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Predictors of Student Teachers' ESD Implementation Intention and Their Implications for Improving Teacher Education

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Abstract: Recently, the German state of Baden-Württemberg included ESD as a guiding perspective for all school curricula. Consequently, teacher education needs to empower and motivate student teachers to implement ESD in schools. In previous ESD research, however, the motivational dimension rarely has been investigated. Psychological theories stress the importance of developing an intention for the actual realization of a behavior. Therefore, we investigated, in an online survey (N = 366), which factors influence student teachers' ESD implementation intention. Furthermore, we investigated how student teachers understand the guiding perspectives and what influences the actual ESD implementation from the respondents' point of view. Via structural equation modelling, we found direct effects of subjective task value, expectation of success and ESD knowledge, as well as indirect effects of SD attitudes and ESD implementation beliefs on ESD implementation intention, but no effects for subjective norm and perceived costs. Analyses of open answers revealed complex understandings of ESD, but also misinterpretations mainly in terms of ESD as equivalent to environmental education. Furthermore, student teachers expected barriers (e.g., lack of time) and formulated support needs (e.g., teaching material) for implementing ESD in schools. Our findings stress the importance of advancing ESD implementation in teacher education.

Keywords: Education for Sustainable Development (ESD); Theory of Planned Behavior (TPB); Expectancy-Value Theory (EVT); predictors; implementation intention; student teachers; teacher education

Citation: Stössel, J.; Baumann, R.; Wegner, E. Predictors of Student Teachers' ESD Implementation Intention and Their Implications for Improving Teacher Education. *Sustainability* **2021**, *13*, 9027. https://doi.org/10.3390/su13169027

Academic Editor: Andrea Weinberg

Received: 15 July 2021
Accepted: 9 August 2021
Published: 12 August 2021

1. Introduction

Our world is at a crucial crossroads: severe challenges such as the COVID-19 pandemic, the growing economic inequality and recent extreme weather events highlight the urgency of an extensive social transformation toward sustainability. Education is an essential prerequisite for advancing sustainable development, because "Education for Sustainable Development" (ESD) aims to empower and motivate individuals to create sustainable and just societies through education [1].

In order to implement ESD as comprehensively as possible in all areas of education, ESD has been established as a guiding objective of numerous international initiatives. Examples include the UN Decade of ESD (2005–2014), the Global Action Programme (GAP) on ESD (2015–2019), the 2030 Agenda for Sustainable Development with its 17 Sustainable Development Goals (SDGs) and the ESD for 2030: Towards Achieving the SDGs (2020–2030). In Germany, too, ESD is increasingly being anchored in educational landscapes. For example, the state of Baden-Württemberg has anchored ESD as one of the guideline perspectives in the new curriculum (see Figure 1) as well as a cross-sectional competence into teacher education [2,3].

Education for Sustainable Development enables students to make informed decisions and act responsibly to protect the environment, for a functioning economy and a fair global society for current and future generations. This relates above all to respecting the natural limits of the Earth system's carrying capacity and dealing with growing social and global injustices. This requires responsibly applied creativity, intelligent solutions, and foresight. Sustainable development requires learning processes that promote the necessary mental and cultural change. In addition to the acquisition of knowledge about (non-) sustainable developments, the following core concerns are of particular importance: Willingness to engage and take responsibility, dealing with risks and uncertainty, empathy for other people's life situations and solid judgement on future issues.

Education for Sustainable Development empowers students to contribute to sustainable development as consumers, at work, through civic engagement and political action. It is therefore not only a matter of being able to react to existing problems, but above all dealing with the future with foresight and of participating in innovative life and society designs that make a forward-looking and responsible transition to a sustainable world possible.

The anchoring of the guiding perspective in the education plan is concretised by the following terms: Significance of and threats to sustainable development, Complexity and dynamics of sustainable development, Values and norms in decision-making situations, Criteria for actions that promote and inhibit sustainability, Participation, involvement, co-determination, Capacity for democracy, Peace strategies.

Figure 1. Guiding Perspective on Education for Sustainable Development [4].

In its formulation, the guiding perspective focuses on understanding the multiple facets and the complexity of sustainable development, and on enabling students to deal with this complexity by developing future solutions as well as engaging actively in promoting sustainable development. Furthermore, the guiding perspective is rooted in the so-called "Beutelsbach Consensus", which has been formulated for political education in Germany [5]. This consensus states that in schools, all education that contains political aspects has to adhere to three basic principles:

1. No overpowering: Overpowering students in any way in order to trick them into conforming to a certain opinion is not permitted. Teachers must support students to develop their own opinion towards a topic. The goal of all political education is the education of mature and responsible citizens.
2. What is controversial in science and politics, has to be presented as controversial in school: It is important to describe different options and alternatives, in order to prevent indoctrination. This might even involve developing positions that might be alien to students in more detail. This also includes presenting those topics that are not controversial in science, such as human activity being the main reason for the current rapid climate change, as not controversial. However, this request of the Beutelsbach Consensus is sometimes misunderstood, and it is falsely assumed that climate change denial needs to be presented as a valid option, too.
3. Students need to be enabled to analyze a political situation and their own interest, as well as to influence a political situation in terms of their own interests. This aligns with the guiding perspective, because it includes education about participation and engagements in order to pursue sustainable development.

Taken together, the idea behind the guiding perspective and the Beutelsbach Consensus comes close to what Vare and Scott [6] have called ESD 2, which is "building capacity to think critically about what experts say and to test ideas, exploring the dilemmas and contradictions inherent in sustainable living" (p. 191). This idea of ESD goes beyond

traditional environmental education, which Vare and Scott [6] call ESD 1, and consists of "promotion of informed, skilled behaviors and ways of thinking, useful in the short-term where the need is clearly identified and agreed" (p. 191).

However, the leap from a theoretical mission to an actual implementation of ESD in schools can only succeed if teachers actually implement ESD in schools. Therefore, researchers investigate which factors support or hinder teachers' ESD implementation (e.g., [7–13]). While several ESD surveys among teachers have already been conducted (e.g., [7,8,10,13–15]), there have been only a few large-scale ESD surveys among student teachers investigating which factors support or hinder their behavior to implement ESD in schools. Against the background that student teachers play a crucial role for the ESD implementation in schools in future [1], and that in several studies, teachers mentioned insufficient teacher education and teacher training as a barrier for the actual implementation of ESD in schools [7,8,10,13–15], large-scale surveys might help to identify factors that support or hinder their intentions to implement ESD later in their careers as teachers.

1.1. The Role of ESD Implementation Intention

According to the findings of motivational psychology, an existing behavioral intention (here, the intention to implement ESD in school) represents a central basic prerequisite for the actual execution of this behavior (e.g., [16–20]). High ESD implementation intention among (student) teachers can thus be considered as an essential necessary condition for successful implementation of ESD in schools. Therefore, one goal of this study was to investigate what factors influence student teachers' ESD implementation intention.

1.1.1. Factors Influencing the Formation of Intention

First described by Ajzen in 1985, the Theory of Planned Behavior (TPB) is one of the most widely used theories to predict and explain behavioral intentions and behavior [21,22]. According to the TPB [20], attitude, subjective norm and perceived behavioral control towards a certain behavior determine the intention to perform this behavior. In relation to our study, attitude describes the extent to which student teachers evaluate the implementation of ESD in schools as positive or negative. The subjective norm refers to the perceived social pressure that important reference people from professional or private life expect ESD implementation in their work as teachers. Perceived behavioral control describes the perceived control of actually being able to implement ESD in schools.

A central criticism of TPB is that the explanatory model is too narrow [23–26]. According to Ajzen [20], in order to increase the predictive power of the model, the influence of potentially relevant background variables (e.g., general attitudes, emotions, gender, age, income, knowledge and experience) can be additionally examined. Furthermore, the model can be supplemented by additional determinants if they explain variance beyond the determinants of the TPB [27]. Indeed, several studies already indicated that the TPB model can be extended by additional variables in order to increase the predictive power of the model (e.g., [28–32]). For example, the study by Weber and Fiebelkorn [32] showed that in addition to determinants of intention deducted from TPB, nature attachment and environmental concern also determine student teachers' intention to eat sustainably. Furthermore, the study by Cheung et al. [29] showed that beyond the TPB determinants of intention, college students' intention to recycle wastepaper was also determined by their knowledge.

Apart from TPB, the Expectancy-Value Theory (EVT) [33] also provides us with valuable insights on factors influencing an individual's intentions. According to the EVT, the personal expectation of success and the subjective task value influence the intention to show a certain behavior. In the context of the present research objective, the personal expectation of success describes the extent to which student teachers are convinced, on the basis of their perceived competences, that they can successfully implement ESD in everyday school life. The subjective task value indicates the value that student teachers attribute to the implementation of ESD in school. Eccles and Wigfield [33] specify four subcomponents of subjective task value: intrinsic value, usefulness, importance and cost [33]. This means

that student teachers experience a high task value if they expect to have fun and/or interest in implementing ESD in school (high intrinsic value), and if they expect that the implementation of ESD in school will conform with their own self-image, such as being responsible, justice-loving and nature-loving, (subjective importance). Furthermore, subjective usefulness indicates the extent to which student teachers are convinced that they can achieve long-term or short-term goals (e.g., career, reward and recognition of school leadership) by implementing ESD in schools. Perceived costs, on the other hand, refer to the negative aspect of the value component: they describe the extent to which student teachers believe that implementing ESD in schools involves a high degree of effort and/or sacrifice (e.g., fear of failure and less free time) [33,34].

1.1.2. Factors Influencing the Realization of Intention

Even though intention to perform a certain behavior seems to be a central prerequisite for the actual performance of this behavior, the findings of previous studies also indicate that about half of the individuals with behavioral intention do not succeed in acting according to their behavioral intention (e.g., [35–38]). In literature, such circumstances are described as intention–behavior gaps (cf. [39,40]).

The phenomenon of the intention–behavior gap raises the question why some people do not succeed in implementing their intention behaviorally. The Theory of Action Control by Kuhl [18] and the Rubicon Model of Action Phases by Heckhausen and Gollwitzer [19] offered a significant contribution to clarifying this question. These authors strongly argued for a distinction between motivational and volitional processes of an action course, because motivational processes are important for the formation of a behavioral intention and volitional processes for the realization of this behavioral intention, while volitional processes had remained unnoticed in motivation research for many decades [41].

Accordingly, intention–behavior gaps occur when problems, such as no time, intense emotions and lack of knowledge, arise in the realization of a behavioral intention (volitional processes) (cf. [18,19,42]). Therefore, the present study also investigated what barriers and support needs student teachers perceive with regard to the actual implementation of ESD in schools.

1.2. The Present Study: Research Questions and Hypotheses

The main goal of the present study was to identify relevant factors influencing student teachers' ESD implementation intention (motivational processes), because an existing ESD implementation intention is a central basic prerequisite for the actual implementation of ESD in schools as well as because the actual execution of the desired behavior (volitional processes), here to implement ESD in schools, is still in the future of the respondents. However, in order to gain insights into realization difficulties or realization facilitators, we investigated which factors might hinder or support the actual implementation of ESD from the respondents' point of view. Additionally, we investigated student teachers' ESD knowledge. With the goal of identifying and publishing misinterpretations regarding the ESD guiding perspective.

