Article

Exploring Pedagogical and Digital Practices in Vocational Education and Training: Comparing Teacher and Student Perspectives

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Abstract: This article investigates the pedagogical and digital practices of vocational education and training teachers, offering comparative insights from both teacher and student perspectives. To this end, two questionnaires were constructed for teachers and students and then validated by means of inter-judge procedures and expert review. The questionnaires were administered to representative samples of 158 teachers and 309 students in intermediate and higher vocational education and training programs in the Spanish region of Catalonia. Thanks to institutional collaboration, it was possible to obtain both samples by a non-probability sampling technique. The results obtained from the quantitative analyses performed show that while most vocational education and training teachers utilize a combination of active and lecture-based methods, less than a third incorporate online tools, prioritizing institutional platforms. Although both teachers and students acknowledge a diversity of teaching strategies, the latter, particularly female students and those in advanced years or on dual programs, tend to be more critical of the effectiveness of the teaching strategies employed compared to their teachers. The findings underscore the need for vocational education and training programs to enhance digital tool integration and address the varying perceptions of teaching effectiveness to better meet students' expectations and needs.

Keywords: vocational education and training (VET); pedagogical practices; digital technologies; teacher-student perspectives

1. Introduction

1.1. Pedagogical Approaches in VET

One of the main goals of the vocational education and training (VET) system is to provide students with future skills and abilities to adapt to the evolving labor market [1]. This implies the need for teachers to continuously update their professional knowledge [2] and adopt modern pedagogical approaches [3–5]. These two aspects have been addressed in extensive research studying the effectiveness of teaching strategies on students' learning processes. Firstly, some studies indicate that no single standardized training strategy can guarantee success in vocational training programs [4], rather there is a need to apply a variety of strategies that facilitate flexible learning environments which enable the learner to master complex tasks independently. Secondly, Payne [6] reported that some strategies can influence individuals in different ways, such as group work that may favor the participation of some students and hinder that of others. Thirdly, Bender [7] encouraged teachers to replace lectures with differentiated lessons, to trust students to learn from each other and, whenever possible, to invite students to plan and prepare

learning activities. Finally, Lucas, Spencer and Claxton [8] advocated for the use of experiential learning combined with feedback, questioning, application, reflection and theoretical explanations.

Above and beyond the effectiveness of teaching strategies, some studies have focused on differences in student perceptions regarding instructors' teaching methods according to different variables. These variables are crucial for teachers to consider when adjusting their methods to meet student needs [9]. Students' perceptions change according to the year they are in since the further they progress in their studies, the better perspective they have of their learning and abilities [10], and also because of the theoretical and practical knowledge they have been acquiring and the relationships they have established with their teachers [11].

In addition to the interest in adapting teaching strategies to the needs of today's learners, there has been increased interest in the use of digital technologies in VET. This has come with the aim of improving teaching and learning processes, especially after the COVID-19 pandemic [12,13]. Several studies have investigated teaching-delivery modes after the shift from face-to-face teaching to remote teaching. Usach Pérez, Taléns-Visconti and Ruano Casado [14] found no differences in the quality of teaching between face-to-face and remote learning in VET, even though face-to-face students performed better. Poláková and Klımova [15] examined student perceptions of remote learning, finding that VET students prefer diverse teaching strategies and synchronous online courses for their direct interaction with teachers and peers.

The shift from face-to-face teaching to remote teaching has also meant further development of institutional platforms and external tools such as social media to support the use of teaching strategies [16]. Callan and Johnston [17] investigated the adoption of social media in Australian VET and concluded that the adoption of different forms of social media appealed to different types of VET students. Although the innovative features of social media align with institutional goals for more customized and flexible training, teachers perceive institutional policies, the absence of clear innovation strategies and auditors' assessment preferences as barriers to the broader adoption and integration of social media in program delivery and assessment. That being said, however, Syauqi, Munadi and Bruri Triyono [18] noted that teachers' management of online learning does not meet student expectations. Students report that while online learning offers motivational benefits and easier access to resources, it fails to enhance their experience or productivity in mastering competencies. Moreover, despite the ease of accessing resources, many students express reluctance when it comes to continuing to use online learning platforms in the future.

1.2. VET in Spain: The Case of Catalonia

There is a growing need being expressed for more effective practices and the updating of vocational training pedagogies, especially in those countries that are developing the dual modality in VET, as is the case in Spain. Taking the German model as a reference, Spain incorporated the dual modality in VET in 2012 with legislation that was neither agreed with the social agents nor supported with specific economic resources for its implementation, all in the context of a serious economic crisis [19]. In the last ten years, this starting situation has been corrected through regulatory development at both the state and autonomous community level and increased funding and institutional support to increase the number of places offered, although it still represents a minimal percentage of the VET on offer in Spain, around 5% [20]. That being said, the model still presents some important shortcomings with respect to the original one and an excess of diversity among the characteristics of the regional models due to the challenges involved in transferring a model from one country to another [21–23].

