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Usefulness of Digital Methods in Evaluating School Work Alternance Projects: How Actors and Contexts Under Observation Can Interconnect

Maria Dentale

Abstract: Analysis of data from institutional sources, available on platforms and websites, have helped public policy makers to further understand the potential of digital methods, and how they can be most usefully applied (Agodi, 2010). *Digital research* (Rogers, 2016) requires an adaptable and flexible use of digital methods, capable of combining and connecting both institutional purposes and web data, through the use of complex research designs, according to a specific research culture, 'with-and-in' the digital world. The Department of *Communication and Social Research* - Sapienza University of Rome - is undertaking research as part of the Project of Relevant National Interest «*Evaluating School-Work Alternance: a longitudinal study in Italian upper secondary schools*», and this paper reports the initial outcomes. At this preliminary stage, the research is exploratory, examining SWA/PTSO school projects (school years 2016/17; 2018/19), by exploring the school websites and the *MIUR Platform of Alternance Histories*, which contains the most successful projects developed by school networks. After downloading and analysing the selected texts, different types of projects could be identified, particular training courses being set up according to the school type, the geographical area of the school, and how far a course could influence students in their choices of future employment and further education. In projects are differently combined: *i.* soft skills to be developed by the students (e.g. citizenship, vocational and managerial skills); *ii.* educational methods used to implement the activities (differentiated into *learning by doing* or *learning by thinking*).

Keywords: SWA/PTSO projects; soft skills; upper secondary schools; content analysis as a survey; digital research.

1. The frontiers of *digital research*: usefulness of data in evaluative research

Social researchers now have access to numerous empirical sources which provide consistent data and vast amounts of information thanks to new communication technologies producing *big data*, *big corpora*, *open data*, *linked data*, etc. (Aragona & Felaco, 2018). According to Amaturio and Aragona (2019), expressions such as «data deluge», «data revolution», «datafication» and «data-intensive society» have been used to indicate how the extensive use of new communication technologies has changed the role that data play in businesses, in administrations, and in society as a whole. Through the use of data, there has been an ever greater onus on the importance of evaluation and assessment, with governmental policies being increasingly evidence-based, a process begun in the 90s (Stame, 2016). In its policy-making, governance is guided by data to establish learning objectives, so as to improve the performance and credibility of public institutions and programs (Wholey et al., 1970). Data production goes hand in hand with public administration (PA) decision-making, and as such, becomes the basis for the evaluation of public policies. This process of learning from experience to produce organizational change represents *double loop* learning whereby actions within an organization are simultaneously seen as vectors of change, both enacting and feeding into policy-making processes, with underlying assumptions, norms, and objectives being continually open to reassessment (Lo Presti & Stame 2015; Furubo & Stame, 2018).

Hence, this utilization-focused evaluation consists in judging the utility and actual use of evaluations (Patton, 1978), which are assumed to be based on experience and collected data, so responding to learning objectives. The data produced and obtained by PAs, while respecting the needs of accountability, is used to understand when and how programs work, and the impact they have on the organizational culture, and how potential users (direct beneficiaries or the community in general) will be affected (Weiss, 2007). As frequently underlined (Patton, 2007), the importance given to the interchange of data within evaluative research requires a critical use of evaluation (Furubo & Stame, 2018) when analysing public policies and studying their implementation. How a regulatory context determines the application of a policy needs to be established, which, in turn, will require consideration of the setting or context where a policy is implemented, including the values, needs and expectations of beneficiaries and implementers. Within this framework, SWA/PTSO projects¹, available on the websites of a sub-sample

¹ The acronyms refer to two public policies: 1. School-Work Alternance and 2. Pathways for Transversal Skills and Orientation. They both favour the integration of upper secondary school students into the labour market, and help decisions making with regards to higher

of Italian secondary schools, were analysed, to evaluate the effects (both expected and unexpected) the projects had produced on the school careers of students, and their choices for further education and future employment.

The evaluation analysis was set up with the following assumptions: *i.* the value systems and regulatory contexts of the specific training courses (at high schools, technical schools, and vocational training schools) influence how policies are implemented in the school-work alternance (*put policy into action* - Brodtkin, 2011); *ii.* consequently, the school website data related to the projects (secondary analysis), must be interpreted taking into account the social and economic needs of the territorial context of each school.

How data is to be used and interpreted should naturally consider the specific requirements of each evaluation and assessment, and respective aims (Stame, 2016). The research procedures of the present study also took into consideration two main factors. First, while the evaluation of the *evidence-based learning* (Fetterman *et al.*, 1996) was, on the one hand, subject to limitations linked to the amount of and type of information available on the school websites, on the other, it represented an opportunity to assess freely available information, through systematic analysis of data concerning experiences of the companies and students involved in the SWA/PTSO projects. Second, the *data intensive society* (Aragona & Felaco, 2018) has had a profound impact on research, particularly in the use of digital methods (Biolcati & Martire, 2018). Digitizing information has not only encouraged cross-disciplinary approaches involving various scientific communities, interested in analyzing social reality through open-access data, but has also favored the integration of data via different techniques and social research methods. In the field of education, in particular, as PAs shift towards more open government, big data and computational science are allowing key performance indicators to be organized, analyzed, and visualized for the benefit of social research. As information is made available (open government), there is an ever increasing reliance on Big Data² to work towards efficient fact-based decision-making. By retrieving open-access web data and applying different social research techniques, this study reports the research carried out at the CORIS Department, Sapienza, University of Rome, as part of the Project of Relevant National Interest (PRNI)³ *Evaluating the School-Work Alternance:*

education.

