

Article

“I Wanted a Profession That Makes a Difference”—An Online Survey of First-Year Students’ Study Choice Motives and Sustainability-Related Attributes

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Abstract: Higher education institutions are obligated to facilitate students in the development of sustainability competencies, which enable them to act as “change agents” in their future profession-specific environment. Therefore, students’ study motives, prior knowledge, attitudes, and experiences regarding sustainability should be considered when designing Education for Sustainable Development (ESD) programmes. The present study compares first-year students in teacher training with first-year students in other study programmes and explores their study choice motives as well as sustainability-related conceptions, engagement and self-efficacy beliefs using a semi-standardised online questionnaire. Results show that the choice of study is dominated by intrinsic factors and the relevance of extrinsic factors differs by degree programmes with lower extrinsic values for the teacher training students. Regarding sustainability, we find simple and often unelaborated concepts. Teacher training students show significantly higher scores than non-teacher training students regarding the sustainability-related behavioural domain and self-efficacy beliefs. In addition, a gender gap increasing with age and with lower sustainability scores for older males could be identified but only for teacher training students. In conclusion, the results show valuable starting points as well as challenges that should be considered when designing target-oriented learning processes in (inter)disciplinary sustainability courses at higher education institutions.

Keywords: higher education; education for sustainable development; study-choice motivation; sustainability conceptions; sustainability engagement; self-efficacy

1. Introduction

At the international level, the UN Decade “Education for Sustainable Development (ESD) 2005–2014” [1], the follow-up programme “Global Action Programme 2015–2019” [2], the “Global Education 2030 Agenda” [3,4], and the current “ESD for 2030” programme [4] emphasise the particular importance of integrating ESD into all levels of education.

Consequently, Higher Education Institutions (HEIs) also play a key role in promoting a sustainable, future-oriented development [5]. They should “lead by example” [6], incorporating sustainability values and practices in teaching, research, institutional management, and operational systems [7]. Students at HEIs should be qualified as future decision makers; it is important to raise their awareness of (un)sustainable development and to support them in the development of competencies that are important in terms of sustainable development (SD), such as systems, critical, anticipatory thinking, problem-solving competence, and the ability to participate [8–10]. They should be prepared to act as influential citizens and

“change agents” in their profession-specific environment and to take part in the necessary societal transformation towards SD [5,7].

Even though HEIs are increasingly committing themselves to the guiding principle of SD and organising themselves in international initiatives and networks [5,11], a strategic and practically effective process for anchoring the guiding principle, which also includes the integration of ESD in the curricula of higher education, is mostly the exception [5,12]. Although ESD is in the process of being implemented at HEIs and the body of literature on ESD is growing [13], empirical studies assessing learning outcomes are rare [14]. As innovative pedagogical approaches based on a constructivist understanding of learning are increasingly gaining importance in higher education, research into students’ individual learning prerequisites is also of increasing relevance, as is a field of research on which there is little literature in many areas of study. Knowing learners’ personal experiences, motivations, conceptions, and attitudes support designing learning as interaction between these prerequisites and new structures and perspectives. Thus, students can be supported in developing an entire network of mental structures, allowing them to establish rational and meaningful relationships with the environment and society [15].

In the context of an increasing orientation of HEIs towards the idea of ESD, the Austrian University College of Teacher Education Tyrol (UCTE Tyrol) and the Swiss University of Applied Sciences of the Grisons (UAS Grisons) are in the process of a strategic implementation of ESD since 2019. Within the framework of the research project “Measuring impact—ESD in higher education”, the two HEIs are concerned with finding the sustainability-relevant entry requirements students meet when they begin their academic studies and—in the course of a long-term study—how they develop their sustainability competencies and their SD-professional action competence during their studies.

The present paper is guided by the overarching research goal to find first-year students’ study choice motives and SD-related conceptions, engagement, and self-efficacy beliefs and to derive conclusions and implications for an effective, target group-oriented HESD. The study variables are representative aspects of the cognitive, affective-motivational, and behavioural domains of sustainability competencies and important elements of SD-specific professional action competence (see Section 2.1). Accordingly, the present study focuses on the following research questions:

- What motivates first-year students to choose a certain degree programme, and do aspects of sustainability play a role in their motives?
- How can the students be characterised regarding their sustainability conception, their engagement in sustainability and their sustainability-related self-efficacy?

There are indications in the scientific literature that variables related to value-oriented concepts—such as sustainability—vary depending on disciplinary and professional backgrounds and gender. Therefore, degree programme and gender are defined as independent variables and a third research question is addressed:

- What differences can be identified across the various study programmes and do socio-demographic characteristics, e.g., gender, play a role?

From previous research, the following two hypotheses could be derived:

Hypothesis 1. *The study choice motives differ between degree programmes.*

Hypothesis 2. *There are differences in the sustainability-related attributes (sustainability conceptions, engagement in sustainability and sustainability-related self-efficacy) according to the degree programme (teacher training vs. non-teacher training students), expecting higher values for teacher training-students and, according to gender, expecting higher results for females.*

2. Theoretical Background and State of the Art

2.1. Higher Education for Sustainable Development (HESD)—Purpose and Learning Outcomes

HEIs aim at qualifying future decision-makers for roles in politics, economy, and society. It is a common concern of Higher Education for Sustainable Development (HESD) to support students in gaining an understanding of interrelationships and the importance of SD in general, as well as for their later professional fields. Hence, HEIs are obligated to facilitate students in the development of knowledge, mindsets, and competencies enabling them to participate in societal negotiation and co-creation processes in favour of SD [10,16–18] and thus contribute to the realisation of a “Great Transformation” [19]. In the sense of this emancipatory approach of ESD [20,21], the aim is not to educate people to behave in a certain way but to enable them to think critically about SD-related questions and to participate in shaping SD [8,10,22,23].

To achieve this, key competences of ESD are required, such as systemic, anticipatory, value-oriented, strategic thinking, as well as interpersonal and problem-solving competencies or the competence of collaboration [10,24]. Systematic literature reviews have shown there are many different concepts of sustainability competencies and ESD learning outcomes, such as skills, literacy, or capabilities; however, they often include very similar elements [25]. These competencies are highly generic and not yet well specified in terms of different competence levels or regarding their meaning and application domains across various disciplinary and professional contexts [13,26,27]. While there are already some models for “(E)SD-specific professional action competences” for the teaching profession [28], the approaches for other professional disciplines are (still) rare and rather pragmatic.

Common to all models of (E)SD learning outcomes, however, is that they cover knowledge, skills, attitudes, and values. While the behaviour domain is often missing in earlier descriptions, current attempts to operationalise sustainability competencies, as well as “(E)SD-specific professional action competences”, consider the trilogy of the cognitive, affective-motivational, and behavioural domains [24,27–32] (Figure 1, upper part). The following variables are relevant aspects within the mentioned domains (Figure 1; lower part):

- Study choice motives as part of the affective-motivational domain (see Section 2.2): motives determine our behaviour, give insight into personal preferences, and influence the course of study and academic achievement [33–37]. From the perspective of ESD, study choice motivation can be analysed by looking at the importance of intrinsic and extrinsic motives and the role that society and future-related aspects play [28].
- Sustainability conceptions as part of the cognitive domain (see Section 2.3): they give insight into the cognitive representation about the term sustainability, which is a fundamental prerequisite for learning processes in the field of ESD [27,28]. Sustainability conceptions show the extent to which certain sustainability principles are anchored in the idea and which dimensions are included. From these, good starting points for ESD can be derived.
- Engagement in sustainability as part of the behavioural domain (see Section 2.4): students’ sustainable behaviours and their active engagement in sustainability initiatives give insight into students’ behavioural patterns and experiences within the fields—equally important prerequisites for ESD.
- Sustainability-related self-efficacy (see Section 2.5) as part of the affective-motivational domain: sustainability-related self-efficacy beliefs show that people believe their actions make a difference, which has a major impact on their behaviour to act in a socially responsible way [38,39]. High self-efficacy expectations are seen as having great potential to foster the development of sustainability competencies and corresponding professional action competence [27,28].

