The Impact of Lessons Addressing Sustainability on Vocational College Students' Attitudes Towards Sustainability

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Abstract The great importance that topics such as environmental protection and sustainability currently have for teenagers cannot be ignored. In addition to the Fridays for Future movement, the Shell Youth Study also confirms the personal involvement of young people with regard to the issue of sustainability. Recently conducted studies have demonstrated the immense influence of school on students and their attitudes towards sustainability. The combined effect of this positive impact of school lessons and the high level of personal involvement of teenagers or students regarding the topic of sustainability reveals a research topic that is addressed in the study at hand. Hereby, the focus lies on a group of students that is often overlooked in this context: students in vocational colleges. Using a survey consisting of 39 participants, the effect that teaching the topic of sustainability has on their attitudes towards this topic was investigated. To this end, two differently de-signed lessons were taught. The lesson concepts differ in their orientation: within the first one, the students dealt with sustainability from a consumer perspective; in the other, they dealt with sustainability from a company perspective. The evaluation of the questionnaires based on differently oriented dilemmas was carried out by means of a Wilcoxon signed-rank test.

Keywords:: vocational education, didactics, sustainability.

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1 Research question, state of research, and research gap

In 2018, Greta Thunberg started the Fridays for Future movement that motivates a great number of young people to make personal sacrifices in the fight for climate protection. By participating in school strikes, they accept missing out on classes, asking themselves why they should be learning for their futures when their futures are at risk and under threat (cf. Fridays for Future, no year). Shell's Youth Study also confirms the assumption that young people nowadays feel personally affected by environmental protection: According to the study, three out of four young people state that environmental pollution constitutes the most worrying factor (cf. Deutsche Shell-Holding 2019:3). Without wishing to discuss the legality of such school strikes, it does seem paradoxical here that motivated learners should select this tool in particular, since schooling and education are potentially well equipped to contribute greatly to a sustainable future. There is good reason why quality education is part of the 17 goals of the Agenda 2030 for Sustainable Development (cf. BMZ 2017: 13).

The study at hand intends to shed light on the influence of teaching/learning on the sustainable attitude of learners. The focus of our observation is a group of students who have scarcely been noticed in the context of climate protection and Fridays for Future: learners in vocational colleges. Focusing on trainees and apprentices, Helga Berg demonstrates that this particular group of students has special leverage (cf. Berg 2020: 136), since they are the "skilled employees of tomorrow who can make sustainable occupational behavior in their companies a reality" (ibid.). Based on this influential ability, it makes sense to examine the impacts on students in vocational colleges that lessons involving the topic of sustainability have.

Lau's study A Step Forward: Ethics Education Matters, shows that participation in the subject of "business ethics" has a positive impact on learners' ethical awareness (cf. Lau 2009: 581). Moreover, it must be taken into consideration that a discrepancy between moral judgment and subsequent action suffices (cf. DeTienne et al.: 2019: 16 f.).

2 Creation of hypotheses

In alignment with the campaign of the German Federal Ministry of Education and Research entitled "Education for Sustainable Development" (cf. BMBF, no year), there is conviction that educational systems can fundamentally bring about a positive impact on the sustainable behavior of learners. Consequently, sustainability is anchored as learning content in all the vocational courses of vocational colleges. One cross-subject learning goal is defined within the curricula as that of the "Fostering of future-shaping skills for sustainable development under equal consideration of economic, societal, and ecological aspects (sustainability)"[1] (Ministerium für Schule und Bildung 2018: 6). This expectation is concretized in the subject area of economics and public administration through the goal that learners acquire competences such as values orientation and how to handle complexity in the context of sustainability (cf. ibid.:13).

