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Am I Fit for Tomorrow's Labor Market? The Effect of Graduates' Skills Development during Higher Education for the 21st Century's Labor Market

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Abstract: This study contributes to the employability skills debate by investigating how students' self-perceived 21st century skills relate to the self-perceived fit between their higher education curriculum and their future labor market for a sustainable entry to this labor market. Survey data from 4670 fourth-year students over a period of four years were analyzed. Furthermore, out of this group, 83 students were monitored longitudinally over their full educational student careers. Results showed a positive relationship between students' self-perceived 21st century skills and their self-perceived "education-future labor market fit". Among more recent cohorts, a significant improvement in their self-perceived 21st century skills was found. Overall, this study indicated that in order to deliver "employable" graduates, students need to be thoroughly trained in 21st century skills, and their development should be retained and expanded. This is one of the few studies that uses a vast amount of both cross-sectional and longitudinal data on skills and labor market perspectives among new graduates.

Keywords: education-future labor market fit; self-rated 21st century skills; labor market analysis; employability; role of higher education

1. Introduction

Over recent decades, labor market requirements have radically changed [1], particularly in view of the introduction of new ways of organizing work in the 21st century [2]. New ways of organizing work implies that working conditions are increasingly characterized by more competition, work intensification, a faster work pace, shorter lead times, the expansion of different kinds of flexible work contracts, including part-time work, and an increased decentralization of decision-making authority and responsibilities in the workplace [2]. Due to these changes, a sustainable entry to this labor market is crucial, and the interest in the degree of graduates' so-called "work-readiness" has exploded [3]. Among others, by the notion that educational systems suffer from a lack of training with regard to employment skills [4]. According to Lechner, Tomasik, and Silbereisen [5], career prospects

and the “education-future labor market fit” have become more uncertain, individual career paths have become less stable [3], and graduates need to be prepared for this new environment.

It has been recently noted that attention should be drawn to the skills of graduates who are entering the current labor market [6]. The future workforce is required to pursue more general skills for living and working in the 21st century, besides job specific skills [7]. These more general skills comprise so-called “21st century skills” [7,8], which include amongst others: collaboration [9], communication [10], problem-solving skills [11], and critical thinking [12]. Though, not being fundamentally new skills, they remain a crucial base and necessary in the 21st century. A recent study by Butum, Nicolescu, Stan, and Găitănanu [13] showed that these four skills are highly appreciated by students of different fields (economic and social) to participate in the current labor market. Hence, Voogt et al. [7] suggest a critical role for education with regard to the implementation of these 21st century skills. Therefore, universities (including universities of applied sciences) have been pressured to deliver graduates that are highly employable at the end of their educational career [14]. This means that individuals should have the capacity to continuously fulfill, acquire, or create work by using their competences in an optimal way [15] in order to sustainably enter the labor market. Furthermore, sustainable employment may foster positive, sustainable organizational development [16].

Since the transition from education to work can be challenging for graduates that enter the labor market [17], a strong “education-future labor market fit” is deemed essential for their early careers to be successful. In order to achieve this fit or match of the supply and demand in labor markets [18], universities are supposed to update their higher educational programs by stimulating graduates to develop 21st century skills [19]. Furthermore, the 2030 agenda for sustainable development by the UN General Assembly [20] specifically stresses with goal four, quality education, with amongst others a focus on sustainable development (goal 4.7). The present study aims to contribute to the scholarly and societal debate between employability and (21st century) skills [21]. Moreover, this study adds to the literature on 21st century skills [22] by helping to close the gap between what stakeholders involved intend to reach in terms of learning, that is the “implemented curriculum”, and what is actually obtained, that is the so-called “attained curriculum” [23] in order to assess if expected learning outcomes (preparing students for a sustainable entry to the labor market) are achieved. This is performed by analyzing a vast amount of data while combining both cross-sectional and longitudinal methods. Overall, this study focuses on investigating the extent to which students’ self-reported 21st century skills relate to how they perceive fit between their curriculum and their future labor market; whether recent cohorts of students in their final year have gained more skills at the end of their student career than older cohorts; and whether students have developed these skills over their student careers.

2. Theoretical Framework and Hypotheses

In order to cope with 21st century changes and a more sustainable entrance to the labor market, multiple reviews e.g., [8,22–24] have outlined frameworks incorporating the current necessary knowledge, skills, individual attitudes, and attributes. These frameworks show consensus that, in order to live, contribute to, and survive in the present society, collaboration, communication, problem solving, critical thinking, digital literacy, citizenship, creativity, and productivity are vital [7]. Although not being radically new skills, these first four types of skills—that is, collaboration, communication, problem solving and critical thinking—remain essential, and a fundamental base in the 21st century, and they can be grouped under “social” and “cognitive” skills. Following the definition by Deming [25], collaboration and communication fall under social skills. Problem solving and critical thinking can be labelled as cognitive skills, in line with the description of the “non-routine analytical” job tasks used by Autor, Frank, and Richard [26].

In their recent review of skill requirements in relation to the contemporary labor market, Deming and Kahn [27] report that both “social” and “cognitive” skills correlate positively with external measures such as firm performance. Furthermore, they also find evidence for a so-called cognitive/social skill complementarity, thus stressing the continued importance of skills such as

collaboration, communication, problem solving, and critical thinking. This means that these skills are still indispensable in the 21st century [28], hence the name 21st century skills [29]. In particular, as mentioned earlier, Voogt et al. [7] find consensus in the literature on the following 21st century skills: collaboration, communication, problem-solving, and critical thinking which will be elaborated on below.

