

# Comparison Between Apprenticeship Learning and Traditional Learning in Students of Mechanical Engineering Vocational Education: A Case Study in Slovenia\*

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The objective of the work is to present a longitudinal study that examines the impact of teaching approaches on occupational skills and competencies and the possibility of further education or employment. We compared two groups of students taught according to the same curriculum. The first group (N = 25) learned according to the apprenticeship learning style (apprentices), and the second group (N = 19) learned according to the school-based learning style (students). We found that apprenticeship students with better average results at the end of compulsory education enrolled in the apprenticeship style of education, but the differences were not statistically significant. Students had higher average grades in the first year than apprentices, but apprentices had higher average grades in the second and third year. In the third year, the differences were statistically significant. There was no statistically significant difference between the average grades of the final exam. This study concludes that different educational styles do not have a relevant impact on vocational skills and competencies when the curriculum is the same. This is the first comparative case study and the basis for other studies. Apprenticeship enables also equal opportunities for further education and a faster transition from school to work. It is indispensable for all those who are considering or have already begun to implement apprenticeship.

**Keywords:** vocational education and training (VET); upper secondary education; apprenticeship; work-based learning; school-based learning

## 1. Introduction

School-based learning (SBL), a theory-based teaching style in which a trainer guides students through a series of topics, is increasingly being supplemented by another method proven effective: work-based learning (WBL). In vocational education and training (VET), WBL is often referred to especially when talking about apprenticeships. WBL is an educational strategy that allows students to put theory into practice. It builds specific technical and more general employability skills in student workers. Several studies have found that WBL provides an environment in which students can practise and develop qualification-relevant skills and knowledge as they perform actual job tasks in the workplace [1–5]. The workplace provides real, hands-on work experiences to better prepare students for the challenging world of work. Students are enabled to explore what they have learned in the classroom within a real-world context.

Programmes involving work-based experiences can facilitate better employment outcomes for students, a strong return on investment to employers and governments, and flexible and practical options for training providers [3, 6–8]. Billett [9]

points out that the value of learning through work resides not only in the ability to engage in everyday work activities through which capacities can be reinforced, refined and transformed, but also in the possibility to receive direct guidance from co-workers and indirect suggestions through clues and cues provided in the workplace. A factor contributing to the interest in WBL has been the growth of the knowledge economy and the use of high-performance work practices that are transforming how work is organised [7]. As Sung and Ashton [10] have observed, WBL has become increasingly important, and the use of the workplace as a learning experience has been transformed. It offers the opportunity to address strategic objectives allied to competitive advantage[11].

WBL is at the heart of apprenticeship [12]. We categorised our apprenticeship teaching style as VET. Still, the skills provided with WBL are more specific than those in the theory-based teaching style because students work in relevant organisations or companies as part of their learning [8, 13]. The WBL strategy is useful for developing skilled workers who are able to meet the needs of employers. Apprenticeship is implemented to successfully transition from school to the labour market and solve the job-skill mismatch between the education

field and the workplace [14]. Apprenticeship as a learning style has been the most common means of developing occupational capacities across human history. The vast majority of occupational preparation has most likely arisen through individuals' active and personally-mediated learning outside institutionalised educational provisions [15]. Apprenticeships are usually seen as an education style focused on initial occupational preparation, usually for young people, but in distinct ways across nation-states. However, there are different models of variance between them. Some of these models primarily premise on workplace experiences, with apprentices being employees and positioned as novice practitioners [16, 17]. Others comprise programmes largely enacted through educational institutions, with apprentices being students [18]. Across human history, most occupational preparation has arisen through apprenticeship as a mode of learning, not through models of education [15].

Developing a quality apprenticeship programme is the first stage of the apprenticeship life cycle, which can be divided into four main processes [19]:

- Establishing an institutional framework for social dialogue.
- Identifying skills needs in sectors and occupations.
- Developing occupational profiles and curricula based on skills needs assessments.
- Providing instructional and learning materials.

Several studies have shown that theoretical knowledge acquired in school is essential in practical training [20], and vice versa, that knowledge gained in practical training contributes to the learning and understanding of theoretical knowledge at school [21]. The regulations that set out workplace training content [22] and quality standards [23] are essential to ensure high-quality learning. We are interested in what kind of apprenticeship style should be introduced in Slovenia so that apprentices:

- spend most of their training time using the WBL method;
- have the same opportunities for further education as SBL students;
- meet employers' expectations of a faster transition from school to work.

