Research Collaboration of Austrian and Indian Teenagers in the Context of Education for Sustainable Development

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Abstract: Today’s environmental challenges have been determined and exacerbated by human behavior. It is imperative that education develops learning-settings that enable students to make their individual lifestyles more sustainable. The aim of this paper is to examine the effect of the research-education-collaboration ‘AustrIndia-4QOL’ (Teenagers from Austria and India Perform Research on Quality of Life) on the teenagers’ awareness of the importance of environmental aspects in regards to quality of life, and on their willingness to act towards more sustainable lifestyles. Therefore, the results from a collaboration via social media and from a collaboration with additional face-to-face workshops were analyzed. The question of whether an increased awareness or willingness to act is followed by a change of real action after the project was also investigated. The results indicate that conducting education for sustainable development requires long term educational engagement, and that unintended effects cannot be excluded.

Keywords: Education for Sustainable Development; teenager education; international collaboration; conceptual change; change of action; quality of life; sustainable lifestyles

1. Introduction

There is widespread agreement that environmental problems caused by humans and their strive for ever higher living-standards call for urgent action in order to secure a life-sustaining environment for future generations [1–5]. This requires new forms of education to empower individuals as well as societies to take action towards sustainable development [4,5]. The United Nations (UN) ‘Decade for Education for Sustainable Development’ (ESD) between 2005 and 2014 [6], and the subsequent, ‘Global Action Program’ (GAP) on ESD [7], both set out to address these issues.

Learning theories, like moderate constructivism and conceptual change theories, are supposed to enable the development of education-settings which contribute to a better understanding of the processes of natural sciences [8–10]. This is a necessity for deeper insights into environmental problems [11,12]. Yet, the real cause of many environmental problems lies in human behavior, and it has been proven that environmental knowledge and awareness do not automatically lead to a change of action. Moreover, an exact understanding of human motivation to act in environmentally friendly ways is still missing [13–18]. Nevertheless, various recommendations about the development of successful learning-settings for ESD can be found in the existing literature [7,19–25].

The research-education-collaboration ‘AustrIndia-4QOL’ (Teenagers from Austria and India Perform Research on Quality of Life) followed a moderate-constructivist understanding of learning. Thereby, learning is understood as a self-determinant, individual and social process but without renouncing a certain degree of instruction [26,27]. This project created the opportunity for 56 teenagers from an Indian high school to collaborate with 46 teenagers from an Austrian high school between
2015 and 2016. The students, all around the age of 16, were divided into two treatment groups and jointly performed research on the relationship between quality of life (QOL) and sustainability. While the cooperation within one group was limited to a collaboration via social media (Social Media Group), the students of the other group were able to also take part in a face-to-face collaboration (Face-To-Face Group).

This project examined the impact of these two variants of international collaboration between teenagers from different socio-cultural backgrounds. We investigated whether the participants’ awareness of the importance of environmental issues for QOL, and their willingness to act for more sustainable lifestyles increased compared to a control group. The Face-To-Face Group was also tested to see whether their high level of willingness to act was turned into real action 15 months after the end of the project. The results allow insights into both the success and limitations of an international collaboration, which are relevant for the practical implementation of ESD.

Thus, the AustrIndia-4QOL project contributes to a better understanding of the effects of an international collaboration on teenagers’ concepts of QOL and sustainability. This seems important since the scientific evidence demonstrating the change of social science concepts is still inadequate [12]. Furthermore, it shows how moderate-constructivist learning theory can be an opportunity for creating effective learning settings for ESD. The consideration of constructivist forms of learning and teaching is increasingly relevant in the digital age. Technological development makes it more and more possible for learners to individualize their learning process and actively construct their own knowledge [28].

While there is extensive research on competences for sustainable development, research linking these competences with suitable pedagogical approaches is still limited [29]. The implementation of the project AustrIndia-4QOL contributes in that respect to overcome this gap.

2. Theoretical Background

2.1. The Urgent Need for Change

In order to maintain conditions that allow humanity to survive and prosper on our planet, further human development has to take place within the ‘planetary boundaries’. These boundaries define biophysical thresholds, the crossing of which could cause irreversible environmental changes [1]. On the basis of their investigations, Steffen et al. [3] come to the alarming conclusion that humanity has already overstepped four out of the nine planetary boundaries. This is mainly due to the high amount of resource consumption in the countries of the Global North [29].

To achieve sustainability, humans have to be willing to readjust their lifestyles on an individual and societal level. Humans must understand that QOL is not at all equal with standard of living [30], and that environmentally responsible behavior does not generally mean making sacrifices [31]. On the contrary, people should realize that environmentally responsible behavior and subjective QOL are, for the most part, positively related [31,32].

2.2. ESD–Learning for a Sustainable Future

The United Nations World Summit on Sustainable Development in 2002, which was followed by the ‘Decade for Education for Sustainable Development’ from 2005 to 2014, marks the starting point for a broad discussion about the integration of the principles of sustainable development into education systems [6]. The international significance of ESD was afforded further credence by the GAP launched in 2014 as a follow-up program. ESD is seen as “a key instrument to achieve the Sustainable Development Goals” agreed by the United Nations and is thus it was included in the 2030 Agenda for Sustainable Development [5] (p. 7).