	Cognitive domain	Affective-motivational domain	Behavioural domain
Including e.g.	<ul style="list-style-type: none"> knowledge about fundamental concepts and structures of sustainability knowledge of ecological, social, cultural, economic and political systems with connection to sustainability-related questions convictions about the importance of sustainability for one's own field of study, the future etc. 	<ul style="list-style-type: none"> Motivations Values (such as personal acceptance of the intergenerational idea of justice) Normative preferences and objectives Attributions of responsibility Self-efficacy-beliefs etc. 	<ul style="list-style-type: none"> Practices of sustainable behaviour Reflections on daily routines Develop and testing new sustainable action patterns
considered in the present study	<p><i>Sustainability conceptions (section 2.3)</i> measured over → own definition on sustainability → weak / strong sustainability</p>	<p><i>Study choice motives (section 2.2)</i> interpreted from an E(SD)-perspective</p> <p><i>Sustainability-related self-efficacy beliefs (section 2.5)</i> measured over → sustainability-related individual self-efficacy → sustainability-related collective self-efficacy</p>	<p><i>Engagement in sustainability (section 2.4)</i> measured over → self explained sustainability-related engagement → sustainability actions in everyday life</p>

Figure 1. Examined aspects of the study in the context of competence domains.

There is a need for corresponding pedagogical approaches at HEIs that not only impart knowledge but also allow interdisciplinary, problem- and project-oriented learning, thereby supporting the development of respective skills [15,28,40,41]. For an effective design of such constructivist learning environments, where students learn by connecting new information with existing knowledge in collaborative and situated learning environments [42], the focus must be on the students' entry prerequisites. With what motivations, conceptions, values, everyday experiences, beliefs, etc. do students at HEIs approach their studies? How heterogeneous is this student body in terms of relevant learning conditions, which determine the use of the learning opportunities offered? Understanding what students perceive as relevant at the beginning of their academic career and what they bring with them in terms of prior knowledge, attitudes, and experiences regarding SD should be considered when designing (E)SD programmes. Findings on this can provide valuable starting points for the design of learning processes.

2.2. Study Choice Motives

To tie in, it helps to understand what motivates people to decide and act in a certain way. In general, it is the striving for control and for achieving (or avoiding) goals, whereby various factors influence direction, persistence, and intensity of purposeful behaviour, such as dispositional personality traits or incentives inherent in the activity itself or deriving from the expected results [33,43].

Besides skills and cognitions, individual motives, or one's motive system consisting of a bundle of motives, is one of the major determinants of behaviour [33]. Motives are enduring dispositions that determine the initiation, direction, intensity, and duration of individual behaviour [33]. Motives depend on individual preferences and determine how strongly positive stimuli or events are evaluated, triggering behaviour due to the prospect of goal achievement [34,35].

To date, there have been almost no studies on study choice motives that consider motives related to SD, such as contributing to society or helping to shape a future worth living in. Additionally, the importance and distinctions of intrinsic and extrinsic motives in different degree programmes is not yet researched thoroughly. There is a connection between the distinctions of extrinsic/intrinsic motivation and egoistic (the activity must have a direct benefit for oneself) and altruistic motivation (without self-interest, e.g., to help other people) in that altruistic motives refer to an intrinsic orientation of the person because, ultimately, they are determined by internal value dispositions [44].

Intrinsic motives are present when a certain activity is carried out for its own sake, such as subject interest, inclination, aptitude, and the desire for personal development. Extrinsic motives, on the other hand, represent an external influence, such as good employment opportunities, high income, or prestige [44,45]. The distinction between extrinsic and intrinsic motivations is not always unambiguous. For example, when personal values are implemented, intrinsic motivation is usually assumed, although there may also be social influence from third parties [44]. Furthermore, intrinsic and extrinsic motivation are not mutually exclusive; individuals pursue multiple goals with their behaviour [46].

2.2.1. Study Choice Motives of Teacher Training Students

The motives for studying and choosing a profession differ depending on the degree programme selected [47]. For example, a large number of national and international studies of prospective teachers [48–53] shows that intrinsic motives, such as the attributed value of the teaching profession, the joy of working with children and young people, the social contribution, and also the ability to design good teaching [36,54–57], play an important role in study choice. Hence, for teacher training students, the main motive for choosing this field of study is the intention to work with children and young people, which is significantly stronger among first-year teachers in special education and primary education than among those in secondary education [36,37,58]. Various studies show that the importance of extrinsic motives varies greatly among teacher training students [43,54,55]. Due to the high proportion of women in the teaching profession, the most important extrinsic motive is the compatibility of family and career [59]. Compared to other fields of studies, professional status is less important to teacher students, whereas economic and pragmatic motives, such as short duration of training, skills for later family responsibilities, and a versatile and broad education, are more important [60].

In the context of ESD, Brandt et al. [28] show that a large part of social engagement mainly relates to children (in the sense of “preparing children for future life”, “supporting children in their development”), while contributing to social development only plays a minor role. The relatively low importance of the social contribution in the choice of study among student teachers is also visible in the study by Ulich [61], in which contributing to social development was mentioned by only 1% of the respondents.

In contrast, there are research results of older, quantitative studies in which “the important societal task of the teacher” was mentioned by 64% of the 1574 respondents ([62] cited after [52]) or the motive of “improving society” is comparatively important among student teachers [53]. These findings are interesting from an ESD perspective, as students who are more motivated by social commitment to the teaching profession generally also have higher environmental attitudes [28].

2.2.2. Study Choice Motives of Non-Teacher Training Students

There is sparse research on the study choice motives of students at Universities of Applied Sciences (UAS). Hence, when deciding on the type of HEI and the field of study, no clearly prioritised motives can be identified. Rather, different factors and their interplay influence the choice of study, such as social, gender, personality, interests and abilities, previous learning experiences, prospects, or expected benefits [63–66].

Overall, intrinsic motives dominate the choice of study [45,67]. Interest in the field of study and personal values are the most important reasons, although other aspects, such as one’s own abilities or job prospects, also play a role [68]. In general, the prospects of a good salary and the opportunity to improve society are highly valued [67]. The ratio of importance of motives differs depending on the field of study [45,68,69].

Compared to students at universities, UAS students have a more pronounced desire for personal development [66]. In addition, extrinsic motives generally play a more important role for them, such as diverse career opportunities, independent work, secure professional positions, good earning potential, status of the profession, or demand in the labour market [66,67]. The “interest in the subject” motive is very pronounced among

students of cultural studies, humanities, natural sciences [67,68], and engineering [66]. The “opportunity for personal development” is important in economics and social sciences and the expected benefits of “interesting work” in medicine and health care sciences [66,67]. Extrinsic motives, such as “good earning opportunities”, “career opportunities”, as well as “status of the profession”, are of high importance in law, economics, and engineering. For students of economics, social sciences, and engineering, security in the form of “career opportunities” and “secure jobs” are important [66–68]. Other frequent motives of students of economics or social sciences are the “expectation of future independent work”, “contact with people”, “being able to contribute to social change”, and “wanting to help others” [66,67].

Irrespective of gender, intrinsic motives are the most important. Extrinsic motives are mentioned more frequently by male students and social motives by female students [66,67]. In line with this orientation, more women are found in the cultural and social sciences, whereas the opposite is true for engineering or STEM studies [67,69].

2.3. Sustainability Conceptions

First-year students’ sustainability conceptions are very important prerequisites for learning in the context of HESD. Despite the lack of a mutual understanding and definitions of sustainability and SD in the scholarly debate [70], some basic principles are proven as the core of any sustainability discussion [71]; these are the principles of intra- and inter-generational justice, as well as the three-dimensionality of economic, environmental, and social interests [71,72]. These principles form the theoretical framework for interpretation of students’ sustainability concepts in most studies, including the present one.

A recent study conducted by Sundermann and Fischer [18] is highly relevant to the present study. In a literature review, they first examine 17 studies, published from 2008 to 2019, in which sustainability concepts are surveyed among university students from various disciplinary backgrounds. They reveal that students often start their student career with naive and unstructured concepts and—independent of the field of study—primarily associate ecological or environmental aspects with sustainability, while economical and sociocultural aspects hardly play a role. The correlation between students’ conceptions of sustainability and their perceived relevance of sustainability for their current studies and their later professional future highlights the importance of taking students’ sustainability conceptions into account when stimulating learning processes that support the development of an elaborated understanding [18].

In addition, the authors argue that teacher training students differ from other students showing lower scores regarding the perceived relevance of sustainability for their current studies and future profession. For environmental sciences, this is easily explained because sustainability is an integral part of the scientific discipline. However, high values placed on perceived relevance of sustainability for engineering and business administration students are discussed as a possible result of the explicit focus on sustainability in engineering sciences and economics. Only students of digital media seem to be unable to link their field to sustainability aspects, showing lower values than teacher training students, which can be explained due to their clearly defined technical discipline [18].