Regarding the ESD implementation intention, we formulated the following hypotheses:

Hypothesis (H1). *Based on the TPB [20], we expected that student teachers' ESD implementation intention is higher for participants with a positive attitude.*

Hypothesis (H2). *Based on the TPB [20], we expected that student teachers' ESD implementation intention is higher for participants with a high subjective norm.*

Hypothesis (H3). *Based on the TPB [20], we expected that student teachers' ESD implementation intention is higher for participants with a high perceived behavioral control towards ESD.*

Hypothesis (H4a). *Furthermore, we expected that the motivational variables derived from EVT [33] have an additional influence on the ESD implementation intention. Implementation intention was expected to be higher for student teachers who attribute a high intrinsic value.*

Hypothesis (H4b). *Based on the EVT [33], student teachers' ESD implementation intention was expected to be higher for student teachers who attribute a high subjective importance.*

Hypothesis (H4c). *Based on the EVT [33], student teachers' ESD implementation intention was expected to be higher for student teachers who attribute a high subjective usefulness.*

Hypothesis (H4d). *Based on the EVT [33], student teachers' ESD implementation intention was expected to be higher for student teachers who attribute low perceived cost.*

Hypothesis (H4e). *Based on the EVT [33], student teachers' ESD implementation intention was expected to be higher for student teachers who attribute a high expectation of success towards ESD.*

Hypothesis (H5). *Based on the research results of Weber and Fiebelkorn [32], we expected that student teachers' ESD implementation intention is higher for participants with high SD attitudes.*

Hypothesis 6 (H6). *Based on the research results of Cheung et al. [29], we expected that student teachers' ESD implementation intention is higher for participants with high ESD knowledge.*

The questions of how students understand the ESD guiding perspective as well what barriers and support needs they identify in order to implement ESD were addressed exploratively.

2. Materials and Methods

2.1. Participants and Design

The online survey included N = 366 student teachers (80.3% female, 18.9% male, 0.9% diverse, M_{age} = 23.55, SD_{age} = 3.07). Overall, 66.7% (n = 244) of the respondents were studying at a university of education, 31.7% (n = 116) at a university, and 1.6% (n = 6) indicated "other" at this point. Some 41.3% (n = 151) of the participants studied at least one ESD-related subject (biology, geography and basic sciences [8]). Basic science, in German called Sachunterricht, is a subject taught in elementary school in Germany that is intended to familiarize students with scientific and technical phenomena as well as with social, economic and historical conditions in their home region [43]. Because of the advanced anchoring of ESD in the Baden-Württemberg higher education legislation Kultusministerkonferenz, this survey was targeted primarily at student teachers from Baden-Württemberg. Therefore, 89.6% (n = 328) of the respondents were matriculated in Baden-Württemberg and 10.4% (n = 38) in other German federal states. With regards to the gender distribution, this sample roughly equals the current student population [44].

Participants were recruited through teacher education centers, lecturers and social networks. Participation was voluntary. All subjects gave their informed consent for inclusion before they participated in the study. As an incentive, 20 vouchers were raffled among the participants.

The study was conducted as an online survey combining quantitative and qualitative questions. The quantitative questions were used to directly examine students' ESD implementation intention and the relevant influence factors by structural equation modelling. The open questions aimed at examining the understanding of the guiding perspective and the perceived barriers and support needs. The combination of both allowed us to better interpret quantitative data.

2.2. Questionnaire

The online questionnaire used in the present work was developed based on the TPB [20] and supplemented by the motivational variables of the EVT [33]. In addition, participants were asked about perceived barriers and support needs regarding the actual implementation of ESD in schools as well as their interpretation of the guiding perspective. We chose the ESD questionnaire used by Waltner et al. [45] in the BUGEN-project as a base, because it allowed us to compare the results of our ESD survey with student teachers with the results of the ESD survey with in-service teachers.

2.2.1. Understanding of the ESD Guiding Perspective

In order to examine how student teachers understand the guiding perspective implemented in the curriculum, and to make sure that they are aware of the content of the guiding perspective, all participants were presented with the official guiding perspective on ESD at the beginning of the questionnaire. They were then asked to summarize the most important points in their own words.

2.2.2. Influencing Factors of ESD Implementation Intention

We used items from the ESD questionnaire of Waltner et al. [45] for measuring the determinants (attitude, subjective norm, perceived behavioral control) as well as a variety of potential background variables (general attitudes, age, gender, education, knowledge) of intention according to the TPB [20]. For measuring the determinants of intention according to the TPB, we adapted $N = 4$ items for each scale (e.g., "ESD belongs in as many subjects as possible" for measuring ESD attitude; "ESD topics are important to schools" for measuring subjective norm; "Other topics would come up short if I would implement ESD" for measuring perceived behavioral control). For measuring the potential background variable general attitudes, we adapted the scale SD attitudes with $N = 10$ items (e.g., "It is still the case that politicians do far too little to protect the environment"). Participants expressed their agreement for these scales on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). For measuring the potential background variable knowledge, two items were adapted ("Did you know that ESD was included as a guiding perspective in the Baden-Württemberg education plans in 2016?." and "Have you attended any courses in the past four years that addressed ESD?"). Participants expressed their agreement on this scale on a 4-point ordinal scale (1 = no to 4 = yes, I could spontaneously name goals/contents and 1 = no event, 2 = one event, 3 = two events, 4 = three or more events).

Furthermore, we adapted items from a study orientation questionnaire by Karst et al. [46] for measuring ESD implementation intention as well as for measuring the motivational factors according to the EVT (expectation of success, subjective task value: intrinsic value, importance, usefulness, cost [33]). For measuring ESD implementation intention, two items were adapted from Karst et al. [46] (e.g., "I am currently very determined that I will teach ESD in future") and one item was formulated independently ("Can you imagine teaching ESD?"). Participants expressed their agreement on these items on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

For measuring the motivational factors according to the EVT, we adapted $N = 3$ items for each scale from Karst et al. [46], resulting in five scales: expectation of success (e.g., "I will teach the contents of ESD very well"), intrinsic value (e.g., "I will enjoy the implementation of ESD"), subjective importance (e.g., "Implementing ESD addresses issues that are important for me"), subjective usefulness (e.g., "The implementation of ESD will help me even more in my life") and perceived costs (e.g., "For the implementation of ESD I have to invest a lot of time"). Participants expressed their agreement with these items on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

In addition, we used four control items to check the attention of the participants (e.g., "A small test for attention: Please tick the answer option 'strongly disagree'").

2.2.3. Perceived Barriers and Support Needs

An open response format was used for measuring student teachers' perceived barriers ("What difficulty or difficulties do you see in implementing ESD at school?") as well as perceived support needs ("What support/s would you like to have for the implementation of ESD at school?") regarding actual ESD implementation.

2.3. Coding of Open Answers

The data evaluation of the open questions was carried out according to the method of qualitative content analysis by Mayring [47] because this method allows for quantitative analysis once responses have been coded.

2.3.1. Understanding of the ESD Guiding Perspective

The process involved defining a categorization scheme based on inductive and deductive classification for open answers to the item: "What does the guiding perspective of ESD mean to you? Please summarize the most important points in your own words". The categories were mainly developed deductively from the guiding perspective on ESD of the federal state of Baden-Württemberg (see Figure 1). For this purpose, the guiding perspective on ESD was first paraphrased and then abstracted, to divide the content into 42 small units of meaning. These sense units were then reduced and finally transferred into 23 categories. From the results of the deductive generated categories, a coding guide including description, anchor example and keywords emerged. To check the categories, the participants' answers were sorted into the category scheme. Three categories had overlaps, these were transferred into other categories and sorted out. Responses that went beyond the categories were collected and analyzed by means of inductive content analysis. At the beginning, 8 inductively generated categories emerged, 3 of these remained central and were transferred into the final coding scheme. The inductively generated categories were added to the final coding guide with 23 categories in total (see Table 1).

2.3.2. Perceived Barriers and Support Needs

The category guides for the items measuring perceived barriers ("What difficulties do you see in implementing ESD at school?") and perceived support needs ("What support would you like to see for the implementation of ESD at school?") were obtained inductively from the participants' answers. First, the answers of the participants were paraphrased and clustered into units of meaning, followed by a reduction in the units if overlaps became apparent. The results were then combined into eight categories for perceived barriers and nine categories for perceived support needs. A first coding guide was developed. To ensure the validity of the coding manual, the category specifications were checked after approximately 30% of the statements and adjusted. The final coding guides including descriptions, anchoring examples and keywords can be found in Tables 2 and 3.

2.3.3. Interrater Reliability

To perform the interrater reliability check for all categories, 70 statements for each item (roughly 25%) were selected and coded by an independent rater. The range of Cohen's Kappa values of the interrater reliability test for the answers relating to the understanding of the guiding perspective of ESD ranged from 0.65 to 1, and more than half of the values were above 0.90. For the category "perceived barriers", the interrater reliability showed a range of 0.85 to 1, and more than half of the values were above 0.96. For the category "perceived support needs", the range of interrater agreement was 0.80 to 0.94, and the values of 5 out of 8 categories were above 0.89. Taken together, the interrater reliability was good to very good (based on [48]).

2.4. Procedure

The online survey was conducted with the online survey software LimeSurvey. Before the survey began, a qualitative pretest according to Döring and Bortz [49] was implemented with $N = 5$ student teachers in order to identify and eliminate possible processing difficulties. The online survey was available for participants from June 2020 to July 2020. The order of the items used in the survey was randomized to counteract potential halo or question series effects [50]. With the exception of the demographic data items, which were placed at the end of the questionnaire, all items on a page had to be answered completely in order to continue with the questionnaire. With the aim to motivate student teachers to implement ESD in schools, participants had the opportunity to download an information sheet about ESD in schools after finishing the online questionnaire.

Table 1. Coding scheme for the understanding of the guiding perspective on ESD of student teachers.