In what sense/how learning goals that take sustainability into account can be conveyed in lessons was examined, inter alia, in 2013 in teacher training courses at Swedish universities. The contents of courses there were oriented towards the educational goals of the campaign addressing Education for Sustainable Development". After the courses had taken place, it was shown that the conveying of course contents had had a proven positive effect on the awareness and attitude of the teacher training students (cf. Andersson et al. 2013: 5146). Moreover, the research study *Nachhaltiger Konsum: (k)ein Thema für die Berufsbildende Schule (Sustainable Consumption: Is it a topic for Vocational Schools or not?)*[2] shows that, with the help of projects in vocational colleges on the topic of sustainability, new sustainable possibilities for action can also be conveyed to learners. Furthermore, it is underlined that sustainability represents a cross-occupational competency which – in the spirit of Kafki – helps learners to acquire self-determination, co-determination, and solidarity. Addressing this topic is, moreover, on account of current problems such as climate change, relevant for the lifeworld of learners (cf. Fischer and Raschpichler 2012: 16 f.).

[1] Authors' own translation from the German
[2] Authors' own translation from the German

In order to measure the influencing of sustainable behavior, several studies observe learners' moral learning growth, since learners often have to face conflict situations in their own lifeworld in which they have to make morally responsible decisions. It is particularly in the field of sustainability that learners are confronted with situations of this kind. According to Lind, morality can be taught. Although the process of its acquisition lasts a lifetime, it can be fostered during school life (cf. Lind 2009: 22). This theme is also addressed in the research of Kowasch and Lippe: *Moral impasses in sustainability education? Empirical results from school geography in Austria and Germany*. The authors find that learners already acquire moral principles outside of school with regard to sustainability. However, a school can influence these and can foster sustainable behavior. What is decisive here is the way in which this topic is treated and conveyed to school students. According to their findings, democratic learning approaches and participatory approaches in the classroom are particularly good for developing moral principles (cf. Kowasch and Lippe 2019: p.1077 f.). Current studies examining the impact of teaching university students about sustainability have arrived at similar findings. According to these, courses that foster the moral competency of university students result in a positive development of the students' generation of new ideas in the field of sustainability (cf. Ploum et al. 2019: 249; 255).

It is questionable, though, as to which effect teaching has on the topic of sustainability in vocational colleges in the sector of white-collar occupations, since until now institutions of this kind have not been targeted for such research either in a general way or for a specific subject (cf. Fischer and Raschpichler 2012: 16 f.). Subject-related findings are mainly availably for general schools or for universities (cf. DuPuis and Ball 2013; Sengupta et al. 2020). Therefore, we derive the following hypothesis:

Teaching on the topic of sustainability has a positive effect on the attitude of learners towards sustainability.

Based on the personal concern of the young people for protecting their environment – as described above – directly involving learners in the lesson would make sense. An observation from the perspective of a private person or consumer might therefore be an appropriate starting point for a person-centered lesson, since it would address learners in a role that is familiar to them.

In order to ensure a person-centered focus during a lesson, an orientation towards the lifeworlds of the learners needs to take place. Claudia Richter highlights that, in a lesson, it is only possible to convey insights and to encourage behavioral changes through a lifeworld orientation (cf. Richter 2017: 87). Concentrating on personal relevance in the classroom is also highly significant for vocational education. According to Gillen, learners' (further) development is only achievable if personal relevance is integrated into a lesson (cf. Gillen 2017: 6). In this case, "personal relevance" means incorporating different access opportunities into a lesson in order to reach out to all learners and to take different types of learners and different interests into consideration. For this reason, "the lifeworlds" are referred to rather than "the lifeworld" (cf. Richter 2017: 86).

The analysis by Frémeaux, Puyou, und Michelson combines personal-relevance-based teaching in vocational education with the subject of "accounting". They were able to show a reduction in the rationality of the accountants' mode of working and simultaneously an enhanced power of judgment when personal relevance was present in a lesson (cf. Frémeaux 2018: 11).