Collaborating is a skill, which in the current labor market has become a necessary requirement, as organizations acknowledge that collaboration, for instance, drives innovation [30], being an important capability that is needed in order to reach the organizational goals. Collaboration allows people to “solve the problems they face and to reach a common goal” [9] (p. 318). Previous studies have shown that both critical thinking and problem-solving (other desirable 21st century skills) can be enhanced by students who are involved in collaborative learning [31]. Moreover, we know from earlier research that challenges and problems in the labor market with regard to collaborative work are often due to a lack of training in this particular skill [32]. Hence, it is essential to focus on teaching these collaborative skills, early on—that is, in higher educational programs and not only once being employed—in order to have a sustainable entrance to the future labor market.

Another highly important human social function is the skill to communicate with one another [10]. In particular, communication is an essential skill to possess for new entrants to the labor market in their collaboration with others. After all, almost all interpersonal and social interactions in the workplace involve a component of communication [33]. Specifically, conversing, which can have many different forms, e.g., negotiating, advising, explaining etc., and presenting, the main method of one-way communication, both play an essential role in the workplace [34]. Hence, in the 21st century, communication has a predominant position at the labor market. Therefore, focusing on communication skills is important for higher educational organizations to be able to provide a sustainable entry for graduates to the labor market.

In the 21st century, the amount of repetitive jobs is reduced and, as a result, the increasing job complexity and dynamics make problem-solving skills crucial for a sustainable entry to the labor market. In other words, at present, one needs to solve problems “on-the-spot”, which comprises that in many circumstances, workers are not enabled to follow rationale in solving problems at work [11]. However, in order to solve work-related problems effectively, a precise understanding of the problem at hand is required [35]. Although it may be argued that problem solving is a “generic” skill, a more precise knowledge of the complexity and dynamics that are inherent to modern jobs, and a sound arsenal of domain-specific knowledge, are indispensable [36]. This means that students need to be trained in problem-solving in a context that is specific for their occupational field. D’Zurilla and Sheedy [37] found that sound teaching is needed to thoroughly educate problem solving skills. Therefore, they stress the importance for ample attention for carefully integrating this skill development in higher educational programs.

Finally, nowadays, one is often exposed to “fake news”, and information can easily become blurred, thus making critical thinking another necessary skill in the workplace. “If we lack critical thinking skills, we can easily be fooled into thinking that an argument is strong when the premises actually provide little or no support for the conclusion” [12] (p. 6). McPeck [38] states that in order to execute critical thinking, reflective skepticism is needed in order to set apart critical thinking from just thinking. With critical thinking also being an important requirement for success, as perceived by employers [39], it should have a fundamental place within higher educational programs. As such, critical thinking is also one of the skills that is essential for sustainable development [40].

Hypotheses Development

Based on the outline given above, we developed a set of three hypotheses to be empirically tested in this study.

First, according to the assignment theory [41], educational mismatches imply competency mismatches. Hence, the importance of curricula and the fit they provide with the labor market is a

crucial characteristic. “Nowadays, the career trajectory of graduates becomes more complex and so does the relationship between education and jobs: Graduates with the same educational background can apply for a range of jobs and one job can be executed by graduates with different educational backgrounds” [42] (p. 69). Whereas individuals may experience the degree of fit between their higher educational program and the future labor market in different ways, notwithstanding the degree of factual fit, the fit as perceived by students has become an important measure [43] as it relates to their early career success after graduation. Developing and enhancing the fit between students’ education and the requirements of future labor markets is one of the goals of higher education, which also implies that students need 21st century skills [19]. Based on this, the following Fit Hypothesis was developed.

Fit Hypothesis 1 (H1). *Students’ self-perceived 21st century social and cognitive skills (i.e., the skill for collaboration, communication, problem-solving, and critical thinking) are positively related to them perceiving more education-future labor market fit.*

Second, in view of current changes in education and labor market policies, universities in general are increasingly pressured to produce employable graduates [14,44]. Looking at the core mission of higher educational programs, which is to make students employable for the labor market, we argue that this can be reached by the advancement of competencies, i.e., a combination of knowledge, skills, and attitudes [45]. Being employable nowadays for a job in a future labor market starts with building up the necessary 21st century skills [19], which should, therefore, be taught in educational programs, over and above the domain-specific knowledge [15]. In particular, Kay and Greenhill [19] mention that students preparing for present-day labor markets also need 21st century skills, in the sense of having a more multidisciplinary focus. In line with Deming and Kahn [27], and building upon the 2030 agenda for sustainable development [20] to ensure quality education, it can be assumed that over time universities have started to pay more attention to those social and cognitive skills that are deemed to be particularly important for the 21st century labor market [7]: collaboration, communication, problem-solving, and critical thinking. In view of this, the following Change Hypothesis was developed:

Change Hypothesis 2 (H2). *Fourth-year students in higher educational programs who are part of later cohorts score higher on 21st century skills in comparison with their counterparts from earlier cohorts.*

Third, over the course of their educational careers, students can be expected to develop and accumulated their skills on an ongoing basis, or in other words, learn, thus increasing the amount of 21st century skills they possess [46]. Since we may expect universities to build curricula in which students can learn and develop the skills that fit the future labor market, the following Learning Hypothesis was developed.

Learning Hypothesis 3 (H3). *Students in the final year (i.e., the fourth year) of their higher educational program report more 21st century skills in comparison with their report in their first year.*

3. Methodology

3.1. Procedure and Sample

For this study, a quantitative deductive approach [47] was chosen, using both a cross-sectional and a longitudinal survey design. The data were gathered via a survey approach in a university of applied sciences comprising a diversity of higher educational programs. The data were derived from multiple annual waves (2014–2017) of the National Students’ Survey (NSE) in The Netherlands. Studiekeuze123, which manages the NSE, is an independent collaboration between the Dutch Ministry of Education, Culture and Science, student organizations, and the Dutch institute for higher education. The NSE measures the opinions of students about their higher educational programs. The results are used by

Studiekeuze123 for study choice information. Universities and colleges use the results to improve their education.