To provide an answer to the question posed, we need to examine the existing apprenticeship styles in comparable countries and review the historical and space-specific Slovenian characteristics. When introducing a new education style, it is necessary to research whether the objectives set have been achieved.

### 1.1 VET in Europe

There are several different styles of performing and engaging in VET in European countries [24, 25]. For example, Finland has two independent education styles: school-based learning (SBL) and apprenticeship [26]. There are as many as three education styles used in France, Austria and Germany: SBL and apprenticeship, which prepares students and apprentices for entry into the labour market, and SBL, which prepares students for continuing education [24, 27, 28]. Hupka Brunner et al. [29] notice that the SBL style gives better opportunities for further education and employment than the apprenticeship style. Students gain specific skills in work-based VET systems, while more general skills in school-based VET systems [13]. If we compare the different VET systems in European countries [30], we can classify them into four styles (Table 1).

In 2020, the Council of the European Union adopted a Recommendation on VET for sustainable competitiveness, social fairness and resilience [31]. The Recommendation defines vital principles for ensuring that VET is agile. It adapts swiftly to labour market needs and provides quality learning opportunities for young people and adults alike. It places a strong focus on the increased flexibility of VET, reinforced opportunities for WBL and apprenticeships and improved quality assurance [32].

### 1.2 VET Curriculum

Marsh [33] notes that the meaning of the word curriculum is a pathway of experiences to progress along. The VET curriculum aims to provide students with the necessary skills and knowledge (competencies) to make them employable and successful in their specialities [34]. It includes SBL and WBL. Wheelahan [35] argues: "VET curriculum differs from academic qualifications because the purpose of the academic curriculum is to induct students into a body of knowledge in academic disciplines. The purpose of the vocational curriculum is to induct students into a field of practice and the theoretical knowledge that underpins practise as the basis for integrating and synthesising each."

The conception behind a curriculum has a considerable impact on how it is enacted and what learners experience and learn. Connectivity [36] and integrating practices and different forms of knowledge are usually considered essential for developing vocational competence [37, 38]. Akkerman and Bakker [21] point out a danger that school and work can be seen as constituting distinct practices with different aims (schooling and working). The nature of the tasks in WBL is primarily related to the activities offered in the workplace, and in SBL,

