Student Teachers' Readiness to Implement Education for Sustainable Development

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Abstract: The aim of this study was to examine the contribution of teachers' initial training (field of study, attending education for sustainable development (ESD) course/s) as well as student teachers' socio-demographic characteristics (gender and age) to their readiness to implement ESD (intention to implement ESD and teachers' self-efficacy). A total of 706 student teachers studying at six Croatian universities participated in the study. It was determined that female student teachers express greater intention to implement ESD, however the gender differences were not found on teachers' self-efficacy for ESD. Furthermore, the older the participants, the lesser the extent to which they express their intention to implement ESD. Student teachers in the field of the natural sciences express the intent to implement ESD to a lesser extent compared to students from other fields (humanities, arts, and social sciences). Lastly, it was determined that student teachers who have attended ESD course/s express higher levels of intention to implement ESD as well as teachers' self-efficacy for ESD. In that sense, the higher the number of attended ESD courses, the higher student teachers' readiness to implement ESD. Based on the results of this study, recommendations for teacher education programs have been offered.

Keywords: education for sustainable development; student teachers; intention to implement ESD; teacher self-efficacy; SDG4

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1. Introduction

In both scientific literature and key policy documents, student teachers are regarded as powerful agents of change with the potential to offer successful educational answers to the challenges of the modern world [1–4]. This idea was further emphasized by UNESCO's approving of the Global Action Programme (GAP), whose aim was to provide significant contributions to the realization of sustainable development goals (SDG) by shifting both education and learning towards an equal opportunity for everyone to acquire knowledge, skills, attitudes, and values that would empower them to contribute towards sustainable development (SD) [5]. In order to enable strategic focus as well as encourage all subjects' dedication, five priority action areas were determined by GAP, one of which is focused particularly on (student) teachers, i.e., on "developing teachers and educators' capacities" in education for sustainable development (ESD) [5].

Therefore, teachers have been recognized as the essential agents of change and SD promotion in the ESD context [3]. Both their knowledge and competencies are crucial for the pro-sustainable reconstruction of educational processes and institutions [6]. Additionally, it is evident that student teachers must face difficult challenges not only in regard to their role in creating a sustainable future, but also in their assessments of personal competency to accept this type of challenge. Therefore, questions regarding the nature as well as aspects of student teachers' assessments of their readiness to implement ESD are being raised.

1.1. Aspects of Student Teachers' Readiness to Implement ESD

In this paper, readiness to implement ESD is defined by two key aspects: intention to implement ESD and teachers' self-efficacy for ESD. Teachers' intentions reflect behavioral

aspects of readiness to implement ESD, i.e., teachers' action potential in an ESD context [7]. On the other hand, teachers' self-efficacy represents student teacher's motivational belief that they are able to implement ESD efficiently.

Numerous previous studies focused on exploring various types of teachers' intentions, such as student teachers' intentions to enter and/or stay in the teaching profession, e.g., [8–10], or teachers' intentions to implement certain curriculum domains such as health education, financial literacy, critical thinking, etc., e.g., [11,12]. Furthermore, in education research, teachers' intentions are identified as the most important predictor of their consequential choices and actions in the professional environment, e.g., [9,10,13]. Thus, it was concluded that teachers who express an intention to either behave or act in a particular way are more likely to display that same behavior or action. On the other hand, studies focused on teachers' intentions in the ESD context are particularly scarce [7]. However, identification of teachers' intentions as a key predictor of teachers' future behaviors further supports the importance of studying student teachers' intentions to implement ESD as an indicator of their readiness to implement ESD, as well as a potential predictor of their real behavior in their future professional career. Therefore, in this study, intention to implement ESD is defined as student teachers' assessments of the extent to which they plan to implement ESD aspects in their professional work [7].

Teachers' self-efficacy for ESD represents the second aspect of readiness to implement ESD. Teachers' self-efficacy refers to (student) teachers' assessment of their own ability to set specific educational goals and implement strategies as well as achieve the same goals [14]. The importance of teachers' self-efficacy on teaching practice was confirmed in a number of studies, e.g., [15,16], whereas, in the ESD context, it was determined that teachers' self-efficacy represents a key predictor of teachers' intentions to implement ESD [7].