Two subsets of the data were created for the analyses. The first data set (Data set 1) that was used in this study consisted of 4670 fourth-year students' data points, gathered over a period of four years (Cohorts 2014–2017). Data set 1 was used to test Hypotheses 1 and 2. Data set 2 which comprised a cohort of 83 students that were followed longitudinally in their first year (2014) and in their fourth year (2017) was used for Hypothesis 3.

3.2. Measures

Education-future labor market fit was measured by means of a scale consisting of three items based on insights from Kay and Greenhill [19]. The items were: "Please rate your satisfaction with acquiring skills for professional practice"; "Please rate your satisfaction with the focus of your program on professional practice"; and "Please rate your satisfaction with the link to professional practice (e.g., work placements/internships, guest speakers, assignments for external organizations)". All items were measured on a five-point Likert scale with answering possibilities ranging from (1) "very dissatisfied" to (5) "very satisfied". The scale had a good reliability with Cronbach's $\alpha = 0.94$.

The variable 21st century skills is a scale that builds upon insights from Voogt et al. [7] and from Deming and Kahn [27]. The following six items were included: "How satisfied are you with the degree in which you learn to collaborate with others?"; "How satisfied are you with the degree in which you acquire communication skills (e.g., oral presentations, conversation)?"; "How satisfied are you with the degree in which you acquire problem-solving skills?"; "How satisfied are you with the degree in which you acquire analytic thinking?"; "How satisfied are you with the degree in which you acquire a critical assessment of practice-oriented research?"; and "How satisfied are you with the degree in which you acquire a critical attitude?". All items were measured on a five-point Likert scale with answering possibilities ranging from (1) "very dissatisfied" to (5) "very satisfied". The scale had a good reliability with Cronbach's $\alpha = 0.94$.

In order to test for possible confounding effects, and based upon earlier empirical research in this field in line with e.g., O'Leary [48], we investigated whether "gender" [48], "age" [49], "highest educational degree before admission to the current program" [50], and "housing situation" [51] explained variance in our analysis. As our outcomes indicated that these factors did not add to the predictive validity of our research model, we left them out from all further analyses in order to increase the power of our tests.

3.3. Data Analysis

First, for testing the direct relationship between 21st century skills and education-future labor market fit (see Fit Hypothesis 1), Structural Equation Modeling (SEM) (using Mplus) was performed. Based on insights of Kay and Greenhill [19], the proposed model as presented in Figure 1 assumes 21st century skills to have a positive structural path with education-future labor market fit. Combined with insights of Deming and Kahn [27] and of Voogt et al. [7], we performed Confirmatory Factor Analysis (CFA) with SEM to test the psychometric qualities of the latent variables itself, and the path between these two distinguished latent variables.

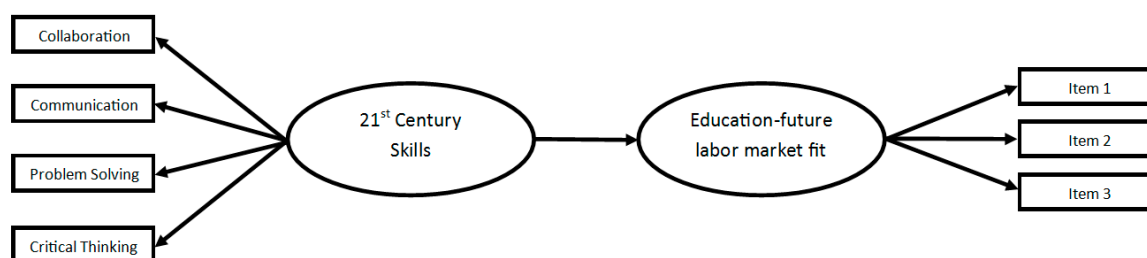


Figure 1. Education-future labor market fit model.

Second, testing for possible differences among fourth-year students from various cohorts (See Change Hypothesis 2), a cohort analysis using ANOVA was conducted. In particular, this analysis is aimed to examine whether fourth-year students of later cohorts score differently on 21st century skills, in comparison with fourth-year students in an earlier cohort.

Third, for testing the longitudinal development of scores on the 21st century skills variable (see Learning Hypothesis 3), a one-way repeated measures ANOVA was conducted. In principle, this analysis is aimed to investigate whether there is a significant difference in the scores of the 21st century skills students gave in their first year in comparison with the scores in their final, fourth year of their academic career.

To check the quality of the data, the assumptions for multivariate analysis were tested (i.e., linearity, randomness, homoscedasticity, normality of errors, and no multicollinearity) [52]. As no violations of the assumptions were found, further analyses were conducted as planned.

4. Results

The descriptives are reported per data set (Data set 1, cross-sectional; Data set 2, longitudinal) on the latent variables. Table 1 shows the number of completed answers per latent variable, the mean scores, the standard deviations, and the correlations between model variables. In Data set 1, the mean score for 21st century skills was 3.84 (SD = 0.66). Education-future labor market fit appears to have a mean score of 3.71 (SD = 0.89). Furthermore, Table 1 also shows that 21st century skills and education-future labor market fit were positively, significantly correlated ($r = 0.62$).

Table 1. Descriptives Data set 1 (fourth-year students in 2014–2017).

Variable	N	Mean	SD	(1)	(2)
(1) 21st century skills	4670	3.84	0.66	~	
(2) Education-future labor market fit	4563	3.71	0.89	0.62 *	~

* Correlation is significant at the 0.01 level (2-tailed). The variable 21st century skills is a latent variable comprising collaboration, communication, problem solving, and critical thinking. Education-future labor market fit is a latent variable comprising 3 items.