Some results of qualitative studies provide more concrete insights into the sustainability concepts of students on different degree programmes. Birdsall [73] concludes that the majority of primary education students display very simple, or, at best, “reasonable concepts” based on vague ideas of future orientation, conservation, resource use, and environmental protection. According to other studies examining sustainability conceptions of teacher training students, the environmental dimension dominates, while sociocultural and economic aspects play a minor role in the conceptions (e.g., [74,75]). Furthermore, in the study of Summers et al. [75], 36% (22 out of 61 participants) recognise all three dimensions as relevant and the same percentage mentioned two of these.

With regard to students in technical disciplines, Segalas et al. [76] explore students’ sustainability conceptions, which are mainly linked to environmental and technological

aspects. Engineering students perceive sustainability often as “soft” science, whilst their interest lies in “hard” engineering [77]. Haase [78] states that, for engineering students, sustainability represents a dilemma between their technology fascination and the romantic ideal of nature and environmental sustainability. Among business students, Reid et al. [79] identify the so-called distance-concept (sustainability as “keeping something going”—e.g., in relation to a business or oneself)—and thus a very limited sustainability concept is by far the most common, whereas the more differentiated concepts of “resources” and “justice” occur only (very) rarely.

Gender differences are rarely included in studies on students’ sustainability conceptions. While Tuncer [80] shows that females have a higher understanding and perception towards sustainable development, Azapagic et al. [77] find no significant gender differences. With respect to the perceived relevance of sustainable development for the major subject, it has been shown that this is more pronounced among male students [18].

Other concrete theoretical aspects of sustainability concepts, e.g., to what extent the conceptions correspond more to a strong or weak understanding of sustainability, are usually not addressed in existing studies.

The numerous studies examining students’ sustainability conceptions usually focus on students of a specific disciplinary background without looking at differences in sustainability conceptions across different degree programmes.

2.4. Engagement in Sustainability

The questions of the extent to which students act sustainably and whether they engage in sustainability initiatives are other relevant learning prerequisites in the context of HESD. Such aspects have been addressed previously in some studies—mostly in terms of sustainability (environmental) behaviour and often linked to the knowledge and attitude domains.

According to Al-Naqbi and Alshannag [81], Esa [82], and Tuncer [80], students at HEIs show high levels of understanding, very strong positive attitudes, and moderate positive behaviour toward sustainable development and the environment. He et al. [83] find that university students in China show positive environmental attitudes and encouragement toward environment-friendly behaviours. Oguz et al. [84] report that most students in Turkey, regardless of their academic level, show good attitudes toward environmental issues and support protection of the environment.

Despite these predominantly positive results in the behaviour domain, Chaplin und Whyton (2014) explore that the widely reported value-action gap, which means attitudes and values do not have to result in corresponding actions, appears also among students. University students often pass on their responsibility for sustainability or inability to act to other agencies, such as government, businesses, or their social group, or they perceive to not have the time or resources to act in a sustainable way [85].

Regarding gender differences, studies related to environmental attitudes, concerns, and behaviours show a relatively clear picture that women tend to report higher values than men [86–89]. Olsson and Gericke [90] demonstrate this gap for the environmental, social, and economic sustainability dimensions separately, where females consistently reported significantly higher values than males.

Only a few studies examine how students’ attitudes and behaviour toward SD and the environment differ according to their field of study [62,91]. It can be summarised that students majoring in economics and business administration [91–94], forestry [92], computer science, commerce and law [95], as well as engineering and maths [94] have lower environmental scores than students in other disciplines. Among other variables, Al-Naqbi and Alshannag [81] also examine the extent to which students differ in their sustainability attitudes and behaviours, depending on their degree programme. Regarding students’ attitudes toward sustainability-oriented challenges, there is only one significant difference between students studying law and those studying engineering sciences, which is in favour of the engineers. No significant differences could be found regarding the behaviour domain.

The differences tend to be most pronounced between business disciplines and non-business disciplines, which Sherburn and Devlin [93] explain by suggesting that students majoring in business, economics, and marketing have a more individualistic and/or competitive ideology than students in other disciplines. They see students as choosing a field of study based upon their existing worldviews, beliefs, and interests.

2.5. Sustainability-Related Self-Efficacy

One of the factors promoting engagement is self-efficacy [96,97] because the conviction of being able to master a challenge, solve a problem, or make a difference motivates accordingly.

The generic concept of self-efficacy, an element of the social cognitive theory, means a person's belief that "one can successfully execute the behaviour required to produce the outcomes" [98]. Based on this understanding, it refers to the strong self-referential aspect of perceived behavioural control and/or "the ability to achieve desired outcomes through one's actions" [99]. Self-efficacy influences how people think, feel, motivate themselves, and act [100] and encompasses the motivation needed for facing challenges and the stamina for successfully meeting them even in difficult times ([101], cited after [102]), which is more necessary than ever in the face of major global challenges.

Generally, high self-efficacy in an area of life reinforces approach motivation toward activities in this specific area [98,103]. Several studies support this finding by suggesting a positive relationship between the extent to which people believe that their actions make a difference and their decision to act in a socially responsible manner with the aim to enhance societal well-being ("do good") or to avoid harmful consequences for society ("do not harm") [38,39].

Self-efficacy varies across domains [104] and might depend on gender and age, although study results are contradictory and do not show clear results. Bausch et. al. [105] asserts, with reference to different sources, that age and gender can affect self-efficacy, but the relationship is highly complex. Without diving in deeper here, we would like to shed light on another aspect, namely that self-efficacy changes over time [37,106], especially due to experiences in one or more of the sources of self-efficacy. These are personal mastery experiences or performance accomplishments, verbal persuasion, vicarious learning, and physiological, as well as affective, states and reactions [98,107,108]; however, personal mastery experiences seem to be the most powerful predictor [108]. These findings open a variety of starting points for educational interventions, whereby the aspect of collective power should be considered.

Given the fact that large-scale global challenges such as climate change can only be solved by collective efforts [109], it is obvious that collective efficacy, which, in a holistic understanding, exceeds the sum of the efficacy beliefs of individual members [110], plays a prominent role. Some studies suggest that collective efficacy might have a higher impact on pro-environmental behaviour than individual self-efficacy beliefs [111,112] and that collective efficacy raises group identity [113]. Knowing about this relationship is important since social identity and group affiliation seem to influence how people perceive and assess environmentally relevant topics as well as their willingness to act in a sustainable manner [114]. Moreover, different studies show a positive relationship between the sense of connectedness, the perceived unity and interdependence with others [115], and socially responsible behaviours.

These insights provide important points of reference for developing and implementing educational interventions aiming at strengthening self-efficacy of students in general and in the specific discipline, such as teacher efficacy in the context of ESD.

3. Materials and Methods

3.1. Sample

Data collection by means of an online questionnaire (UCTEs used the portal SosciSurvey and UAS Grisons LimeSurvey) was conducted at the beginning of the study period in October 2020 at the UAS Grisons, the UCTE Tyrol, and the UCTE Styria. All students in

their first semester were invited to take part in the survey and they signed an informed consent. At the UCTE Tyrol and UCTE Styria, there were teacher training students for primary school teaching and at the UAS Grisons, there were students from 11 different degree programs in business administration and information and engineering sciences. Participants were $N = 655$ first-year students (244 teacher training students at the UCTEs Tyrol and Styria and 411 non-teacher training students at the UAS Grisons: Table 1). To achieve the highest possible response rate, the online survey took place during online courses. High response rates were achieved (UCTE Tyrol: 87.5%; UCTE Styria: 95.0%; UAS Grisons: 70.4%).

Table 1. Respondents by degree programme and gender, absolute frequencies.