**Table 1.** Overview of different VET conceptions prevalent in Europe [30]

<p>1. <i>VET understood as work-based/initial training</i> Identified in Denmark, Germany, Hungary, Austria (apprenticeship), and Slovakia (apprenticeship); and to some degree in Iceland and UK-England (apprenticeship)</p>	<p>VET is considered based on practical knowledge and “learning by doing” for young people (recognised as apprentices) to become members of an occupation/profession (initiation) with distinct occupational or professional ethos and occupational rights. Substantial contribution by companies (financially and as a place of learning, equal or more important than the school) and strong coordination between employers (and trade unions) are presupposed in this conception of VET. It is associated with the middle level of education (ISCED-11 levels 3–4) without or with restricted access rights to higher education. An employer perspective is dominant in so far as VET’s primary purpose is to secure the supply of skilled labour and to foster business innovation and growth.</p>
<p>2. <i>VET understood as initial vocational education (IVET)</i></p>	<p>VET is understood as a particular part of initial education, where schools financed and governed by the State are the main place of learning and learners are regarded as students. Despite the significant variations within this type, two patterns can be distinguished.</p>
<p>2a. Vocationally oriented school education identified in Belgium-Flanders, Bulgaria, Spain, Malta, Austria (school), Romania and Slovenia, and to some degree in Czech Republic, Estonia, Latvia, Lithuania, Slovakia (school), Sweden (school)</p>	<p>“Vocationally oriented school education”, which is discipline-based, mainly occurs in classrooms (although there are work-based elements as well), and teacher-student relations are the typical case. VET is not necessarily occupation-specific, but can also aim at broader vocational fields, is targeted at middle and higher levels (ISCED-11 levels 3–5), addresses young people (15–19), and provides access to higher education. Individual or societal perspectives are more evident; for instance, individual progression and personal growth is a rate.</p>
<p>2b. Varied occupation-oriented upper and post-secondary education identified in Croatia, Cyprus (IVET), Luxembourg, Netherlands, Poland and Portugal; and to some degree in Greece, Ireland (VE), Norway, Sweden (post-sec.)</p>	<p>A broad range of more occupation-specific education, also addressing young adults (18–24) for which securing the supply of skilled labour and entry into working life is rated higher. It is more diverse than type 2a in many other aspects: levels of education span from low to high. So do skill levels (semi-skilled workers and skilled workers); types of providers, instructions and learning approaches can be diverse. School-based and work-based options may form part of one system.</p>
<p>3. <i>VET understood as further training</i> Identified in UK-England, Ireland as vocations training (VT) and Cyprus as continuing vocational education and training (CVET)</p>	<p>VET is understood as mainly further on-the-job training for all age groups (but with high shares of older learners) at various levels (including lower levels, such as ISCED-11 level 2) to become semi-skilled, skilled workers or occupational (with no specific occupational rights) offered by a broader range of further and higher education providers. Programmes for the unemployed or second-chance programmes form part of this understanding. Entry into working life or employability is seen as more important than occupational identity. Employers’ views dominate, and VET is regarded as a means to secure the supply of skilled labour and promote innovation and economic growth.</p>
<p>4. <i>VET understood as (part of) lifelong learning</i> Identified in France and Finland; and to some degree in, Ireland (VT), Greece, Croatia, Italy and Luxembourg</p>	<p>VET is understood as the (organised) coexistence of a diverse set of learning approaches (disciplinary- or experienced-based), teaching sites, education and skill levels addressed (semi-skilled, skilled and occupational), age groups, the status of learners (apprentices or students), types of providers (school, companies, higher education), types of instructors (teachers, trainers, masters), as regards the learning outcomes (both occupation-specific and broader vocational field-oriented, but also prevocational) and types of qualifications (occupational, educational). Consequently, VET is associated with various (also more balanced) purposes, including equity and inclusion, and IVET and CVET form part of one conception of VET in the form of lifelong learning.</p>

it is related to theoretical knowledge [39]. Communication and coordination are crucial to quality WBL in VET. The roles and expectations for everyone involved should be made clear before training begins, and regular communication between training providers, employers and students is the key to successful work-based programmes [8].

A broader view of curriculum and pedagogies needs to be considered, engaged with and enacted to accommodate changes in educational goals for vocational education. These include addressing workplace-specific requirements and developing occupational skills and competence [40]. Billett [41] believes that apprenticeship will only improve learning outcomes if the objectives, curriculum and on-the-job training, are correctly designed and implemented.

Curricula for upper secondary VET programmes in Slovenia comprise general subjects, modules, and practical training conducted as practical training in schools and WBL in companies. Modules are “professional units” of the programme based on vocational standards. The National Education Institute of the Republic of Slovenia (NEIS) is responsible for general subjects and The Institute of the Republic of Slovenia for VET is responsible for modules. Only 80% of curricula for VET programmes are prescribed at the national level. The remaining 20% are the so-called “open curricula” that schools create or cooperations with companies [42]. They are an opportunity for schools and companies to include the contents needed by the local labour market or individual companies.

### *1.3 Historical Outline of Apprenticeship in Slovenia*

Slovenia has a long tradition of apprenticeship training, which was the usual route to taking up an occupation until the early 1980s. Businesses and companies have developed internal training systems for their staff, some even their own training units or centres. In this way, they trained and improved their teams, and some have also introduced programmes for formal vocational training for young people and employees [43]. The last generation of apprentices was enrolled in 1980 and completed the education in 1983. With the introduction of career-oriented education in the school year 1981/82, training through the apprenticeship style of teaching was discontinued.

By adopting the “White Paper on Education in the Republic of Slovenia” in 1995 [44], a new system was introduced, based on VET development and a dual system with apprenticeship training. In 1996, The Organisation and Financing of Education Act [45] was adopted, with some amendments still in force today [46]. At the same time, the Vocational Education and Training Act (VET Act) [47] was adopted, setting the basis for establishing starting points for preparing educational programmes. In 1998, new educational programmes, adapted to the Slovenian education system, were launched in a dual form of education, following the dual system in Austria, Germany and Switzerland. Unfortunately, the introduction of apprenticeships was not successful. Apprenticeships were not entirely comparable with the solutions in the German-speaking countries of Central Europe, where the apprentice has a specific form of employment. “The apprenticeship system had some weaknesses at that time. There was a lack of thorough overall consensus of all participants on their roles, responsibilities and their implementation [48].”