Guiding Perspective	Definition	Anchor Example	Keywords
		Planning	
Time perspective	It is stressed that ESD has the perspective on future developments.	"To deal with, get and use the values of future-oriented life design." "The following generations will carry this on." "This is about acting with foresight."	Best possible, generations, future, forward-looking, transition
Making informed decisions	Students are enabled to make decisions in complex fields of action. Risks, dangers and uncertainties are recognized and weighed.	"This is about empowering people to form opinions and make decisions." "Students should learn more about (non-)sustainability, its impacts and their own possibilities for action." "Critical, conscious handling of information."	Forming opinions, weighing up, making decisions, critical thinking, consequences, information, knowledge
		Acting	
Responding to problem situations	Students are enabled to respond to current and, above all, future problems and risks. Students should be able to deal with today's problems and risks.	"Problems and challenges in relation to the world of tomorrow." "Enables people to reflectively deal with individual and societal problems and fields of action." "Short or long-term consequences." "Besides acquiring knowledge, empathy, commitment and dealing with risks play a major role." "Explaining consequences and risks of an unsustainable lifestyle."	Problems, challenges, prevention, coping, risks, today, consequences, implications
Acting sustainably	Actions are planned and lived out in a sustainable way. Behavior moves towards a sustainable attitude.	"[...] can apply these to their personal lives." "Learning to adapt actions according to the circumstances." "Dealing with our and their actions in a sustainable way."	Action, changes, behavior, implementation, everyday life
		Participation and Commitment	
Civil participation, engagement	Students are to be made aware of the opportunities for participation and make use of them. Political activism and participation in society are lived out.	"Get involved." "Promote the social engagement of the pupils [...]." "To help shape future generations through their participation."	Co-determination, participation, involvement, willingness, engagement
Good Coexistence [a]	A good living together of the people of the world society. Improving the community and the social aspects.	"ESD aims to empower future generations to act differently towards the environment, the economy and social interaction." "Dealing with fellow human beings and the environment."	Social aspects, world society, togetherness, community, living together, people
		Protection of the environment	
Protection of the environment	Protecting the environment by respecting the limits of carrying capacity and treating the planet with care.	"Education that works for a preservation of the environment." "Respecting the natural limits of the Earth system's resilience."	Protection, environmental concept, resources, limits of resilience, careful use of the earth

Table 1. *Cont.*

Guiding Perspective	Definition	Anchor Example	Keywords
		Motivations and attitudes	
Awareness [a]	There is awareness of current and future events related to climate change. There is awareness of the perception of the living environment.	"Awareness of one's own actions." "Pupils are sensitized at school."	Awareness, Sensitization
Motivation and interest [a]	There is interest and motivation to act sustainably.	"To motivate students to participate and think about sustainability." "To convey enthusiasm for nature and love for the earth."	Motivation, interest, enthusiasm
Values and norms	Students are enabled to incorporate certain norms and values into decision-making processes and their daily lives.	"For this, the most important values and norms are taught."	Moral, values, norms
Responsibility	Students are encouraged to take responsibility for the consequences of their actions. Actions are taken with foresight to avoid negative consequences as much as possible.	"Participate in democratic processes through responsible, thoughtful decision-making." "Students should learn to show responsibility for sustainability and global justice." "For me, the guiding perspectives also convey that each of us can and must participate."	Responsibility of the individual, responsible actions, imperative to act
Justice	Social standard for the fair distribution of resources, opportunities and quality of life among the people of this and next generations.	"Awareness of the injustices of global society." "To enable students to manage the environment responsibly in harmony with functioning economies and justice for present and future generations."	Intergenerational, intragenerational, global and social justice
		Knowledge	
Knowledge acquisition	Students are provided with knowledge through which they understand ESD comprehensively. Knowledge is gained in an interdisciplinary way and includes new perspectives.	"Knowledge is imparted and stimulated on various fundamental and thus influential areas." "Development of a deeper understanding." "All-round education about the world and our society."	Knowledge, knowledge transfer, understanding, education, comprehensive
Intelligent and Innovative Solutions	Students are empowered to create intelligent solutions and innovative ways of living and society.	"Be part of innovation." "Think about sustainable solutions." "[. . .] in an innovative and forward-looking way."	Innovation, solution, life designs, solution-oriented
Complexity and dynamics of ESD	Students are enabled to understand the complexity and dynamics of ESD.	"Sustainable development aims to support students to be aware of the complexity of sustainability." "Awareness of dynamic changes in cultural and social values."	Complexity, dynamics
Peace strategies	Students are able to explore and work with peace strategies.	"In my opinion, ESD is closely related to value, democracy and peace education."	Peace, peaceful

Table 1. *Cont.*

Guiding Perspective	Definition	Anchor Example	Keywords
		Competences	
Creativity	Students can approach situations and circumstances with creativity and think unconventionally.	"[. . .] so that our society and the entire world will be [. . .] more creative and generally better in the long run." "Creative shaping of the future."	Creativity, unconventional, open-minded
Empathy	Students can reflect on their own and others' guiding principles, have an idea of justice and can show empathy for others based on this.	"[. . .] sensitizing them to this." "Developing compassion for others."	Empathy, compassion, solidarity, moral action and thinking
Democratic capacity	Students are enabled to participate in democratic processes. They are acting as responsible citizens in a democratic system.	"To become consumers and citizens of a democratic social order based on consensus." "To qualify students for a better future, to promote a democratic and solidary society and the sustainable use of our planet."	The concept of democracy, aspects of democracy, democratic processes
		SD in specific Roles	
Consumers	The consumer and his role in consumption decisions.	"[. . .] that their consumption decisions and everyday behavior are globally linked and can have corresponding consequences."	Consumption decisions, consumption, consumer role
SD on the job	SD is pursued on the job a student will have in future.	"Ability to make self-informed decisions, different levels (politics, own consumption, on the job)."	Profession, work
		Outcomes of ESDs	
Sustainable Development	Students' acquisition of a conceptual understanding of sustainability and sustainable development should ultimately lead to a sustainable development.	"Sustainability for the Earth and its future inhabitants."	Threat, meaning, contribution, sustainable development, sustainability
Functioning economy	The preservation of a functioning economy.	"[. . .] as well as teaching action for a functioning economy and a just global society."	Economics, economic concept

The category guide was obtained by deductive and inductive content analysis according to Mayring [47]. The guide is based on the guiding perspective of the state of Baden-Württemberg from "Educational Plans" by Ministerium für Kultus, Jugend und Sport Baden-Württemberg [4]. [a] Statements that go beyond the content of the guiding perspective of the state of Baden-Württemberg. These categories were obtained inductively from the answers and added to the category guide.

Table 2. Category guide for perceived barriers regarding ESD implementation in schools.

Perceived Barriers	Definition	Anchor Example	Keywords
Structural barriers	Structural barriers for the implementation of ESD-oriented teaching are seen in the area of (time) resources, the curriculum and the lack of anchoring of ESD in the school system. Regarding the curriculum and the deepening of certain contents, the priority and the displacement of contents are seen as challenging on a structural level.	"The overly tight curriculum makes it difficult to implement ESD due to lack of time and therefore opportunity." "Lack of teachers." "[. . .] difficult to add ESD in addition to the already compulsory material."	Lack of time, time expenditure, effort, curriculum, educational plan, system, lack of teachers, prioritization of content, suppression of content, setting of priorities
Content barriers	Barriers are seen concerning the integration of ESD in cross-curricular teaching. Barriers can occur in the subject integration and due to the complexity of the topic.	"Reference must be made to the subject taught." "[. . .] applied in as many subjects as possible." "One must break down a very complex topic and present it in a simplified, but the correct way."	Interdisciplinary, holistic, referencing, integration of content, complexity
Lack of support from colleagues, headteachers	Barriers to implementing ESD caused by a lack of support in the school staff. Lack of interest and motivation are also seen as barriers.	"Too little support from colleagues, school management." "Some teachers just don't care enough to bring this subject properly to the students." "[. . .] gives a lot of extra work for a teacher to do."	Support, colleagues, school management, attitude, motivation, workload
Competences of teachers	Barriers feared among teachers due to lack of ESD-related skills, methods and knowledge due to insufficient teacher education and teacher training.	"Teachers may not be appropriately trained."	Knowledge, competence, methods, procurement of materials, study
Students	Barriers that are feared among students regarding ESD implementation. Lack of ESD interest and motivation among students, as well as age-appropriate teaching of ESD-related content, are seen as challenges.	"Not to bore the pupils because the topic is omnipresent." "ESD has to be introduced to the children in an age- and a subject-appropriate way."	Boredom, disinterest, age-appropriate, excessive demands, changing values, impact
Subjectivity of the topic ESD	Barriers to the implementation of ESD-oriented teaching because of the accusation of the subjectivity of the topic. The neutrality of the teacher and the teaching content is questioned.	"The subject is partly subjective; there should be no political influence on the student." "[...] mixing of empirical science with political beliefs."	Influence, subjectivity, beliefs, political opinion, personal opinion, indoctrination
Parents	Fear of negative reaction regarding ESD-oriented teaching from parents as a barrier.	"Views on this issue of many teachers and parents." "Protest from parents."	Support, concerns, view, attitude, values,
Extracurricular stakeholders	Lack of interest and too little motivation to act and make decisions on the part of non-school stakeholders are seen as barriers.	"Little interest from politics."	political support, financial support, money, politics
System criticism	The general school system as a perceived barrier for actual ESD implementation in schools.	"The school system as a whole is not very designed to promote reflective and sustainable thinking."	School system, system, reformation

The category guide was obtained by inductive content analysis according to Mayring [47].

Table 3. Category guide for support regarding ESD implementation in schools.

Support	Definition	Anchor Example	Keywords
Teaching material and stimulation	Teaching materials and suggestions should be made available. Further, information and reference material should be available.	"Partially provided material, project ideas." "Scientifically sound information and material on the individual topics."	Teaching material, ideas, suggestions, guide, concept
Structural integration of ESD	ESD should be integrated into the curricula, guidelines and syllabi of every subject. ESD should be integrated into lessons in a cross-curricular and coherent way. Structural support also takes place with the intention to change the current school system.	"It should be addressed more also in other subjects than geography." "The curriculum should create capacities so that the topic can be addressed without possible deficits." "More school curriculum for ESD."	Curriculum, interdisciplinary, integration, G9, significance
Freedom for ESD-oriented forms of teaching	ESD-oriented teaching forms are found in inter-and transdisciplinary approaches. Collaborative learning with reflection processes as well as independent action and planning by the students should be applied. A holistic approach is to be pursued.	"Possibly organized project days/events to let the pupils (as well as teachers) implement partial aspects of sustainable development in first projects." "The possibility of integrating excursions." "Interdisciplinary projects/school projects discussion forums in the school."	Excursions, projects, field trips, discussion forums, project days, initiatives, actions; open education
Teacher education	Support that contributes ESD-related teacher education. ESD is to be promoted in general as well as through knowledge about teaching ESD in a subject specific, cross-curricular and didactic way (professional knowledge).	"Further training for teachers in the area of teaching ESD and bringing it closer to the students." "Extensive training and preparation of teachers." "Expert lectures."	Further education, workshops, seminars, lectures, training, didactic
Cooperation with extracurricular partners	Different actors in the school environment work together productively with extracurricular partners. These are, e.g., parents, politicians, experts, companies or scientists.	"Opportunities for educational partnerships." "Cooperation with sustainable companies and researchers." "Integration of the parents in the topic."	Parents, Education, Partnership, Experts, Extracurricular partnerships
Financial and Political Support	Promote ESD-oriented teaching and school life through funding and policy decisions.	"Money for projects." "Government subsidies." "More financial and legal support."	Funds, financial support, government, policy
Support from colleagues and school management	ESD is supported by teachers and teachers' colleagues as well as school management. There is good cohesion between teachers and teacher's college to implement ESD together. Openness to new things and the motivation to implement new things are necessary.	"Teachers should be open to teach something new." "Motivation of teaching assistants." "All teachers pull together." "Support of the school management/college." "The whole school should be behind it."	Will, support, school leadership, exchange, motivation, cooperation, cohesion in the college, openness
Resources in everyday school life	The allocation of more time and appropriate equipment for ESD-related lessons as well as the increase in teaching staff for ESD are reflected in the resources of everyday school life.	"Sufficient time (possibly also for additional projects)." "Appropriate equipment in the schools, e.g., a functioning school kitchen." "Helpers who agree to lecture at schools, conduct workshops, excursions."	Time, resources, more staff, equipment
Holistic concept, role model school	The concept of ESD should be lived out by the school as a role model. The concept should be reflected in the entire school life.	"To set a good example." "[...] to be more closely linked to the actual living environment and in everyday school life." "Integrating sustainability in general in the school."	Holism, Sustainable Development in all areas of everyday life, living principles, being a role model

The category guide was obtained by inductive content analysis according to Mayring [47].