In Data set 2, the variable 21st century skills is measured at two moments in time: in 2014 when the student was in his/her first year and in 2017 when the student was in the fourth-year of their higher educational program. In 2014, 21st century skills had a mean score of 3.85 (SD = 0.60) and, in 2017, 21st century skills had a mean score of 3.74 (SD = 0.65). With regard to their correlation, we found that the two measurement points for 21st century skills did not correlate significantly with one another (see Table 2).

Table 2. Descriptives Data set 2 (longitudinal data: students who were in year one in 2014 and year four in 2017).

Variable	N	Mean	SD	(1)	(2)
2014					
(1) 21st century skills	83	3.85	0.60	~	
2017					
(2) 21st century skills	83	3.74	0.65	0.07	~

There were no significant correlations. The variable 21st century skills is a latent variable comprising collaboration, communication, problem solving, and critical thinking.

4.1. The Relationship between 21st Century Skills and Education-Future Labor Market Fit

Structural Equation Modeling was used in order to test the fit between the proposed model and the data. The proposed model appears to have an acceptable to good fit to the data. The χ^2 value, the Goodness-of-Fit Index (GFI), and the Root Mean Square Error of Approximation (RMSEA) were

calculated. As a rule of thumb, a GFI ≥ 0.90 and a RMSEA ≤ 0.08 indicate a reasonable fit between the model and the data [53]. The model for the total sample appears to have a reasonable fit ($\chi^2 = 1163.60$, $df = 26$, GFI = 0.94, RMSEA = 0.09). Standardized parameter estimates are provided in Figure 2, and unstandardized estimates are shown in Table 3.

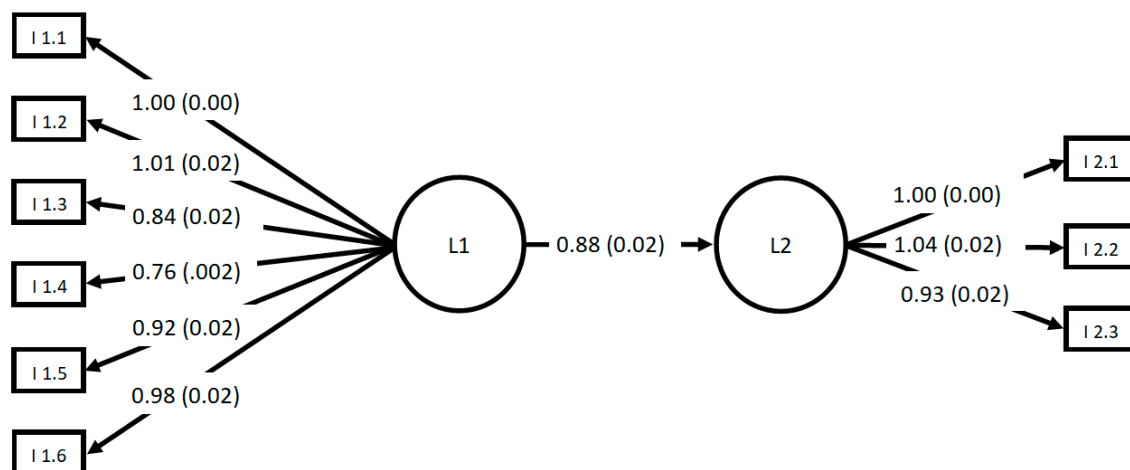


Figure 2. Results Education-future labor market fit model. I 1.1/I 1.6—Critical thinking. I 1.2/I 1.5—Problem solving. I 1.3—Collaboration. I 1.4—Communication. L1—21st century skills. L2—Education-future labor market fit. I 2.1/I 2.2/I 2.3—Education-future labor market fit (items).

Table 3. Standardized and unstandardized coefficients for CFA and results from SEM.

Observed Variable	Latent Construct	β	B	SE
Critical Thinking (B1)	21st century skills	0.73	1.00	
Problem solving (B2)	21st century skills	0.80	1.01	0.02
Collaboration (B3)	21st century skills	0.63	0.84	0.02
Communication (B4)	21st century skills	0.61	0.76	0.02
Problem solving (B5)	21st century skills	0.72	0.92	0.02
Critical thinking (B6)	21st century skills	0.70	0.98	0.02
Preparation 1 (C1)	Education-future labor market fit	0.86	1.00	
Preparation 1 (C2)	Education-future labor market fit	0.86	1.04	0.02
Preparation 1 (C3)	Education-future labor market fit	0.73	0.93	0.02
Model				
Education-future labor market fit on 21st century skills		0.71	0.88	0.02

The significant structural path shows that the variable 21st century skills is positively related to education-future labor market fit ($b = 0.88$, $p < 0.001$), thus providing support for our Fit Hypothesis 1.

4.2. 21st Century Skills over Different Cohorts of Students

A one-way between-groups analysis of variance was conducted to explore the impact of cohort (2014–2017) on the students' levels of 21st century skills. Fourth-year students were grouped according to one of the four specific fourth-year cohorts they belonged to (over the time span 2014–2017). We found a statistically significant difference for 21st century skills between the four different cohorts: $F(3, 4664) = 5.6$, $p = 0.001$. Posthoc comparisons, using the Tukey HSD test, because of the large sample size (Field, 2013), indicated that the mean score in skills among the cohorts that started in 2014 ($M = 3.81$, $SD = 0.66$) was significantly lower compared to the ones from the cohort that started in 2017 ($M = 3.90$, $SD = 0.64$). Additionally, students from cohort 2015 ($M = 3.80$, $SD = 0.66$) appeared to score significantly lower than the ones from cohort 2017. Cohort 2016 ($M = 3.86$, $SD = 0.66$) did not differ significantly from either cohort 2014, cohort 2015, or cohort 2017. In addition, cohort 2014 did not differ significantly from cohort 2015. With these outcomes, we found partial support for our Change Hypothesis 2.