A reason for the effectiveness of personal relevance in lessons can be found in self-efficacy, since personal relevance appeals to learners as autonomous individuals. The resulting stimulation of self-efficacy can lead to learners independently mastering even difficult challenges with the help of the acquired competencies (cf. Schwarzer & Jerusalem 2002: 35). Further evidence for the impact of self-efficacy is provided by the study "Taking Sustainability Personally", which focuses directly on the field of sustainability education and the necessity of combining experiences, emotions, and person-related access in a lesson. Lisa Papaina's study underlines that students' own strength of will needs to be particularly activated when dealing with sustainability, in order to guarantee learning success (cf. Papaina 2019). Moreover, the UNESCO's Global Action Program demonstrates that sustainable action is only possible if people act in the spirit of sustainability and at the same time have their own problem-solving strategies at hand (cf. UNESCO-Weltaktionsprogramm, no year.), which in turn highlights the decisive role of self-efficacy in the context of sustainability. Consequently, it becomes obvious that, for a sustainable attitude, the process of forming one's own will needs to be activated in order to be able to contribute something to sustainable development.

Inspired by the study of Frémeaux, Puyou, and Michelson, we note that there are only a few studies focusing on person-centered aspects in company-centered lessons for white-collar occupations at vocational colleges. As a lifeworld focus is also helpful for conveying economic content, we assume that a person-centered teaching approach will have a stronger impact on learners' sustainable attitude than a company-centered approach, which usually has a weaker lifeworld connection. This leads us to the second hypothesis of our study:

A lesson that focuses on sustainability and that has a direct connection to the lifeworld of the learners (person-centered lesson) has a more positive impact on the attitude of learners towards sustainability than a company-centered lesson has.

3 Design of the study

Since, in the course of the study at hand, the "sustainable attitude" of learners in vocational colleges will be observed, the first question has to be whether and how such an attitude

can be measured. A sustainable attitude is a more abstract term than, for instance, "learning performance of learners", which is why it is difficult to measure.

The topic of sustainability also carries the risk of social desirability. For instance, if learners are directly asked about their attitude to sustainability, perhaps with the help of a test to identify their ecological footprint, it is likely that owing to "fear of social condemnation"[3] (Raab-Steiner and Benesch 2015: 65) they will select an answer that corresponds to the social norm rather than an honest answer. It would probably not be difficult for the learners to choose the "right" answer, since the socially desirable option is usually easy to discern.

In order to avoid this problem, moral dilemmas might be used in this context: "Situations where (at the same time) an agent ought to adopt each of two alternatives separately but cannot adopt both together" (Sinnott-Armstrong 1988: 5). In a dilemma, diametrically opposed moral principles come together (cf. Lind 2009: 18); thus, neither of them is completely moral (or sustainable). Consequently, there is no

[3] Authors' own translation from the German

answer which completely corresponds to the social norms. The problem of social desirability can then be avoided.

In order to tackle the challenge of measuring sustainable attitudes, we found a few survey instruments that make use of moral dilemmas in order to measure learners' power of moral judgement. According to Lind, the latter is "the ability to align one's own thinking with moral ideals and principles and to act on the basis of such thinking"[4] (Lind 2011). This ability relates to thinking and to acting and would appear to be conceptually quite close to the sustainable attitude which is addressed in the framework of the current project. Lind attributes great importance to dealing with counter-arguments, since the moral principles would also have to find application if they came into conflict with other opinions (cf. ibid).

A questionnaire that Lind developed in order to measure the moral power to judge is his Moral Judgment Test[5]. In the course of the questionnaire, respondents are presented with two moral dilemmas that Lind has created (cf. Lind 2009: 49). In both dilemma situations, one character chooses one of the two options for taking action. This decision is evaluated by the respondents on the basis of their moral principles, using a scale from *-4* (totally unacceptable) to *+4* (perfectly acceptable) (cf. ibid.: 51). However, in addition to the two dilemmas, the MJT also contains twelve pro and contra arguments for each dilemma, which respondents have to judge on the same scale. In the case that respondents judge all the arguments, independently of whether they share the stated opinion or not but only on the basis of the moral quality of the arguments, then their moral competence is high according to Lind (cf. ibid.: 49). The confrontation with counter-arguments shows "how pro and contra arguments can be viewed in a differentiated way"[6] (Käter et al. 2016: 52), and this becomes evident through the response pattern of the respondents. The MJT takes about 20 minutes and should where possible be implemented without a time limit, since the latter might impact respondents' judgement ability (cf. Lind 2009: 52).