To enable a societal transformation towards sustainability, sustainable development has to be integrated with education, and education has to be integrated with sustainable development. This two-fold approach has two objectives: Objective one is “to reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower
them to contribute to sustainable development’. Objective two is “to strengthen education and learning in all agendas, programs and activities that promote sustainable development” [33].

These two objectives require learner-centered, participative, action-oriented, and transformative pedagogical approaches for ESD. This means a widespread change of the way education is often thought of today—“a shift from teaching to learning” [5] (p. 7). Science should play an active role in creating effective ESD settings as well as in monitoring the effects of ESD settings on the learners. The latter is also a prerequisite for the development of more evidence-based recommendations for successfully implementing ESD [6,34].

2.3. ESD and the Need for a Change of Concepts

According to Duit [35], “there is a lot of evidence that students’ problem solving behavior is very much influenced by the conceptions they hold” [35] (p. 46). ESD has to deal with learners’ pre-concepts about the processes behind environmental challenges, e.g., the correct understanding of the process of climate change [11,36]. This is also true for their naive concepts of superordinate terms like ‘environment’ or ‘sustainability’, which can often be characterized by a lack of complexity [12]. Therefore, in addition to getting pre-concepts closer to a scientific understanding, increasing awareness that the environment is strongly affected by humans and vice versa is equally important [11,12,37,38].

ESD faces the challenge of creating conditions which enable learners to reflect on their existing concepts, and, eventually, change them. The work of Posner et al. [39] marks a starting point for today’s conceptual change research. This research has always emphasized that knowledge can never be simply passed on from the teacher to the learner, and that the learning outcome is always influenced by existing pre-concepts in the learner’s mind. There is evidence that learners must initially become dissatisfied with their existing pre-concepts, before new concepts which are perceived as intelligible, plausible and fruitful can be developed. In the early days of conceptual change research, Posner et al. [39] expected conceptual change to happen as a radical shift. This classical approach was widely criticized in following years. Critics assume that conceptual change happens as a slow and gradual process during which additional items of knowledge are embedded into existing concepts [10]. Furthermore, learning cannot simply be seen as a passive acquisition of stable knowledge, but rather as a process that includes the active, self-determinant participation of learners [5,9,40].

Another point of criticism has been the predominant focus on the individual learner. Contrary to this cognitive view [40], social constructivist approaches place greater emphasis on the fact that learning happens in a complex socio-cultural context, where motivation, emotions, and attitudes play an important role [10,41].

2.4. The Potential of an International Collaboration for Conceptual Change

The AustrIndia-4QOL project enables an international collaboration between students from Austria which has one of the highest living standards worldwide and students from India where huge parts of the population do not even achieve an adequate minimum standard of living [29]. This disparity is reflected by the unevenness of the ecological footprint of both countries. Whereas Austria shows an ecological footprint of 6 gha per person, the value of India is only 1.2 gha per person [42]. The difference between Austria and India can be seen as representative for the inequality between countries from the Global North and the Global South. In spite of the low global footprint per person, the large population, and even more, the dynamic economic development in India results in an increasingly important role for India when it comes to sustainable development on a global level [43]. Today’s teenagers in Austria are facing the challenge to develop new quality of life concepts which are less dominated by material components, whereas today’s teenagers in India are called upon to orientate themselves not on the predominant quality of life concepts of countries from the Global North but to guide the dynamic economic development in their country towards a more sustainable direction.

Collaboration in general is defined as one of the key competencies for ESD [5]. Collaboration enables and encourages discussions in small groups with the learner’s role frequently changing between
interacting and observing, which is seen as essential for successful learning [44–46]. Through criticism from others, learners start to build more complex and abstract concepts [9,22,47]. “Transformative disruptions” can be best achieved, if people with different ideas, views, values, and perspectives interact with each other [22] (p. 181). An international collaboration between students from different socio-cultural backgrounds, therefore, seems to be an excellent opportunity to foster multi-perspectivity and to promote the creation of socially constructed knowledge [9].

Classic ‘study abroad programs’ often require high financial and organizational efforts (and, due to travelling, are mostly not environmentally friendly at all). Therefore, it is logical to make use of today’s technological advancements and implement international collaborations via social media. Existing research often emphasizes the high level of motivation students have when working with social media, e.g., [48,49], and it is important to make the most of this interest when working with teenagers.

However, it has to be considered that in social media collaborations, less information can be exchanged, and discussions run the danger of showing a lack of depth compared to face-to-face discussions, e.g., [50–52]. This raises the question as to, whether the use of social media can be a valid substitute for face-to-face collaborations.