Degree Programme	Female	Male	Other, N/A	Total
Teacher training students, UCTE Tyrol	78	12	1	91
Teacher training students, UCTE Styria	127	22	4	153
Teacher training students, UCTEs, total	205	34	5	244
Business Administration	31	28	0	59
Tourism	45	14	1	60
Service Design	0	10	0	10
Sport Management	17	38	1	56
Digital Business Management	13	12	1	26
Information Science	36	13	2	51
Mobile Robotics	2	15	0	17
Photonics	1	20	1	22
Multimedia Production	46	32	2	80
Civil Engineering	2	5	0	7
Architecture	8	12	3	23
Non-teacher training students, UAS Grisons, total	211	189	11	411
<i>N</i> , Total	416	223	16	655

The results for some variables examined are not presented at the level of individual study programmes, but at the level of “teacher training students” and “non-teacher training students”, since the sample size of some study programmes of the UAS Grisons was too small for certain analyses (see in more detail Section 3.3.2). Since the implementation date of the survey was set for the beginning of the first semester, the first-year students’ responses are not influenced by the formative education of the respective HEIs. Therefore, irrespective of the “university of origin”, a distinction is only made according to degree programmes.

The gender distribution among the UAS Grisons respondents was balanced (52.6% female) and the teacher training students (UCTEs) were predominantly female (85.8%). Of the 655 participants, 49.9% were between 18 to 21 years old and 51.1% were 22 years and upwards. The first-year students from the UAS Grisons were significantly younger than those from the UCTEs ($p < 0.001$, Cramer’s $V = 0.391$). Overall, female students were younger than male students ($p < 0.001$; Cramer’s $V = 0.290$). There are significant differences in the previous experiences in education by study programme: teacher training students more often completed general secondary education (teacher training students 88.4%, non-teacher training students 32.8%; $p < 0.001$, Cramer’s $V = 0.538$), and a non-teacher training student more often had vocational secondary education (teacher training students 10.4%, non-teacher training students 60.5%; $p < 0.001$, Cramer’s $V = 0.491$). Correspondingly, non-teacher training students more often had previous vocational training (teacher training students 31.1%, non-teacher training students 76.2%; $p < 0.001$, Cramer’s $V = 0.444$). Teacher training students more often completed a voluntary social/ecological year (teacher training students 7.5%, non-teacher training students 2.7%; $p = 0.004$, Cramer’s $V = 0.112$). However, non-teacher training students more often attended civil/military service (teacher training students 7.9%, non-teacher training students 29.2%, $p < 0.001$, Cramer’s $V = 0.251$). There

were no differences between the UAS Grisons and the UCTEs in the tertiary education of the parents ($p = 0.889$, Cramer's $V = 0.005$).

3.2. Questionnaire

In the present study, a semi-standardised questionnaire is used, following the methodology and structure of recent studies in the field [28,116,117] (for a critical review and analysis on respecting instruments, see Redman et al. [13]). The questionnaire is based on the survey instruments developed in the "Educating Future Change Agents" project [28,116] and the study "Nachhaltigkeitsbarometer" in Germany [117], in addition to self-developed questions. The questionnaire contains questions on study choice motivation, sustainability conceptions, engagement in sustainability, and self-efficacy expectations; we also included items on general self-efficacy to better interpret the results of sustainability-related self-efficacy (see Table 2 and the full questionnaire in Supplementary Materials, Table S1).

Table 2. The questionnaire.

	Variable/Index	Implementation
	Study choice motivation	An open question was used at UCTE Tyrol/UCTE Styria: “What is your personal motivation to become a teacher?” [28,57]. The UAS Grisons used 6 closed items: “How important were the following personal motives for your choice of study? Please rank the motives in order of importance by moving the boxes to the right in the correct order. The most important at the top.” [67]
Sustainability-related attributes	Sustainability conceptions	Open item: “What do you understand by the term ‘sustainability’?” ([28], slightly modified). Weak sustainability (understood as natural resources can be replaced by technology and innovation) or strong sustainability (understood as ecology as the basis for people and the economy and therefore given top priority), 4 items on a 7-point Likert scale. Example: 1 = “Too much nature conservation unnecessarily restricts people’s options for action”, 7 = “The protection of ecosystems must take priority over human use” [117], Cronbach’s α in the present study = 0.61.
	Strong (weak) sustainability	
	Engagement in sustainability	“Did you engage in voluntary activities (e.g., in the fields of environment and nature conservation, emergency relief and rescue services, care, support, religion,) or support them, e.g., through donations, prior to your studies?” ([117], slightly modified). 0 = no, 1 = yes.
	Sustainability in everyday life	“It is often not easy to implement sustainability in one’s own everyday life. For each of the following examples, please indicate the extent to which you have done this yourself in the last three years” with 4 items, 5-point Likert scale (1 = “never”, 5 = “always”). Example: “I buy regional, seasonal and organic foods” [118], Cronbach’s α in the present study = 0.56.
Self-Efficacy beliefs	General;	“To what extent do you agree with the following statements?” The three indices were measured on a 4-point Likert scale (1 = “strongly disagree”, 4 = “strongly agree”). 8 items, Example: “I often feel that I have little influence on what happens to me” [119], Cronbach’s α in the present study = 0.67. 4 items, Example: “With my actions I can contribute to a sustainable development” [120,121], Cronbach’s α in the present study = 0.71.
	Sustainability-related individual; Sustainability-related collective	4 items, Example: “We as students can together encourage/motivate others to act more sustainably” [121], Cronbach’s α in the present study = 0.75.
Demography	Age groups; Gender; Degree programme;	1 = 18–21 years of age, 2 = 22 years and more; 0 = male, 1 = female (2 = other, N/A); 0 = non-teacher training (see Table 1), 1 = teacher training (primary school);
	Previous experiences in education;	general secondary education, yes/no, vocational secondary education, yes/no;
	Service completed;	voluntary social/ecological year, yes/no; civil/military service, yes/no;
	Tertiary education of the parents	Does/do one or more of your parents/legal guardians have a completed academic education? yes/no.

Note: For scales with fewer than 10 items, it is acceptable to find Cronbach’s α range between 0.50 and 0.70.

3.3. Data Analysis Strategy

3.3.1. Qualitative Analysis

The answers to the open questions about the motivation for becoming a teacher and to the understanding of sustainability were analysed using the MAXQDA Analytics Pro 2020 software. We followed the procedure of thematic qualitative text analysis according to Kuckartz (2014). In a first step, the categorisation was carried out deductively on the basis of main thematic categories, where we basically followed the code books developed from Brandt et al. (cf. [28,116]).

The category scheme for analysing the motivation question represents a modified form of Watt and Richardson's [57] FIT choice model with the following main categories: "Socialization influence", "Prior teaching and learning experiences", "Task demands", "Personal utility values", "Perceived teaching ability", "Intrinsic career value", "Task returns", "Social utility values—focus on children" and "Social utility values—focus on society". Since students may be motivated by various factors, multiple categories were assigned per student. In a trial run, two coders independently analysed 30% of the data material to test the applicability of the categories (according to Kuckartz [122], 10–20% of the data should suffice for this initial test). According to the results, some minor adjustments to categorisation were necessary (see Supplementary Material, Table S2). Due to the low number of mentions, the categories "Personal utility values" and "Task returns" were combined to form the category "Personal utility value—regarding extrinsic factors" and separated from the category "Personal utility value—regarding individual development". Following this, the main coding process, divided between two coders, was carried out. For determination of intercoder reliability, 10% of the data were coded by both researchers. The intercoder agreement as a calculation of the relative proportion of matching coding [123] shows a very high degree of agreement at 95%. Referring to the process of "consensual coding" ([124], cited from [122]), the cases of different coding were discussed, agreement reached, and corresponding adjustments in the analysis of the entire material were made. In relation to the research question, particularly relevant and frequently occurring categories, such as "social commitment—related to children", were further differentiated by constructing sub-categories inductively from the material [123].

The analysis of the open question concerning the sustainability definition was conducted by three coders. Since intercoder reliability was not sufficient after the first coding process of all replies, the category definitions and boundaries were refined and another run through the entire data material was conducted. Afterwards, the few remaining discrepancies were discussed consensually. The analysis results were transformed into document variables and transferred to SPSS to integrate corresponding elements into further quantitative analyses.

3.3.2. Quantitative Analysis

The quantitative data analysis was performed using SPSS 26. A preliminary ANOVA analysis showed no significant mean differences between the teacher training students from the UCTE Tyrol and the UCTE Styria; thus, the teacher training students from both UCTEs were treated as one group in the subsequent analyses. Further, an ANOVA was calculated only for the subsample of UAS regarding degree programme differences in study choice motives. For the final MANOVA analysis, the students from UAS Grisons with their different fields of study were grouped into "non-teacher training students" because the sample size was too small to analyse all different fields of study separately. After displaying descriptive statistics by gender, age, and degree programme, a multivariate analysis of variance (MANOVA) was conducted on the seven sustainability-related attributes with gender, age, and degree programme as fixed factors. Concerning the sustainability-related attributes, preliminary analyses showed no significant effects of the first-year students' previous experience in education, service completed, age, and the tertiary education of the parents. Therefore, these variables were not included in the final MANOVA.