[4] Authors' own translation from the German
[5] Abbreviated in the following to "MJT"
[6] Authors' own translation from the German

The study at hand is based on these survey instruments and will be described in more detail in the following.

The MJT cannot be used for our study because it is too complex for the formulated hypotheses. The assessment of the pro and contra arguments is not necessary. Instead, only the judgement of the dilemma is the focus of our survey, since we are examining sustainable attitudes rather than moral judgement competence. Moreover, it is not possible to adapt the dilemmas of the MJT to the hypotheses of the project or to the person-centered focus and company-centered focus because the dilemmas are prescribed by Lind. Further, a process time of about 20 minutes was deemed too long for the project at hand. The type of examination was inspired by the MJT and adapted to the given circumstances and to the hypotheses that have to be tested.

The study at hand took place at two different vocational colleges in the Aachen area and was implemented in four different classes. These classes are taught within the framework of the same vocational program and belong to the German Qualification Framework (DQR) level no. 4. The learners are part of the der Fachhochschulreife 13 program (FOS 13), i.e. with the objective of achieving a university entrance qualification.[7]

In the four classes, a double lesson will be taught which focuses on the topic of *sustainability*. One of these double lessons will have a person-centered and the other will have a company-centered perspective, i.e. during the course of the lesson, the learners adopt the perspective of consumers or of companies who are facing a decision with regard to sustainable behavior. These two teaching units are structured as similarly to each other as possible in order to guarantee their comparability within the study.

[7] Originally, this study was planned for a 2-year vocational college and classes from the same year. This was not feasible, however, due to the Covid-19 pandemic and was adapted as described above. Moreover, the planned sample of $N = 100$ was no longer feasible.

Two surveys take place using a questionnaire. One survey takes place before the lesson and one directly after it. Both of the questionnaires are numbered before they are distributed to the learners beforehand in an envelope. The numbering ensures that questionnaires can be matched to each other while simultaneously retaining anonymized conditions

The questionnaire comprises two parts, the first of which was inspired by Lind's MJT. Respondents are presented with dilemma situations which focus on sustainability and in which a character decides in favor of one of the options for action. The topic of the dilemmas is oriented towards the respective focus of the lesson, i.e. it is either person-focused or company-focused.

For reasons serving comparability, the alternative answer in each dilemma will be a less sustainable one. After reading through a situation, the respondents have to react to the decision made by the character. They can do this with the help of a scale – similarly to the MJT – containing four responses. We avoid a dichotomous response format, because we believe it would overly force a concrete decision in favor of or against the decision of the character (cf. Raab-Steiner and Benesch 2015: 58). By nature, a dilemma makes a concrete decision difficult. Respondents might find it so difficult that, in the second survey they might, when in doubt, adhere to their earlier decision, even though their attitude to sustainability might have been influenced by the lesson. A scale, however, enables detection of even slight tendencies of a potential change in attitude. This advantage appears to be such a major advantage that we accept that extreme opinions might not be voiced and that a "tendency towards the middle"[8] (ibid: 66) might arise. We choose a scale with four positions ranging from "*I completely agree"* to "*I completely disagree*", whereby the latter stands for a non-sustainable attitude. This scale was our choice because its even number of graduations makes both differentiation and a clear stance easily observable. The respondents are forced to adopt a position in favor of or against one side, since there is no middle category available to them (cf. ibid.: 60). Owing to this, the selected scale also combats any "tendency towards the middle". Moreover, the scale is limited to four categories because having more categories would make decision making more difficult and time consuming. It might possibly also overtax the respondents.

[8] Authors' own translation from the German.

Differently from the MJT, our respondents are required to formulate one sentence or to jot down a few key words to justify their decision. By offering an open response box, we want to ensure that respondents think carefully about their decision. Any random or indiscriminate responses are avoided, since respondents have to give a brief reason for their answers. The response boxes are only intended to have this purpose; they are not separately evaluated.