4.3. The Longitudinal Relationship between 21st Century Skills in Year One and Year Four

A one-way repeated measures ANOVA was conducted to evaluate the development of students' 21st century skills over their educational careers (longitudinal). For 21st century skills, no statistically significant difference was found for the skills' variable, with Wilks' Lambda = 0.99, $F(1, 82) = 1.23$, $p > 0.05$, and multivariate partial eta squared = 0.02. Hence, no support for Learning Hypothesis 3 was found with our data.

5. Discussion and Conclusions

Educational programs need to be constantly reviewed because of the rapidly changing labor market [54]. In view of the rising need for 21st century skills enabling a sustainable fit with future labor market requirements, schools and educational systems are pressured to ensure quality education [20] and embrace these skills increasingly in their curricula. Consequently, implementing and executing 21st century skills in higher educational programs is viewed to be an important step in the adaptation to future labor market requirements. In view of the core mission of higher educational programs to prepare students for future employment [45], stakeholders in educational institutions have to analyze the labor market to keep track of labor market developments and requirements, and continuously have to invest in enhancing the fit between students' required skills and their higher educational programs to ensure a sustainable entry to this labor market. This study questioned whether higher educational programs keep up with the current labor market requirements—in particular, the demand for 21st century skills (i.e., collaboration, communication, problem-solving, and critical thinking) [7]—by investigating how the 21st century skills affect students' perceived education-future labor market fit (Fit Hypothesis 1); how the acquired skills levels across four cohorts of students having attended higher educational programs have developed over time (Change Hypothesis 2); and, finally, how students perceive these skills to have accumulated throughout their educational careers (Learning Hypothesis 3).

5.1. The Importance of Fit

First, in line with our expectations, the results showed that 21st century skills positively relate to students' perceived education-future labor market fit. This outcome underlines the importance of acquiring these indispensable skills in light of the changes in the world of work, which has a considerable impact on today's graduates entering the workforce [cf. 1]. Moreover, in line with Warn and Tranter [45] who state that it is important to focus on these skills to prepare students for the labor market—that is, enhancing their employability—is a priority for higher education. This can be realized by paying more attention to students' development of 21st century skills in their curricula [11,12,30,33]. All in all, this result indicates that future employees need to learn and build up sufficient skills in order to be able to adapt to changing environments as posted by Carnevale and Smith [39].

5.2. The Importance of Change

Second, 21st century skills need to be further implemented in the curricula of educational systems [29]. By examining the embedment of 21st century skills in higher educational programs, as perceived by the fourth-year students themselves, this study indicated that there is a significant increase over time (Cohorts 2014/2015/2016/2017) based on the scores for the variable "21st century skills" for the distinguished cohorts. However, a significant difference was only present between the cohorts from the years 2014/2015–2017, with the cohort of 2017 scoring highest. In general, this implies that the required focus in educational systems on quality education [20], enabling a sustainable entry to the labor market, is acknowledged, and that the landscape for learning has transformed to curricula (in higher education or even before) with increasing 21st century skills [55]. It could also be that fourth-year students of the later (2017) cohort gathered the 21st century skills to a higher degree before they entered higher education in comparison to earlier cohorts. Nevertheless, the

recognition or perception by students in our sample where students judge the quality of their education is important [56]. Hence, students' perceptions form an interesting place for inquiry for study programs in transition [57]. Furthermore, this outcome is in line with notions on the character of the 21st century skills that are urgently needed in the current labor market [29].

5.3. *The Importance of Learning*

Third and finally, using our longitudinal data, we found that there was no significant difference between the scores on the variable "21st century skills", comparing students in their first year with those in their fourth year. Surprisingly, the mean scores show that students in their fourth year reported lower scores (though not significantly lower) rather than higher scores in their estimation of their own 21st century skills. From a learning perspective, this surprising finding may be explained by students going through "phases in learning". Howell [58], being one of the earliest in the literature dealing with these "phases in learning", stated that students move from what he calls "unconscious incompetent", via "conscious incompetent", "conscious competent", to "unconscious competent". The phenomenon of students going through this development process during their studies, transiting from Phase 1, unconscious incompetent, to Phase 2, conscious incompetent, might explain the lower score for students in year four compared to their assessments in year one. Nonetheless, it remains an important point of attention with regard to this sample.

6. Limitations and Recommendations for Future Research

First of all, the sample was taken from one higher education institute, which is a university of applied sciences, only. This limits the generalizability of the findings but future, preferably more extended, longitudinal research comprising more but similar educational institutions is needed to understand the pattern of differences better. In addition, differences between other types of educational institutions could also be studied. Furthermore, there is a lack of study program specification. Given the limited sample size per higher educational program in our sample, it was not possible to perform analyses per study program of the educational institution under study. Future large-scale research across various higher educational programs could be conducted in order to investigate the generalizability and/or differences across various study programs. Through this, one could highlight differences across levels of educational programs or across work fields, and, accordingly, align the distinguished curricula in order to safeguard students' future labor market fit, depending on their specific needs.

A second limitation pertains to the measurement of 21st century skills in this study. In line with Deming [25] and Voogt et al. [7], this study focused on "social" and "cognitive" skills, of which multiple frameworks show consensus that these are vital to live, contribute to, and survive in the present society. Specifically, those skills that form a crucial base for a sustainable entrance to today's labor market—collaboration, communication, problem solving, and critical thinking—were discussed in this study. Nonetheless, future research could include other skills such as digital literacy, citizenship, creativity, and productivity.

Finally, a third limitation concerns the issue of common-method bias, which is the systematic variance in measurement that is attributable to the specific method used to measure two or more variables [59]. In this study, for all variables, only Likert scales and self-reports were used. In future research, the incorporation of multisource ratings and/or both qualitative and quantitative measures is recommended. Especially the addition of qualitative data could shed more light on the rather surprising results of the Learning Hypothesis 3.