Within this process of legislative development, according to the recent Organic Law 3/2022 on the Organization and Integration of Vocational Training (LOIFP), any offer of vocational training must have a dual nature, incorporating a training phase in a company or similar organization. This should be implemented through the appropriate distribution

of training processes between vocational training centers and companies or equivalent organizations, both contributing to the achievement of the competencies established in each training offer. Thus, this modality emphasizes practical and experiential learning by combining learning at the educational center and in the company. In this case, students must spend at least 33% of the teaching hours in the company. On the other hand, in traditional, non-dual vocational training, there is an internship module in companies, called Workplace Training, which covers 20% of the total hours of the training cycle.

Catalonia is among the regions of Spain with the most students in dual VET [20], yet it represents only 4.46% of total vocational training enrolment. Notably, almost 60% of these students are male [24]. With regard to this, gender differences are evident in several respects: women generally achieve higher grades, are more likely to follow social studies and receive more favorable evaluations from company tutors, especially in environments with a higher proportion of women.

1.3. Aim and Structure

The aim of this research is to analyze teachers' digital and pedagogical practices in VET and students' perceptions of these practices, considering the areas of alignment and potential disparities between teacher intentions and student experiences. The research questions that have oriented the study are as follows:

1. What teaching strategies are most commonly employed by teachers in face-to-face VET, and how do these compare with online teaching strategies?
2. How do students' views on the diversity and effectiveness of teaching strategies and tools compare to those of teachers?
3. How does the level and year of study in VET influence students' perceptions of the variety and efficacy of teaching strategies and tools?
4. How do perceptions of learning and competencies compare between students on traditional VET programs and those on dual VET programs?

We will attempt to answer these questions by first presenting the participants, instruments and data analysis in Section 2; then, in Section 3, the insights and findings that have emerged from the study; and finally, in Sections 4 and 5, the discussion and conclusions of the research.

2. Materials and Methods

2.1. Setting and Participants

The aim of this exploratory study was to compare the perspectives of teachers and students regarding the pedagogical and digital practices used in VET, contributing to current research trends in comparative perceptions on didactic methodologies versus the isolated study of teachers' and students' opinions [25]. To this end, an online questionnaire, explained in the subsequent Instruments section, was administered to VET teachers and students in intermediate (usually 16 to 18 years old) and advanced (usually 18 to 20 years old) VET programs. These are the main programs in initial VET in Spain and correspond to the International Standard Classification of Education (ISCED) levels [26] (Table 1). The questionnaire was distributed anonymously to students through the educational-center directors, with a two-week window for completion, at the end of the 2021–2022 academic year (May 2022).

A non-probabilistic purposive sampling technique was employed based on data accessibility, aiming to achieve representativeness grounded on the population's expert knowledge [27]. This approach was chosen due to the difficulties in accessing the entire population, which prevents exact knowledge of the population's characteristics. It is important to acknowledge that it may not fully represent the broader population.

In this sense, a deliberate approach was used to select 372 public secondary schools and VET schools in Catalonia. A total of 191 responses were obtained from teachers, of which 158 were deemed valid, representing an 82.72% response rate. The validity of the

responses was determined according to the following criteria: completeness of responses, ensuring all mandatory questions were answered; consistency, where responses showing clear contradictions were excluded; time to complete, with unusually short completion times suggesting rushed responses being discarded; and the removal of duplicate responses. A total of 597 students responded, with a valid response rate of 51.8%, resulting in a final sample of 460 VET students. This sample accounted for 0.2% of the latest VET enrolment data in Catalonia for the 2021/22 academic year.

Despite the return to face-to-face teaching for the entire school year, students in their second year experienced a combination of remote and face-to-face teaching in the previous year. This sample of students underwent two types of internships: (a) work training programs ('FCT'), a professional module conducted at a company, and (b) dual vocational education ('dual'), a VET mode combining learning at the educational center and in-company. Table 1 outlines the main characteristics of the sample.

Table 1. Characteristics of the sample.