4. Results

4.1. Study Choice Motives

Answers to the open question posed to teacher training students were categorised according to the FIT-Choice-Model [57], modified by Brandt et al. [28]. For 77.5% of the teacher students, motivational aspects included social engagement with a focus on children. Respondents most frequently referred to:

- Accompanying and supporting the development process of children (“I’m passionate about accompanying children on their journey”; UCTES635).
- The opportunity to teach children and to provide them with the foundation or the tools they need for their future life and their course of education (“The thought that I can teach people (children) and prepare a basic foundation for their future life is very beautiful and motivates me for my upcoming studies”; UCTES599).
- Generating fun, joy, and motivation for learning (“I will instil the joy of learning in them” UCTES779).

The second most stated motivational factor referred to interest in the teacher training, which was mentioned by 52.0% by formulating statements such as “enjoy working with children, a multi-faceted, exciting job” (UCTET186). The third most cited category refers to former learning and teaching experiences, which influences the decision to become a teacher for approximately a quarter (24.2%) of the persons asked. A considerably smaller percentage of all respondents (8.6%) state social engagement regarding society in general as a motivating factor, using statements such as “performing a job with purpose and slightly improving the world through better education” (UCTET209). Quite rarely, factors referring to professional requirements regarding teaching (7%, e.g., “What particularly fascinates me about this job is that it brings with it daily new challenges and that one must deal with many different personalities and situations”; UCTET184), the self-perceived ability to teach (5.7%, e.g., “I enjoy being engaged with children and am able to convey the right values”; UCTES635) or the expected benefit regarding individual development (6.1%, e.g., “getting so much in return from children”; UCTES544) were mentioned. Least mentioned were social influence, such as family tradition or influence by friends (3.3% of respondents) or extrinsic motivation factors, such as job security, good job prospects, or compatibility of career and family (2.5% of all respondents).

UAS Grisons students, on the other hand, ranked various motivational factors according to their importance (Table 3). The mean values of the motivations differed in their importance ($N = 423$). The most important motivation for choosing to study at UAS was interest in the subject and content ($M = 1.94$, $SD = 1.24$), followed by professional technical training ($M = 3.09$, $SD = 1.37$), the opportunity to help shape a future worth living ($M = 3.12$, $SD = 1.41$), career opportunities/higher future salary ($M = 3.25$, $SD = 1.48$), and the opportunity to make decisions ($M = 3.92$, $SD = 1.19$); the lowest ranked motivation was family tradition ($M = 5.69$, $SD = 0.83$).

A variance analysis was performed to determine whether there were significant differences in the study choice motives between UAS Grisons’ degree programmes. Significant differences could be found regarding the opportunity to help in shaping a future worth living ($p < 0.001$, $\eta^2 = 0.07$), career opportunities/higher future salary ($p < 0.001$, $\eta^2 = 0.12$), and interest in the subject and content ($p < 0.001$, $\eta^2 = 0.16$).

Thus, study programs differed most regarding the motivational factor “interest in the subject and content”, explaining 16% of differences. First-year students in business administration and civil engineering ranked interest in the topic and content significantly lower than first-year students in other programs.

The degree program explains 12% of the variance in the motivation reason “career opportunities/higher future salary”. First-year students in service design, business administration, and information science cite career opportunities as a significantly more important motivation than students of other programmes. The degree program explains 7% of the differences in the motivation reason “opportunity to help shape the future in a way that is worth living”. First-year students in digital business management and sport

management state this motivation as significantly more important, while first-year students in information science and business administration rate this motivation as significantly less important than students of other degree programmes.

Table 3. Motivation by degree programme.

Study Programme	1	2	3	4	5	6	7	8	9	10	11	Total
Opportunity to shape a future worth living	2.88	3.73 *	2.50 *	3.61 *	2.71	2.87	2.87	2.79 *	3.40	3.04	3.19	3.12
Career, high salary	3.41	2.63 **	2.88	2.56 ***	3.29	4.22 **	3.70 **	3.19	2.40 *	3.52	3.72 **	3.25
Interest in subject and content	1.35 ***	1.90 **	2.15	2.85 ***	3.14 **	1.78 *	1.82 ***	2.02 **	2.30	1.57 **	1.33 ***	1.94

Note: Arithmetic means on the scale 1 “most important” to 6 “least important”; 1 Mobile Robotics, 2 Information Science, 3 Digital Business Management, 4 Business Administration, 5 Civil Engineering, 6 Architecture, 7 Tourism, 8 Sport Management, 8 Sport Management, 9 Service Design, 10 Photonics, 11 Multimedia Production; one or more significant difference(s) between the study programmes (post-hoc test according to Bonferroni) marked as *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Comparing the results of UAS Grisons (closed question) and UCTE (open question), it can be seen that the high importance of “interest in the subject and content” or “professional specialist training”, as well as the low importance of the motive “family tradition” (as an aspect of social influence) form commonalities. Student teachers attach very little importance to extrinsic motivational factors such as career or high salary.

4.2. Students’ Sustainability Conceptions

Table 4 shows the results of the analysis of the open question about the sustainability conceptions, which were analysed to see whether future orientation and sustainability dimensions were addressed. More than half of the respondents show a general future orientation in their understanding of sustainability; for example, by referring to aspects such as future developments, impacts, aspects of conservation, renewal, longer-term use, etc. (“future-oriented action”; UAS479). One third of respondents, however, do not address any future orientation or they have a different understanding of the time perspective in relation to sustainability (e.g., in relation to more sustainable learning). Only less than 15% of the respondents concretise the reference to the future by specifically addressing the principle of intergenerational justice (e.g., “We protect our environment so that our later generations can live well in the world”; UCTES795); only 10 respondents also include the aspect of intragenerational justice (cf. “For me, something is sustainable if it is long-term or if something meets the needs of the current generation without endangering the possibilities of future generations”; UCTES 590). As far as addressing the sustainability dimensions is concerned, about half of the respondents mentioned aspects of the economic dimension and 46.5% those of the ecological dimension. The fact that aspects of the economic dimension were addressed so frequently can be explained by the fact that, according to the category definitions [28], a general reference to “resources” was attributed to the economic dimension (e.g., “For me, sustainability is the utilisation and management of resources that are not consumed; i.e., they can also be used in the future”; UAS555). Aspects referring to the social dimension of sustainability are only addressed by one quarter (UAS) and one third (UCTEs) of the respondents, respectively.

The results of these two sub-dimensions were added in a sum score, expressing the complexity of the sustainability concept for each individual respondent (see Table 4; Supplementary Material, Table S3). Table 4 shows the mean values. There are no significant differences between the conceptions of teacher training and non-teacher training students ($p = 0.535$, Cohen’s $d = 0.093$), although answers addressing the idea of intergenerational justice and a multidimensional understanding (two or more of the three sustainability dimensions were addressed) are more frequently given by UCTE-students (5% more students in each of the two cases).

Table 4. Category frequencies of results of qualitative analysis and mean-values of sum scores, representing the complexity of students' sustainability conceptions.

	Category	UCTEs (N = 239)	UAS Grison (N = 409)	Total (N = 648)
Future orientation	no future orientation	31.4%	33.0%	32.4%
	future orientation	49.8%	52.1%	51.2%
	intergenerational justice	18.0%	12.7%	14.7%
	inter- and intragenerational justice	0.8%	2.0%	1.5%
Sustainability dimensions	economic dimension	50.2%	52.8%	51.9%
	social dimension	33.5%	26.7%	29.2%
	ecological dimension	50.6%	44.0%	46.5%
	no dimension	19.7%	17.8%	18.5%
	1 dimension	38.5%	46.9%	43.8%
	2 dimensions	31.0%	28.4%	29.3%
	3 dimensions	11.3%	6.6%	8.3%
Sumscore Sustainability conception	0	11.7%	7.8%	9.3%
	1	18.8%	27.60%	24.4%
	2	32.2%	32.30%	32.3%
	3	19.2%	20%	19.8%
	4	17.6%	11.70%	13.9%
	5	0.4%	0.50%	0.5%
	Mean value of sumscore	2.13	2.02	2.06

However, there are significant differences in the sustainability conceptions among students of different courses of study at the UAS. An ANOVA post-hoc test, according to Bonferroni, shows that students of engineering study programs have a significantly higher understanding of sustainability (architecture $M = 3.26$; civil engineering $M = 3.43$) than, for example, students of information science or business administration. Answers by students of digital business management (1.68), mobile robotics (1.71), sports management (1.77), business administration (1.81), and multimedia production (1.94) have low mean values (<2).