7. Practical Implications

Working on the delivery of "sustainable employable" graduates has even increased in importance with the year 2020 being dominated by the COVID-19 pandemic. More specifically, the crisis that this pandemic entails has also left its mark on education [60]. Currently, more than ever, graduates

should perceive themselves to fit with the labor market and to be able to deal with a continuously altering environment [1]. Therefore, we posit that students need to be thoroughly trained in 21st century skills. Skills that have reached broad consensus on being relevant for the 21st century enabling a more sustainable entrance to the labor market are collaboration, communication, problem-solving, and critical thinking skills [7], and these should have a focal place in the curricula in order to enhance the students' fit for the labor market. Nonetheless, in practice, it should be taken into account that not all students start with the same skills or learn the 21st century skills at the same pace [61]. Especially when including 21st century skills in an educational curriculum, this point-of-attention should be taken into account and tailor-made. Extracurricular activities are a way to introduce this to e.g., those students who are behind on particular 21st century skills.

This study also implies that, over the past four years, given the perceptions of the most recent cohort of fourth-year students in comparison with their counterparts from earlier cohorts, a higher perception of 21st century skills exists. This focus, may it be in higher education or earlier on, on the further development of 21st century skills should be retained and expanded.

Notwithstanding these promising outcomes, our longitudinal results show that the average scores of 21st century skills did not increase during the time of the students' educational careers in higher education. In particular, although nonsignificant, there was even a slightly negative trend. Therefore, we need to interpret these outcomes with caution and reflect critically on them. Possibly, students' collaboration, communication, problem-solving, and critical thinking skills do not actually decrease, yet students' perception of those skills decrease. The latter could be explained by the "phases in learning", where students may only have reached the "conscious incompetent" phase later onwards in their study. Hence, a more conscious development of students' own skills—in other words, metacognition—is of utmost importance, in order for the students to take charge of their own learning [62]. Furthermore, from a metacognitive perspective, Nelson [63] argues that, immediately after someone has learned something new, the self-assessment of how well something is learned is less accurate in comparison with the assessment at a later moment in time. Therefore, from a practical point of view, it is crucial to raise students' awareness of their learning curve by stressing the need for continuous self-evaluations.

Overall, the direct effects of 21st century skills on education-future labor market fit, and the increase in 21st century skills scores of more recent cohorts, show that higher-order skills needed for jobs in the new economy are highly important.

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References

1. Soulé, H.; Warrick, T. Defining 21st Century Readiness for all Students: What we Know and How to Get There. *Psychol. Aesthet. Creat. Arts* **2015**, *9*, 178–186. [[CrossRef](#)]
2. Nilsson, S.; Ekberg, K. Employability and Work Ability: Returning to the Labour Market after Long-term Absence. *Work* **2013**, *44*, 449–457. [[CrossRef](#)] [[PubMed](#)]
3. Tomlinson, M. Introduction: Graduate Employability in Context: Charting a Complex, Contested and Multi-faceted Policy and Research Field. In *Graduate Employability in Context: Theory, Research and Debate*, 1st ed.; Tomlinson, M., Holmes, L., Eds.; Palgrave Macmillan: London, UK, 2017; pp. 1–40.
4. López, J.E.; Romero-Díaz de la Guardia, J.J.; Olmos-Gómez, M.C.; Chacón-Cuberos, R.; Olmedo Moreno, E.M. Enhancing Skills for Employment in the Workplace of the Future 2020 Using the Theory of Connectivity: Shared and Adaptive Personal Learning Environments in a Spanish Context. *Sustainability* **2019**, *11*, 4219. [[CrossRef](#)]