International collaborations in general come with several challenges. Obstacles are to be expected especially when participants from the Global North and the Global South work together, and when fundraising for the Global South is involved. Global dependency relationships may be perpetuated through a classification into the humanitarian and generous on the one side, and the poor and helpless on the other [53–56]. Disney [57] (p. 46) even emphasizes the danger of “developing a new form of colonialism” in which the dependency of the South is sustained. It has been noted that, even without the aspect of fundraising, students from the Global North tend to act pretentiously, and to stick to their western-based way of valuation [56,58].

In order to overcome these problems, the equal position of both partners must be a central aspect of an international collaboration [57,59]. Negotiations and discussions have to be based on “reciprocity, equality and mutuality” [55] (p. 923). Furthermore, regular reflection phases during the collaboration are an important way for the participants to address the challenges they have faced so far, and to develop strategies to overcome them [46].

2.5. The Long Way to Achieve a Change of Action

Education is often seen as the key to achieving a change in action towards a sustainable society. “Education for Sustainable Development is particularly needed because it empowers learners to make informed decisions and act responsibly for environmental integrity, economic viability and a just society, for present and future generations” [5] (p. 63). Similar statements can be found in many of the publications of the United Nations about ESD.

However, numerous studies show that it is far too simplistic to expect a linear progression in which increased environmental knowledge leads to environmental awareness, and, finally, to environmentally friendly behavior [13,15–18,21,22]. Environmental awareness is strong and positive in much the same way worldwide, but individual as well as collective action for sustainability is still insufficient. Even a high intention to act is often not sufficiently brought into real action [16].

Despite the fact that “the processes contributing to the actual enactment of pro-environmental behavioral intention are not fully understood” [14] (p. 23), numerous recommendations can be found in the existing literature on how to create learning settings for successfully promoting a change of action towards more sustainable lifestyles. According to these recommendations, learning-settings have to be based on dialogue, real participation, and the promotion of critical thinking. Future scenarios, real life issues, the complexity of environmental topics, ethical aspects, the influence of socio-cultural and economic factors on peoples’ lifestyles have to be considered. Collaborative decision making, the analysis of environmental problems from different angles, the reflection of one’s own lifestyle, and emphasizing the personal reward of acting sustainably are typical criteria mentioned in this context [5,7,9,19,20,23–25,60]. Rather than being overloaded with scientific facts and having ready-made
solutions imposed upon them, people have to be given the opportunity to participate actively and to contribute to the process [21]. However, studies from Germany (the situation in Austria is supposed to be similar) [61,62] as well as from India [60,63,64] show that teaching practice still mainly concentrates on the transfer of seemingly guaranteed knowledge through teachers and textbooks.

Moderate-constructivist learning settings offer the best means of practically implementing the above-mentioned recommendations for creating effective learning settings for ESD. Thereby, learning is seen as an active, learner-centered process where students discover a problem, develop their own research questions, conduct reviews of the current state of research and carry out their own surveys. The gained insights are subsequently classified, evaluated, reflected and prepared for presentation [65–67].

The AustrIndia-4QOL project offers the opportunity to combine the findings from conceptual change research—especially regarding the effects of collaborative learning—with recommendations for creating effective ESD leading to sustainable action. The aim of the research dealt with in this paper is to test whether the students’ awareness of the importance of environmental aspects for QOL change as a consequence of international collaboration. Additionally, it investigates whether or not students are not only willing to change their lifestyles towards more sustainable ones, but also turn this willingness into real action. The research hypotheses are as follows:

1. An international collaboration like AustrIndia-4QOL increases teenagers’ awareness of the importance of environmental aspects for QOL.
   1.1. An international social media collaboration leads to an increase of teenagers’ awareness of the importance of environmental aspects for QOL.
   1.2. An international face-to-face collaboration leads to a greater increase of teenagers’ awareness of the importance of environmental aspects for QOL than a collaboration via social media.

2. An international collaboration increases teenagers’ willingness to act towards more sustainable lifestyles.
   2.1. An international social media collaboration leads to an increase of teenagers’ willingness to act towards more sustainable lifestyles.
   2.2. An international face-to-face collaboration leads to a greater increase of teenagers’ willingness to act towards more sustainable lifestyles than a social media collaboration.

3. A change of teenagers’ awareness of the importance of environmental aspects for QOL and a change of their willingness to act towards more sustainable lifestyles correspond with a change of real action in the follow-up of the project.

3. Methods

3.1. Project Implementation

Regular stays of one of the authors of this paper at the Day Star School in Manali enabled the development of the preliminary considerations concerning this project together with representatives of that school. The involvement of a project coordinator of Day Star School already at the beginning as well as during the whole implementation helped to overcome a solely Eurocentric view.