Variable	Distribution of Students (N = 460)	Distribution of Teachers (N = 158)
Gender	37.2% females; 55.7% males	48.1% females; 51.3% males; 0.6% preferred not to respond
Age	Mean 19.0 years; standard deviation 4.7 years	Mean 44.3 years; standard deviation 9.6 years
Internship	49.1% FCT; 24.1% dual; 25.0% not in internship	-
ISCED level	48.9% Intermediate VET programs (ISCED 354); 49.8% Advanced VET programs (ISCED 554)	54.6% Intermediate VET programs (ISCED 354); 45.4% Advanced VET programs (ISCED 554)
Professional field	26.3% Computer Science; 26.3% Administrative Management; 23.9% Health; 6.7% Image and Sound; 2.4% Physical Education and Sports; 2.0% Trade and Marketing; 2.0% Energy and Water; 1.1% Mechanical Manufacturing; 1.3% Sociocultural and Community Services; 1.3% Electrical and Electronic; 1.7% Installation and Maintenance; 0.7% Tourism and Hospitality Management; 0.4% Food Industry; 0.9% Extractive Industries; 0.2% Ceramic and Glassmaking; 0.2% Agriculture; 0.2% Graphic Arts; 1.1% Other	21.5% Health; 20.8% Computer Science; 10.1% Administrative Management; 7.1% Image and Sound; 6.3% Sociocultural and Community Services; 5.7% Physical Education and Sports; 4.5% Tourism and Hospitality Management; 3.1% Food Industry; 2.5% Agriculture; 2.5% Trade and Marketing; 1.8% Installation and Maintenance; 1.2% Electrical and Electronics; 1.2% Energy and Water; 1.2% Personal Image; 2.4% Other
Years of experience in VET	-	Less than 5 years (38.4%), between 6 and 10 years (19.8%), between 11 and 20 years (30.2%), over 20 years (11.6%)
Position of responsibility	-	Yes (58.9%), No (41.4%)
Participation in educational innovation projects	-	Yes (29.7%), No (70.3%)

2.2. Instruments

The research instruments employed in this study were ad hoc questionnaires written in Spanish, based on the classification of teaching strategies and the use of digital technologies proposed by [25,28]. To ensure their validity, the instruments underwent a rigorous validation process involving seven expert judges, including three VET teachers, who assessed the items' clarity, relevance and significance, employing the content validity approach [29]. Items within the questionnaires were refined based on feedback received regarding their uniqueness, relevance and importance. Additionally, both the research

instruments and the study design underwent validation by the ethics committee of the Autonomous University of Barcelona, which confirmed the correct procedure of anonymization and data recording, as well as the non-inclusion of discriminatory questions.

2.2.1. Teacher Survey

The teachers' questionnaire consisted of 17 items, divided into two sections. The first section of the survey collected demographic information (gender, age, positions of responsibility, participation in innovation projects, years of teaching experience, professional field and training programs in which teaching was conducted). The second section was structured around a selection of fifteen teaching strategies (Table 2), with questions regarding (1) their use during the lockdown (2019–2020 academic year), intermittent teaching (2020–2021 academic year) and current practices (2021–2022 academic year); (2) synchronous use; (3) asynchronous use; (4) use on the institutional digital platform; and (5) use of external tools. For the scope of this article, we have selected items focusing on the frequency of use of teaching strategies, their utilization on digital platforms and external tools in current practices, supplemented by an open-response item. Table 2 outlines the dimensions, variables and items of the instrument.

Table 2. Teacher survey.

Dimension	Variables	Items
Teaching strategies	1. Lectures 2. Debates and discussions 3. Practical exercises 4. Challenge-based learning 5. Problem-solving 6. Analysis and discussion of real-life experiences and situations 7. Flipped classroom (prior autonomous work and active work in class) 8. Group work 9. Oral presentations by students 10. Simulated professional activity 11. Visits by professionals 12. Visits to companies 13. Individual or group tutoring 14. Doubt resolution 15. Autonomous learning	Please indicate the teaching strategies you used most frequently during the pandemic [Option: current] Please indicate how you used the institutional teaching platform throughout the pandemic [Option: current] Please indicate for what purposes you used external tools throughout the pandemic [Option: current] Add any comments you wish to make about teaching practices and the use of technologies driven by the pandemic that add value to vocational training (for example, good practices implemented, changes that have remained beyond the pandemic, future proposals, etc.)

2.2.2. Student Survey

The students' questionnaire consisted of 38 items, distributed in two main sections. The first section focused on gathering demographic information (age, gender, type of training cycle, course, professional field, internship, attendance and technology usage during the internship). This section primarily comprised multiple-choice items. The second section was dedicated to exploring 15 teaching strategies (presented in Table 2), aiming to assess their frequency of use, changes due to emergency situations, retention in the 'new normal' of VET studies and student satisfaction levels with the teaching strategies and modes of delivery (face-to-face or remote). Each item in this section was evaluated on a five-point scale, covering frequency, satisfaction and teaching-delivery mode. The survey also included twelve items aimed at capturing students' perceptions based on their experiences concerning teaching strategies, digital tools and overall learning experiences,

ranging on a Likert scale from 1 (totally disagree) to 5 (totally agree). It also included an open response. For the purposes of this article, items regarding the perceptions and the open-response item have been selected and compared to the teachers' perspectives. Table 3 provides a comprehensive overview of the instrument's items.