Four dilemmas, tailored to the person-centered or the company-centered lesson, are formulated for the questionnaires. Of the four dilemma situations, two of them represent the consumer perspective and two of them the company perspective. The dilemma that is part of the first survey is additionally topicalized in the lesson unit in order to stimulate the learners' interest in "sustainability" and to give them the opportunity to discuss the difficult situation within the class community. At the end of the lesson, a second survey is implemented which also includes a dilemma. Both of the dilemmas represent the same perspective and focus on the same sort of product so that comparability is enabled.

Independently from their perspective, the four dilemmas focus on clothing as a product group, specifically *fast fashion*. The dilemmas in the first survey take a look at jeans, whereas the second survey looks at sneakers. These products seem appropriate, since learners daily consume products of this category and sustainability can be implemented through daily consumption decisions of young people who still live with their parents and do not have a large income. The selected products – jeans and sneakers – can be bought by the learners in their daily life with the means they have available. They can also be examined from the consumer perspective and from the producer perspective.
The respondents were specifically not informed of how the questionnaire would be evaluated. The intention was to minimize the likelihood of learners purposely influencing the outcome of the survey.

4 Results of the study

4.1 Evaluation procedure

Since the same learners were surveyed on the same topic at two different times, i.e. at the beginning and at the end of a lesson, two dependent samples exist. Due to the conception of the two surveys, there are also ordinally scaled random variables X and Y. X represents the sample from the first questionnaire before the lesson and Y that of the second questionnaire. Due to these factors, we apply the Wilcoxon signed rank test in order to test our hypotheses based on our dilemma questionnaires (cf. Steiner and Benesch 2018: 123). It is the goal of the test to determine whether significant changes occur between the samples or whether any differences are random.

In order to apply the Wilcoxon signed rank test, the null hypothesis H_0 – which was to be rejected – and the alternative hypothesis H_1 – which was to be confirmed – were formulated for the first and for the second hypothesis.

The results of the samples X and Y are recorded by means of the following scale: Since there is no neutral position, the sustainable attitude (Position: *I completely disagree)* is defined as *4*. The neighboring position, as a more sustainable attitude, corresponds to notation *3*. A less sustainable attitude is a *2* and the non-sustainable attitude is a *1*. In this way, the distance between the individual positions is assumed to be equal in order to enable the statistical evaluation.

In a next step, we determine the difference between both pairs of values which have resulted from the survey. A particular focus is on the sign of the change. For instance, if the difference has a positive sign, the learner agrees more with the character's attitude to sustainability within the dilemma than he or she did in the first survey. With a negative sign, a change towards a less sustainable attitude can be discerned. If the difference is 0, there is no change. The differences of the observed values for each learner are now considered as a sample. These values are ordered according to their amounts in decreasing order and are consequently ranked. In the case of identical differences, these values are allocated to the average rank (cf. ibid.: 328). Differences equal to zero are not ranked. Finally, the rankings are given the

sign of the difference (cf. Universität Zürich 2018). In order to obtain the test statistic *W,* firstly the sum of all positive rankings and the sum of all negative rankings are formed. *W* now represents the minimum of the obtained values. The significance of the test statistic is checked by comparing it with a critical value. To do this, the z-value must first be calculated according to the following formula:

$z = \frac{W - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$, whereby n is the number of paired differences from zero. Finally, this value can be compared with the critical values of the standard normal distribution, since the size of the sample is sufficiently large. In the case that the amount of z is greater than the critical value, a significant difference exists (cf. ibid.).

In order to be able to compare different data collections with each other, the correlation coefficient $r = \frac{|z|}{\sqrt{N}}$ is determined according to Pearson. There is a weak effect between the results of the dilemma surveys if r=0.10. We can speak of a medium effect if r=0.30 and a strong effect if *r=0.50* (cf. ibid.).