A pre-test conducted with 201 teenagers from Austria and 190 teenagers from Northern-India marked the starting point for the AustrIndia-4QOL project. From this initial group, three school classes from each country were chosen to participate in the further project-steps. One class from India and Austria served as a control group with no special treatment. The teenagers from two other classes from both countries conducted a collaboration which was divided into two phases of approximately three months each (Figure 1). The selection and the assignment of the respective school classes in a control and two treatment groups at the beginning of the project was done purely based on organizational criteria (e.g., school timetables).
At the beginning of the first phase, the students used their mobile phones to make short videos about their schools and their home towns, and they presented these videos in a closed Facebook group. An additional video conference via Skype enabled them to see each other and introduce themselves. In the following weeks, the students jointly performed their autonomous research on the QOL concepts of young people in their regions according to a moderate-constructivist understanding of learning. Eight questions designed by the Austrian students, and eight questions designed by the Indian students...
were integrated into a common questionnaire. The students subsequently conducted a survey in each country and exchanged and discussed their results via Facebook.

A moderate-constructivist learning setting forms also the basis for the second phase of the project. In this phase, the students formed small groups with their compatriots, and chose one particular aspect of QOL according to their interests and coupled this aspect with the ideas of sustainability. After agreeing on a specific inquiry, they conducted research on their topic (e.g., mobility against the background of climate change, nutrition against the background of the over-fishing of the oceans, etc.). The results were frequently discussed via Facebook with the corresponding group from the other country. This paper does not discuss those research results, but instead focuses upon the effect of the students’ research on their awareness of the importance of environmental aspects for QOL, and on their willingness to act towards more sustainable lifestyles. The project was completed by jointly creating a final document with specific suggestions on global, regional and personal levels for more sustainable lifestyles. During this phase, special emphasis was given to combining the students’ research results with individual options to act towards more sustainable lifestyles.

At the end of the second phase of the project, ten Indian students were able to take part in an additional ten-day face-to-face collaboration with the 22 students from one of the Austrian school classes (Face-To-Face Group). This provided the opportunity for these students to engage in intensive real-time discussions in comparison to 46 Indian students and 24 Austrian students who could only take part in mainly asynchronous social media discussions (Social Media Group). Whereas the financial background of the students’ families and their possibilities to apply for a passport were crucial for the selection of the ten Indian students for the face-to-face collaboration, the Austrian school class was selected due to organizational criteria. In case of the ten Indian students also a certain bias cannot be excluded. It can be assumed, that mainly highly motivated students expressed their interest in taking part.

Regardless of the type of discussion, special focus was given to the contribution of all teenagers in the overall AustrIndia-4QOL project in order to support a collaboration as equals [68]. Additional reflection phases during the collaboration provided an opportunity for the students to express the challenges they perceived and to discuss possible solution approaches [46].

3.2. Study Sample

General information about the AustrIndia-4QOL project was presented to both the Austrian and the Indian students several weeks before the project started. It became obvious at a very early stage that they were all extremely interested in taking part. The students and their parents had no reservations about being involved and voluntarily agreed on data collection for scientific research. Without the teenagers’ total engagement, it would have been impossible to make this project a success.

The participants originated from the two comparably small towns of Manali in Northern India with approx. 43,000 inhabitants (sub-district Manali) [69] and Feldkirch in Austria with approx. 35,000 inhabitants of the surrounding areas. The Indian participants attended the Day Star School (DSS) (www.daystarmanali.org) in Manali and the Austrian participants attended the Gymnasium Schillerstrasse (GYS) (www.gys.at) in Feldkirch. A few small cooperative projects between these schools had already been carried in previous years.

The DSS in Manali is an English-speaking, privately-operated school, which prepares students for A-levels. According to representatives of the DSS, the students are from different religious and social caste groups (the caste-system still affects daily life in this area). While approximately 20% of the students at the DSS are only able to attend this school due to sponsorship by external donors who cover the financial costs, the majority come from families who can be best described as being comparatively financially well-off. This is especially true for the ten Indian students who eventually visited their project partners in Austria. Their families were able to pay for the journey without assistance. It took a great deal of effort and lengthy negotiations on the Indian and the Austrian side to persuade the authorities to grant the Indian students travel visas. Especially the Institute of Geography was very
helpful in this respect. There were more students keen to come to Austria, however, not having the required documentation for their passport applications readily available meant that they were unable to make the journey. For all ten Indian students and their accompanying teacher, it was their first journey outside India. Once in Austria, the Indian students were hosted by the families of their project partners, which not only lowered costs but also enabled the Indian students a direct insight into the lifestyles of their counterparts [70].

The GYS is a state operated high school in Feldkirch in the western part of Austria. Most of the attending students come from middle-class families. They are part of the 45% [71] (p. 30) of Austrian teenagers in their age group who attend a higher secondary school which prepares them for A-level exams (‘Matura’).

The Austrian and Indian students were all approximately 16 years old. At this age, independence of one’s parents and thoughts about the future are issues that are of great significance for teenagers. This makes this age group especially interesting for conceptual change research [12].

Migrants from India are scarce in the western part of Austria, and most Austrian students are unlikely to have ever met any Indians personally. As a result of Austria’s minor presence on the world stage, it can be assumed that the Indian students’ knowledge about Austria is limited. Due to the highly different circumstances of life in Manali, as compared to Feldkirch, it can be stated that the AustrIndia-4QOL project enables a collaboration between students from different socio-cultural backgrounds. This is also reflected in some differences regarding the QOL-concepts of the Indian and Austrian students, as the pre-test results show [72].