Table 3. Student survey items.

Items
Teaching and learning strategies used by teachers ...
Are varied.
Enhance my learning.
Promote the development of competencies necessary for the job market.
The technological tools used by teachers ...
Are varied.
Enhance my learning.
Promote the development of competencies necessary for the job market.
In the modules ...
I develop competencies that enhance my adaptability.
I develop competencies that promote my autonomy as a student.
My participation as a student is regularly encouraged.
Assignments are regularly proposed for collaboration with students from other modules or cycles.
When presented in a flexible manner, I learn more.
When I can access digital resources before class, I learn more.
Please tell us the value of studying in VET from your perspective (open-ended).

Source: Authors' own data.

2.3. Data Analysis

The data were analyzed using the IBM SPSS statistical software package (version 26), with a focus on ensuring normality. Descriptive analyses were initially conducted, followed by inferential analysis using contingency tables and the χ^2 independence test to evaluate the relationships between the categories of the variables. This test was supplemented with the Cramer's V statistic, which measures the degree of association between variables while mitigating the impact of sample size. Moreover, normalized adjusted residuals were computed to pinpoint significant differences between groups [27]. Subsequently, the strategies were categorized into four dimensions—Lecture, Situated Learning, Autonomous Learning and Active Learning (Table 4)—following the proposal presented in [25,28] and with the corresponding theoretical and empirical foundations. A validation process involving 11 educational researchers and VET professionals was then conducted to refine this classification, and the necessary improvements were made. Finally, the analysis also includes an open-ended question, the answers to which have been reviewed through qualitative content analysis carried out using Atlas.ti software (version 9).

Table 4. Teaching strategy dimensions.

Teaching Strategies (Dimension)	Teaching Strategies (Items)
Lecture	Lectures Doubt resolution
Situated Learning	Analysis and discussion of real-life experiences and situations Simulated professional activity

	Visits by professionals
	Visits to companies
Autonomous Learning	Autonomous learning
	Individual or group tutoring
	Debates and discussions
	Practical exercises
	Flipped classroom
Active Learning	Challenge-based learning
	Problem-solving
	Group work
	Oral presentations by students

Source: Authors' own data following the classification of teaching strategies of [25,28].

3. Results

Despite the non-probabilistic purposive nature of the sample, the results show a significant degree of consistency with the existing literature and theoretical expectations. Starting at the descriptive level, the results of the study indicate that the surveyed teachers used different didactic strategies in the teaching–learning process, in line with what has been published in the literature [30]. The teaching strategies most used in face-to-face learning included solving practical exercises, addressing doubts and engaging in group work, as reported by over 70% of respondents. That being said, over 60% of teachers also reported using them to foster student autonomy, provide individual or group monitoring, deliver content either through teacher-led presentations or student presentations and tackle problem-solving tasks. Conversely, some active methodologies have not been widely adopted; for instance, Challenge-Based Learning was only used by 45.6%, and the Flipped Classroom by just 27.9%. The latter was found to be the least used teaching strategy among VET teachers. There is considerable room for improving online teaching, where less than one-third of teachers reported using tools to support teaching. Those teachers who did say they use online tools to support the teaching and learning process did so for solving practical exercises and problems, as well as for presenting theoretical content. When they used such tools, they used the institutional online platform of the school to a greater extent than other available online tools. However, for specific activities, especially for encouraging debates, discussions and real-life simulations, these teachers did use external tools more than the institutional platform (Table 5).

Table 5. Teaching strategies and tools used by teachers: frequency and percentage of teachers' responses.

	Face-to-Face Learning	Online: Institutional Platform	Online: External Tools	Online: Both
Lectures	106 (67.1%)	22 (13.9%)	11 (7%)	35 (22.2%)
Debates and discussions	91 (57.6%)	12 (7.6%)	16 (10.1%)	10 (6.3%)
Practical exercises	118 (74.7%)	28 (17.7%)	10 (6.3%)	44 (27.8%)
Challenge-Based Learning	72 (45.6%)	18 (11.4%)	7 (4.4%)	26 (16.5%)
Problem-solving	99 (62.7%)	21 (13.3%)	12 (7.6%)	36 (22.8%)
Analysis and discussion of real-life experiences and situations	89 (56.3%)	15 (9.5%)	21 (13.3%)	14 (8.9%)
Flipped Classroom	44 (27.9%)	7 (4.4%)	6 (3.8%)	14 (8.9%)
Group work	114 (72.2%)	29 (18.4%)	12 (7.6%)	25 (15.8%)
Oral presentations by students	101 (63.9%)	13 (8.2%)	15 (9.5%)	17 (10.8%)
Simulated professional activity	77 (48.7%)	9 (5.7%)	17 (10.8%)	16 (10.1%)