3. Results

3.1. Understanding of the ESD Guiding Perspective

On average, in their summary of the guiding perspective, the student teachers described 4.3 aspects from the guiding perspective (*SD* = 2.2), with a maximum of 12 different aspects. Five student teachers did not produce a categorizable answer.

By far, the most frequent aspect that student teachers took out of the guiding perspective was the goal of environmental protection, with 57.9%, followed by the goal to enable students to make informed decisions (44.3%). Other common themes were the focus on future (time perspective) and the understanding of the concept of sustainable development (both 38.0%), as well as urging students to take responsibility (35.5%), acting sustainably (30.3%) and to participate and engage in public processes (27.6%). Interestingly, more than 20% of the respondents stated that raising awareness for sustainability issues was part of the guiding perspective, even though this is not mentioned in the text. Around 20% mentioned that ESD aims at improving communities in terms of good coexistence of everyone, which is also not mentioned explicitly in the guiding perspective. Almost 8% stated that the guiding perspective is about promoting certain values and norms. Competences such as empathy, creativity and democratic capacities were described altogether by 15%. Taken together, we found that the student teachers have a strong idea of ESD as environmental protection education, but are also aware of the broader perspective of understanding and dealing with complexity in the context of sustainable development. All results can be found in Figure 2.

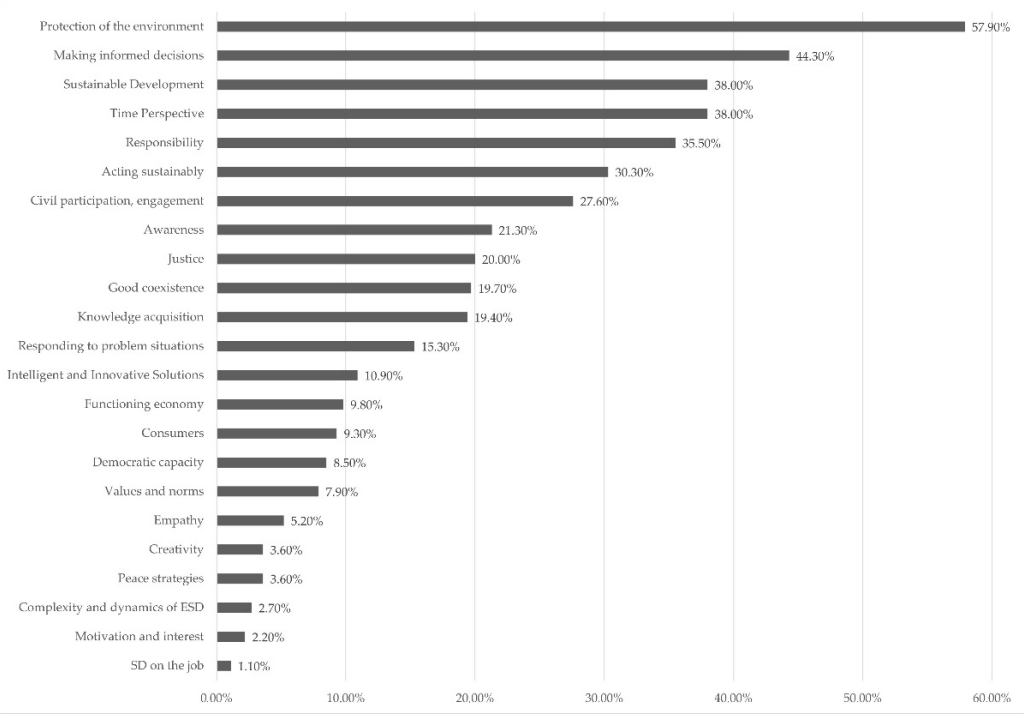

Figure 2. Understanding of the ESD guiding perspective. *N* = 366.

3.2. Factors Influencing ESD Implementation Intention

3.2.1. Data Analysis

In order to determine the influence of different variables on student teachers' ESD implementation intention, a Structural Equation Model was calculated. Before calculating this SEM, an Exploratory Factor Analysis (EFA) was conducted to empirically explore how the model of the TPB [20] can be extended by the determinants of intention according to the

EVT (expectation of success and subjective task: intrinsic value, importance, usefulness and cost [33]). Based on these results and considering the internal consistencies for these scales, the final scales for all variables studied were then formed for the subsequent analyses. Descriptive statistics (sample mean, standard deviation, range, Cronbach's α, number of items, example items) of the final scales can be found in Table 4.

3.2.2. Exploratory Factor Analysis (EFA)

We performed an EFA, because we did not expect a certain number of factors. As the extraction method, we used the maximum likelihood method and as the rotation method, we used the VARIMAX rotation. Neither the scree plot nor the rotated factor matrix gave a clear picture of the number of factors. Therefore, we performed EFAs with six, five and four factors. The five-factor solution yielded the best result, explaining altogether 40.1% of the variance. Two items with loadings < 0.3 were excluded. We could confirm the scales expectation of success, subjective norm, as well as the factor perceived costs. In addition, the items measuring the variables intrinsic value, subjective usefulness and subjective importance, two items originally assigned to the scales ESD attitude and perceived behavioral control loaded on a common factor, which we labeled subjective task value. Thus, the items measuring perceived costs did not load with the items measuring intrinsic value, subjective usefulness and subjective importance on a common superordinate factor subjective task value, as assumed in the EVT by Eccles and Wigfield [33]. This is in line with other studies (e.g., [51,52]) which also found that the items measuring the variables intrinsic value, subjective usefulness and subjective importance loaded on the superordinate factor subjective task value and the items measuring perceived costs loaded on a separate factor. Finally, the fifth factor consisting of three items we originally assigned to the scale ESD attitude and two items we originally assigned to the scale perceived behavior control, we labeled as ESD implementation beliefs.

3.2.3. Final Scales

Internal consistency, measured with Cronbach's alpha, was good (cf. [53,54]) for the scales of intention, expectation of success and subjective task value (see Table 4). For the scales of subjective norm and ESD implementation beliefs, values were slightly worse, but still acceptable ($\alpha = 0.66$ and $\alpha = 0.68$). However, since the exclusion of items would not have led to any improvement in the internal consistency of these two scales, the item assignment of these scales remained unchanged. The perceived costs scale was reduced by the item "I still have a lot to learn to implement ESD", as this resulted in an improvement in Cronbach's alpha from $\alpha = 0.65$ to $\alpha = 0.68$ for this scale.

3.3. Descriptive Statistics

On average, respondents rated their ESD implementation intention as rather high ($M = 4.27$, $SD = 0.74$, *Range* = 1.67–5.00, $\alpha = 0.81$). The scale of ESD knowledge had the lowest mean value and the subjective task value scale had the highest mean value (see Table 4). This shows a general discrepancy between high ESD implementation motivation and low ESD knowledge. For more information, see Table 4.

Table 4. Descriptive statistics (sample mean, standard deviation, range, Cronbach's **α**, number of items, example item) of the final scales.

Scale	M	SD	Range	α	Number of Items	Example Item
Intention	4.27	0.74	1.67–5.00	0.81	3	I am very unsure right now about teaching ESD in the future.
ESD implementation beliefs	4.24	0.59	1.60–5.00	0.68	5	Other topics would suffer if I would implement ESD.
Subjective norm	4.24	0.59	1.60–5.00	0.66	4	Sustainable development topics play a rather subordinate role in schools.
Subjective task value	4.48	0.50	2.40–5.00	0.87	10	Implementing ESD addresses issues that are important for me.
Perceived costs	3.82	0.76	1.00–5.00	0.68	2	I have to invest a lot of time to implement ESD.
Expectation of success	3.89	0.63	1.33–5.00	0.70	3	I will teach the contents of ESD very well.
SD attitudes	4.30	0.63	1.50–5.00	0.83	6	It worries me to think about the environmental conditions our children and grandchildren will probably have to live in.
ESD Knowledge	1.55	0.98	0.50–3.50	-	2	Have you attended any courses in the past four years that addressed ESD?

N = 366. The descriptive statistics (sample mean, standard deviation, range, Cronbach's α) refer to unstandardized values. α = Cronbach's alpha. Five-point Likert scales (1 = disagree, 2 = rather disagree, 3 = partly agree/partly disagree, 4 = rather agree, 5 = agree) were used for measurement, with exception for measuring ESD knowledge (1 = no, 2 = yes, but I could not name goals/contents, 3 = yes, but I would have to think a bit before I could name goals/contents, 4 = yes, I could name goals/contents spontaneously and 1 = no event, 2 = one event, 3 = two events, 4 = three or more events).

3.4. Structural Equation Model (SEM)

We used full information maximum likelihood estimation for our analysis. All analyses were run with the lavaan package of the statistic program R. Based on our theoretical consideration as outlined in the hypotheses and the EFA described above, we formulated a model as presented in Figure 3, with subjective task value, perceived costs, expectation of success, subjective norm, ESD implementation beliefs, ESD knowledge and SD attitudes as predictors. Information on all correlations between the constructs used in the model are given in Table 5.

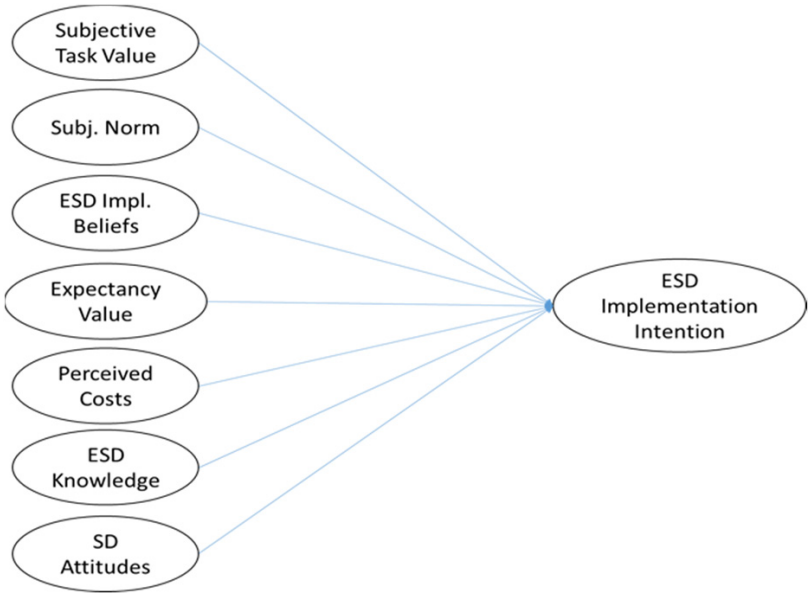

Figure 3. Proposed structural equation model.

ESD knowledge was operationalized through the item "knowledge on the ESD guiding perspectives" and the number of ESD-related courses that had been taken already by the student. For general SD attitudes, at the beginning, all 11 items were included. For SD attitudes, items with factor loadings in the measurement model below 0.40 were excluded; thus, the final number of predicting items for this factor was reduced to six. The resulting model showed acceptable fit indices: CFI = 0.915, RMSEA = 0.045 and SRMR = 0.048 (see [55]). Significant predictors of intention were ESD knowledge, subjective task value and expectation of success. ESD implementation beliefs were only significant in tendency. Subjective norm, perceived costs and SD attitudes did not have any direct predictive value for the intention (see Figure 4).