4.3. Sustainability-Related Attributes

4.3.1. Descriptives

The mean values for the seven sustainability-related attributes are generally in the upper half of the answer scales (Table 5).

4.3.2. Multivariate Analysis of Variance (MANOVA)

The MANOVA with gender, age groups, and degree programme as fixed factors and the seven sustainability-related variables (Table 5) as dependent variables explained 9% of variance for sustainability in everyday life and 6% for both engagement in sustainability and strong (weak) sustainability.

Gender and degree programme accounted for most of the differences in sustainability-related attributes. There were effects by gender on strong (weak) sustainability ($p < 0.001$) and sustainability in everyday life ($p = 0.001$), with females scoring higher than males (Figure 2). The degree programme affected engagement in sustainability ($p < 0.001$) and sustainability in everyday life ($p < 0.001$), as well as individual ($p = 0.001$) and collective sustainability-related self-efficacy ($p = 0.005$) consistently with higher values for teacher training students (Figure 2).

Table 5. Descriptive by gender, age, and degree programme.

	<i>N</i>	Sustainability Conception		Strong (Weak) Sustainability		Sustainability-Related Engagement		Sustainability in Everyday Life		General Self-Efficacy		Sustainability-Related Self-Efficacy (Individual)		Sustainability-Related Self-Efficacy (Collective)	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Gender															
Male	223	2.03	1.16	4.76	1.04	0.42	0.50	2.85	0.79	3.08	0.35	2.94	0.50	3.16	0.51
Female	415	2.07	1.19	5.23	0.88	0.60	0.49	3.22	0.72	3.00	0.40	3.03	0.51	3.27	0.50
Age															
18–21 years	324	2.01	1.21	5.11	0.94	0.58	0.49	3.17	0.73	3.00	0.39	3.02	0.50	3.30	0.48
22 and older	325	2.11	1.16	5.03	0.99	0.48	0.50	3.02	0.79	3.06	0.37	2.98	0.51	3.16	0.51
Degree programme															
Teacher training	242	2.13	1.26	5.25	0.87	0.69	0.47	3.34	0.67	3.03	0.43	3.10	0.52	3.36	0.50
Non-teacher training	410	2.02	1.14	4.96	1.00	0.45	0.50	2.96	0.78	3.03	0.35	2.94	0.49	3.15	0.49
Total	652	2.06	1.19	5.07	0.96	0.54	0.50	3.10	0.77	3.03	0.38	3.00	0.51	3.23	0.50

Note: Means (*M*) and standard deviations (*SD*). Information on the respective scales can be found in Table 2.

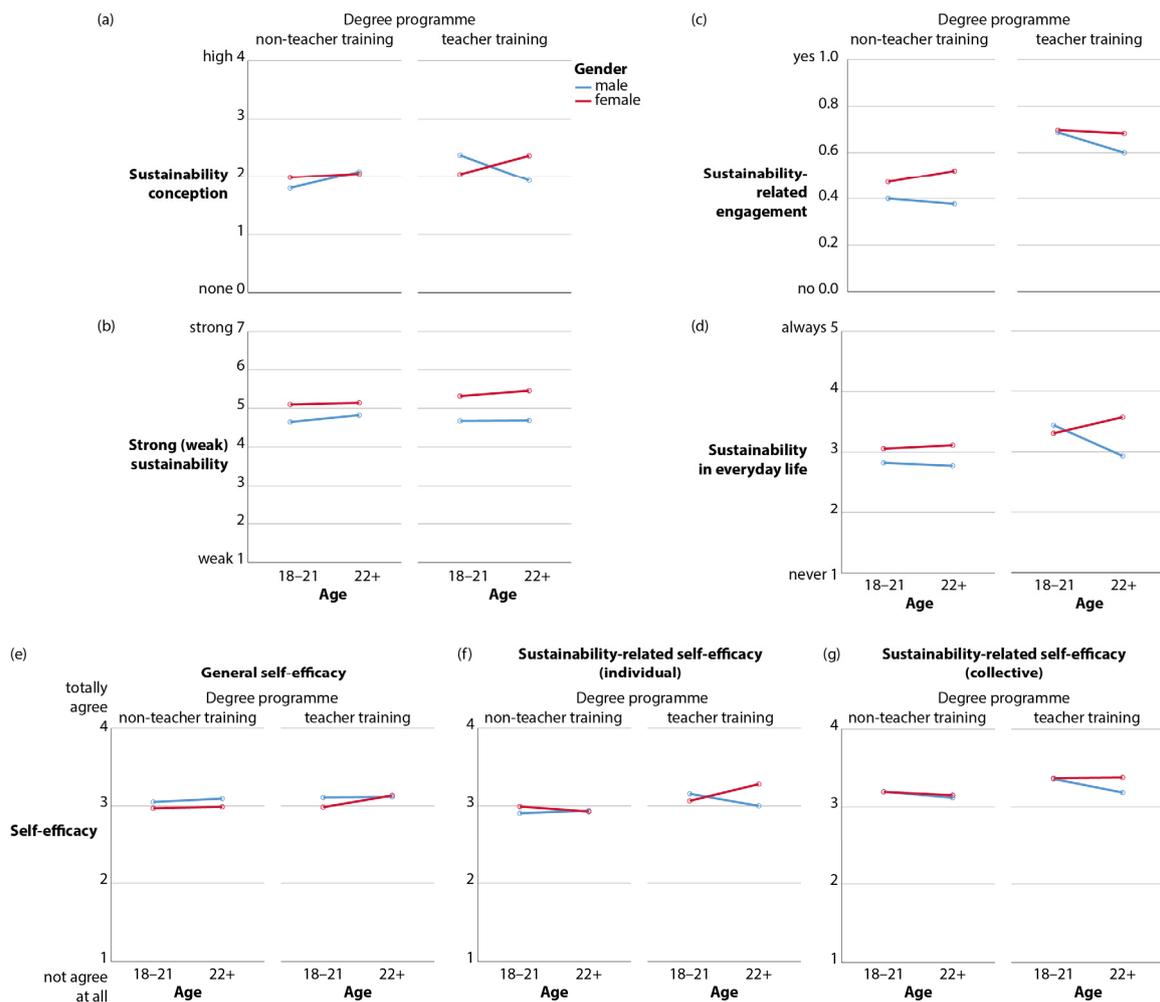


Figure 2. Sustainability-related attributes by degree programme, age, and gender. Note: The order of panels (a–g) is the same as in Tables 2 and 5. Estimated means (MANOVA).

Interaction effects: The crossing lines in Figure 2 indicate interaction effects of gender, age, and degree programme for sustainability in everyday life ($p = 0.046$), individual sustainability-related self-efficacy ($p = 0.039$) and, tendentially, also for sustainability conceptions ($p = 0.065$). Interaction effects of age and gender occur only among student teachers and not among students in other fields of study. For teacher training students, sustainability conceptions, sustainability in everyday life, and individual sustainability-related self-efficacy increases for females and decreases for males with increasing age. Moreover, there was an overall interaction effect of gender and age for sustainability in everyday life ($p = 0.009$), also increasing for females and decreasing for males with increasing age.

5. Discussion

The present study aims to find the study motives, SD-related conceptions, engagement, and self-efficacy beliefs of first-year students entering different universities to derive conclusions and implications for the development of an effective, target group-oriented HESD. The results are discussed along with the central questions and hypotheses, presented in the introduction.

5.1. What Motivates First-Year Students to Choose a Certain Degree Programme, and Do Aspects of Sustainability Play a Role in Their Motives?

In almost all degree programmes, intrinsic factors dominate study choice, especially regarding interest in the subject and related activities. These results are in line with the findings of other studies that analyse the study choice motives of teacher training students. They also demonstrate the dominance of intrinsic motives, particularly the desire to work with children and young people [36,55,56,61], as well as a high level of interest in the teaching profession [57]. Concerning extrinsic motivations, research so far shows very different results; our findings are supporting the results that confirm a very low importance of extrinsic motivations (cf. e.g., [61]).