Individual or group tutoring	107 (67.7%)	32 (20.3%)	9 (5.7%)	23 (14.6%)
Doubt resolution	117 (74.1%)	27 (17.1%)	13 (8.2%)	28 (17.7%)
Autonomous learning	110 (69.6%)	28 (17.7%)	9 (5.7%)	29 (18.4%)
Visits to companies.	63 (39.9%)			
Visits by professionals	75 (47.5%)			

An open-ended question on the questionnaire gathered teachers' perceptions of their teaching practices and the tools used according to the circumstances. Among the responses, the most frequently recurring idea was the importance and positive impact of technological tools in supporting teaching strategies, especially due to the pandemic (70%). Several teachers mentioned how these tools have facilitated assignment submissions, student monitoring, group work and conducting virtual lessons. Additionally, some emphasized that these tools were 'here to stay' and continued to be used after the pandemic, integrated into various pre-existing strategies or new ones in the teaching–learning process. Therefore, the challenge now lies in 'continuing to use technological and digital strategies and learn their full potential'.

Most students (80%) perceived this array of strategies and tools as a pertinent set of resources to improve the teaching–learning process, considering different degrees of agreement (from agree to absolutely agree) (Table 6). Nevertheless, a notable discrepancy arose between males and females. Specifically, a greater proportion of females, 27.9%, in contrast to 14.1% of males, expressed either no agreement or only slight agreement with this assertion (Table 6).

Table 6. The teaching and learning strategies used by the teachers enhance my learning: frequency and percentage of students' responses according to their degree of agreement and gender.

Gender	Strongly Disagree/Disagree	Agree	Strongly Agree/Absolutely Agree	Total
Female	31 (27.9%)	39 (35.1%)	41 (36.9%)	111 (100.0%)
Male	26 (14.1%)	82 (44.6%)	76 (41.3%)	184 (100.0%)
Total	57 (19.3%)	121 (41.0%)	117 (39.7%)	295 (100.0%)

Looking more deeply into the differences in the students' perceptions of teachers' strategies and tools according to the characteristics of the students, the data indicate that they had a significantly different perception depending on whether they were in intermediate or advanced VET and, within the level, whether they were in the first or second year. These differences can be organized according to three aspects: strategies, tools and subjects (called modules in VET).

Firstly, with regard to the strategies used by teachers in the classroom, the variable that brings together the level and year of the students explains significant differences in whether they were considered varied ($\chi 2 = 17.756$, df = 6, $p = 0.007$, Cramer's V = 0.170) and conducive to learning ($\chi 2 = 22.132$, df = 6, $p = 0.001$. Cramer's V = 0.189). On the one hand, first-year students in advanced VET were strongly or completely in agreement that the strategies and tools were varied, in a significantly higher percentage than second-year students, 45.3% compared to 24.7% (Table 7). Conversely, second-year students in advanced VET were not at all or slightly in agreement with the statement in a significantly higher percentage than first-year students, 28.4% compared to 11.6% (Table 7).

On the other hand, in upper secondary education, first-year students were significantly more likely to consider that the strategies favor learning, in contrast to second-year students. In other words, second-year students were more critical of whether the strategies used by teachers favored their learning (Table 7).

Although the level and grade variable does not explain significant differences in the overall variable corresponding to the perception of whether teaching strategies enhanced the development of work competencies, the same trend reappeared, whereby first-year

students showed more positive perspectives than second-year students. Table 3 indicates that the percentage of second-year students in intermediate VET who rated this statement as not at all or being slightly in agreement was significantly high, while first-year students of advanced VET significantly rated it as strongly or completely in agreement.

Table 7. Students' perceptions of the strategies used by teachers according to level and year: frequency and percentage of students' responses for each item.

Item	Degree of Agreement	First-Year Intermediate VET	Second-Year Intermediate VET	First-Year Advanced VET	Second-Year Advanced VET	Total
The strategies used by teachers are varied	Strongly disagree/disagree	11 (19.3%)	17 (20.0%)	10 (11.6%)	23 (28.4%)	61 (19.7%)
	Agree	28 (49.1%)	50 (58.8%) +	37 (43.0%)	38 (46.9%)	153 (49.5%)
	Strongly agree/absolutely agree	18 (31.6%)	18(21.2%) -	39 (45.3%)	20 (24.7%)	95 (30.7%)
The strategies used by teachers are conducive to learning	Strongly disagree/disagree	17 (29.8%)+	16 (18.8%)	6 (7.0%)	22 (27.2%)	61 (19.7%)
	Agree	20 (35.1%)	40 (47.1%)	32 (37.2%)	34 (42.0%)	126 (40.8%)
	Strongly agree/absolutely agree	20 (35.1%)	29 (34.1%)	48 (55.8%)	25 (30.9%)	122 (39.5%)
The strategies used by teachers enhance the development of work competencies	Strongly disagree/disagree	11 (19.3%)	21 (24.7%) +	9 (10.5%)	14 (17.3%)	55 (17.8%)
	Agree	25 (43.9%)	38 (44.7%)	36 (41.9%)	44 (54.3%)	143 (46.3%)
	Strongly agree/absolutely agree	21 (36.8%)	26 (30.6%)	41 (47.7%)	23 (28.4%)	111 (35.9%)
Total		57 (100.0%)	85 (100.0%)	86 (100.0%)	81 (100.0%)	309 (100.0%)