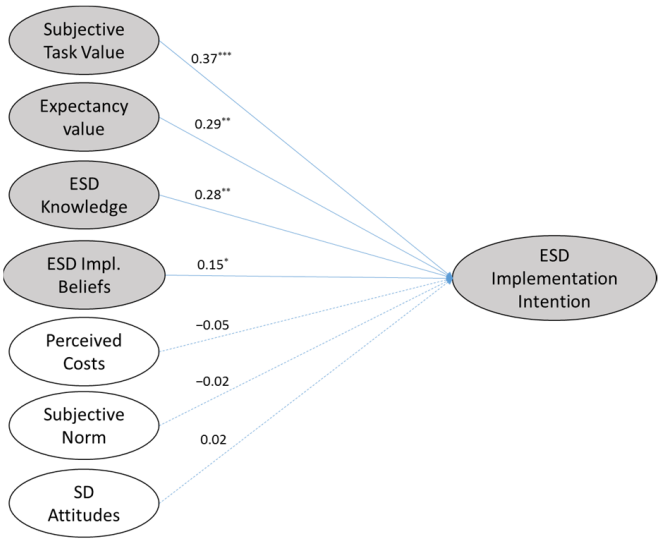

Figure 4. Path coefficients for Model 1. Predictive values are printed in gray. $N = 366$. *** $p < 0.001$; ** $p < 0.05$; * $p < 0.10$.

However, even though they did not directly predict intention, SD attitudes as well as ESD implementation beliefs had a medium correlation with subjective task value. Therefore, we developed a second model with a nested structure (see Figure 5). The model excluded perceived costs and subjective norms, and included ESD implementation beliefs and SD attitudes as predictors for subjective task value. The fit of the model was comparable to the first model: CFI = 0.909, RMSEA = 0.055 and SRMR = 0.053.

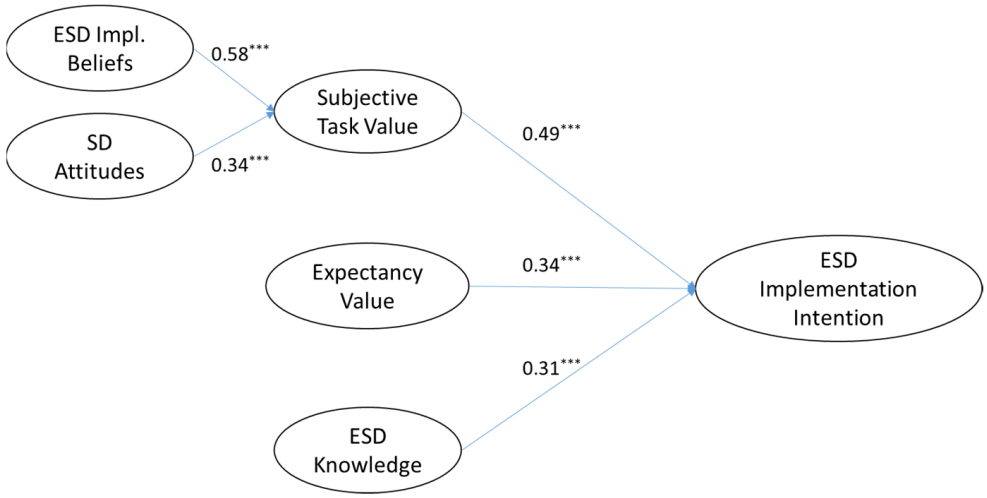

Figure 5. Model 2. All path coefficients are significant at a level of *** $p < 0.001$. $N = 366$.

A direct comparison of both models based on the AIC revealed that the second model had a better fit with the data (AIC Model 1: 25,967.58 vs. Model 2: 20,746.01). Moreover, when comparing the model fits of both models with an ANOVA, there was no significant difference between both models: $\Delta\chi^2 = 165.42$, $p = 0.25$. Consequently, the model with fewer predictors, Model 2, was chosen to explain the data. This means that beliefs about the ESD implementation in school as well as general SD attitudes influenced the subjective task value, and that subjective task value, expectation of success and ESD knowledge together influenced the ESD implementation intention. However, contradicting our hypotheses, perceived costs as well as subjective norm did not play any major role in forming ESD implementation intention.

Table 5. Correlations of the variables of the final scales.

Variable	SN	EIB	STV	ES	PC	I	EK	SDA
Subjective Norm (SN)	1.00							
ESD Implementation Beliefs (EIB)	0.021	1.00						
Subjective Task Value (STV)	−0.017	0.574 **	1.00					
Expectation of Success (ES)	0.018	0.349 **	0.473 **	1.00				
Perceived Costs (PC)	−0.127 *	−0.101	−0.088	−0.269 **	1.00			
Intention (I)	0.013	0.500 **	0.630 **	0.486 **	−0.216 **	1.00		
ESD Knowledge (EK)	0.111 *	0.201 **	0.153 **	0.113 *	−0.117 *	0.338 **	1.00	
Sustainable Development Attitude (SDA)	−0.002	0.360 **	0.553 **	0.244 **	0.009	0.371 **	−0.032	1.00

$N = 366$. * $p < 0.05$ ** $p < 0.01$.

3.5. Perceived Barriers and Support Needs

3.5.1. Perceived Barriers

Student teachers expected structural barriers, such as the lack of time (53.8%), to be most important, followed by barriers arising from the content, such as the complexity of the topics (27%). Roughly a quarter expected too little support by other teachers, and 18.3% felt that they were not sufficiently prepared by their teacher education. Smaller proportions expected to be hindered by lack of motivation of the students (16.4%) or protests of parents (7.1%). Interestingly, 10.1% found that the topics of ESD were too subjective to teach in school (see Figure 6).

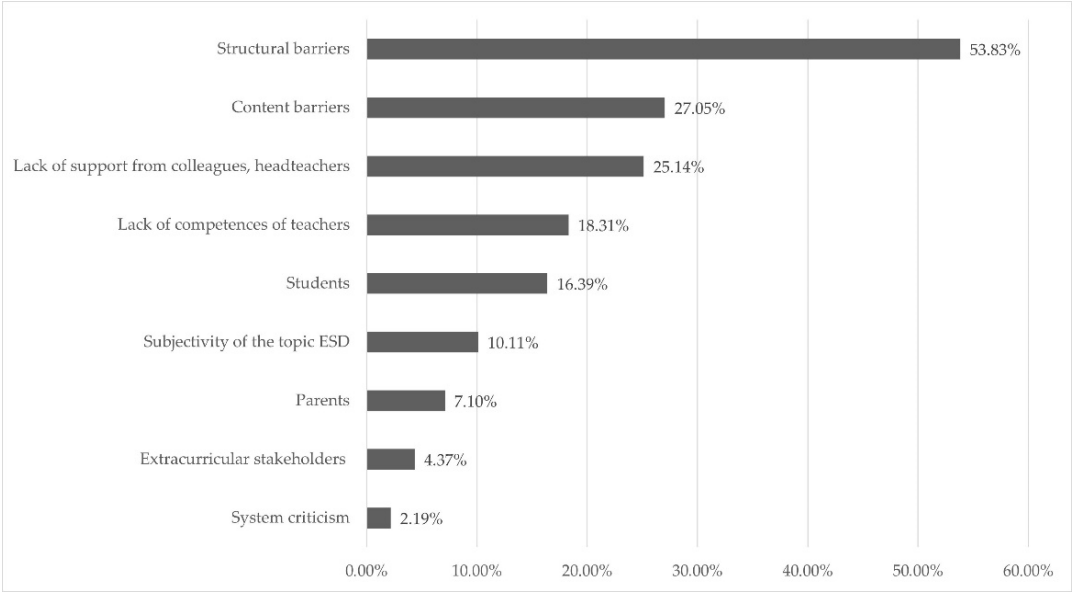

Figure 6. Perceived Barriers towards ESD Implementation Intention. $N = 366$.

Taken together, the student teachers expected little opportunity to teach ESD in the curriculum as well as little support from colleagues and headteachers. A fewer number feared that they might face opposition from parents, students and other stakeholders.

3.5.2. Perceived Support Needs

Student teachers saw the provision of appropriate teaching materials as the greatest source of support (39.6%). This was followed by about a quarter of student teachers who saw support opportunities at the structural level, such as fixed integration into the curriculum (27.6%), freedom for suitable forms of teaching (24.3%) and suitable education and training opportunities for (student) teachers (21.6%). Around one-sixth of the student teachers thought that support by colleagues would be helpful (15.8%), and another 17.5% wished for more financial and political support, as well as more collaborations with extracurricular partners (18.6%) and resources in everyday school life (19.9%). A small group (4.9%) asked for whole institution approach, in which the whole school acts as a role model.

In summary, the provision of materials and lesson plans was seen as the greatest opportunity, whereas structural support does not score as highly as might be expected in relation to Figure 7.

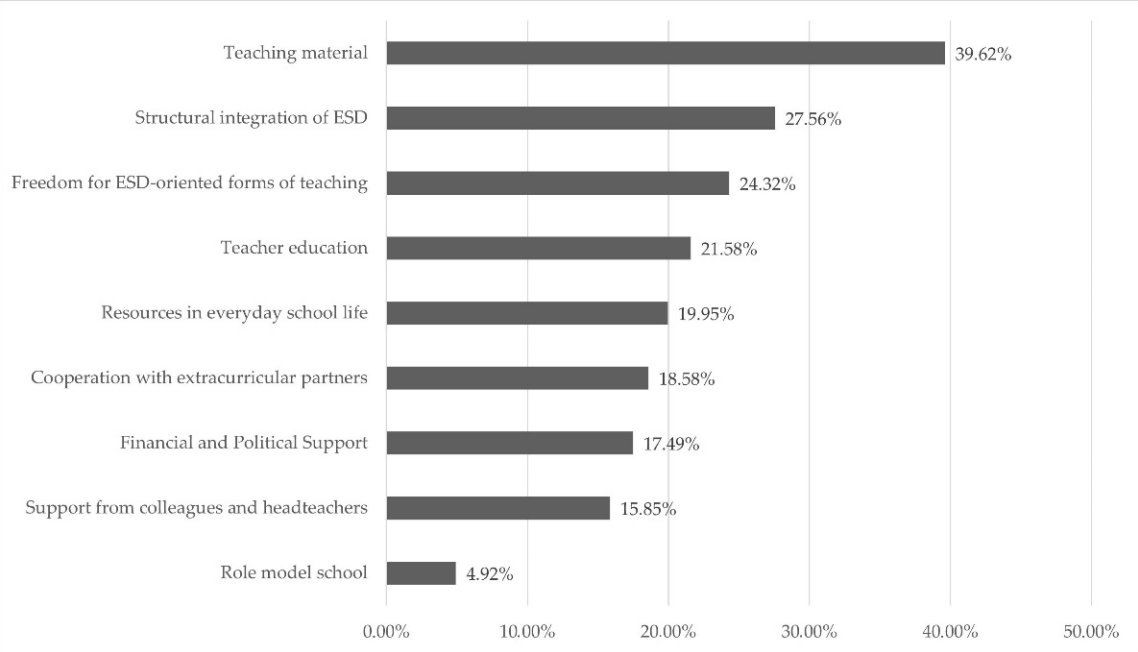

Figure 7. Perceived support opportunities towards ESD implementation intention. N = 366.