3.3. Data Collection and Data Analysis

For data collection, pre- and post-tests were conducted at the beginning and at the end of the collaboration. Additionally, the students of the Face-To-Face Group took part in a follow-up survey 15 months later.

The pre- and post-test contained freewriting about QOL, and a questionnaire with open and closed questions. For this paper, the students’ responses regarding two topics were considered: First, seven questions (including the freewriting exercise) which allowed for insights into students’ awareness of the importance of environmental aspects for QOL, and, second, nine questions dealing with students’ willingness to act towards more sustainable lifestyles (see Supplementary Material for the specific questions). All questions were tested in advance with other students and crosschecked by teachers of both schools to make sure that the questions are in line with the life-reality of young people of those regions.

The freewritings as well as the responses to the open questions were analyzed following the criteria of a qualitative content-analysis [73] using the software MAXQDA 12. To allow for a comparison with an existing survey conducted by Oberrauch et al. [74] with high-school students around the same age, the categories were mainly determined deductively, and partly adapted during the process of coding. For the coding, a three-part Likert scale was used. Depending on the results of the coding process, the response behavior of each individual student was transformed into a numerical value where the value ‘zero’ stands, e.g., for ‘environmental aspects not mentioned’, the value ‘one’ for ‘environmental aspects mentioned’ and the value ‘two’ for ‘environmental aspects mentioned extensively’. This procedure was repeated separately for every open question. The coding was done independently by two researchers. Conflicting values were discussed and resolved afterwards.

In addition to this, questions were used where the participants had to select answers from a given list (e.g., choose the three most important . . . ) as well as answers based on a six-part Likert scale. These responses were also transformed into a numerical value between zero and two. Therefore, a maximum value of 14 would theoretically be possible for the seven questions regarding the students’ awareness of the importance of environmental aspects for QOL and a theoretical maximum value of 18 would be possible for the nine questions regarding the students’ willingness to act towards more sustainable lifestyles. The percentage each student achieves in relation to the theoretical maximum
is interpreted as the individual level of awareness or as the individual level of willingness to act. These levels as well as the change of these levels between the pre- and post-test form the basis for the further analyses.

In the follow-up survey 15 months after the collaboration, the students of the Face-To-Face Group were asked by means of six specific questions (see Supplementary Materials) to record whether they had changed their behavior (reduced travelling by car, reduced consumption of electric energy, etc.) since the end of the project. Therefore, a five-part Likert scale (less often, rather less often, identically, rather more often, more often) was used. The response behavior was transformed into a numerical value between minus two (less often) and plus two (more often). The percentage each student achieves in relation to the theoretical maximum (12 points) or respectively minimum (~12 points) out of the six questions is interpreted as the individual’s reported change of action.

The statistical analyses were conducted with the software ‘RStudio’. When interpreting the statistical data, the small sample size has to be taken into account. However, due to the fact that the results from the different project groups provide a clear and homogenous picture, they can be considered as plausible and—at least to some extent—generally valid. To check the results between different groups or between pre- and post-test for statistical significance, a p-value was calculated with the help of a Mann–Whitney–Wilcoxon rank-sum test. Possible correlations between different variables were examined by calculating Spearman’s ρ. A bootstrapping approach (1000 replications) was used for calculating confidence intervals [75,76].

Aside from discussing the quantitative results, sample quotations were cited to allow for a deeper understanding of the students’ arguments. These quotations originated from the freewriting the students wrote as a part of the post-test. Obvious spelling and grammar mistakes were corrected for better readability, and the statements from the Austrian students were translated into English. A code is used rather than the student’s names. Thus, ‘IN’ signifies an Indian teenager and ‘AT’ an Austrian teenager.

4. Results

4.1. The Change of Teenagers’ Awareness of the Importance of Environmental Aspects for QOL

An analysis of data from the pre-and post-test assessing the students’ awareness of the importance of environmental aspects for QOL results in three core messages:

1. The students’ awareness already differed remarkably between the different project-groups at the beginning, and the difference between Austrian and Indian participants was significant (p < 0.001) in general (Table 1).

2. A comparison of the response behavior between pre- and post-test showed no significant change for the Control Group and for the Social Media Group. Contrarily, the awareness of the Face-To-Face Group increased by a statistically significant margin (AT: \( p = 0.049 \); IN: \( p = 0.032 \)) (Table 1).