4.2 Results for Hypothesis I

To evaluate the first hypothesis, the findings of the surveys of all students ($N = 39$) are observed before and after the lesson. H_0: $\mu_{\text{vor der Stunde}} \geq \mu_{\text{nach der Stunde}}$ und H_1: $\mu_{\text{vor der Stunde}} < \mu_{\text{nach der Stunde}}$ serve as the decision making basis. H_0 is to be rejected at a significance level of $\alpha = 0.05$.

As Table 1 *Median of the dilemmas* shows, the median shifts by one positive unit between the questionnaires before and after the lesson.

Table 1: Median of the dilemmas

		Dilemma before the lesson	Dilemma after the lesson
N	Valid	39	39
Median		2.0000	3.0000

Since the values of 1.00 and 2.00 represent a non-sustainable or a less sustainable positioning and 3.00 and 4.00 a more sustainable or completely sustainable attitude, we can assume that the lesson had a positive effect on learners' sustainable attitude. This is evidenced by the results of the Wilcoxon signed rank test as shown in Table 2.

Table 2: Ranks of the Wilcoxon sign-rank test

		N	Mean rank	Rank total
Dilemma after the lesson - Dilemma before the lesson	Negative ranks	2[a]	15.75	31.50
	Positive ranks	23[b]	12.76	293.50
	Ties	14[c]		
	Total	39		

a. Dilemma after the lesson < Dilemma before the lesson
b. Dilemma after the lesson > Dilemma before the lesson
c. Dilemma after the lesson= Dilemma before the lesson

Notice the positive ranks: In the survey after the lesson, 23 learners have a higher decision value, i.e. a more sustainable decision, than before the lesson, but 14 learners have not changed their judgement. With regard to the latter, however, it should be emphasized that eleven of them with a decision value of 3.00 and above in the first survey have not changed their judgement.

The test statistics in Table 3 indicate a potential rejection of our Hypothesis H_0.

Table 3: Statistics for the Wilcoxon rank-sum test

	Dilemma after the lesson – Dilemma before the lesson
Z	-3.701[b]
Asymptotic significance (2-sided)	.000
Exact significance (2-sided)	.000
Exact significance (1-sided)	.000
Point probability	.000

a. Wilcoxon test
b. Based on negative ranks

As $\alpha = 0.05 > 0.000$ (one-sided) holds for the test statistics, we can reject H_0, which results in an acceptance of H_1. Consequently, these findings confirm our hypothesis that *Teaching on the topic of sustainability has a positive effect on the attitude of learners towards sustainability*. On account of the significance, the correlation coefficient can also be taken into consideration. As $r = \frac{|Z|}{\sqrt{N}} = \frac{3{,}701}{\sqrt{39}} = 0.59 > 0.5$ holds, there is a strong effect with regard to the difference between the first and the second survey. Thus, it can be assumed that teaching has a large impact on the sustainable attitude of learners.

4.3 Results for Hypothesis II

In order to test the second hypothesis, the samples are categorized according to the different lesson focuses. For the person-centered lesson, we obtain a sample size of $N = 18$ and for the company-centered lesson one of $N = 21$. If we observe the change in the medians of both groups in Table 4, we clearly see that there is a positive change between the survey before the lesson and the survey after the lesson for the person-centered lesson.

Table 4: Medians

		Person-centered		Company-centered	
		Dilemma before the lesson	Dilemma after the lesson	Dilemma before the lesson	Dilemma after the lesson
N	Valid	18	18	21	21
Median		2.0000	3.0000	3.0000	3.0000

In contrast, the medians of the survey for the company-centered lesson show no change. If we examine the impacts of the different perspectives adopted in the lesson, the Wilcoxon signed rank test shows in Table 5 for the person-centered perspective that there is a negative effect for none of the 18 learners, whereas for 70% of them a positive change has occurred. In comparison, the table for the company-focused lesson shows that for two learners, their assessment of the dilemmas has worsened with regard to their attitude towards sustainability.