Compared to the results of Brandt et al. [28], who use the same categories to explore the study choice motives to become a teacher among second and fourth semester students, the present study shows a lower significance of social engagement related to society. A reason for this can be those students in their second and fourth semesters are already advanced in their study and thus already completed sustainability modules. Nevertheless, it must be noted that for the cohorts of teacher training students surveyed in the present study, aspects of future societal development hardly play a role.

Hypothesis 1 (the study choice motives differ between degree programmes) can be partly confirmed. Due to methodological differences in the surveys for the present study, a direct comparison of the motives of the teacher training students with those of UAS students is not possible. Nevertheless, some remarkable features can be discussed. The aspect related to the future and social responsibility (“opportunity to shape a future worth living”) seems to be of relevance for many UAS students. This is interesting in comparison with the result of Sundermann and Fischer [18], who examine that almost half of the students (across all subjects) find sustainability relevant for their current study subject and over half also find it relevant for their future professional environment. Thereby, teacher training students display lower values compared to students in other study programmes. Our results are in line with other studies regarding the high relevance of extrinsic motivational factors for degree programmes at UAS [66–68], with significant differences between degree programmes. In our results, especially but not only students of business administration and information sciences are more extrinsically motivated and find the “opportunity to shape a future worth living” less relevant. In contrast to previous research, we were not able to confirm this also for certain engineering programmes, such as civil engineering.

When designing sustainability courses, it may be worth considering the findings on these different motivations. Barth and Timm [9] show that the perceived relevance of sustainability for the later professional environment can be increased through sustainability courses, which can have an influence on the motivational situation and commitment in the field of ESD and the course of study in general. Likewise, reflections on personal values and motivations and their deconstruction in the context of socio-cultural constructedness (e.g., extrinsic rewards and maximisation of “intellectual capital” as a feature of a neoliberal world, cf. [125]), for example, could be useful.

Although there are hardly any studies so far that look at study choice motivation from the perspective of ESD, it can be assumed that intrinsic and extrinsic motivations are of great importance for ESD learning processes; therefore, there is a need for further research here.

5.2. How Can the Students Be Characterised in Terms of Their Conception of Sustainability, Their Engagement in Sustainability and Their Sustainability-Related Self-Efficacy?

Our research shows positive scores for most sustainability-related variables, which is largely consistent with previous study results.

As far as sustainability conceptions are concerned, our results are consistent with previous studies, which describe overall very simple and often unelaborated concepts of sustainability among students. For student teachers, the results in terms of sustainability conceptions are very similar to those of Brandt et al. [28]. Unsurprisingly, the ecological dimension dominates in the concepts (e.g., [74,75]). However, aspects of the economic

dimension are mentioned more often in our study than in other studies. This can be explained by the strong orientation towards the concept of “resources”, which—if not specified more precisely or in another context—was assigned to the economic dimension. Aspects of the social dimension are predominantly underrepresented in students’ sustainability conceptions, which appears to be an interesting result combined with Sunderman and Fischer’s results: they find a correlation between the importance of the socio-cultural dimension in students’ sustainability concepts and the perceived relevance of sustainability for current studies and for their professional future [18]. Strengthening the perception of social issues in the context of sustainability may therefore not only contribute to more holistic sustainability conceptions but also to a stronger perception of the relevance of sustainability for the professional environment.

It is a central task of HESD to support students in developing a multi-perspective, integrative understanding of sustainability based on their existing concepts. Combining our findings to those of Sinakou et al. [126], we encounter an interesting paradox, and, at the same time, an opportunity arises: academics at HEIs also do not have a holistic concept of SD focusing more on aspects of economy and society [126], whereas students come with concepts that are focused on the ecological dimension. As a consequence, in discursive learning spaces, these different focuses and perspectives should be brought into negotiation and linked in relation to sustainability issues and problems, which can enrich learning processes and the development of systems thinking competency of all (not only students).

In terms of sustainability engagement and behaviour in everyday life, students tend to score in the slightly positive range, which is in line with the predominantly positive results of previous research (see Section 2.4).

The fact that the mean values of sustainability-related self-efficacy are in the upper third—for the collective even in the upper quarter—is a surprising result. This means that students are already quite strongly convinced that they can contribute to shaping the world in the sense of sustainable development. Therefore, universities should provide learning experiences that reinforce students in these beliefs, e.g., through project- and action-oriented learning settings (cf. [96,107,108]). In this way, feelings of self-efficacy can be directly accessed, reflected upon, and strengthened in concrete experiences of action. This is promising, especially considering the fact that sustainability-related self-efficacy is an important prerequisite for sustainable behaviour [38,39,120]. At the same time, it seems particularly important in the complex and controversial field of sustainability to reflect on learners’ expectations of desired outcomes. The consequences of action cannot be experienced directly [120]; at the same time, working on a sustainability problem does not necessarily mean developing a solution, but rather understanding the problem, elaborating it, developing options for action, generating ideas and visions, and critically and reflectively dealing with them. Well-dosed experiences of success and a critical reflection of challenges and conclusions for further expectations can be gained in action-, problem-, and project-oriented learning environments. When sustainability-related self-efficacy is low, more effort is required to discuss existing barriers to self-efficacy beliefs in the complex field of sustainability.

Furthermore, high levels of sustainability-related self-efficacy are a good basis for aiming at strengthening their perceived relevance and self-efficacy for integrating sustainability into their profession. As Demirci and Teksoz [127] find, students show relatively high self-efficacy levels for integrating sustainability into their profession, but most students failed to explain the ways of integration. Thus, in addition to a further development of a student’s sustainability conceptions, specific teaching efforts are needed to make this integration visible, understandable, and applicable to students.

5.3. What Differences Can Be Identified across the Various Study Programmes and Do Socio-Demographic Characteristics Play a Role?

In this section, hypothesis 2 is discussed first: “there are differences in the sustainability-related attributes (sustainability conceptions, engagement in sustainability and sustainability-

related self-efficacy) according to the degree programme (teacher training vs. non-teacher training students), expecting higher values for teacher training-students and according to gender, expecting higher results for females”.

Regarding the differences due to the degree programme, hypothesis 2 is confirmed. Teacher training students show significantly higher values in engagement in sustainability and sustainability-related self-efficacy beliefs. The finding that these significant differences do not occur in general self-efficacy beliefs supports the interpretation that the significant differences are caused mainly by a different affinity to the idea of sustainability. The results are consistent with those found in literature, which so far shows significantly lower values in attitudes and behaviour for most of the disciplines, which were classified in the present study as non-teacher training programmes, such as business administration and information sciences (see Section 2.4). For students who show rather low scores for all variables examined (e.g., students of business administration), Sherburn and Devlin [93] explain that they are more strongly characterised by an individualistic and/or competitive ideology than students of other majors. Research shows that sustainability can be successfully integrated in business courses and that values, attitudes, and—to a lesser extent—ways of behaviour changed [128]. According to Stubbs and Cocklin [129], for business students to effectively learn about sustainability means developing new ways of thinking and dealing with different world views.

The differences between students from technical and non-technical degree programmes can be interpreted by the fact that the former perceive the relevance of sustainability for their studies and professional future as less important than the latter [18]. This is also confirmed by the finding that students from technical programmes often consider sustainability to be a “soft” science, whereas their chosen field of study and interest lies in “hard” sciences [77]. Furthermore, students of technical programmes describe sustainability primarily in terms of ecological and technical aspects [76] and thus neglect economic and social factors more than others.

The higher scores in sustainability-related attributes among teacher training students can be explained by their stronger social orientation and higher voluntary commitment (cf. Section 2.2). Although their attitudes towards sustainability are stronger and they integrate it more into their everyday life, this does not necessarily mean that they associate the idea of sustainability with their later professional activities. This can be explained by the low relevance of sustainability aspects for study choice in the present study or for future professional life in other studies (e.g., [18]).

Consequently, it is an important task in all degree programmes to support students in recognising the importance of sustainability in their future professional environment.

Regarding the sustainability conception, significant differences can only be found between study programmes of the UAS Grisons, whereby our results are consistent with Sundermann and Fischer [18], who show that engineering students have a better understanding of sustainability compared to students of business administration and information sciences. They justify it by the fact that the sustainability idea is more integrated in some disciplines (e.g., engineering) than in others.

