherausforderungen zurecht zu kommen und zugleich weitere Schäden zu verhindern. Dieser Prozess wird oft mit dem Wort ‘Nachhaltigkeit’ beschrieben. Der Begriff ist in seiner Definition und seiner Verwendung oft sehr vage und kontextabhängig. Bemühungen hinsichtlich einer nachhaltigen Entwicklung, um gesellschaftliche, ökonomische und ökologische Interessen auszugleichen, kommen vor allem von den Vereinten Nationen (UN) und der Organisation der Vereinten Nationen für Erziehung, Wissenschaft und Kultur (UNESCO). Das Ziel in Zusammenhang mit nachhaltiger Entwicklung ist es, Prozesse und Veränderungen in Gang zu setzen, um die Bedürfnisse dieser Generation zu erfüllen, ohne den zukünftigen Generationen diese Möglichkeit zu nehmen. Die Bedeutung von Bildung in Bezug auf nachhaltige Entwicklung wurde von der UNESCO erkannt und durch die Realisierung der ‘UN-Dekade für Bildung für nachhaltige Entwicklung’ und des ‘Globalen Aktionsprogrammes für Bildung für nachhaltige Entwicklung’ weltweit gefördert.

In dieser Masterarbeit wurden 477 SchülerInnen aus vier unterschiedlichen Schulen zu ihrer Einstellung bezüglich Grundwerten, die dem Nachhaltigkeitskonzept zugrunde liegen, verglichen. Diese Grundwerte sind Respekt gegenüber der Natur, bestehend aus biozentrischen und anthropozentrischen Werten, Solidarität sowie Gleichberechtigung. Des Weiteren wurden die Quellen für den Wissensgewinn zum Thema Nachhaltigkeit, das Begriffsverständnis sowie die Selbsteinschätzung der SchülerInnen zum Wissenstand über Nachhaltigkeit erforscht. Zusätzlich zu diesem quantitativen Ansatz wurden die Ergebnisse durch einen qualitativen Zugang speziell in einer Schule erweitert: ein Lehrerinterview und eine Gruppendiskussion mit SchülerInnen wurden durchgeführt. In einem zweiten Schritt wurde ein Workshop zum Thema ‘21. Klimakonferenz’ mit 125 SchülerInnen dieser Schule abgehalten.

Die Ergebnisse zeigen signifikante Unterschiede in Bezug auf das Geschlecht der SchülerInnen sowie Unterschiede in Abhängigkeit von der besuchten Schule. Nach statistischer Korrektur des Geschlechtereinflusses konnten in Bezug auf die besuchte Schule allerdings nur für den Grundwert Respekt für die Natur signifikante Unterschiede festgestellt werden. Ein Unterschied zwischen den beiden Schulformen Handelsakademie und Gymnasium war nur bei den anthropozentrischen Werteinstellungen nachweisbar. Zusätzlich konnten signifikante geschlechtsspezifische Unterschiede in Bezug auf biozentrische und anthropozentrische

Werteinstellungen festgestellt werden. Ergebnisse dieser Studie zeigen eine positivere Einstellung gegenüber der Umwelt bei weiblichen Schülerinnen. Auch ein Trend zu einer positiveren Einstellung hinsichtlich der Werte Solidarität und Gleichberechtigung kann aus den Resultaten dieser Studie herausgelesen werden.

Bezüglich des Wissensgewinns über Themen, die Nachhaltigkeit betreffen, nennen 90% der SchülerInnen den Schulunterricht als Quelle.

Die dieser Masterarbeit zugrundeliegende Definition von Nachhaltigkeit gemäß Birdsall (2014) wurde verwendet, um die Antworten der SchülerInnen zu kategorisieren. Die Selbsteinschätzung der SchülerInnen bezüglich ihres Wissenstandes zum Thema Nachhaltigkeit wurde im Durchschnitt mit 'Gut' bis 'Befriedigend' bewertet, was nicht unbedingt den Ergebnissen des Begriffsverständnisses entspricht. Die meisten SchülerInnen erklärten die Bedeutung von Nachhaltigkeit nur unter Miteinbeziehung der Umweltdimension, anstatt der Komplexität der Nachhaltigkeitsdefinition gerecht zu werden. Zusätzlich entsprachen auch die meisten Begriffe, die von den SchülerInnen spontan in Zusammenhang mit Nachhaltigkeit genannt wurden, nur der Umweltkomponente der Definition. Es lässt sich argumentieren, dass die SchülerInnen Nachhaltigkeit mit Dingen verbinden, die aufrechterhalten werden sollen (z.B. Natur und natürliche lebenserhaltende Systeme), nicht aber mit Dingen, die weiterentwickelt werden müssen (z.B. Menschen, Ökonomie, Gesellschaft), um erstere aufrechterhalten zu können. Ein weiterer Hinweis auf ein vereinfachtes Verständnis zeigt sich an der Tatsache, dass 23% der SchülerInnen nicht in der Lage waren, eine zutreffende Antwort auf die Frage was Nachhaltigkeit bedeutet zu geben und 60% der SchülerInnen sich mit der Antwort auf die Umweltkomponente beschränkt haben.