“The new Starting Points for the Preparation of VET Programmes [52] have brought about significant changes: the integration of general, vocational and practical knowledge” [27]. Between 2004 and 2012, based on the new starting points, a major overhaul of educational programmes was carried out. The 31st article of the VET Act [53] stipulates that practical training is provided as practical instruction at school and as on-the-job training at the employer. The VET Act defines on-the-job training as integrating education and training (theories and practices), which is achieved through cooperation between schools, enterprises and business-to-business training centres [54]. Aberšek and Flogie [55] believe that the historical review of the didactic style of technical education reflects the needs of society at that time.

### *1.4 New VET Strategy with Apprenticeship in Slovenia*

The education system in Slovenia is organised as a public service [56]. To comprehensively present the structure of the education system in the Republic of Slovenia, we combined data from various sources [28, 49–51].

Compulsory education (CE) (ISCED-11 244 [50]) starts at the age of six and lasts nine years (Fig. 1). VET begins at the upper secondary level, with the first external differentiation at the age of 15, when learners can choose IVET programmes (ISCED-11 353 (2 or 3 years) and ISCED-11 354 (4 years)) or general upper secondary programmes (ISCED-11 344), gymnasias (grammar schools) (4 years, completed with the general Matura exam). Professional gymnasias provide general education but with some emphasis on professions. Tertiary education, in general, comprises higher vocational education (ISCED-11 554 (2 years)), professional (ISCED-11 655) and academic programmes at the bachelor level (ISCED-11 645 (3 or 4 years)), integrated bachelor and master programmes (ISCED-11 766 (5 or 6 years)) and doctoral programmes (ISCED-11 844 (3 or 4 years)). General programmes in compulsory and upper secondary schools are the responsibility of The National Education Institute of the Republic of Slovenia, while VET programmes are the responsibility of The Institute of the Republic of Slovenia for VET.

With the amendment of the VET Act [53] in 2006, we abolished apprenticeship. Only elements of the dual form were retained, which allowed for the reintegration of apprenticeships with the introduction of the Apprenticeship Act [57] in 2017. Until 2017/18, we had only one VET style, preparing participants for entry into the labour market and further education. Apprenticeship has become an additional VET style for the occupation, while both curricula and knowledge catalogues remain the same. In the apprenticeship style of education, at least 50% of the curriculum must be delivered through WBL learning at the employer (SBL less than 50%), and at least 40% of the educational programme has to be offered through the SBL style, which must include general education subjects [57]. An apprentice is a student who is trained according to an educational programme imparted through the apprenticeship style, while a student is trained according to the SBL style. The apprentice does not have the status of an employee; both have the status of a student.

The chambers verify practical training placements in companies suitable for apprentices. An apprenticeship contract is a condition for enrolment in a school offering a VET programme in the