5. Lechner, C.M.; Tomasik, M.J.; Silbereisen, R.K. Preparing for Uncertain Careers: How Youth Deal with Growing Occupational Uncertainties before the Education-to-work Transition. *J. Vocat. Behav.* **2016**, *95*, 90–101. [CrossRef]
6. Piątkowski, M.J. Expectations and Challenges in the Labor Market in the Context of Industrial Revolution 4.0. The Agglomeration Method-Based Analysis for Poland and Other EU Member States. *Sustainability* **2020**, *12*, 5437. [CrossRef]
7. Voogt, J.; Erstad, O.; Dede, C.; Mishra, P. Challenges to Learning and Schooling in the Digital Networked World of the 21st Century. *J. Comput. Assist. Learn.* **2013**, *29*, 403–413. [CrossRef]
8. Binkley, M.; Erstad, O.; Herman, J.; Raizen, S.; Ripley, M.; Miller-Ricci, M.; Rumble, M. Defining Twenty-First Century Skills. In *Assessment and Teaching of 21st Century Skills*, 1st ed.; Griffin, P., Ed.; Springer Science Business Media: Dordrecht, The Netherlands, 2012; pp. 17–66.
9. Sahin, A.; Ayar, M.C.; Adiguzel, T. STEM Related After-School Program Activities and Associated Outcomes on Student Learning. *Educ. Sci. Theory Pract.* **2014**, *14*, 309–322. [CrossRef]
10. Greenaway, K.H.; Wright, R.G.; Willingham, J.; Reynolds, K.J.; Haslam, S.A. Shared Identity is Key to Effective Communication. *Pers. Soc. Psychol. Bull.* **2015**, *41*, 171–182. [CrossRef]
11. Neubert, J.C.; Mainert, J.; Kretzschmar, A.; Greiff, S. The Assessment of 21st Century Skills in Industrial and Organizational Psychology: Complex and Collaborative Problem Solving. *Ind. Organ. Psychol.* **2015**, *8*, 238–268. [CrossRef]
12. Hughes, W.; Lavery, J. *Critical Thinking: An Introduction to the Basic Skills*, 6th ed.; Broadview Press: Peterborough, NH, USA, 2015; pp. 1–468.
13. Butum, L.C.; Nicolescu, L.; Stan, S.O.; Găitănanu, A. Providing Sustainable Knowledge for the Young Graduates of Economic and Social Sciences. Case Study: Comparative Analysis of Required Global Competences in Two Romanian Universities. *Sustainability* **2020**, *12*, 5364. [CrossRef]
14. Bridgstock, R. The Graduate Attributes we've Overlooked: Enhancing Graduate Employability through Career Management Skills. *High. Educ. Res. Dev.* **2009**, *28*, 31–44. [CrossRef]
15. Van der Heijde, C.M.; Van der Heijden, B.I.J.M. A competence-based and multi-dimensional operationalization and measurement of employability. *Hum. Resour. Manag.* **2006**, *45*, 449–476. [CrossRef]
16. Magrin, M.E.; Marini, E.; Nicolotti, M. Employability of disabled graduates: Resources for a sustainable employment. *Sustainability* **2019**, *11*, 1542. [CrossRef]
17. Kuron, L.K.; Lyons, S.T.; Schweitzer, L.; Ng, E.S. Millennials' Work Values: Differences across the School to Work Transition. *Pers. Rev.* **2015**, *44*, 991–1009. [CrossRef]
18. Martínez-Cerdá, J.F.; Torrent-Sellens, J.; González-González, I.; Ficopal-Cusí, P. Opening the black-box in lifelong E-learning for employability: A framework for a Socio-Technical E-learning Employability System of Measurement (STELEM). *Sustainability* **2018**, *10*, 1014. [CrossRef]
19. Kay, K.; Greenhill, V. Twenty-first Century Students Need 21st Century Skills. In *Bringing Schools into the 21st Century*, 1st ed.; Wan, G., Gut, D.M., Eds.; Springer: New York, NY, USA, 2011; pp. 41–65.
20. UN General Assembly. Transforming Our World: The 2030 Agenda for Sustainable Development A/RES/70/1. Available online: <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf> (accessed on 18 July 2020).
21. Wright, J.; Brinkley, I.; Clayton, N. *Employability and Skills in the UK: Redefining the Debate*; The Work Foundation: London, UK, 2010.
22. Dede, C. Comparing Frameworks for 21st Century Skills. In *21st Century Skills: Rethinking How Students Learn*, 1st ed.; Bellanca, J., Brandt, R., Eds.; Solution Tree Press: Bloomington, IN, USA, 2010; pp. 51–76.
23. Voogt, J.; Pareja Roblin, N. A Comparative Analysis of International Frameworks for 21st Century Competences: Implications for National Curriculum Policies. *J. Curric. Stud.* **2012**, *44*, 299–321. [CrossRef]
24. Mishra, P.; Kereluik, K. What 21st Century Learning? A Review and a Synthesis. In *Proceedings of Society for Information Technology & Teacher Education International Conference 2011*, 1st ed.; Maddux, C.D., Koehler, M.J., Mishra, P., Owens, C., Eds.; AACE: Chesapeake, VA, USA, 2011; pp. 3301–3312.
25. Deming, D.J. The Growing Importance of Social Skills in the Labor Market. *Q. J. Econ.* **2017**, *132*, 593–640. [CrossRef]
26. Autor, D.H.; Frank, L.; Richard, J.M. The Skill Content of Recent Technological Change: An Empirical Exploration. *Q. J. Econ.* **2003**, *118*, 1279–1333. [CrossRef]
27. Deming, D.J.; Kahn, L.B. Skill Requirements across Firms and Labor Markets: Evidence from Job Postings for Professionals. *J. Labor Econ.* **2018**, *36*, 337–369. [CrossRef]