Die Ergebnisse der Workshop-Analyse zeigen ein hohes Interesse der SchülerInnen am Thema Klimawandel, und auch die Notwendigkeit des Handelns konnte von den SchülerInnen erkannt werden. Dieses Resümee zeigt, dass es sehr unwahrscheinlich ist, dass bei den SchülerInnen ein fehlendes Wissen über Themengebiete wie Klimawandel oder Globale Erwärmung vorliegt.

Neben dem Ziel der Wissensvermittlung besteht das grundsätzliche Problem der Bildung für nachhaltige Entwicklung daher darin, wie das Wissen auch so umgesetzt werden kann, dass Menschen ihr Verhalten dahingehend ändern, dass sie einen gesellschaftlichen und ökonomischen Wandel in Gang bringen können.

6.2. Questionnaire (German original)

Soziodemographische Angaben

Schule: _____

Klasse: _____

Spezialisierung/Zweig (wenn vorhanden): _____

Geburtsjahr: _____

Geschlecht: ☐ männlich ☐ weiblich

Derzeitiger Wohnsitz: _____

Teil A

Bitte kreuze an, inwieweit Du folgenden Aussagen zustimmst bzw. nicht zustimmst!	trifft voll und ganz zu	trifft eher zu	trifft teilweise zu	trifft eher nicht zu	trifft überhaupt nicht zu
1. Wenn mir etwas von meinem Taschengeld übrig bleibt, dann würde ich etwas davon hergeben, um Naturschutzprojekte zu unterstützen.	☐	☐	☐	☐	☐
2. Ich würde sogar mithelfen, Spenden für Umweltschutzprojekte zu sammeln.	☐	☐	☐	☐	☐
3. Ich versuche andere davon zu überzeugen, dass die Natur wichtig und wertvoll ist.	☐	☐	☐	☐	☐
4. Um Energie zu sparen, drehe ich die Heizung im Winter nicht zu stark auf.	☐	☐	☐	☐	☐
5. Ich drehe das Licht in meinem Zimmer immer ab, wenn ich den Raum verlasse.	☐	☐	☐	☐	☐
6. Ich versuche Wasser zu sparen, indem ich mich nur kurz unter die Dusche stelle oder das Wasser während des Zähneputzens abdrehe.	☐	☐	☐	☐	☐
7. Im Sommer freue ich mich über das Vogelgezwitscher und über Schmetterlinge, die herumfliegen.	☐	☐	☐	☐	☐
8. Ich genieße es, mich in der freien Natur zu bewegen.	☐	☐	☐	☐	☐
9. Ich fühle mich draußen sehr wohl, weil es dort (z.B. im Wald) so schön still ist.	☐	☐	☐	☐	☐
10. Menschen haben das Recht, die Natur zu verändern.	☐	☐	☐	☐	☐
11. Mir gefällt ein gepflegter Rasen (z.B. Golfrasen) besser als eine natürliche Wiese mit Gräsern, Kräutern und Blumen.	☐	☐	☐	☐	☐
12. Um die Menschheit ernähren zu können, muss natürliche Vegetation gerodet werden, um Nahrung anbauen zu können.	☐	☐	☐	☐	☐