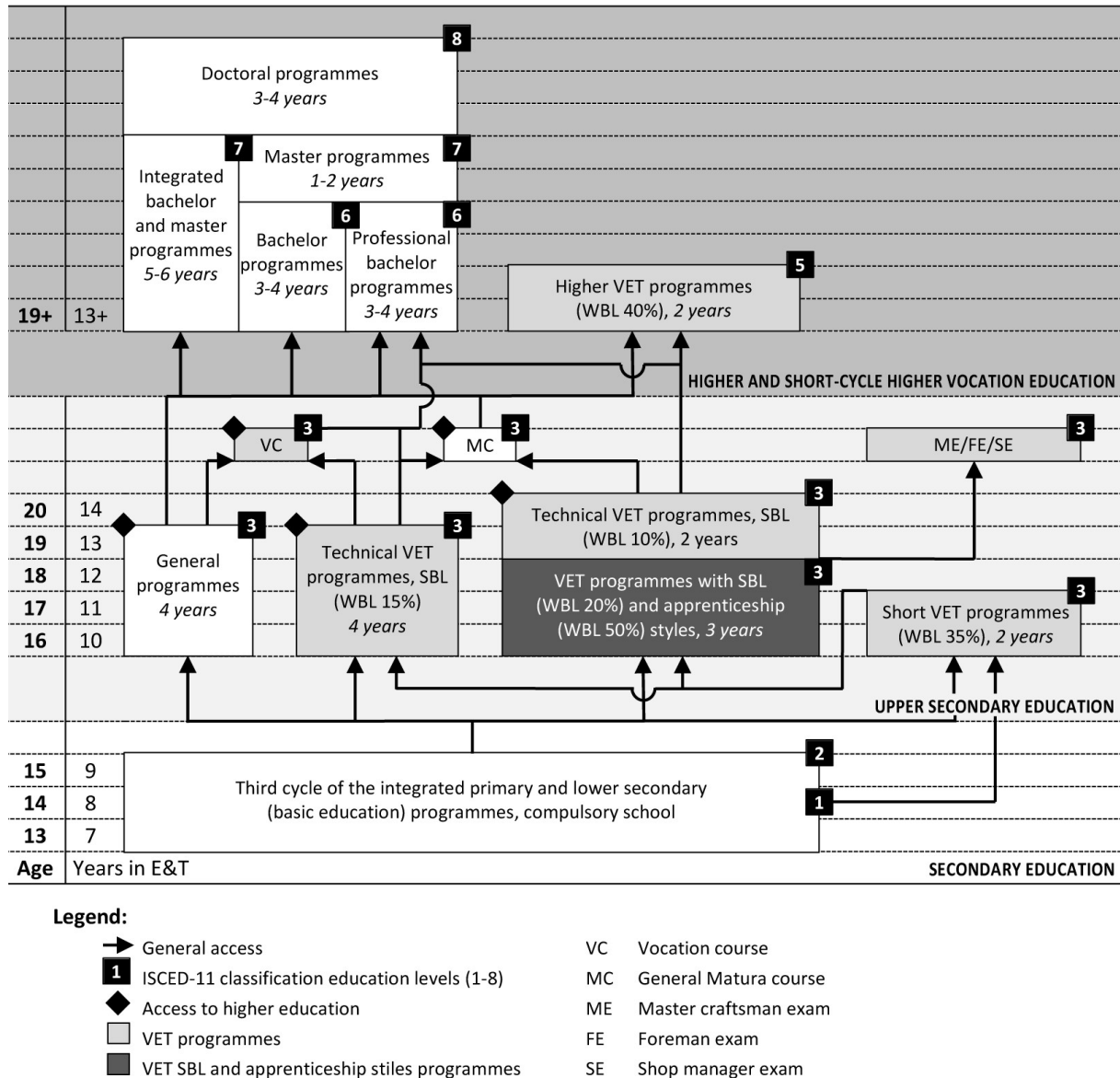


Fig. 1. Structure of the education system in the Republic of Slovenia in the school/academic year 2018/19 [28, 49–51].

apprenticeship style. The future apprentice (must be at least 15 years old, if not, then the parents must also sign) and the employer sign the contract (not an employment contract) and register it at the corresponding chamber [58]. The school and the company draw up the plan for implementing the apprenticeship under the provision of the chamber. In practice [42], the programme is prepared by the school. It includes the objectives of WBL, a set of competencies for WBL, distribution and schedule of education at the school and WBL in the company, ways and modes of communication between the company and school, and a plan for cooperation in providing the final exam for the apprentice [58]. A necessary condition for a successful introduction of apprenticeship is the involvement of employers. It is also essential to have a broad

agreement from employers (chambers), employees (trade unions), parents, students, schools and relevant ministries [59].

## 2. The New Experimental Implementation of Apprenticeship in Slovenia

The European Social Fund (ESF) project and the reform of Upper-Secondary Vocational Education 2016–2021 began in November 2016 to support the implementation of the apprenticeships. The reform aims were to help the companies, providing WBL, to create and monitor a register of practical training placements in cooperation with the social partners (chambers, trade unions) to develop flexible and individualised teaching methods and learning styles [58]. Apprenticeship was introduced in the school

year 2017/18 for an experimental implementation of the apprenticeship style of education at seven schools for four vocational programmes: Gastronomie/Hotelier, Stonemason, Joiner and Metal Designer/Toolmaker. For the experimental implementation of apprenticeship, the vocational programmes and schools were selected in the agreement between the Chamber of Commerce and Industry of Slovenia, the Chamber of Craft of Slovenia, the National Institute for VET (CPI) and the Ministry of Education, Science and Sport of the Republic of Slovenia.