4. Discussion

Teachers play a crucial role in implementing ESD in schools. Therefore, ESD is being implemented more and more into curricula worldwide. In our study, we aimed at better understanding of how student teachers understand the ESD guiding perspective that was introduced by the state of Baden-Württemberg (Germany), and to examine what influences student teachers' intention to implement ESD in schools (motivational processes). In addition, we investigated perceived barriers and support needs regarding the actual implementation of ESD in schools to identify potential influencing factors for intention–behavior gaps (volitional processes).

4.1. Discussion

Generally, ESD implementation intention was high among student teachers. This result indicates that the central basic prerequisite for the actual implementation of ESD in schools among student teachers is fulfilled (cf. [16–20]).

Consistent with the EVT Model [33], high subjective task value and expectation of success towards ESD implementation in schools were found to be positive predictors of ESD implementation intention. Thus, these results indicate that student teachers' ESD implementation intention is particularly high if they attribute high subjective value, i.e., fun, interest, importance and usefulness, to ESD implementation in schools, and if they think that they can successfully implement ESD in everyday school life. These findings are in line with results of previous studies (e.g., [56–58]). For example, in a study by Bong [56], students' subjective task value and expectation of success influenced their course enrollment intentions. The superordinate variable subjective task value is based on the results of the present EFA, composed of the subcomponents intrinsic value, subjective importance and subjective usefulness. Eccles and Wigfield [33] note that the variable "intrinsic value" is closely related to the variable "intrinsic motivation" of the self-determination theory according to Deci and Ryan [59]. Intrinsic motivation is defined here as a person's effort to do something for its own sake, because of pleasure or interest in the thing. A variety of study results show that intrinsic motivation positively influences the quality of learning processes and outcomes [60]. For example, findings indicate that intrinsically motivated learners, compared to extrinsically motivated learners (motivated by external factors), experience more attention, curiosity and self-confidence toward a particular task, which translates into more sustained persistence, creative ability, better performance [61,62], increased identification with professional education [63], increased job satisfaction [64] and general well-being [65]. Thus, ESD courses for student teachers should be designed to elicit enjoyment and interest in implementing ESD in schools. According to Deci and Ryan [59], the enjoyment of and interest in implementing ESD in schools increases by addressing needs competence (e.g., informative feedback, recognition, professional knowledge), autonomy (e.g., self-directed learning and teaching/choice, knowledge of agency) and social inclusion (e.g., supportive working and learning environment). In addition, content relevance (e.g., realism), instructional quality (e.g., clear structure) and perceived content interest of the teacher (e.g., commitment) also influence the enjoyment of and interest in implementing ESD in schools [59]. Therefore, it seems profitable to consider these aspects when designing ESD courses. The subjective importance regarding the implementation of ESD in schools could be strengthened through ESD courses, for example, by considering individual interests, wishes and needs of the participants (cf. [19]). Subjective usefulness regarding the implementation of ESD in schools could be promoted in teacher education, for example, through recognition, such as a certificate of participation, or reward, such as ECTS credits. The expectation of success among student teachers can be promoted by teaching ESD-relevant professional knowledge (content knowledge, pedagogical knowledge and pedagogical content knowledge). This includes, for example, teaching knowledge about current problem situations as well as the goals and contents of ESD (content knowledge), fostering skills for changing perspectives and accepting a changed teacher role, i.e., as a learning supporter instead of a role model (pedagogical knowledge) and using appropriate teaching strategies, materials and media (pedagogical content knowledge) [66–68].

Moreover, student teachers' ESD implementation intention was particularly high if they were familiar with the goals and contents of the ESD guiding perspective, and if they had already attended ESD-related courses. In the present study, however, on average the respondents stated that they could not name any goals and contents of the guiding perspective ESD and attended either no or only one ESD course. In line with these findings, only 20% of the surveyed teachers in the ESD survey by Waltner et al. [45] stated that they were familiar with the ESD guiding perspective, most of them not being able to name concrete goals or content. Furthermore, only 15% of these surveyed teachers stated that they had attended an ESD-relevant training event in the past three years [45]. These findings

emphasize the relevance of greater ESD implementation in student teacher education as well as in in-service teacher training. Additionally, reflective essays or learning protocols that prompt (student) teachers to reflect about the connection of knowledge from ESD courses with knowledge (student) teachers gained in other courses or school practice might be promising, because they raise the availability of the knowledge and the perceived usefulness of the contents at the same time.

Finally, we found an indirect effect of SD attitudes and ESD implementation beliefs on intention through subjective task value. This means that the more important a sustainable development in general was to the student teachers, and the more they were convinced that it is principally possible to implement ESD in everyday school life, the more positively they evaluate ESD implementation in schools and, as a result, the higher their ESD implementation intention. Our findings are in line with the assumptions of EVT that the subjective task value as well as the expectancy of success are an important prerequisite for forming an implementation (e.g., [57,58,69,70]). In addition, the indirect effects of general attitudes have been documented by other researchers, including Weber and Fiebelkorn [32]. ESD implementation beliefs can be fostered in ESD courses by addressing the diverse implementation possibilities of ESD in schools (e.g., excursions, projects, experiments, films, artistic design, working with texts). Teacher education could support a positive attitude towards ESD implementation in schools among student teachers, for example, by showing successful examples of ESD implementation (e.g., teaching units and school projects). In addition, communicating and reflecting on the relevance of ESD for a social transformation towards sustainability could play a key role for a positive evaluation of ESD in schools.

When asked about factors possibly supporting or hindering their implementation of ESD in school, student teachers described factors on the individual level (such as the importance of knowledge), but also structural factors on higher levels (integration in the curriculum, availability of resources) and on school level (such as support of colleagues and headteachers). Interestingly, the perceived barriers and support needs resemble the problems named by already teaching teachers, such as a lack of ESD teacher education and teacher training, more ESD teaching material, a lack of ESD knowledge, general overloading of the curriculum and a lack of ESD anchoring in the curriculum (e.g., [7,8,10,13–15]). Thus, the perceived barriers and support needs among student teachers appear to be strongly in line with the actual barriers and support needs regarding ESD implementation in schools. These (perceived) barriers and support needs should be taken seriously in order to strengthen ESD implementation intentions as well as to avoid intention–behavior gaps, such as reported by teachers in previous ESD surveys [7,8,10,14,15]. In order to enable student teachers to implement ESD in schools, a profession-oriented ESD teacher education—i.e., a teacher education that enables the networking of ESD-relevant content knowledge, pedagogical content knowledge and pedagogical knowledge—is necessary, because it generally helps to increase the transfer of knowledge [71]. Following Waltner et al. [45], we therefore recommend an improvement in the quality and quantity of ESD teacher education as well as a presentation of high-quality ESD teaching materials and implementation methods in ESD courses. In order to increase the actual participation in ESD teacher education, there is also a need for appropriate incentives or obligations (e.g., ECTS points and certificates). Another possibility to address perceived barriers and to provide support to students are approaches based on the idea of communities of practice, in which students and teachers form groups, aiming at exchange about ESD in school and realizing and reflecting ESD-projects. A smaller way of realizing community-based approaches would be to invite more teachers to university in order to talk and exchange about successful projects.

Interestingly, student teachers showed a diverse interpretation of ESD. On the one hand, most student teachers associated ESD with environmental protection, which is more related to the simpler idea of ESD 1 [6] that ESD should generally raise awareness of sustainability issues, to convey knowledge and to promote certain values and norms. On

the other hand, many student teachers summarized acting and taking responsibility in a complex world with a perspective on future developments as most important aspects of ESD. In order to promote a sophisticated understanding of the guiding perspective, it might be helpful to actively address the difference between ESD 1 and ESD 2, and support students in their reflection of their understanding.

Another interesting result is that there are also quite a few student teachers who perceived ESD and the related topics as too subjective. This could be due to a lack of understanding of the principles of the Beutelsbach Consensus, which explicitly give recommendations to deal with topics related to political actions and personal opinions. As formulated in the Consensus, ESD explicitly aims at empowering students to make their own decisions and to analyze and influence a political situation according to their own interests. Given the strong impact that non-sustainable development will have on young peoples' future, it should be even more important to empower them to understand current developments, rather than take it out of the curriculum. Again, these findings emphasize the importance of learning more about ESD in teacher education in order to avoid misinterpretations, such as being too subjective and understanding ESD as a mainly environmental education program aimed at convincing individuals to adopt certain behaviors.

In our view, the results from the open answers in general underscore the role of knowledge about ESD for the implementation in school. For example, the call for more ESD teaching material shows that little is known about the vast amount of publicly available material. Furthermore, the call for better curriculum integration stands somehow in contrast to the fact that ESD is already a guiding perspective. Furthermore, although the guiding perspective of ESD is an integral part of what should be learned in school and allows multiple ways to do so, student teachers requested additional time, such as project weeks, which shows that—other than what is expressed in the guiding perspective—student teachers perceived ESD as an add-on rather than as part of everyday teaching. This interpretation is also supported by the finding that quite a number of respondents called for engagement of external experts for teaching ESD-related topics. Again, this shows the need for improving the quality and quantity of ESD teacher education.

In contrast to our hypotheses, we found no significant effects for perceived costs and subjective norm. This means that a perceived high degree of effort as well as a perceived social pressure to implement ESD in their work as teachers had no influence on student teachers' ESD implementation intention. One reason for the absence of an effect could be the operationalization of this variable. In the present study, the items measuring perceived cost referred exclusively to the perceived (time) effort associated with ESD implementation. However, according to Eccles and Wigfield [33], the variable "perceived cost" includes all negative aspects, such as anxiety, associated with a particular task. Therefore, it would be interesting to examine in future studies whether perceived cost has a significant effect on student teachers' ESD implementation intention when this variable also measures subjective anxiety (e.g., fear of failure, fear of learner reaction). On the other hand, even though the subjective norm was no significant predictor in our models, the open answers indicate that there are at least some student teachers who anticipate little support from colleagues, little interest from pupils, and, moreover, negative responses from parents. This seems to be a kind of contradiction. One explanation might be that even though the student teachers in the sample voice concerns that can be summarized as a negative subjective norm, they do not believe at the time of studying that it will reduce their intention to implement ESD when they are in service, if they see at the same time the importance of sustainable development, feel that it is their job to implement ESD in school and expect a positive task value if they act in line with their own values. Another reason for the absence of an effect could be that for many student teachers, the implementation in school is still far in the future, and therefore, they cannot imagine the impact social norms may have on them. A significant effect of the subjective norm on the intention to implement ESD could, therefore, become apparent at a later point in their professional careers. It would be desirable to test this assumption in future studies.

4.2. Limitations

When interpreting these results, it should be considered that the mentioned intention to implement ESD is based on a prospective self-report, which might be influenced by social desirability. Accordingly, respondents' answers might have been positively biased by widespread social norms and expectations regarding sustainable development [49]. In addition, it should be considered that voluntary participation probably could not avoid a certain selection bias towards ESD-receptive student teachers. To counteract these limitations, respondents were informed in advance of the study that participation in the study would be completely anonymous.