1.2. Contribution of Teachers' Initial Education

One of the key issues in ESD research is determining whether student teachers feel ready to implement ESD as well as identifying factors that influence their assessment. Recent literature often emphasizes the importance of higher education, i.e., teachers' initial education during their training and preparation for ESD, e.g., [17,18]. The highest number of studies focus on suggesting potential ways of ESD integration into studies as well as curricula focused on student teacher education, e.g., [19–21]. However, studies focused on the research of aspects of student teachers' readiness to implement ESD—examined in the context of initial teacher education contribution—can be found, e.g., [22]. In the same manner, the contribution of teachers' initial education most frequently refers to studying of either effects of the teacher education program or effects of attending ESD courses.

Furthermore, while exploring the effects of teaching programs, differences among student teachers' knowledge, attitudes, and behavior were found in empirical studies depending on their study programs. Additionally, it is frequently found that student teachers of the natural sciences show higher levels of knowledge about ecology (independent of gender) as well as more positive attitudes towards environmental issues, e.g., [23,24]. Bursjöö [25] uncovers that student teachers traditionally continue to perceive that the task of ESD implementation belongs mostly to Biology and Geography teachers. This is particularly interesting because, due to its connection with studies that include teachers in practice, and whose results indicate that teachers of different subjects implement SD to differing extents as well as in different ways, e.g., [26–28]. For example, Uitto & Saloranta [28] found that natural science teachers (mostly Biology and Geography) most frequently implement SD in their work, while simultaneously implementing a holistic approach to it, including equal focus on its every dimension. On the other hand, humanity and social science teachers scarcely implement ESD and they usually include just one of its dimensions (social) in their work.

Most of the initiatives, started by teacher education institutions with the aim of the institutionalization of ESD within the education system, focused exclusively on either integration of SD specific aspects into existing university courses or introducing new

ones that deal with SD issues into study programs [29]. Thus, it is not surprising that most studies, focused on the research of the effects of initial teacher education, mostly refer to the study of effects of attending ESD courses. However, the abovementioned studies show very inconsistent results. On the one hand, results of previous studies on student teachers [17,30,31] point out that attending ESD courses at the higher education level contributes towards more positive attitudes towards SD and higher assessment of knowledge regarding sustainability topics as well as sustainable behavior. On the other hand, certain authors indicate the lack of attending SD courses' contribution to either attitudes [32,33] or knowledge about SD [34–36]. For example, Demirci & Teksoz [36] found that, although students who attend SD courses are more prone to assess their knowledge regarding the same field higher compared to others, their real knowledge remains relatively poor. Based on that, Boon [34,35] found that, despite the inclusion of climate change topics in teachers' education, student teachers do not show significantly more knowledge regarding the same topic compared to their knowledge at the start of their study.

1.3. Socio-Demographic Characteristics: Gender and Age

Results of previous empirical studies indicate that concern regarding the contribution to SD as well as shifting towards a sustainable future differs depending on the individual's gender [37]. Women, compared to men, assess to a higher extent and more often pay more attention to SD principles [38].

The abovementioned differences are also present in the ESD field as well as among student teachers. As an example, it is frequently found that female student teachers have more positive attitudes towards environment and ecology topics [23,39,40], higher levels of ecological literacy [41], more clarified conceptions of SD as well as a higher level of awareness regarding SD topics [42], and show higher levels of pro-ecological and pro-sustainable behavior [43–45]. Although scarce, studies whose results show the opposite direction of gender differences can be found. For example, Álvarez-García et al. [43] found that male student teachers show higher levels of knowledge about ecology compared to their female counterparts. Additionally, it is important to emphasize the existence of empirical studies in which gender differences among future students were not found, e.g., [46].