Note: The contingency table shows the percentage of the categories for the independent variable (level and year) for each category of the dependent variable (degree of agreement with the item). The symbols "+" and "-" indicate that the standardized and adjusted residual was significantly high or low, respectively.

Secondly, addressing students' perceptions of the tools used by teachers to support the teaching–learning process, the variable reflecting the course and level of the students once again proved to be crucial in understanding the differences in perceptions.

On the one hand, this variable explains the differences in whether students considered the tools to be varied or not ($\chi 2$ = 18.373, df = 6, p= 0.005, Cramer's V = 0.172). Once again, first-year students, especially in advanced VET, had more positive perceptions than second-year students. Thus, the percentage of first-year students who rated the tools as varied was significantly high, while the percentage of second-year students was at the opposite end, with a significantly high percentage responding not at all or being slightly in agreement (Table 4).

On the other hand, the same results occurred with the perception of whether the tools promoted learning or not ($\chi 2$ = 18.394, df = 6, p= 0.005, Cramer's V = 0.173). Again, a significantly high percentage of first-year students in advanced VET rated themselves as strongly or completely in agreement (54.7%), while a significantly low percentage of second-year students did so (27.2%), with significantly more at the opposite end of the range (28.4% not at all or slightly in agreement).

Finally, again, the same dynamic of differences in responses was observed in the responses corresponding to the item on the contribution that the tools can make to developing labor competencies ($\chi 2$ = 17.717, df = 6, p= 0.007, Cramer's V = 0.169) (Table 8).

Table 8. Students' perceptions of the tools used by teachers according to their level and year: frequency and percentage of students' responses for each item.

Item	Degree of Agreement	First-Year Intermediate VET	Second-Year Intermediate VET	First-Year Advanced VET	Second-Year Advanced VET	Total
The tools are varied	Strongly disagree/disagree	20 (35.1%)	19 (22.4%)	16 (18.6%)-	32 (39.5%) +	87 (28.2%)
	Agree	18 (31.6%)	43 (50.6%)	32 (37.2%)	29 (35.8%)	122 (39.5%)
	Strongly agree/absolutely agree	19 (33.3%)	23 (27.1%)	38 (44.2%)+	20 (24.7%)	100 (32.4%)
The tools support my learning	Strongly disagree/disagree	13 (22.8%)	19 (22.4%)	8 (9.3%)-	23 (28.4%)+	63 (20.4%)
	Agree	23 (40.4%)	38 (44.7%)	31 (36.0%)	36 (44.4%)	128 (41.4%)
	Strongly agree/absolutely agree	21 (36.8%)	28 (32.9%)	47 (54.7%)+	22 (27.2%)-	118 (38.2%)
The tools favor the development of labor competencies	Strongly disagree/disagree	16 (28.1%)	14 (16.5%)	13 (15.1%)	22 (27.2%)	65 (21.0%)
	Agree	21 (36.8%)	44 (51.8%)+	28 (32.6%) -	37 (45.7%)	130 (42.1%)
	Strongly agree/absolutely agree	20 (35.1%)	27(31.8%)	45 (52.3%) +	22 (27.2%)-	114 (36.9%)
Total		57 (100.0%)	85 (100.0%)	86 (100.0%)	81 (100.0%)	309 (100.0%)

Note: The contingency table shows the percentage of the categories for the independent variable (level and year) for each category of the dependent variable (degree of agreement with the item). The symbols "+" and "-" indicate that the standardized and adjusted residual was significantly high or low, respectively.

Regarding professional modules, first-year students in intermediate VET considered themselves to be not at all or slightly in agreement that they learn more if the teaching–learning process is approached in a more flexible manner. This difference was statistically significant ($\chi 2$ = 16.512, df = 6, *p*= 0.011. Cramer's V = 0.163) (Table 9).

Table 9. Frequency and percentage of students' responses regarding their perceptions of modules.