Moreover, a high intention does not immediately lead to an actual execution of this behavior. Instead, intention–behavior gaps can occur when problems with the realization of this intention (e.g., no time, lack of knowledge) arise (cf. [19]). Because the actual execution of implementing ESD in schools by student teachers is expected only in the future, it was not possible to investigate actual but rather perceived barriers and support needs which influence the realization of ESD implementation in schools.

Another limitation of the study is the sample, which studied different subjects as well as at different universities. Therefore, the structure of factors influencing implementation intention could be different for subgroups. In addition, the factors identified in the study explained only about half of the variance. Therefore, further studies are needed to gain more insight into other factors that influence student teachers' intention to implement ESD.

Despite these limitations, our study provides insights for the conception of ESD teacher education as well as further research needs for a successful ESD implementation in schools.

5. Conclusions

In summary, the results of the present study indicate that the intention of student teachers to implement ESD is significantly determined by cognitive and motivational aspects. In this regard, the present study revealed a discrepancy between motivation and knowledge. Although the respondents were motivated to implement ESD in schools, especially when they had a positive attitude towards sustainable development, their understanding of the content and goals of the ESD guiding perspective can be further improved. These findings are of direct relevance for the design of ESD teacher education to increase the likelihood that student teachers will implement ESD in their future work as teachers and thereby drive a societal transformation toward sustainable development. Specifically, ESD teacher education should include all domains of teachers' professional knowledge (content knowledge, pedagogical knowledge, pedagogical content knowledge), as this provides a coherent ESD knowledge base [72,73] and, at the same time, increases the motivational aspects that influence the actual implementation of ESD in schools. Profession-oriented teacher education can be achieved by working on learning tasks that enable a coherent connection between content knowledge, pedagogical knowledge and pedagogical content knowledge. More specifically, the participants should be able to experience how they can successfully implement the goals and contents of the ESD guiding perspective in schools, i.e., an implementation that has an impact on students' sustainability competence development.

Thus, this study significantly contributes to the investigation of relevant factors influencing student teachers' intention to implement ESD in schools. The results also provide important information for the design and implementation of ESD teacher education. To advance actual ESD implementation in schools, future studies should investigate further ways to counteract the (perceived) barriers frequently reported by (student) teachers that hinder actual ESD implementation in schools (e.g., overload of curricula, teaching materials, financial and political support and more collaborations with extracurricular partners). The present study provides an important theoretical and empirical basis for such investigations.

Author Contributions: Conceptualization, J.S. and E.W.; Methodology, J.S., R.B. and E.W.; Validation, R.B. and E.W.; Data Curation, J.S.; Writing—Original Draft Preparation, J.S.; Writing—Review and Editing, R.B. and E.W.; Visualization, R.B.; Supervision, E.W.; Project Administration, J.S. All authors have read and agreed to the published version of the manuscript.

Funding: The article processing charge was funded by the Baden-Wuerttemberg Ministry of Science, Research and Art and the University of Freiburg in the funding program Open Access Publishing.

Institutional Review Board Statement: The study was conducted it in accordance with the German Psychological Society's (DGPs) ethical guidelines (2004, CIII) as well as with APA ethical standards. There were no experimental manipulations. In order to take part in the price draw, participants needed to provide an email address. This personalized data was collected on an external page and could not be linked to the answers of the study. Each participant read a consent document about the procedures and data protection, and provided informed consent. All were aware of taking part in research. The data were collected and analyzed anonymously.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: In the case of a private request, our data set as well as the print version of the online questionnaire can be shared in the original language (German).

Conflicts of Interest: The authors declare no conflict of interest.

References

1. UNESCO. *UNESCO-Roadmap zur Umsetzung des Weltaktionsprogramms "Bildung für Nachhaltige Entwicklung"*; Deutsche UNESCO-Kommision: Bonn, Germany, 2014. Available online: https://www.unesco.de/sites/default/files/2018-01/unesco_roadmap_bne_2015.pdf (accessed on 4 August 2021).
2. Kultusministerkonferenz. Zur Situation und zu Perspektiven der Bildung für Nachhaltige Entwicklung. Bericht der Kultusministerkonferenz vom. 17 March 2017. Available online: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2017/2017_03_17-Bericht-BNE-2017.pdf (accessed on 5 August 2021).
3. Nationale Plattform Bildung für Nachhaltige Entwicklung & Bundesministerium für Bildung und Forschung. Zwischenbilanz zum Nationalen Aktionsplan Bildung für Nachhaltige Entwicklung. 2020. Available online: https://www.bne-portal.de/bne/shareddocs/downloads/files/zwischenbilanz_nap_bne_1.pdf;jsessionid=C738FCC583583AAE2F68CC897CB6B414.live382?__blob=publicationFile&v=1 (accessed on 5 August 2021).
4. Ministerium für Kultus, Jugend und Sport Baden-Württemberg. Bildung für Nachhaltige Entwicklung (BNE). Available online: http://www.bildungsplaene-bw.de/,Lde/Startseite/BP2016BW_ALLG/BP2016BW_ALLG_LP_BNE (accessed on 5 July 2021).
5. Wehling, H.-G. Konsens à la Beutelsbach?: Nachlese zu einem Expertengespräch. In *Das Konsensproblem in der Politischen Bildung*; Schiele, S., Ed.; Klett: Stuttgart, Germany, 1977; pp. 173–184.
6. Vare, P.; Scott, W. Learning for a Change. *J. Educ. Sustain. Dev.* **2007**, *1*, 191–198. [CrossRef]
7. Borg, C.; Gericke, N.; Höglund, H.-O.; Bergman, E. The barriers encountered by teachers implementing education for sustainable development: Discipline bound differences and teaching traditions. *Res. Sci. Technol. Educ.* **2012**, *30*, 185–207. [CrossRef]
8. Brock, A.; Grund, J. Executive Summary. Bildung für Nachhaltige Entwicklung in Lehr-Lernsettings—Quantitative Studie des Nationalen Monitorings. Befragung von LehrerInnen. 2018. Available online: https://www.ewi-psy.fu-berlin.de/einrichtungen/weitere/institut-futur/aktuelles/dateien/executive_summary_lehrerinnen.pdf (accessed on 5 August 2021).
9. Buddeberg, M. Bildung für nachhaltige Entwicklung als Querschnittsaufgabe. *Die Dtsch. Sch.* **2016**, *108*, 267–277.
10. Rieß, W.; Mischo, C.; Reinholz, A.; Richter, K.; Dobler, C.; Seybold, H. *Evaluationsbericht, Bildung für Nachhaltige Entwicklung an Weiterführenden Schulen in Baden-Württemberg". Maßnahme Lfd. 15 im Aktionsplan Baden-Württemberg*; Umweltministerium Baden-Württemberg: Stuttgart, Germany, 2008. Available online: https://www.researchgate.net/publication/278619237_Evaluationsbericht_Bildung_fur_nachhaltige_Entwicklung_BNE_an_weiterfuhrenden_Schulen_in_Baden-Wurttemberg_Massnahme_Lfd_15_im_Aktionsplan_Baden-Wurttemberg (accessed on 5 August 2021).
11. Rode, H.; Bolscho, D.; Hauenschild, K. Gute Chancen für Bildung für nachhaltige Entwicklung an Schulen.: Ausgewählte Ergebnisse einer empirischen Studie. *Z. Int. Bild. Entwickl.* **2006**, *4*, 33–35.
12. Seybold, H.; Rieß, W. Von der Umweltbildung zu einer Bildung für nachhaltige Entwicklung?: Erhebung des Ist-Standes an baden-württembergischen Grundschulen. In *Bildung für Nachhaltige Entwicklung: Ergebnisse Empirischer Untersuchungen*; Schrenk, M., Holl-Giese, W., Eds.; Kovač: Hamburg, Germany, 2005.
13. Waltner, E.-M.; Scharenberg, K.; Hörsch, C.; Rieß, W. What Teachers Think and Know about Education for Sustainable Development and How They Implement it in Class. *Sustainability* **2020**, *12*, 1690. [CrossRef]
14. Borg, C.; Gericke, N.M.; Höglund, H.-O.; Bergman, E. Subject- and experience-bound differences in teachers' conceptual understanding of sustainable development. *Environ. Educ. Res.* **2014**, *20*, 526–551. [CrossRef]