Apart from gender, participants' ages also represent one of the potential socio-demographic factors of student teachers' readiness to implement ESD. Moreover, there are only a few studies in the ESD field that examine age differences in implementing aspects of ESD. The results of those studies, either focused on student teachers or teachers in practice, mostly show that older participants have higher levels of readiness to implement ESD [28,46]. However, it is important to emphasize that results of previous studies regarding age differences in variables related to SD show highly inconsistent results [47]. Therefore, this study will try to explore whether readiness to implement ESD depends on student teachers' ages.

2. Materials and Methods

2.1. Research Aims

The aim of this study is to examine the contribution of teachers' initial training as well as student teachers' socio-demographic characteristics to their readiness to implement ESD (intention to implement ESD and teachers' self-efficacy).

Bearing that in mind, specific research tasks were determined:

1. Examine whether gender differences exist in student teachers' readiness to implement ESD.
2. Examine whether correlation exist between student teachers' age and their readiness to implement ESD.
3. Examine whether differences exist in student teachers' readiness to implement ESD in regard to their field of study.
4. Examine whether differences exist in student teachers' readiness to implement ESD in regard to attending ESD courses.

5. Examine whether correlations exist between student teachers' readiness to implement ESD and the number of attended ESD courses.

The inconsistency of previous study results—focused on the exploration of effects of socio-demographic characteristics or the contribution of teachers' initial education to student teachers' variables related with SD—suggest the highly complex nature of these phenomena. Therefore, scientific hypotheses that define the expected direction of potential differences in readiness to implement ESD variables (intention to implement ESD and teachers' self-efficacy) were not set. Listed research tasks are primarily exploratory, whilst obtained data can serve in order to generate new hypotheses regarding student teachers' readiness to implement ESD in future research.

2.2. Participants

A total of 706 student teachers (of which 535 female and 171 male) studying at six Croatian universities (in Zagreb, Split, Rijeka, Osijek, Zadar, and Pula) that offer teaching programs participated in the study. Student teachers' average age was M = 23.54 (SD = 2.40). The largest number of participants attend teacher training in the humanities (N = 372), followed by natural sciences (N = 127), while a slightly smaller number attend teacher training in the arts education (N = 112) and in the social sciences (N = 87).

2.3. Instruments

Intention to implement ESD Scale [7] was used to measure student teachers' intentions to implement ESD. The instrument consists of 33 items divided into four subscales: (I) Intention to implement ESD content subscale (4 items), (II) General intention to implement ESD subscale (10 items), (III) Intention to implement ESD teaching approaches and methods (7 items), and (IV) Intention to focus on achieving ESD learning goals (12 items). All questionnaire items were assessed on a seven-point Likert scale. Items referring to a general intention to implement ESD as well as those referring to an intention to implement sustainable development content were assessed on a 7-point Likert scale ranging from 1—I completely disagree, to 7—I completely agree. Items referring to intention to implement ESD teaching approaches and methods as well as those referring to intention to focus on achieving ESD learning goals were assessed on a 7-point Likert scale that measured frequency of usage, ranging from 1—never, to 7—always. The instrument has a four-factor structure. Internal consistency ranges from α= 0.86–0.97 among the subscales [7].

Teachers' self-efficacy for ESD scale was applied in order to measure teachers' self-efficacy for ESD. The instrument was constructed on the basis of items used in [48], which were consequently translated and adapted into Croatian [7,49]. The instrument consisted of 7 statements, where the participants' task was to express the degree of agreement with every listed statement on a 5-point Likert scale (1—I completely disagree; 5—I completely agree). The instrument has a one-factor structure, where its internal consistency, determined in previous studies [7,49], was α= 0.66–0.88.

The research was conducted by using the combination of printed and online questionnaires, completed during regular teacher education lessons in Croatia.

3. Results

Descriptive data of all intention to implement ESD variables and teachers' self-efficacy were calculated (Table 1). Arithmetic means (M), standard deviations (SD), skewness and kurtosis indices, and minimum (MIN) and maximum (MAX) results for each variable are presented.

Table 1. Descriptive data.