There were no candidates for the occupations of Stonemason, nor did one of the selected schools have any candidates for the Joiner apprenticeship programme. The experimental implementation of apprenticeship took place at five schools, with only three programmes. As there were just a few apprentices in three schools, they were grouped with the students of the SBL style. Two schools had an independent apprenticeship classroom. The total number of apprentices enrolled in the first school year of the experimental implementation was 53. 14 in the Gastronomie/Hotelier programme (in two schools), 12 in the Joiner programme (in one school) and 27 in the Metal Designer/Toolmaker programme (in two schools), in the second school year (together first and second year students), 185 apprentices in 13 schools and 8 VET programmes and the third school year (in the first, second and third year), 330 apprentices in 19 schools and 12 VET programmes. About 12.300 (17% of the population) enrolled in VET programmes (ISCED-11 354) per year [60].

We carried out a longitudinal VET research and set the following research questions:

1. Did students with higher grades in the last three years of CE and the National Assessment of Knowledge (NAK) results, enrol in the apprenticeship learning style of education?
2. Did the average grades of apprentices and students differ at the end of each year?
3. Did the average grades of the final exams (FE) differ to such an extent that they did not have the same opportunities for further education?
4. Which VET education learning style gave better results and why?

### 3. Research Methodology

We conducted a large-scale longitudinal study to monitor student achievement in the last three years of CE and throughout secondary VET school for students in the apprenticeship style (the experimental group – EG) and students in the SBL style (the control group – CG) (Table 2).

**Table 2.** Analysis of students' achievements

The number of school subjects in the last three years of CS	35
The grades ranged for school subject	1 to 5 (5 is the best)
The maximum summary grades for school subject	175
The maximum score for Slovene on the NAK	100
The maximum score for mathematics on the NAK	100
The maximum score on the NAK	200
The grades ranged in VET	1 to 5 (5 is the best)

After summarising the grades of all school subjects in the last three years of CE students (the total number of points) and for the NAK (Slovene and mathematics), we conducted a descriptive and inferential statistical analysis [61]. We compared the average grades at the end of the first, second and third year of VET education and the final exam (FE) for both education styles (EG and CG) using descriptive and inferential statistical analysis.

#### 3.1 Sample

In one of the schools with experimental implementation in the first year, 23 apprentices enrolled in an independent section of the Metal Designer/Toolmaker programme, representing 43.4% of all apprentices enrolled in the experimental implementation. Two apprentices enrolled in the middle of the school year. 19 students enrolled in the parallel independent section of the SBL style. Both education styles had the same curriculum and teachers, enabling us to conduct comparative studies. Twenty-five apprentices enrolled in the first year of the apprenticeship style (EG) experimental implementation; 21 of them completed their apprenticeship education within the specified time-frame, representing 84.0%. 19 students enrolled in the parallel SBL style (CG) first year, 18 completed their third year. 16 of them graduated successfully and on time, or 84.2%. Two students did not finish their third year, so they did not fulfil the conditions to register for the FE.

In preparing the statistical data, we only considered the apprentices and students who started their first year of the apprenticeship Metal Designer/Toolmaker programme in the school year 2017/18 and completed their third year of apprenticeship in the school year 2019/20.

### 4. Results

#### 4.1 Comparison of Achievements at the End of Primary School

To determine whether students with better results

**Table 3.** Descriptive statistical analysis of the grades in the last three years of CE and the NAK in Slovene and mathematics.