Item	Degree of Agreement	First-Year Intermediate VET	Second-Year Intermediate VET	First-Year Advanced VET	Second-Year Advanced VET	Total
I learn more in modules when they are approached in a more flexible way	Strongly disagree/disagree	17 (29.8%) +	10 (11.8%)	10 (11.6%)	8 (9.9%)	45 (14.6%)
	Agree	16 (28.1%) -	40 (47.1%)	31 (36.0%)	36 (44.4%)	123 (39.8%)
	Strongly agree/absolutely agree	24 (42.1%)	35 (41.2%)	45 (52.3%)	37 (45.7%)	141 (45.6%)
Total		57 (100.0%)	85 (100.0%)	86 (100.0%)	81 (100.0%)	309 (100.0%)

Note: The contingency table shows the percentage of the categories for the independent variable (level and year) for each category of the dependent variable (degree of agreement with the item). The symbols "+" and "-" indicate that the standardized and adjusted residual was significantly high or low, respectively.

The study also reveals some differences in the VET modality, which, although not statistically significant, may be worth mentioning here. Firstly, there was an absence of statistically significant differences between students who study dual VET and those who study VET through the traditional mode. However, although the differences were not significant, due to the central tendency in the responses, noteworthy differences did appear (Table 10). Students enrolled in the dual mode were more critical, showing a higher tendency toward centrality, compared to those enrolled in the FCT module without the dual mode, who reported more positive perceptions.

Secondly, and similarly, in Table 10, it can be observed that students enrolled in the dual mode were also more critical of the development of autonomy in professional

modules compared to those enrolled in the FCT module without the dual mode or those who have not yet completed their internships, since the former had the lowest percentage of responses at the highest level of agreement.

Table 10. Student perception according to the modality in which they carry out their internships: frequency and percentage of students' responses for each item.

Item	Degree of Agreement	I Don't Do an Internship	Traditional VET	Dual VET	Total
The tools favor the development of labor competencies	Strongly disagree/disagree	14 (18.9%)	26 (16.8%)	15 (18.8%)	55 (17.8%)
	Agree	35 (47.3%)	67 (43.2%)	41 (51.2%)	143 (46.3%)
	Strongly agree/absolutely agree	25 (33.8%)	62 (40.0%)	24 (30.0%)	111 (35.9%)
In the modules, I develop competencies that promote my autonomy as a student	Strongly disagree/disagree	8 (10.8%)	22 (14.2%)	15 (18.8%)	45 (14.6%)
	Agree	34 (45.9%)	60 (38.7%)	39 (48.8%)	133 (43.0%)
	Strongly agree/absolutely agree	32 (43.2%)	73 (47.1%)	26 (32.5%)	131 (42.4%)
Total		74 (100.0%)	155 (100.0%)	80 (100.0%)	309 (100.0%)

Note: The contingency table shows the percentage of the categories for the independent variable (level and year) for each category of the dependent variable (degree of agreement with the item).

To conclude the Section 3, it is important to point out that students acknowledged the variety of strategies and tools that teachers used in their teaching (Table 5). However, the findings suggest that they expressed reservations about their efficacy in facilitating learning and enhancing professional competencies. This skepticism intensified with students' progression through VET, notably seen in the second-year of advanced VET expressing greater criticism compared to their first-year counterparts. Thus, despite recognizing the breadth of instructional approaches, students questioned their impact on their educational journey and skill development.

4. Discussion

This article presents a comprehensive analysis of teaching practices and digital technologies used by VET teachers, exploring the perspectives of both educators and students. In accordance with the findings of Lv and Chen [31], who demonstrated the effectiveness of applying a variety of teaching methods in the curriculum development of vocational education, our study highlights the variety of didactic strategies employed by teachers in both face-to-face and online settings (as reported in Table 5, almost all strategies were used). This includes lectures, practical exercises, problem-solving and group work, which are predominantly used in more than 70% of the cases in F2F. These predominant strategies align with the prior findings by Han [32], which showed that effective teaching methods for vocational education include lectures with guidance, cases and exercises and interactions. Conversely, in our study, online settings, practical exercises, problem-solving and lessons were used in a little over 20% of the cases, demonstrating a low variety of strategies in online settings.

Although research indicates that flipped learning and challenge-based learning (CBL) are highly suitable for vocational education, supporting the kind of student activities essential in vocational settings and substantially enhancing learners' cognitive abilities and emotional well-being [33–35], our investigation reveals that the adoption of those active strategies remains limited in Spanish VET, evidenced by their usage rates of only 45.6% and 27.9%, respectively (see Table 5). The underutilization of these active learning strategies raises questions about potential barriers to their adoption, which could include

lack of training, resources or institutional support for educators. According to Chan [36], VET teachers must be experts in their subject matter and skilled in teaching methods such as those.