Variable	MIN	MAX	M	SD	Skewness (SE = 0.092)	Kurtosis (SE = 0.184)
General intention to implement ESD	10	70	50.39	11.31	−0.584	0.290
Intention to implement ESD content	4	28	21.63	4.82	−0.953	0.826
Intention to implement ESD teaching approaches and methods	7	49	34.43	8.42	−0.323	−0.098
Intention to focus on achieving ESD learning goals	12	84	64.15	13.09	−0.486	0.096
Teachers' self-efficacy	7	35	22.36	5.08	−0.255	0.246

Note: SE—standard error.

It was determined by the Kolmogorov–Smirnov test that the distribution of results shows statistically significant deviation from normal on every measured scale (K–S values range from 0.04 to 0.17; $p > 0.01$). In regard to the abovementioned fact, non-parametric tests were exclusively used during further analysis. In order to determine whether differences in student teachers' intentions to implement ESD as well as teachers' self-efficacy exists in regard to (I) participants' gender, (II) field of study, and (III) attending ESD courses, a Mann–Whitney U Test and Kruskal–Wallis H test were used. Additionally, Spearman's coefficient of correlation was calculated in order to determine the correlation between intention to implement ESD and teachers' self-efficacy with (I) participants' age and (II) number of attended ESD courses. For the non-parametric test results, descriptive indicators of results were shown: median (C) and semi-interquartile range (Q) as well as effect size. For the Kruskal–Wallis H test results, effect size coefficient was shown (η^2), which represents a large effect when its value is higher than 0.14, medium when the value is around 0.06, and small if its value is around 0.01 [50]. For the Mann–Whitney U test results, the effect size coefficient (r) was shown, which is considered to be large if its value is higher than 0.5, medium if the value is around 0.3, and small if the value is around 0.10 [50].

There are statistically significant gender differences among participants in every student teachers' aspect of intention to implement ESD. Female student teachers show higher levels of (I) general intention to implement ESD ($C_F = 52$; $Q_F = 8$; $C_M = 48$; $Q_M = 7.5$), (II) intention to implement SD content ($C_F = 23$; $Q_F = 2$; $C_M = 21$; $Q_M = 3.5$), (III) intention to implement ESD teaching methods and approaches ($C_F = 35$; $Q_F = 5.5$; $C_M = 32$; $Q_M = 5$), and (IV) intention to focus on achieving ESD goals ($C_F = 66$; $Q_F = 9.5$; $C_M = 62$; $Q_M = 8.5$). Effect size coefficients indicate a small gender effect size (r ranges from 0.16 to 0.18) on intention to implement ESD variables. Moreover, the results show that there is no statistically significant gender difference in teachers' self-efficacy for ESD (Table 2).

Additionally, the results show that participants' age is statistically significantly connected with the aspects of intention to implement ESD (Table 2). Correlation between those variables is both low and negative, which suggests that the higher the participants' age, the lesser the extent of their general intention to implement ESD and intention to implement ESD teaching methods and approaches as well as their intention to focus on achieving ESD goals. It is important to emphasize that the listed correlations, although statistically significant, show a very low connection between the listed variables.

Table 2. Gender differences in the intention to implement ESD and teacher self-efficacy and correlations with participants' age.

Variables	Gender Differences				Correlation with Age (N = 706)
	U	z	*p*	r	
1. General intention to implement ESD	35,140.5	−4.57	$p = 0.000$	0.17	−0.10 **
2. Intention to implement ESD content	34,845.5	−4.71	$p = 0.000$	0.18	−0.05
3. Intention to implement ESD teaching approaches and methods	35,260.0	−4.52	$p = 0.000$	0.17	−0.08 *
4. Intention to focus on achieving ESD learning goals	35,690.5	−4.33	$p = 0.000$	0.16	−0.12 **
5. Teachers' self-efficacy	43,434.5	−0.99	$p = 0.000$	/	−0.05

* $p < 0.05$; ** $p < 0.01$.

Furthermore, the results show that statistically significant differences in intention to implement SD content exists among student teachers in regard to their field of study as well as in their intention to focus on achieving ESD goals (Table 3). Effect size coefficients indicate a small effect size of field of study on the intention to implement ESD variables.