	Apprenticeship (EG) (N = 21)		SBL (CG) (N = 17)	
	PS	NAK	PS	NAK
Mean	110	81.6%	101	68.9%
Std. Deviation	14.0	24.9%	13.4	25.4%
Minimum	92	28%	80	25%
Maximum	144	133%	126	107%
Coefficient of variation	12.7%	30.5%	13.2%	36.0%
Skewness	0.88	0.073	0.24	0.098
Kurtosis	0.084	0.37	-0.62	-1.04
Shapiro-Wilk test	0.063	0.96	0.81	0.40

**Table 4.** Levene's test of homogeneity of variance, an independent t-test and Cohen's test for CE and NAK.

	Levene's test		t-test		Cohen's test
	F	Sig.	t	Sig. (2 - tailed)	d
CS	0.036	0.85	2.00	0.053	0.67
NAK	0.15	0.70	1.56	0.13	0.51

**Table 5.** Descriptive statistical analysis of the average grades at the end of the year and the final exam

	Apprenticeship (EG) (N = 21)				SBL (CG) (N = 18)			
	1.	2.	3.	FE	1.	2.	3.	FE
Mean	3.14	3.64	3.95	3.67	3.32	3.37	3.27	3.50
Std. Deviation	0.56	0.53	0.50	0.56	0.69	0.71	0.80	0.66
Minimum	2.54	2.91	2.83	2.50	2.36	2.36	2.00	2.50
Maximum	4.77	5.00	5.00	5.00	4.71	4.91	4.83	5.00
Coefficient of variation	17.9%	14.7%	12.6%	15.1%	20.7%	21.0%	24.5%	18.8%
Skewness	1.23	0.84	-0.34	0.22	0.81	0.72	0.37	0.60
Kurtosis	2.01	0.80	0.59	0.88	0.025	-0.011	-0.12	0.74
Shapiro-Wilk test	0.012	0.27	0.64	0.11	0.12	0.27	0.52	0.15

have enrolled in the apprenticeship style of education, we compared the total number of points in the last three years of CE and results on the NAK in Slovene and mathematics. We produced a descriptive statistical analysis (Table 2). The mean, the mathematical average of the total number of points, summarises the grades of all school subjects in the last three years of CE and the mathematical average of the NAK in Slovene and mathematics. We have not received any data for one student in the CG (must be N = 18).

Comparing the enrolled students between the EG and the CG determines whether there are statistically significant differences in the achievements during CE. This ensures the research's internal validity and allows the attribution of identified differences to the education styles. The normality of the distributions tested using the Shapiro-Wilk test achieves high power when the sample number is around N = 20 [62]. The CE and NAK values for both groups were normally distributed (Shapiro-Wilk test is > 0.05), so we performed Leven's test of homogeneity of variance before the independent t-test (Table 4).

The differences in the total number of points from subject evaluations in the last three years of

CE and the final results of the NAK in Slovene and mathematics between the EG and the CG are not statistically significant ( $p > 0.05$ ). The effects on group differences are medium ( $d_{CS} = 0.67$  and  $d_{NAK} = 0.51$ ) [63].

#### 4.2 Comparison of Average Grades at the End of the Year and the Final Exams

To compare the average grades (scale 1–5) at the end of the years 1, 2 and 3 and the FE, we first performed descriptive statistics for the EG and the CG (Table 5). Because two students did not complete the third year before the final exam began,

**Table 6.** Mann-Witney U test for means ranks of average grades at the end of the first year

	Mann-Whitney U test
Mean rank for apprenticeship (N = 21)	18.1
Mean rank for school-based learning (N = 18)	21.4
Mann-Whitney U	163
Z	-0.73
Asymp. Sig. (2-tailed)	0.46
Measure of effect size	0.12

**Table 7.** Levene's test of homogeneity of variance, an independent t-test and Cohen's test for means of average grades in the second and third year and at the FE

	Levene's test		t-test		Cohen's test
	<i>F</i>	Sig.	<i>t</i>	Sig. (2 - tailed)	<i>d</i>
Mean of average grades in second year	1.48	0.23	1.35	0.19	0.44
Mean of average grades in third year	3.35	0.075	3.25	0.002	1.05
Average grades of final exam	0.004	0.95	0.84	0.41	0.28

they did not have the prerequisites to participate ( $N = 16$  for FE).

Average grades at the end of the first, second and third year of VET education and the FE conform to the normal distribution, except for the first year of apprenticeship ( $p = 0.012$ ). We used a non-parametric Mann-Whitney's U test to compare grades for the first year (Table 6).

The Mann-Whitney U test indicated that the differences in average grades at the end of the first year are not statistically significant ( $p = 0.46$ ). The effect of the group is small ( $r = 0.12$ ).

Before the independent t-test for the average grades of the second and third year and the FE, we performed Leven's homogeneity of variance test (Table 7).