28. Lewin, C.; McNicol, S. Supporting the Development of 21st Century Skills through ICT. In *KEYCIT 2014: Key Competencies in Informatics and ICT*, 1st ed.; Brinda, T., Reynolds, N., Romeike, R., Schwill, A., Eds.; University Press: Postdam, Germany, 2015; pp. 98–181.
29. Van Laar, E.; Van Deursen, A.J.; Van Dijk, J.A.; de Haan, J. The Relation Between 21st-century Skills and Digital Skills: A Systematic Literature Review. *Comput. Hum. Behav.* **2017**, *72*, 577–588. [[CrossRef](#)]
30. Cardon, P.W.; Marshall, B. The Eype and Reality of Social Media Use for Work Collaboration and Team Communication. *Int. J. Bus. Commun.* **2015**, *52*, 273–293. [[CrossRef](#)]
31. Neo, M. Developing a Collaborative Learning Environment using a Web-based Design. *J. Comput. Assist. Learn.* **2003**, *19*, 462–473. [[CrossRef](#)]
32. Forte, A.M.; Flores, M.A. Teacher Collaboration and Professional Development in the Workplace: A study of Portuguese Teachers. *Eur. J. Teach. Educ.* **2014**, *37*, 91–105. [[CrossRef](#)]
33. Bonaccio, S.; O'Reilly, J.; O'Sullivan, S.L.; Chiochio, F. Nonverbal Behavior and Communication in the Workplace: A Review and an Agenda for Research. *J. Manag.* **2016**, *42*, 1044–1074. [[CrossRef](#)]
34. Brink, K.E.; Costigan, R.D. Oral Communication Skills: Are the Priorities of the Workplace and AACSB-accredited Business Programs Aligned? *Acad. Manag. Learn. Educ.* **2015**, *14*, 205–221. [[CrossRef](#)]
35. Newell, A.; Simon, H.A. *Human Problem Solving*, 1st ed.; Prentice-Hall: Englewood Cliffs, NJ, USA, 1972; pp. 1–920.
36. Wheelahan, L.; Buchanan, J.; Yu, S. *Linking Qualifications and the Labour Market through Capabilities and Vocational Streams*; National Centre for Vocational Education Research (NCVER): Adelaide, Australia, 2015.
37. D'Zurilla, T.J.; Sheedy, C.F. The Relation Between Social Problem-solving Ability and Subsequent Level of Academic Competence in College Students. *J. Cogn. Psychother.* **1992**, *16*, 589–599. [[CrossRef](#)]
38. McPeck, J.E. *Critical Thinking and Education*; Routledge: New York, NY, USA, 2016; pp. 1–178.
39. Carnevale, A.P.; Smith, N. Workplace Basics: The Skills Employees Need and Employers Want. *Hum. Resour. Dev. Int.* **2013**, *16*, 491–501. [[CrossRef](#)]
40. Rieckmann, M. Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures* **2012**, *44*, 127–135. [[CrossRef](#)]
41. García-Aracil, A.; Van der Velden, R. Competencies for Young European Higher Education Graduates: Labor Market Mismatches and their Payoffs. *High. Educ.* **2008**, *55*, 219–239. [[CrossRef](#)]
42. Grosemans, I.; Coertjens, L.; Kyndt, E. Exploring Learning and Fit in the Transition from Higher Education to the Labour Market: A Systematic Review. *Educ. Res. Rev.* **2017**, *21*, 67–84. [[CrossRef](#)]
43. Kowtha, N.R. School-to-work Transition and Newcomer Socialisation: The Role of Job-related education. *J. Manag. Organ.* **2011**, *17*, 747–763. [[CrossRef](#)]
44. Burke, C.; Scurry, T.; Blenkinsopp, J.; Graley, K. Critical Perspectives on Graduate Employability. In *Graduate Employability in Context*, 1st ed.; Tomlinson, M., Holmes, L., Eds.; Palgrave Macmillan UK: London, UK, 2017; pp. 87–107.
45. Warn, J.; Tranter, P. Measuring Quality in Higher Education: A Competency Approach. *Qual. High. Educ.* **2001**, *7*, 191–198. [[CrossRef](#)]
46. Chew, B.H.; Zain, A.M.; Hassan, F. Emotional Intelligence and Academic Performance in First and Final Year Medical Students: A Cross-sectional Study. *BMC Med. Educ.* **2013**, *13*, 1–10. [[CrossRef](#)]
47. Bahari, S.F. Qualitative versus Quantitative Research Strategies: Contrasting Epistemological and Ontological Assumptions. *Int. J. Technol.* **2010**, *52*, 17–28. [[CrossRef](#)]
48. O'Leary, S. Gender and management implications from clearer signposting of employability attributes developed across graduate disciplines. *Stud. High. Educ.* **2019**, *44*, 1–20. [[CrossRef](#)]
49. Sulaiman, A.; Mohezar, S. Student Success Factors: Identifying Key Predictors. *J. Educ. Bus.* **2006**, *81*, 328–333. [[CrossRef](#)]
50. Jackson, M. *Determined to Succeed? Performance Versus Choice in Educational Attainment*; University Press: Stanford, CA, USA, 2013; pp. 1–368.
51. Kuh, G.D.; Kinzie, J.L.; Buckley, J.A.; Bridges, B.K.; Hayek, J.C. *What Matters to Student Success: A Review of the Literature*; National Postsecondary Education Cooperative: Washington, DC, USA, 2006.
52. Field, A. *Discovering Statistics Using IBM SPSS Statistics*, 5th ed.; Sage: London, UK, 2013; pp. 1–821.
53. Browne, M.W.; Cudeck, R. Alternative Ways of Assessing Model Fit. In *Testing Structural Equation Models*, 1st ed.; Bollen, K.A., Long, J.S., Eds.; Sage: Newbury Park, CA, USA, 1993; pp. 136–163.

54. Caggiano, V.; Schleutker, K.; Petrone, L.; González-Bernal, J. Towards Identifying the Soft Skills Needed in Curricula: Finnish and Italian Students' Self-Evaluations Indicate Differences between Groups. *Sustainability* **2020**, *12*, 4031. [[CrossRef](#)]
55. Trilling, B.; Fadel, C. *21st Century Skills: Learning for Life in Our Times*; John Wiley: New York, NY, USA, 2009; pp. 1–256.
56. Duke, C.R. Learning Outcomes: Comparing Student Perceptions of Skill Level and Importance. *J. Mark. Educ.* **2002**, *24*, 203–217. [[CrossRef](#)]
57. Neier, S.; Zayer, L.T. Students' Perceptions and Experiences of Social Media in Higher Education. *J. Mark. Educ.* **2015**, *37*, 133–143. [[CrossRef](#)]
58. Howell, W.S. *The Empathic Communicator*; Wadsworth: Minneapolis, MN, USA, 1982; pp. 1–255.
59. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.Y.; Podsakoff, N.P. Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [[CrossRef](#)]
60. Chen, T.; Peng, L.; Jing, B.; Wu, C.; Yang, J.; Cong, G. The Impact of the COVID-19 Pandemic on User Experience with Online Education Platforms in China. *Sustainability* **2020**, *12*, 7329. [[CrossRef](#)]
61. Sahlberg, P. *Finnish Lessons 2.0: What Can the World Learn from Educational Change in Finland?* Teachers College Press: New York, NY, USA, 2014; pp. 1–264.
62. Kolb, A.Y.; Kolb, D.A. The Learning Way: Meta-cognitive Aspects of Experiential Learning. *Simul. Gaming* **2009**, *40*, 297–327. [[CrossRef](#)]
63. Nelson, T.O. Consciousness and Meta-Cognition. *Am. Psychol.* **1996**, *51*, 102–116. [[CrossRef](#)]



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