Table 3. Differences in intention to implement ESD variables and teacher self-efficacy with regard to the student teachers' field of study.

Variables	χ^2	df	*p*	η^2
1. General intention to implement ESD	3.03	3	$p = 0.388$	/
2. Intention to implement ESD content	13.37	3	$p = 0.004$	0.02
3. Intention to implement ESD teaching approaches and methods	4.01	3	$p = 0.261$	/
4. Intention to focus on achieving ESD learning goals	15.94	3	$p = 0.001$	0.02
5. Teachers' self-efficacy	4.72	3	$p = 0.194$	/

In order to determine whether a potential statistically significant difference exists on the variables of the four defined fields of study (natural sciences, humanities, social sciences, and arts), multiple-comparison post-hoc correction of groups was used by conducting a Mann–Whitney U test along with Bonferroni correction. Due to the fact that six Mann–Whitney U tests were conducted for this purpose, the correction dictates that differences at the significance level of $p < 0.008$ can be considered statistically significant.

The results suggest that statistically significant differences in the intention to implement SD content exist between students of the natural sciences and humanities (U = 19,210.5; z = −3.16; $p < 0.008$; r = 0.14). Students of humanities ($C_H = 23$; $Q_H = 2.5$) express higher levels of intention to implement SD content compared to students of the natural sciences ($C_{NS} = 22$; $Q_{NS} = 4$).

Furthermore, the results show that statistically significant differences exist in the intention to focus on achieving ESD goals between students of the natural sciences and humanities (U = 18,511.5; z = −3.65; $p < 0.008$; r = 0.16) as well as among students of the natural sciences and arts (U = 5461.5; z = −3.1; $p < 0.008$; r = 0.20). Students of the natural sciences ($C_{NS} = 59$; $Q_{NS} = 10$) express lower level of intention to focus on achieving

ESD goals compared to students of humanities ($C_H = 66$; $Q_H = 9$) as well as arts ($C_A = 66$; $Q_A = 9.63$).

Out of all participants (N = 706), 121 of them (17.1%) attended ESD courses. On average, students attended one to two ESD courses (M = 1.59; SD = 0.89; range = 1–5).

Results suggest that statistically significant differences exist on all variables of intention to implement ESD in regard to attending ESD courses (Table 4). Students who have attended ESD course(s) express a higher level of (I) general intention to implement ESD ($C_{YES} = 55$; $Q_{YES} = 7.75$; $C_{NO} = 50$; $Q_{NO} = 8.5$), (II) intention to implement SD content ($C_{YES} = 23$; $Q_{YES} = 2.5$; $C_{NO} = 22$; $Q_{NO} = 3$) and (III) intention to implement ESD teaching methods and approaches ($C_{YES} = 38$; $Q_{YES} = 5.75$; $C_{NO} = 34$; $Q_{NO} = 6$) as well as (IV) intention to focus on achieving ESD goals ($C_{YES} = 71$; $Q_{YES} = 9.25$; $C_{NO} = 64$; $Q_{NO} = 9.5$). Size effect coefficients indicate small effect size of attending ESD courses (r ranges from 0.13 to 0.17) on the intention to implement ESD variables.

Table 4. Contribution of ESD courses to the intention to implement ESD variables and teachers' self-efficacy.

Variables	Attending ESD Courses				Number of ESD Courses Attended
	U	z	*p*	r	
1. General intention to implement ESD	28,298.0	−3.48	$p = 0.001$	0.13	−0.22 **
2. Intention to implement ESD content	27,497.5	−3.88	$p = 0.000$	0.15	−0.19 **
3. Intention to implement ESD teaching approaches and methods	25,958.0	−4.62	$p = 0.000$	0.17	−0.15 **
4. Intention to focus on achieving ESD learning goals	27,692.0	−3.77	$p = 0.000$	0.14	−0.11 *
5. Teachers' self-efficacy	19,540.5	−7.78	$p = 0.000$	0.29	−0.42 **

* $p < 0.05$; ** $p < 0.01$.