Table 5: Ranks

		Person-centered			Company-centered		
		N	Mean rank	Rank sum	N	Mean rank	Rank sum
Dilemma after the lesson - Dilemma before the lesson	Negative ranks	0[a]	.00	.00	2[a]	8.50	17.00
	Positive ranks	13[b]	7.00	91.00	10[b]	6.10	61.00
	Ties	5[c]			9[c]		
	Total	18			21		

a. Dilemma after the lesson < Dilemma before the lesson
b. Dilemma after the lesson > Dilemma before the lesson
c. Dilemma after the lesson = Dilemma before the lesson

Moreover, more than 40% of the learners have not changed their attitude. In the person-centered lesson group, it was by comparison 27% who had the same sustainable attitude before and after the lesson.

In Table 6, the test statistics of the Wilcoxon signed rank tests show that in the person-centered lesson there was a significant change: $\alpha = 0.05 > 0.000$ (one-sided).

Table 6: Test statistics

Statistics for test[a]		
	Person-centered	Company-centered
	Dilemma after the lesson - Dilemma before the lesson	Dilemma after the lesson - Dilemma before the lesson
Z	-3,286[b]	-1,848[b]
Asymptotic significance (2-sided)	.001	.065
Exact significance (2-sided)	.000	.097
Exact significance (1-sided)	.000	.048
Point likelihood	.000	.005

a. Wilcoxon test
b. Based on negative ranks

There is also a significant change with regard to the surveys with a company-focus, since

$\alpha = 0.05 > 0.048$. In order to now be able to compare the different lesson contexts with each other, we observe the correlation coefficient. With the help of the test statistics, for the person-centered lesson we have: $r = \left|\frac{Z}{\sqrt{N}}\right| = \left|-\frac{3{,}286}{\sqrt{18}}\right| \approx 0.7745 > 0.5$. Therefore, by definition, there is a strong effect between both dilemmas. In contrast, for the company-centered lesson, $r = \left|\frac{Z}{\sqrt{N}}\right| = \left|-\frac{1{,}848}{\sqrt{21}}\right| \approx 0.4033$. As thus $0.3 < 0.4033 < 0.5$ holds, there is a medium effect between the survey before and after the lesson. Consequently, we can assume that a person-centered lesson has a stronger effect on the respondents than a company-centered lesson has. Thus, we verify Hypothesis H_2.

5 Conclusions, limitations, and outlook

This work has addressed the issue of whether and under what conditions lessons on the topic of sustainability have on the vocational college learners' attitude towards sustainability. In doing so, two hypotheses were examined.

Using a Wilcoxon signed-rank test, we can confirm that lessons on the topic of sustainability have a positive effect on learners' attitude towards sustainability. With regard to the dilemmas, 23 of the respondents make a more sustainable decision after the lesson than before the lesson. Therefore, the first hypothesis can be confirmed on the basis of our data.

In the course of our observation of person-centered and company-centered teaching concepts, there was in particular a stronger positive effect of the former type of lesson focus. Both types of concept resulted in a positive change in learners' attitudes towards sustainability after the lesson. With the help of the respective effect levels, we can however establish that person-centered teaching has a greater impact on learners' decisions than company-centered teaching does. Consequently, on the basis of our data we can confirm the second hypothesis, too.

In summary, it should be said that the findings of the work at hand should, in part, be seen as representative, since the sample size is $N = 39$. Our findings show, then, tendencies, which should be further examined in a more comprehensive study with a larger number of participants in order to test their general validity.

Further, the attitude towards sustainability, which learners bring with them to the lesson, might impact the influence of the lesson. The *Fridays for Future* movement clearly shows that young people are currently very involved in the topics of environmental protection and sustainability. This might result in their already bringing a strong positive attitude towards sustainability with them and the influence of the lesson remains at a minimum. Particularly with regard to Hypothesis 2, in the first survey respondents already had sustainable attitudes in the case of company-centered teaching. This high number at the onset might have contributed to the effect of the lesson on sustainable attitudes being only slight.

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