3. The correlation between the individual awareness in the pre-test, and the increase of this awareness showed for all three groups, and for the Indian as well as for the Austrian students, in general; a negative value (overall correlation: \( p = -0.509 \)). This means that those students whose level of awareness was rather low in the pre-test increased their level of awareness throughout the project. Nevertheless, these students did not reach the level of those students with a high awareness in the pre-test (Figure 2). However, smaller confidence intervals in the post-test indicated that the differences within the groups became smaller.
4.2. The Change of Teenagers’ Willingness to act Towards More Sustainable Lifestyles

An analysis and comparison of data from the pre- and post-test regarding the students’ willingness to act towards more sustainable lifestyles resulted in three core messages:

1. The transformation into a numerical value of the students’ response behavior concerning the nine questions dealing with the students’ willingness to act towards more sustainable lifestyles showed that the students of all project groups reached a high percentage of the theoretically achievable maximum already in the pre-test (Table 2). Looking at some of those questions in detail enabled a deeper insight into the students’ lifestyle concepts. Thus, it appears that 42.4% of the Austrian students and 51.7% of the Indian students stated that they consider environmental aspects when shopping, but the students’ concepts also revealed some limitations. The price of products (74.2% of the Austrian students, 65.5% of the Indian students) and in case of the Indian students also fashion trends, and specific brands (81.6%) influenced their shopping habits to a greater extent than environmental aspects (see also e.g., [77]). For the Austrian students, it is notable that although 78.8% (82.8% of the Indian students) could imagine reducing the amount of their own car use, 60.6% of them (29.9% of the Indian students) rejected the suggestion to
renounce individual automobile ownership all together. The desire for comfort and convenience as well as the societal background shaped environmental behaviors to a great extent [13].

2. A comparison of the response-behavior in pre- and post-tests shows a different development of Austrian and Indian students. All Austrian project-groups increased their willingness to act towards more sustainable lifestyles between pre- and post-tests, however, only the change in the Face-To-Face Group was statistically significant ($p = 0.023$). In contrast to these findings, all Indian project-groups showed a slightly lower willingness to act (Table 2).

3. The correlation between the willingness to act towards more sustainable lifestyles in the pre-test and the increase by the time of the post-test showed a negative value for all groups, and for the Indian as well as for the Austrian students in general (overall correlation: $\rho = -0.478$). This means that those students whose willingness to act was rather low in the pre-test increased their willingness to act throughout the course of the project (Figure 3). Nevertheless, these students did not reach the levels of students with a high willingness to act in the pre-test. However, smaller confidence intervals in the post-test (with the exception of the Indian students of the Control Group) indicate that the differences within the groups became smaller.

**Table 2.** Teenagers’ willingness to act for a more sustainable lifestyle. AT = Austrian teenagers; IN = Indian teenagers. * Statistically significant on a 95% confidence level according to Mann–Whitney–Wilcoxon rank-sum test ($p$-value). Spearman’s $\rho$: Correlation between the individual’s willingness to act in the pre-test and the increase of the willingness to act.

<table>
<thead>
<tr>
<th>Number of Teenagers</th>
<th>Willingness to Act Pre-Test in Percentage of Maximum Value</th>
<th>Willingness to Act Post-Test in Percentage of Maximum Value</th>
<th>Change Between Pre- and Post-Test in Percentage (p-Value)</th>
<th>Spearman’s $\rho$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group AT</td>
<td>20</td>
<td>64.17</td>
<td>65.50</td>
<td>2.08 (0.363)</td>
</tr>
<tr>
<td>Control Group IN</td>
<td>31</td>
<td>60.68</td>
<td>58.17</td>
<td>−4.13 (0.199)</td>
</tr>
<tr>
<td>Social Media Group AT</td>
<td>24</td>
<td>59.21</td>
<td>61.44</td>
<td>3.75 (0.184)</td>
</tr>
<tr>
<td>Social Media Group IN</td>
<td>46</td>
<td>61.96</td>
<td>60.89</td>
<td>−1.72 (0.705)</td>
</tr>
<tr>
<td>Face-To-Face Group AT</td>
<td>22</td>
<td>63.99</td>
<td>69.14</td>
<td>8.05 * (0.023)</td>
</tr>
<tr>
<td>Face-To-Face Group IN</td>
<td>10</td>
<td>62.22</td>
<td>60.33</td>
<td>−3.03 (0.878)</td>
</tr>
</tbody>
</table>

![Figure 3](image_url)  
**Figure 3.** Change of the willingness to act towards more sustainable lifestyles between the pre- and post-test in percentage points. Statistically significant change for the Austrian teenagers in the Face-To-Face Group ($p = 0.023$).
4.3. The Change of the Teenagers’ Real Actions

At the end of the AustrIndia-4QOL project, the question arose as to whether this project would have a sustainable effect and, if it did, would it be followed by a real change of action towards more sustainable lifestyles. Therefore, a follow-up test was conducted with the 32 students of the Face-To-Face Group 15 months after the actual project. The students were asked whether they had changed their behavior regarding six different aspects (see Supplementary Materials). An analysis of the follow-up survey, and the connection of these results with the results we previously focused on in this paper led to two core messages:

1. Despite the high numbers of specific suggestions given by the students and their often-cited willingness to act towards more sustainable lifestyles, the follow-up survey revealed that these intentions were followed by a change of action only to a minor extent. Although the students’ self-reports showed a statistically significant change of action in some of the six questioned aspects, their reported change of action for all six aspects turned out be considerably lower as compared to the earlier stated willingness to act (−37.1% for the Austrian and −40.0% for the Indian students). The reported change of action was not correlated in the case of the Austrian students, and negatively correlated in the case of the Indian students (ρ = –0.59) with their expressed willingness to act. This means that the change of action only occurred to a minor extent in those fields in which the students mentioned a high willingness to act.