15. Hörsch, C.; Waltner, E.-M.; Scharenberg, K.; Rieß, W. Bildung für Nachhaltige Entwicklung als fächerübergreifende Aufgabe—Merkmale von Lehrkräften und Unterrichtspraxis in verschiedenen Fachkulturen. In *Lehr- und Lernforschung in der Biologiedidaktik: Band 9*; Kapelari, S., Möller, A., Schmiemann, P., Eds.; StudienVerlag: Innsbruck, Austria, 2020.
16. Fishbein, M.; Ajzen, I. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*; Addison-Wesley: Reading, MA, USA, 1975.
17. Rogers, R.W. A Protection Motivation Theory of Fear Appeals and Attitude Change. *J. Psychol.* **1975**, *91*, 93–114. [CrossRef]
18. Kuhl, J. *Motivation, Konflikt und Handlungskontrolle*; Springer: Berlin/Heidelberg, Germany, 1983.
19. Heckhausen, H.; Gollwitzer, P.M. Thought contents and cognitive functioning in motivational versus volitional states of mind. *Motiv. Emot.* **1987**, *11*, 101–120. [CrossRef]
20. Ajzen, I. *Attitudes, Personality, and Behavior*, 2nd ed.; Open University Press: Maidenhead, Berkshire, UK, 2005.
21. Ajzen, I. Consumer attitudes and behavior: The theory of planned behavior applied to food consumption decisions. *Ital. Rev. Agric. Econ.* **2015**, *70*, 121–138. [CrossRef]
22. Armitage, C.J.; Conner, M. Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *Br. J. Soc. Psychol.* **2001**, *40*, 471–499. [CrossRef] [PubMed]
23. Gifford, R.; Nilsson, A. Personal and social factors that influence pro-environmental concern and behaviour: A review. *Int. J. Psychol.* **2014**, *49*, 141–157. [CrossRef]
24. Mayerl, J. *Kognitive Grundlagen sozialen Verhaltens.: Framing, Einstellungen und Rationalität*, 1st ed.; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2009.
25. Hasbullah, N.; Mahajar, A.J.; Salleh, M.I. Extending the Theory of Planned Behavior: Evidence of the Arguments of its Sufficiency. *Int. J. Humanit. Soc. Sci.* **2014**, *4*, 101–105.
26. Stranieri, S.; Ricci, E.; Banterle, A. The Theory of Planned Behaviour and Food Choices: The Case of Sustainable pre-packed Salad. Proceedings in System Dynamics and Innovation in Food Networks 2016. *Int. J. Food Syst. Dyn.* **2016**, 209–212. [CrossRef]
27. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
28. Bissonnette, M.M.; Contento, I.R. Adolescents' Perspectives and Food Choice Behaviors in Terms of the Environmental Impacts of Food Production Practices: Application of a Psychosocial Model. *J. Nutr. Educ.* **2001**, *33*, 72–82. [CrossRef]
29. Cheung, S.F.; Chan, D.K.-S.; Wong, Z.S.-Y. Reexamining the Theory of Planned Behavior in Understanding Wastepaper Recycling. *Environ. Behav.* **1999**, *31*, 587–612. [CrossRef]
30. Harland, P.; Staats, H.; Wilke, H.A.M. Explaining Proenvironmental Intention and Behavior by Personal Norms and the Theory of Planned Behavior. *J. Appl. Soc. Psychol.* **1999**, *29*, 2505–2528. [CrossRef]
31. Paul, J.; Modi, A.; Patel, J. Predicting green product consumption using theory of planned behavior and reasoned action. *J. Retail. Consum. Serv.* **2016**, *29*, 123–134. [CrossRef]
32. Weber, A.; Fiebelkorn, F. Nachhaltige Ernährung, Naturverbundenheit und Umweltbetroffenheit von angehenden Biologielehrkräften—Eine Anwendung der Theorie des geplanten Verhaltens. *Z. Didakt. Nat.* **2019**, *25*, 181–195. [CrossRef]
33. Eccles, J.S.; Wigfield, A. Motivational Beliefs, Values, and Goals. *Annu. Rev. Psychol.* **2002**, *53*, 109–132. [CrossRef]
34. Wigfield, A.; Eccles, J.S. Expectancy–Value Theory of Achievement Motivation. *Contemp. Educ. Psychol.* **2000**, *25*, 68–81. [CrossRef]
35. Gallois, C.; Kashima, Y.; Terry, D.; Mcamish, M.; Timmins, P.; Chauvin, A. Safe and Unsafe Sexual Intentions and Behavior: The Effects of Norms and Attitudes. *J. Appl. Soc. Psychol.* **1992**, *22*, 1521–1545. [CrossRef]
36. Orbell, S.; Sheeran, P. "Inclined abstainers": A problem for predicting health-related behaviour. *Br. J. Soc. Psychol.* **1998**, *37*, 151–165. [CrossRef]
37. Sheeran, P.; Orbell, S. Self-schemas and the theory of planned behaviour. *Eur. J. Soc. Psychol.* **2000**, *30*, 533–550. [CrossRef]
38. Stanton, B.F.; Li, X.; Black, M.M.; Ricardo, I.; Galbraith, J.; Feigelman, S.; Kaljee, L. Longitudinal stability and predictability of sexual perceptions, intentions, and behaviors among early adolescent African-Americans. *J. Adolesc. Health* **1996**, *18*, 10–19. [CrossRef]
39. Grimmer, M.; Miles, M.P. With the best of intentions: A large sample test of the intention-behaviour gap in pro-environmental consumer behaviour. *Int. J. Consum. Stud.* **2016**, *41*, 2–10. [CrossRef]
40. Sheeran, P.; Webb, T.L. The Intention-Behavior Gap. *Soc. Personal. Psychol. Compass.* **2016**, *10*, 503–518. [CrossRef]
41. Brandstätter, V.; Schüler, J.; Puca, R.M.; Lozo, L. *Motivation und Emotion: Allgemeine Psychologie für Bachelor*; Springer: Berlin/Heidelberg, Germany, 2013.
42. Ajzen, I. Behavioral Interventions Based on the Theory of Planned Behavior. 2006. Available online: https://www.researchgate.net/publication/245582784 (accessed on 24 May 2021).
43. Sekretariat der Kultusministerkonferenz. Sachunterricht. Available online: https://www.bildungsserver.de/glossarbegriff.html?glossarbegriffe_id=140 (accessed on 3 July 2021).
44. Statistisches Landesamt Baden-Württemberg. Hochschulen. Available online: https://www.statistik-bw.de/BildungKultur/Hochschulen/ (accessed on 6 August 2021).
45. Waltner, E.-M.; Rieß, W.; Mischo, C.; Hörsch, C.; Scharenberg, K. *Abschlussbericht: Bildung für nachhaltige Entwicklung—Umsetzung Eines Neuen Leitprinzips Und Seine Effekte Auf Schüler/-Innenseite*; Pädagogische Hochschule Freiburg: Freiburg, Germany, 2021. Available online: https://phfr.bsz-bw.de/frontdoor/deliver/index/docId/877/file/Abschlussbericht_BUGEN_eBook.pdf (accessed on 5 August 2021).

46. Karst, K.; Ertelt, B.-J.; Frey, A.; Dickhäuser, O. Studienorientierung durch Self-Assessments: Veränderung von Einstellungen zum Studienfach während der Bearbeitung eines Selbsttests. *J. Educ. Res. Online* **2017**, *9*, 205–227.
47. Mayring, P. *Qualitative Inhaltsanalyse: Grundlagen und Techniken*, 12th ed.; Beltz: Weinheim, Germany, 2015.
48. Bortz, J.; Döring, N. *Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler*, 4th ed.; Springer: Berlin/Heidelberg, Germany; New York, NY, USA, 2006.
49. Döring, N.; Bortz, J. *Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften*, 5th ed.; Springer: Berlin/Heidelberg, Germany, 2016.
50. Diekmann, A. *Empirische Sozialforschung: Grundlagen, Methoden, Anwendungen*, 13th ed.; Rowohlt: Reinbek bei Hamburg, Germany, 2005.
51. Conley, A.M. Patterns of motivation beliefs: Combining achievement goal and expectancy-value perspectives. *J. Educ. Psychol.* **2012**, *104*, 32–47. [CrossRef]
52. Trautwein, U.; Marsh, H.W.; Nagengast, B.; Lüdtke, O.; Nagy, G.; Jonkmann, K. Probing for the multiplicative term in modern expectancy–value theory: A latent interaction modeling study. *J. Educ. Psychol.* **2012**, *104*, 763–777. [CrossRef]
53. George, D.; Mallery, P. *SPSS for Windows Step by Step: A Simple Guide and Reference, 11.0 Update*, 4th ed.; A & B: Boston, NJ, USA, 2003.
54. Schmitt, N. Uses and abuses of coefficient alpha. *Psychol. Assess.* **1996**, *8*, 350–353. [CrossRef]
55. Hu, L.; Bentler, P.M. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Struct. Equ. Modeling* **1999**, *6*, 1–55. [CrossRef]
56. Bong, M. Role of Self-Efficacy and Task-Value in Predicting College Students' Course Performance and Future Enrollment Intentions. *Contemp. Educ. Psychol.* **2001**, *26*, 553–570. [CrossRef] [PubMed]
57. Chiu, C.-M.; Wang, E.T. Understanding Web-based learning continuance intention: The role of subjective task value. *Inf. Manag.* **2008**, *45*, 194–201. [CrossRef]
58. Meece, J.L.; Wigfield, A.; Eccles, J.S. Predictors of math anxiety and its influence on young adolescents' course enrollment intentions and performance in mathematics. *J. Educ. Psychol.* **1990**, *82*, 60–70. [CrossRef]
59. Deci, E.L.; Ryan, R.M. *Intrinsic Motivation and Self-Determination in Human Behavior*; Plenum Press: New York, NY, USA, 1985.
60. Prenzel, M.; Drechsel, B. Ein Jahr kaufmännische Erstausbildung: Veränderungen in Lernmotivation und Interesse: One year vocational education—Changes in learning motivation and interest. *Unterrichtswissenschaft* **1996**, *24*, 217–234.
61. Deci, E.L.; Ryan, R.M. A motivational approach to self: Integration in personality. In *Perspectives on Motivation: Nebraska Symposium on Motivation, 1990*; Dienstbier, R., Ed.; University of Nebraska Press: Lincoln, NE, USA, 1991; pp. 237–288.
62. Sheldon, K.M.; Ryan, R.M.; Rawsthorne, L.J.; Ilardi, B. Trait self and true self: Cross-role variation in the Big-Five personality traits and its relations with psychological authenticity and subjective well-being. *J. Personal. Soc. Psychol.* **1997**, *73*, 1380–1393. [CrossRef]
63. Bergmann, C. Schulisch-berufliche Interessen als Determinanten der Studien- bzw. Berufswahl und -bewältigung: Eine Überprüfung des Modells von Holland. In *Interesse, Lernen, Leistung: Neuere Ansätze der Pädagogisch-Psychologischen Interessenforschung*; Krapp, A., Prenzel, M., Eds.; Aschendorff: Münster, Germany, 1992; pp. 195–220.
64. Holland, J.L. *Making Vocational Choices: A Theory of Vocational Personalities and Work Enviroments*, 2nd ed.; Englewood Cliff, NJ: Prentice-Hall: Hoboken, NJ, USA, 1985.
65. Ryan, R.M.; Deci, E.L.; Grolnick, W.S. Autonomy, Relatedness, and the Self: Their Relation to Development and Psychopathology. In *Theory and Methods*, 1st ed.; Cicchetti, D., Cohen, D.J., Eds.; Wiley: New York, NY, USA, 1995; pp. 618–655.
66. Biebricher-Sondermann, R.; Maier, P. Verbraucherbildung als Teil einer BNE in der Lehrkräftebildung Kompetent und nachhaltig durch den Angebotsdschungel: Lehrkräfte sind wichtige Impulsgeber. In *BNE-Strukturen Gemeinsam Gestalten: Fachdidaktische Perspektiven und Forschungen zu Bildung für Nachhaltige Entwicklung in der Lehrkräftebildung*; Keil, A., Kuckuck, M., Faßbender, M., Eds.; Waxmann: Münster, Germany, 2020; pp. 71–82.
67. Hellberg-Rode, G.; Schrüfer, G. Professionalisierung für BNE in der Lehrkräftebildung. In *BNE-Strukturen Gemeinsam Gestalten: Fachdidaktische Perspektiven und Forschungen zu Bildung für Nachhaltige Entwicklung in der Lehrkräftebildung*; Keil, A., Kuckuck, M., Faßbender, M., Eds.; Waxmann: Münster, Germany, 2020; pp. 217–234.
68. Waltner, E.-M.; Rieß, W.; Brock, A. Development of an ESD Indicator for Teacher Training and the National Monitoring for ESD Implementation in Germany. *Sustainability* **2018**, *10*, 2508. [CrossRef]
69. Bong, M. Between- and within-domain relations of academic motivation among middle and high school students: Self-efficacy, task value, and achievement goals. *J. Educ. Psychol.* **2001**, *93*, 23–34. [CrossRef]
70. Eccles, J.S. Gender Roles and Women's Achievement-Related Decisions. *Psychol. Women Q.* **1987**, *11*, 135–172. [CrossRef]
71. Hammerness, K. From coherence in theory to coherence in practice. *Teach. Coll. Rec.* **2006**, *108*, 1241–1265. [CrossRef]
72. Hellmann, K.A.; Kreutz, J.; Schwichow, M.G.; Zaki, K. *Kohärenz in der Lehrerbildung: Theorien, Modelle und empirische Befunde*, 1st ed.; Springer VS: Wiesbaden, Germany, 2018.
73. Graichen, M.; Wegner, E.; Nückles, M. Wie können Lehramtsstudierende beim Lernen durch Schreiben von Lernprotokollen unterstützt werden, dass die Kohärenz und Anwendbarkeit des erworbenen Professionswissens verbessert wird? *Unterrichtswissenschaft* **2019**, *47*, 7–28. [CrossRef]