Leven's test confirmed homogeneity of variances, so we performed an independent t-test and Cohen's test. The independent t-test indicated that differences in mean of average grades in the second year and average grades of FE were not statistically significant ( $p_{2nd} = 0.19$  and  $p_{FE} = 0.41$ ). The effect on the group in the second year was small ( $d_{2nd} = 0.28$ ), and at the FE, it was medium ( $d_{FE} = 0.44$ ). The mean difference in average grades in the third year was statistically significant ( $p_{3rd} = 0.002$ ). The effect of the group was large ( $d_{3rd} = 1.05$ ).

## 5. Discussion

Before the experimental implementation of the apprenticeship style of education, we conducted a statistical analysis of the experimental (EG) (the apprenticeship style) and control (CG) (the SBL style) groups of the Metal Designer/Toolmaker educational programme. From the initial analysis of the Comparison of Achievements at the End of Compulsory School (Tables 3 and 4), there were no statistically significant differences between the EG and the CG. Students who had a higher total number of points from the completed subject assessments in the last three years of compulsory education enrolled in the apprenticeship teaching style. Students in the EG also had better overall achievement in the NAK in Slovene and mathematics. The reason for this could be that employers sign the apprenticeship contract more easily and more readily with students who had achieved better

results during compulsory education. The apprenticeship contract is a prerequisite for enrolment in the apprenticeship style of education.

The final grades mean at the end of each year and mean grades at the final exam showed that the first-year CG had a higher final grades mean than the EG. In the second and third years and at the final exam, the EG had a higher mean of final grades. In the third year, the higher mean of the final assessments was statistically significant. For the EG, the final assessments increased by years of education, but they did not significantly change for the CG. The mean of the final exam grades was also higher in the EG but not statistically significant. Considering that the EG was already more successful than the CG, it were also more successful in general, except in the first year.

Although it appears at first glance that more successful students were included in the apprenticeship style, the statistical effect on the group was only medium, and the differences were not statistically significant. There is no statistically significant difference between the skills and competencies of apprentices and students at the final exam.

The sizes of the EG ( $N = 25$ ) and the CG ( $N = 19$ ) were relatively small, but the EG covered 43.4% of all enrolled apprentices in the school year. The same teachers trained students in both groups in the school education, but in training in companies, they had different mentors.

The answers to the research questions are:

1. Students enrolled in the apprenticeship style (EG) of education had higher grades in the last three years of CE and better results on the NAK than students enrolled in the SBL style (CG) of teaching. The differences were not statistically significant.
2. The EG and the CG average grades were different at the end of each year. The CG had higher average grades in the first year, but the EG did in the second and third year. In the third year, the differences between the groups were statistically significant.
3. The final exam average grades of the EG and the CG were not statistically significantly different, so they had equal opportunities for further education.



4. The apprenticeship style (EG) offered the same opportunities for further education as the SBL style (CG). Nevertheless, the apprenticeship was faster and more successful in the transition from school to the labour market because apprentices spent more time at the workplace and had more work experience.

## 6. Conclusions

With the reintroduction of the apprenticeship style of education, the Slovenian education system faces a great challenge to make it successful. The dual form introduced in 1998 was unsuccessful because there was a lack of thorough overall consensus among all stakeholders regarding their roles, responsibilities and implementation. We now have another opportunity to implement apprenticeships like they are implemented in other European countries with a tradition of apprenticeship training.

This study concludes that different educational styles do not have a relevant impact on vocational skills and competencies when the curriculum is the same. Apprenticeships are not just another way of

acquiring knowledge for the career: they offer equal opportunities for further education and a faster transition from school to work. Both types have the same opportunities for further education. Nevertheless, apprentices had a more successful transition from school to work because they spent more time at the workplace and had more work experience, which employers desired and expected.

The apprenticeship style requires cooperation and agreement between partners, so its implementation is more demanding. It is necessary to further train mentors in companies, because they become key persons in the training through apprenticeships. The apprenticeship partners should also consider increasing the training time in companies.

Monitoring the performance of both styles of VET needs to continue. By comparing apprenticeship and SBL learning styles at the implementation level, we can determine the strengths and weaknesses of each education style. With such analysis, we can improve both teaching approaches. Apprenticeships will be successful if they are constantly monitored and if we react quickly to changing situations and deficiencies.

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