2. Focusing on the individual students indicates that the reported change of action correlated strongly with the awareness of the importance of environmental aspects for QOL, and with the willingness to act towards more sustainable lifestyles (Table 3), which the students’ showed in the pre-test. There was no correlation, or even a negative correlation, between the reported change of action on the one hand, and the change of the awareness and the change of the willingness to act between the pre- and post-test on the other (Figure 4). A change of action was primarily reported by students who showed almost no change of their awareness and willingness to act (situated near the vertical zero-line in Figure 4), but who already showed a high level in the pre-test.

![Change of Action vs. Change of Awareness](image1.png)

![Change of Action vs. Change of Willingness to Act](image2.png)

**Figure 4.** Individual reported change of action in relation to the change of the awareness of the importance of environmental aspects for QOL (correlation: AT: ρ = –0.084; IN: ρ = –0.302) and in relation to the stated willingness to act towards more sustainable lifestyles (correlation: AT: ρ = –0.227; IN: ρ = –0.314).
Table 3. Correlation (Spearman’s $\rho$) between the teenagers’ reported change of action with the awareness of the importance of environmental aspects for QOL and with the willingness to act towards more sustainable lifestyles in the pre- and post-test as well as with the change between pre- and post-test. AT = Austrian teenagers; IN = Indian teenagers.

<table>
<thead>
<tr>
<th></th>
<th>Awareness Pre-Test</th>
<th>Willingness to Act Pre-Test</th>
<th>Awareness Post-Test</th>
<th>Willingness to Act Post-Test</th>
<th>Change of Awareness</th>
<th>Change of Willingness to Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported change of action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-Face Group AT</td>
<td>0.382</td>
<td>0.510</td>
<td>0.324</td>
<td>0.316</td>
<td>−0.084</td>
<td>−0.227</td>
</tr>
<tr>
<td>Face-to-Face Group IN</td>
<td>0.713</td>
<td>0.352</td>
<td>0.252</td>
<td>0.287</td>
<td>−0.302</td>
<td>−0.314</td>
</tr>
</tbody>
</table>

5. Discussion and Conclusions

The increased use of social media in education seems tempting in order to minimize the financial and organizational efforts of international collaborations. In the AustrIndia-4QOL project, several students from the Social Media Group as well as from the Face-To-Face Group mentioned a higher awareness of the importance of environmental aspects for QOL in the post-test. Nevertheless, in our project, the exclusive collaboration via social media showed no overall statistically significant effect on the awareness of the importance of environmental aspects for QOL, if measured as an aggregation of the students’ response behavior regarding seven selected questions. This is in line with several existing research studies which point to the huge challenges in triggering a far-reaching debate with extensive argumentations on social media [50–52].

By observing the face-to-face collaboration, the tremendous level of personal engagement of the students became obvious. Their emotional discussions often continued even after the end of the project workshops. It can be assumed that the students of the Face-To-Face Group were, to a greater extent, confronted with different opinions and the personal contact led to a deeper involvement with the discussed topics [46,78]. This group showed a significant change of the awareness of the importance of environmental aspects for QOL in contrast to the Social Media Group which showed no significant change. Therefore, research hypothesis 1.1 has to be rejected, but research hypothesis 1.2 can be confirmed.

Student examples:

After the AustrIndia project I think the QOL has changed to some extent. [...] My thoughts about saving the ecology have also changed because I’m much more aware about how we are hurting our environment (IN204).

I became aware that QOL is not natural but that it is possible to have a good QOL even with a lower living standard, less materialism and comfort. Luxury and the like are often hindering or have a negative effect on QOL. I have also become aware that a ‘clean’ environment has a great influence on QOL. I became especially aware of this when jointly designing posters [as a preparation for the discussions] about the topic ‘environment’ (AT215).

Awareness is seen as an indirect, but important determinant for the willingness to act towards sustainable lifestyles [14,79]. Therefore, it is not surprising that the low increase of awareness of the importance of environmental aspects for QOL of the Social Media Group was followed by no statistically significant increase of the willingness to act towards more sustainable lifestyles. As a consequence, research hypothesis 2.1. has to be rejected as well. The analysis of the response behavior of the Face-To-Face Group showed a diverse picture. While the increase of awareness was also followed by an increased willingness to act in case of the Austrian students, the willingness to act of the Indian students decreased slightly. Consequently, research hypothesis 2.2 can neither be simply verified nor can it be rejected. From statements the students wrote at the beginning and at the end of the face-to-face collaboration, it can be concluded that the Indian students increased their claims for more economic
growth of the countries of the Global South [70]. It can be assumed that the direct contrast with the living-standards of one of the wealthiest countries worldwide may have prevented an increased willingness to act towards more sustainable lifestyles. This confirms that a collaboration between students of the Global North and the Global South is inseparably connected with the aspect of global (in)justice and entails the danger of showing unintended effects [55,57,80]. This aspect is also explicitly mentioned by several Indian as well as Austrian students of both treatment groups in the post-test.