Bitte kreuze an, inwieweit Du folgenden Aussagen zustimmst bzw. nicht zustimmst!	trifft voll und ganz zu	trifft eher zu	trifft teilweise zu	trifft eher nicht zu	trifft überhaupt nicht zu
1. Unkraut sollte vernichtet werden, weil es den Nutzpflanzen den Platz wegnimmt.	☐	☐	☐	☐	☐
2. Neue Straßen und Verkehrswege zu schaffen ist so wichtig, dass es egal ist, wenn dafür Bäume gerodet werden.	☐	☐	☐	☐	☐
3. Weil Gelsen (Mücken) in Mooren und Sümpfen leben, sollten diese Flächen zugeschüttet und für die Land- und Viehwirtschaft verwendet werden.	☐	☐	☐	☐	☐
4. Menschen sollen die Natur kontrollieren und darüber bestimmen.	☐	☐	☐	☐	☐
5. Ich kann mir vorstellen, Geld für arme Menschen in einem weit entfernten Land zu spenden.	☐	☐	☐	☐	☐
6. Ich würde sogar mithelfen, Spenden für diese ärmeren Menschen in einem weit entfernten Land zu sammeln.	☐	☐	☐	☐	☐
7. Ich bin dazu bereit, 2€ meines Taschengeldes pro Monat zu spenden, wenn das Geld dafür verwendet wird, Schulen in Indien zu bauen.	☐	☐	☐	☐	☐
8. Ich denke, dass es viel wichtiger ist, den Menschen zu helfen, die in meiner Nähe wohnen, als Menschen Hilfe zu leisten, die weit entfernt leben.	☐	☐	☐	☐	☐
9. Es wäre der beste Weg, jedes Land seine eigenen Probleme selbst lösen zu lassen.	☐	☐	☐	☐	☐
10. Wir, die in Österreich leben, haben die Verantwortung, Menschen in ärmeren Ländern zu helfen.	☐	☐	☐	☐	☐
11. Ich finde es gut, dass es große Gehaltsunterschiede gibt. Dadurch werden die Menschen motiviert, fleißiger zu sein und härter zu arbeiten.	☐	☐	☐	☐	☐
12. Ich finde, dass alle arbeitenden Menschen ungefähr das gleiche Gehalt bekommen sollten.	☐	☐	☐	☐	☐
13. Es ist wichtig, dass es einen Unterschied zwischen armen und reichen Menschen gibt. Dadurch haben ärmere Leute ein Ziel, das sie verfolgen können.	☐	☐	☐	☐	☐
14. Ich fühle mich gut, wenn ich mit anderen etwas teile.	☐	☐	☐	☐	☐
15. Ich fände es wichtiger, dass alle Kinder und Jugendliche auf der ganzen Welt in die Schule gehen können, als dass SchülerInnen in Österreich z.B. kostenlose Schulmahlzeiten erhalten.	☐	☐	☐	☐	☐
16. Ob ich in Zukunft arm oder reich werde, ist von mir selbst abhängig.	☐	☐	☐	☐	☐

Teil B

Wie würdest du deinen Wissensstand zum Thema Nachhaltigkeit beurteilen? Kreuze an!

sehr gut	gut	befriedigend	genügend	nicht genügend
☐	☐	☐	☐	☐

Wo hast du etwas zum Thema Nachhaltigkeit gelernt? Kreuze an UND nenne konkrete Beispiele!

☐	Schulunterricht (z.B. in einem bestimmten Unterrichtsfach oder durch Projekte):
☐	Sonstige Vorträge, Kurse etc.:
☐	Medien (z.B. TV, Zeitung, Magazine, Bücher):
☐	Diskussionen, Gespräche (z.B. mit der Familie):

Nenne so viele Stichwörter wie möglich, die Dir zum Thema Nachhaltigkeit einfallen (mindestens vier)! Wenn dir mehr Begriffe einfallen, dann kannst du diese gerne hinschreiben!

1)	2)
3)	4)

Was ist Nachhaltigkeit? Beschreibe in ganzen Sätzen, was du unter diesem Begriff verstehst! In welchen Bereichen ist Nachhaltigkeit von Bedeutung?

In welchen Lebensbereichen bist Du nachhaltig? Nenne konkrete Beispiele!

Vielen Dank fürs Mitmachen!

6.3. Feedback form (German original)

Klasse: _____

Reflexion

Bitte kreuze an, inwieweit Du folgenden Aussagen zustimmst bzw. nicht zustimmst!	trifft voll und ganz zu	trifft eher zu	trifft teilweise zu	trifft eher nicht zu	trifft überhaupt nicht zu
1. Der Workshop hat mir Spaß gemacht.	☐	☐	☐	☐	☐
2. Ich weiß jetzt mehr als vorher.	☐	☐	☐	☐	☐
3. Das Thema „globale Erwärmung“ betrifft mich persönlich	☐	☐	☐	☐	☐
4. Das Thema hat mich interessiert.	☐	☐	☐	☐	☐
5. Ich würde gerne mehr zu diesem Thema erfahren.	☐	☐	☐	☐	☐
6. Ich bin (z.B. durch meinen hohen Lebensstandard) für den Klimawandel mitverantwortlich.	☐	☐	☐	☐	☐

Bitte beantworte die Fragen in ganzen Sätzen!

7. Was hast du heute gelernt?
8. Was war heute für dich persönlich das Wichtigste?
9. Möchtest du sonst noch etwas sagen?

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