Moreover, results show that students who have attended ESD course(s) show higher levels of teachers' self-efficacy for ESD ($C_{YES} = 26$; $Q_{YES} = 2$) compared to students who did not attend them ($C_{NO} = 22$; $Q_{NO} = 3.5$). Size effect coefficient indicates medium effect size (r = 0.29) of attending ESD courses variable on teachers' self-efficacy.

Apart from this, a statistically significant positive correlation was determined between the intention to implement ESD and teachers' self-efficacy variables and the number of attended ESD courses (Table 4). The more ESD courses student teachers attended, the higher their levels of intention to implement ESD. Additionally, they felt readier to implement ESD (they showed higher levels of teachers' self-efficacy).

4. Discussion

The aim of this paper was to determine the contribution of socio-demographic characteristics and student teachers' initial education to their readiness to implement ESD, i.e., their intention to implement ESD and self-efficacy for ESD.

Results point toward the existence of statistically significant gender differences on all variables of intention to implement ESD; however, the differences were not found on teachers' self-efficacy for ESD. The lack of gender differences in teachers' self-efficacy for ESD is in line with the results of previous studies regarding teachers' general self-efficacy, whose results also suggest that gender does not have a significant effect on teachers' self-efficacy, e.g., [14,51,52]. It seems that teachers' self-efficacy is formed by other factors such as vicarious learning, positive previous experiences, etc. [53], which do not depend on gender.

On the other hand, female student teachers express higher levels of intention to implement ESD compared to their male counterparts (higher results across all four intention

subscales). The presented results are in accordance with the results of previous studies, e.g., [39,40,43,44,54].

Since the 1980s, numerous authors have tried to offer an explanation for the abovementioned gender differences during the discussion about environment and development [37]. Some of the earliest explanations of gender differences stem from ecofeminism. Ecofeminists have identified and connected something that is similar to the logic of patriarchal domination–destruction of nature and women's inferiority [55]. Moreover, ecofeminism supporters find the connection between identification of women and the natural environment by arguing that women are, in a biological sense, closely connected with nature due to their reproductive abilities, which makes it more probable that degradation will harm them, whereas they also feel responsible for its preservation [56]. Recently, socialization theories are used in order to explain gender differences in variables connected with sustainability and sustainable development, e.g., [40,57,58]. Socialization theories assume that gender differences represent a consequence of the socialization process, which stems from gender constructions to which children are continuously exposed under the influence of their environment (e.g., parents, teachers, media, etc.) [40]. Socially constructed gender stereotypes dictate that girls should be cooperative, interdependent, emphatic, and willing to help as well as possess a stronger care ethic. On the other hand, boys are expected to be independent and competitive [40,58]. Therefore, it is expected that women express higher pro-sustainable interest and care behaviors because they are socialized to care for their community and the common good.

Apart from gender differences, it was determined in this paper that the older the participants, the lesser the extent to which they express their intention to implement ESD. The presented results are in line with the results of previous studies in the field of sustainability science that point out the fact that older individuals express lower ecological awareness as well as behave pro-ecologically more rarely compared to younger participants; e.g., the meta-analysis conducted by [59]. Some authors find the explanation of these age differences in the assumption that the dominant social paradigm more expressed among older individuals (in Western cultures) is one that emphasizes individualism, concern for personal interests, and economic growth at the expense of environmental welfare [60,61]. Moreover, they believe that older individuals are less willing to change their personal habits, which represents main challenge in the attempt to behave pro-ecologically [62]. While interpreting the obtained results, it is important to note that the sample was quite homogenous regarding age. Although the age range was relatively large (20–48), only 10% of participants were above the age of 25. Additionally, it should be mentioned that all stated correlations, although statistically significant, show a very low correlation between the mentioned variables (correlations range from -0.08 to -0.12). Thus, they should be interpreted with caution, although the results suggest certain trends.