Student examples:

By seeing all this, I got to differentiate between standard of living and QOL. I saw Austria, how developed it is, how balanced it is, but it also has some negative points too. They are so influenced by higher standard of living that the people don’t know what it used to be like 100 years back. They use up so many resources to make a good life, they have all the facilities, but they are not using them (IN210).

Through the dialogue via Facebook with the students from India, the term [QOL] became a new dimension with arguments that I had not considered before. E.g. that Europe has a ‘clean production’ only because most of the ‘dirty’ work is done in developing countries. This increases our QOL but causes on the other hand a lower QOL for the workers and inhabitants in the regions where products for the western market are manufactured (AT111).

The effect of the international collaboration on the individual students was unevenly distributed within the project groups. The awareness of the importance of environmental aspects for QOL as well as the willingness to act towards more sustainable lifestyles increased more amongst students with a low awareness and willingness to act in the pre-test (Figures 1 and 2). The fact that this effect can also be seen within the Control Group indicated that even the conducted pre-test may have had an impact. Despite the stronger increase, students with a low awareness and willingness to act at the beginning did not reach the same level as students with a high level in the pre-test. This illustrates the influence of existing concepts on learning outcomes and underlines the importance of teachers gaining knowledge about the concepts of students in their particular class and adapting their learning-settings individually [8,10,12].

For a successful implementation of ESD, the awareness of the importance of environmental aspects for QOL and the willingness to act towards more sustainable lifestyles has to be followed by a real change of action [19,81]. Considering that only the Face-to-Face Group showed a significantly increased awareness, and in the case of the Austrian students, also a significantly increased willingness to act, we focused our follow-up survey on this group. An interpretation of the data has to consider that self-reports about pro-environmental behavior tend to be too optimistic, mainly due to social desirability bias [82,83]. Looking at the individual students, the change of action most strongly correlates with the awareness of the importance of environmental aspects for QOL and with the willingness to act towards more sustainable lifestyles, which the students showed in the pre-test. Contrarily, no correlation or even a negative correlation, could be found between the change of the awareness and the change of the willingness to act on the one hand, and the reported change of action on the other hand (Figure 3). As a result, research hypothesis 3 has to be rejected.

As with all studies, especially in a school setting, there are limitations that may have unintendedly influenced the results. First, a learning setting like the one used in the AustrIndia-4QOL project requires a lot of social collaboration among the students. Therefore, the social structure within a class as well as different learning styles of students may have a certain impact. This learning setting favors students who prefer learning through social interaction compared to students who prefer individual learning. Taking this aspect into consideration, the students were also required to keep a research diary in order to allow for individual reflections about experiences gained in the project.

Second, the different experiences of students in using social media as a working tool is undoubtedly another important aspect which influences the outcome of the collaboration. Therefore, we decided to use the social media platform Facebook which all students use at least for personal purpose.
Third, the students’ demographics, their cultural background and the predominant teaching and learning methods at both schools influence the way students will be able to deal with the challenges of such a project.

Fourth, the small sample size reduces the generalizability of the findings. To minimize this effect, the school classes taking part in the project were chosen randomly due to organizational restraints. The only exception were the ten Indian participants in the face-to-face collaboration where the financial background of their families, the access to a passport, as well as their personal motivation were crucial aspects.

The financial as well as the organizational efforts for conducting face-to-face collaborations will always be a limiting factor in a school setting. Therefore, future research seems desirable in order to develop pedagogical approaches which foster more intensive discussions and collaborations via social media.

In our survey, a two-step process was observed. Students with a lower level of awareness of the importance of environmental aspects for QOL and a lower willingness to act towards more sustainable lifestyles at the beginning showed a stronger increase in these fields, whereas students with a higher awareness and willingness to act in the beginning reported a stronger change of action as a consequence of the project. Therefore, an increased awareness and willingness to act can be seen as the first step on which further education settings must be built. Our findings confirm that ESD can only succeed as a long-term project. Cross-curricular teaching throughout the entire school career and implementing ESD as a whole institution approach seems necessary to promote sustainable development successfully [79,84,85]. To implement these aims into school practice, more research is urgently needed as well as a political will, in order to consider the requirements of ESD seriously, when it comes to the development of school curricula and to the creation of general conditions at schools which promote new ways of teaching and learning.

Supplementary Materials: Items of the questionnaires used in this study. The following are available online at http://www.mdpi.com/2071-1050/11/18/5094/s1.

Author Contributions: Conceptualization, M.D. and L.K.; methodology, M.D.; software, M.D.; validation, M.D.; formal analysis, M.D.; investigation, M.D.; resources, M.D.; data curation, M.D.; writing—original draft preparation, M.D.; writing—review and editing, M.D.; visualization, M.D.; supervision, L.K.; project administration, M.D.

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