A preference for institutional platforms over external tools in online teaching is evident among these teachers, as the former were used more frequently for all strategies by at least five percentage points compared to external tools, except for activities focusing on debates, discussions and reality simulations. These activities were more often conducted using external tools, as shown by the differences in Table 5. One reason for this, according to Callan and Johnston [17], is that teachers perceive institutional policies, lack of innovation strategies and auditors' preferences as barriers to the wider adoption of social media in program delivery and assessment in vocational education.

Student feedback presents an interesting contrast, with a generally positive outlook on the diverse range of resources and strategies employed by teachers, although there was a significant gender gap in the perceptions of their efficacy (as reported in Table 6). While 80% of students acknowledged the positive influence of these strategies on their learning, women were less inclined to agree with this opinion compared to their male counterparts. These findings differ from prior studies, where no differences were found between women's and men's perceptions on teacher support [37].

Furthermore, this study contradicts prior studies on the distinctions in perceptions based on the year and level within the VET program (as reported in Tables 7 to 9). While Santhanam and Hicks [10] found that students' learning perspectives improve with academic progression, our study data reveal an opposite trend, with significant variations in how the strategies and tools employed were viewed in terms of diversity, learning facilitation and competency development. In this regard, students in the initial stages of higher-level courses (CFGS, first year) often held more favorable opinions than those in later stages (as reported in Tables 7 and 8). As seen in the Section 3, first-year students in advanced VET expressed more positive opinions about the variability in the strategies used by their teachers and the contribution these strategies could make to their learning compared to second-year students regarding their VET programs. Also, with regard to the professional modules, first-year students in intermediate VET largely disagreed that a more flexible approach to teaching and learning contributes to better learning outcomes (as reported in Table 9). This finding may be attributed to the increased maturity and critical-thinking abilities of second-year students in comparison to first-year students. First-year students often exhibit a lack of familiarity with VET and uncertainty regarding their future professional path, leading them to favor traditional or teacher-centered instructional approaches. As with the previous findings, these differ from those of other studies, like Al-Momani [38], who reported no statistically significant differences in students' attitudes toward VET specialization based on gender, academic year or academic rating.

Additionally, this research touches on the influence of different training modalities, like the dual training system, on student perceptions (as reported in Table 10). Although no statistically significant differences were found, trends suggest that students enrolled in dual training are more critical, since they expressed disagreement regarding how effective teaching strategies are in facilitating the development of professional competencies. These results are in accordance with Sylte [39], who evinced a need for the development of professional didactical teaching competencies focusing on job-related professional education to meet future competency needs at work. Moreover, despite existing research by Widiartini and Sukerti [40] underscoring the value of fostering learner autonomy to align with students' needs and interests, a factor shown to influence performance, our findings reveal a level of skepticism among dual students regarding the contribution that current strategies make to their autonomous learning capabilities. This skepticism stems from their awareness of the labor market and the specific professional roles they are being prepared for during their company training.

The main limitation regarding this study revolves around the representativity of the sample. We recognize that a non-probabilistic purposive sample limits the generalizability

of the results. However, the robustness of the findings is supported by the congruence of the interview data with the quantitative results and existing research. This consistency suggests that, despite the sample limitations, the insights gleaned from this study are valuable and reflective of broader trends.

5. Conclusions

The significant differences in perceptions regarding teaching effectiveness between female students and teachers suggests underlying issues that may affect the learning experience and outcomes for female students. This warrants further investigation into the causes and potential strategies to address these disparities, in line with research studying gender segregation in VET [41].

The variation found in student perceptions based on their educational stage and level of VET underscores the importance of customizing teaching strategies to match the unique needs and circumstances of different student groups. There is a need for continuous innovation in educational practices, with examples such as integrating more interactive digital tools or adopting flexible learning modules that can be adjusted to enhance student participation and learning effectiveness.

The critical viewpoint of students in dual training systems toward the strategies employed for competency development and autonomy suggests that while this approach has its merits, there may be areas for improvement in how it is implemented to better serve student needs. Enhanced cooperation between educational institutions and workplaces, as suggested by Poortman, Reenalda and Nieuwenhuis [42], could bridge the gap in theoretical knowledge acquisition and better harmonize school-based learning with practical experience.

This study highlights the need for ongoing research into effective teaching practices in vocational education, particularly in the context of rapid technological advancement and changing labor-market demands. Engaging with both teachers' and students' perspectives is crucial in developing strategies that are both innovative and inclusive, catering to the diverse needs of the student population. This alignment involves not only adapting to technological trends but also preparing students for future challenges by equipping them with relevant skills and competencies. Moving forward, we recommend that future studies employ more representative sampling methods to build upon our results and further validate the observed trends.

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