Regarding gender differences, hypothesis 2 is only partially confirmed in the present study. The female students show higher scores in terms of strong sustainability and everyday actions, but other attributes show no significant differences. These findings are consistent with results of other studies that also demonstrate significantly higher scores in women’s sustainability awareness and actions [86–89].

The age of the respondents is another relevant socio-demographic variable. The interaction effects show a consistent pattern depending on age for teacher training programmes: the sustainability-related attributes of male students decrease with increasing age, but the reverse is true for female students and this effect does not occur for non-teacher training students. This gender gap is an interesting finding and a few other studies [90,92] confirm that the gender gap is larger for older students. However, socialisation theory can provide a rationale: gender-specific role expectations promote girls’ concern for others

and the environment [87,90] and teaching traditions preserve the conventional process of gender socialisation [90]. The question of why the gender gap is larger only among the older teacher training students is an interesting finding that should be addressed in further research. Olsson and Gericke argue that the interaction between gender and age is especially notable in the environmental and social dimensions of SD [90], which could be an indicator that the social orientation of teacher training students compared with the economic orientation of non-teacher training students plays a role.

5.4. Limitations

The strength of the present study is the implementation of a complete survey of first-year students from three HEIs with high response rates. However, the sample size was not sufficient to analyse the different degree programmes from the UAS Grisons separately in the MANOVA while also controlling for age and gender. A further consequence of the limited sample size is the distinction between teacher training students and non-teacher training students, which necessitated a higher level of aggregation. The distinction on that level is a consequence of the sample sizes and not a distinguishing characteristic of the “HEIs of origin”.

Given the fact that different question formats (qualitative vs. quantitative) were used, the results for study choice motivation of teacher training and non-teacher training students are only comparable to a limited extent. In this case, the same question formats would have provided better results.

In addition, the framework conditions of the three involved HEIs differ due to the fact that they are located in different countries (two UCTEs in Austria and one UAS in Switzerland) and differ in their range of studies (UCTE offering only teacher training courses, UAS offering various fields of study). It would have been better if all HEI locations had been in one country so that this context could be better controlled. It would also have been better if all three locations had been full universities so that all subjects (teaching/non-teaching) varied within the location.

Finally, data were collected using an online questionnaire and no other instruments were used. Therefore, the results are self-reported.

6. Conclusions

6.1. Practical Implications

What can be learned from the results to optimally promote the development of sustainability competencies and SD-specific professional action competence while considering the specific characteristics of the target group?

Students enter their studies intrinsically motivated regarding the activity in their later professional environment and bring with them mostly undifferentiated and very heterogeneous ideas on the topic of sustainability. Since study choice motivation of students at UAS with their different study programmes (engineering, economics, information studies, etc.) can vary greatly (see the partial fulfilment of hypothesis 1), the development and implementation of specific target group-oriented teaching-learning formats are all the more important. It is highly relevant to sensitise students with unelaborated conceptions and low affinity to sustainability (see fulfilment of hypothesis 2, e.g., business and information sciences) to the relevance of sustainability and to elaborate the corresponding references and potentials for their future professional environment. Recognising the potential to “make a difference” through engagement to shape society towards sustainable development during studies and in the future professional environment, as quoted in the title of this paper, can be one of the desired learning outcomes. The latter also applies strongly to teacher training students, which we will come back to in the following.

We derive the following (challenging) tasks for a corresponding HESD:

- Even if the concept of SD seems to play a more significant role among student teachers—also in relation to their personal everyday life—than students at the UAS, this does not necessarily imply that sustainability is seen as particularly relevant to

their study and later professional practice. Therefore, students need a broad understanding of SD and awareness-building measures are necessary in order for students to recognise the relevance of SD for their personal and future professional life. Their interest in the profession and associated intrinsic motivation should be a promising starting point. In addition, the students' high sustainability-related self-efficacy can build a strong basis for the development of creative ideas and concepts to think and live the idea of sustainability in an integrative and holistic way in their future professional environment.

- Students should be picked up with their very heterogeneous and differently differentiated sustainability conceptions and motivations and should have opportunities to experience themselves as self-effective on real-world problems. Sustainability (pre-)conceptions can be activated when a problem is framed in a sustainability perspective. The preconceptions may act as a filter that selects and adapts any new information. In teaching, this can be performed in different ways, such as:
 - Discipline-specific: by recognising the social role, responsibility, and opportunities associated with shaping the future professional environment, aiming at strengthening motivation. Isolated sustainability courses alone are not recommended [23], although they allow students to explore basic concepts, principles, and worldviews. There is a need for the integration of sustainability in the different subjects that goes beyond this; otherwise, sustainability may be seen as a separate, disconnected issue. More precisely, it means to take up the sustainability concept as a guiding principle that can provide orientation in the respective professional domain, whereby a multidimensional view on the professional environment becomes visible (economic, social, and environmental sustainability). The Sustainable Development Goals [4], for example, can help to elaborate such relationships. This is an area for future research and course development with the aim of integrating sustainability in the best possible way.
 - Interdisciplinary/cross-curricular: given the fact that students of different degree programmes enter HEIs with different sustainability conceptions, interdisciplinary modules on sustainability should be developed in which students from different disciplines come together in interdisciplinary modules, promoting exchange, dialogue, and joint learning. It is important that these courses are based on constructivist learning theory and offer student opportunities to enter into exchanges with lecturers, colleagues, and other people, challenging their own ideas, values, and perceptions with the aim of integrating new perspectives. Consequently, highly standardised courses, as they are also often implemented in the context of digitalisation offensives at HEIs (e.g., in the form of Massive Open Online Courses), must be avoided because they cannot possibly meet these claims. Efficiency criteria, such as saving time and money or reaching a large number of students, are counterproductive and will counteract the intended purpose.
- Across all degree programmes: sustainability-related self-efficacy, especially collective sustainability-related self-efficacy and how students can be given opportunities for positive experiences, should be considered. Project- and problem-oriented work on real-world cases could provide corresponding opportunities. Projects implemented in the HEIs environment would give students the opportunity to participate in HEIs' development in the sense of a whole system approach, where the goal is to change the learning place itself—the HEI—into a place where sustainability is lived in all its dimensions. This is especially important for teacher students, enabling experiences that shape them and that they can transfer to the development of the schools in which they will later teach.
- Since male students show significantly lower values in relation to most sustainability-related attributes (see the partial fulfilment of hypothesis 2 regarding gender), it

is especially important to involve them in discussion and reflections of respecting values, as well as to deconstruct and reduce the consolidation of gender stereotypes in general—an aspect that also forms a specific topic in social sustainability. In this context, it is also about reflecting on teaching traditions (at HEIs, secondary and primary schools) that may often contribute to the reinforcement of gender stereotypes.

6.2. Further Research Implications

Further analysis of the existing data and further studies must explore the links between the different sustainability attributes as well to the study choice motives, which in our research have not been addressed. Even the concept of sustainability-related self-efficacy is rarely researched and should be included more often in empirical studies to better understand the relevance of this aspect for HESD.

Appropriate learning settings for different degree programmes must be designed, tested, evaluated, and further developed. They should aim at imparting relevant knowledge, at supporting students in awareness-building and competence development, as well as at providing opportunities for positive individual, as well as collective, self-efficacy experiences.

The present study shows the first results of the larger collaborative research project “Measuring impact—ESD in higher education” conducted by the UCTE Tyrol in collaboration with the UCTE Styria and the UAS Grisons. Within this project, a long-term study is conducted to explore how students develop aspects of the cognitive (e.g., sustainability conception, conceptions of the human–nature interplay), affective-motivational (e.g., SD and ESD-related self-efficacy beliefs, perceived relevance of (E)SD, assumptions on affectedness and responsibilities), and behaviour competence domain (everyday actions, engagement in sustainability initiatives) in the course of their studies and beyond (when students are already active in their professional environment). The project will also explore the extent to which different criteria, such as motivation, sustainability conceptions, and self-efficacy expectations, play a role in the further development of (E)SD-related action competence.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/su13158273/s1>, Table S1: Questionnaire, Table S2: Students’ motivation to become a teacher—coding details, Table S3: Students’ sustainability conceptions—coding details. References used in the Supplementary Materials: [28,67,116–121].

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