Furthermore, it was determined that students of the natural sciences express an intent to implement ESD to a lesser extent compared to students from other fields. Obtained results significantly differ compared to the results of previous studies in an international context that suggest that student teachers of the natural sciences are the readiest to implement ESD. Additionally, they are the most devoted to the abovementioned field compared to student teachers from other fields [23,24,28]. It is possible that differences between countries and cultures exist (for example, during the preparation process of student teachers for entrance into the teaching profession as well as for ESD implementation), which in turn disallow the comparison of the results obtained in an international context with those obtained in national research.

In order to understand why student teachers of the natural sciences are those who express lower levels of intention to implement ESD, it should be examined whether differences exist among individual study programs in the same field. In the same manner, conducting a detailed analysis of study programs of the natural science teachers' education is essential in order to understand what students of different programs study and what their programs consist of as well as the degree of emphasis put on SD and ESD during their

initial teacher education. Therefore, this is the only way to offer a cohesive explanation of the obtained differences among student teachers in different fields of study.

Moreover, it was determined that students who have attended ESD course/s express higher levels of intention to implement ESD (higher result across all four intention subscales) as well as teachers' self-efficacy for ESD. In that sense, the higher the number of attended ESD courses, the higher student teachers' readiness to implement ESD. Obtained results are in line with the results of a number of previous studies that imply that attending SD courses at a higher education level contributes to higher assessments of knowledge regarding the topic and higher levels of pro-sustainable behaviors as well as higher awareness regarding the importance of ESD, e.g., [17,30,31,54].

Ultimately, it seems that attending ESD courses, i.e., being exposed to ESD content as well as learning outcomes, is related with more a positive way of pro-sustainable thinking and behaving as well as a higher level of readiness to implement ESD. However, prior to drawing any conclusion based on the obtained results, it is important to state potential limitations of this study. First, due to the fact that this study was conducted during a single measuring point, a baseline was not determined prior to or during the very beginning of the start of the course. Additionally, data regarding course compulsoriness were not collected, i.e., whether students attended compulsory or elective ESD courses. It is possible that the levels of student teachers' intentions to implement ESD didn't change while attending courses, instead (elective) ESD courses were attended by students who want to prepare adequately for things which they plan to implement in their future professional work. Therefore, only longitudinal research design—characterized by monitoring the same students before, during, and after attending courses—would resolve the abovementioned issues in the process of understanding the contribution of ESD course attendance to the student teachers' readiness to implement ESD.

5. Conclusions and Recommendations

Based on the results of this study as well as their implications, several key guidelines for the improvement of teacher education study programs in the SD direction can be summarized.

First, in order to enable student teachers to acquire the required knowledge as well as gain competencies needed for efficient implementation of ESD in their future professional work, it is important that they are provided with an opportunity to explore the SD content during their initial teacher education. Thus, it is necessary to include (a higher number of) ESD courses into teacher education study programs. However, introduction of SD as well as ESD courses can be considered a first stage of a higher education switch towards sustainability and SD. According to the results of this study, it can be expected that certain (albeit limited) positive learning outcomes will be achieved among student teachers by including ESD courses into their study programs. However, in order to ensure higher level of student teachers' readiness to implement ESD, it is important to make more fundamental changes in study programs. It is necessary that SD as well as sustainability as a principle becomes a fundamental orientation during the creation as well as improvement of student teachers' learning programs. Simultaneously, it is important to work not only on introducing SD as well as ESD courses into study programs, but also to switch the institution's functioning into an SD direction.

Second, particular emphasis should be put on teacher education in the final year and offer students who are near graduation support during the preparation for ESD implementation in their future professional teaching.

Finally, it is necessary to make changes in order to increase the promotion of SD values at the level of the institution's initial teacher education program leaders. Higher education institutions must publicly proclaim SD values, ensure their representation in all (or at least the majority) of those institutions' activities and encourage working on achieving SD goals as well as switching towards more sustainable universities by, for example, including service learning as well as rewarding initiatives related with SD.

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Data Availability Statement: More about the research and project on http://foror.uniri.hr/?lang=en (accessed on 10 May 2022).

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