² Methods of extracting information from Big Data, involves three main steps: *i.* collection of data (creating and saving); *ii.* processing, including extraction, integration and analysis; *iii.* the interpretation and reuse of data (microdata, documentary sources, etc.) for research purposes, enabling subsequent analyzes that go beyond monitoring, and incorporate formative evaluation objectives (Scriven, 1995): the aim is *to help projects work better* by involving different groups of beneficiaries and asking appropriate questions, considering the project context (Rossi *et al.*, 2007).

³ The present analysis of *School Work Alternance (SWA)* and *Pathways for Transversal Skills*

a longitudinal study in Italian upper secondary schools, and focuses on the phases regarding the carrying out and organization of the web research on SWA/PTSO school projects. In evaluating the projects, the study exploited cutting-edge open-access databases, and mixed different data, through the use of a *mixed method approach* (Amaturo & Punziano, 2016; Mauceri, 2018), in line with the methodological framework of the various research phases.

From the start, in selecting sources, the web research required an open and flexible methodological approach, whereby various steps of analysis were combined to analyze results. The school websites were examined, and all the documentation considered useful to reconstruct the school-work alternance schemes, was exported (as we will see, the study combined this documentation with all the other documents published by the school relating to the projects under study, such as the Three-Year Education Plan (TYEP) agreements of cooperation with local structures involved in the projects, prizes and acknowledgments to students).

2. How *digital methods* contributed to the research design

Theory and empirical research (Rogers, 2016) have underlined the importance of developing flexible research approaches when using digital methods. In accordance with a specific culture of doing research, 'with-and-in' the digital world, complex research design can combine and connect varying institutional purposes, through the collecting and sharing of web data. This kind of research necessitates certain steps: adequate formulation of research questions, selection of the most appropriate sources, and data collection

and Orientation (PTSO) projects is part of the PRNI, promoted by the *Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione* (INVALSI, Principal Investigator) in collaboration with the *Sapienza University of Rome*, the *Milano Bicocca University* and the *University of Genova*. The goal of the PRNI is to evaluate the impact of PTSOs on the educational careers of students. Through a complex, longitudinal, multi-wave evaluation research design, the specific aims are to: *i.* reconstruct the development and career course of about 20,000 school students involved in PTSOs; *ii.* describe the PTSOs promoted by n. 100 sampled upper secondary schools; *iii.* identify how teachers adapt pedagogical strategies to the PTSOs; *iv.* describe the training and employment opportunities offered by the PTSTO hosting organisations; and, *v.* outline the policy governance systems. By using *mixed methods* research (both qualitative/quantitative social research methods and techniques), the overall aim is to develop: *i.* a systematic review of studies on PTSOs; *ii.* a *content analysis* (survey research) of projects promoted by schools; *iii.* a longitudinal (multi-wave) study on PTSTO students, school managers and tutors; *iv.* interviews and focus groups with key informants (public administrations, hosting organisations). Through web surveys, data is collected on the *PTSTO Online Platform* designed both to collect the projects promoted by the schools, and to store the responses to the surveys addressed to students, school managers and PTSTO tutors. Regarding the work of the Sapienza research unit, in particular, the present paper focuses on the results of the exploratory analysis carried out on the School Work Alternance (SWA, the policy that preceded the PTSOs) and on the PTSOs promoted by 22 schools (selected among those in the sample).

through web-based procedures (Caliandro & Gandini, 2019; Veltri, 2021); innovative application of data analysis techniques borrowed from different digital fields, such as using *content analysis as a survey* (Losito, 1996; Faggiano, 2016), and *social network analysis* (Newman, 2018; Borgatti *et al.* 2018). As indicated, as part of the PRNI, the Sapienza research unit managed and conducted the first phase of the background analysis on SWA/PTSO projects promoted by some of the schools included in the Invalsi⁴ sample. The exploratory research aimed to be both *descriptive* and *explorative*. First, through the use of a content analysis as a survey, the texts were to be analyzed, so that the application of *precoded classifications*, obtained from the literature and from the references contained in the official documents governing the application of the alternance policy, could be validated. Second, findings from this *descriptive phase*, could then be used to formulate new, more useful, classifications, for subsequent phases of the research.

In accordance with a mixed methodological approach, the results of the content analysis as a survey (classifications of project themes, learning objectives, educational methods used and target skills in students) were used to develop the research tools, to be employed in the subsequent phases of the research, such as: *i.* online questionnaires for teachers/tutors and students involved in the multi-wave surveys of the longitudinal study⁵; *ii.* analysis sheet of SWA/PTSO projects promoted by the schools. Both the answers to the questionnaires and the school projects will be uploaded on to the PRNI Digital Platform, which notably includes two features - repository or crowd sourcing (Rogers, 2016) of questionnaire responses, and interactive communication of research results to the various stakeholder communities (schools, hosting organizations and students). In facilitating exchange between the various research steps through a common data bank, and allowing easy access for the descriptive analysis and the subsequent explorative analysis, the digital platform has all the necessary features of integrated digital research: immediate space-time coding across different observation contexts; effective archiving/downloading procedures of large databases; and, comparison of data through different information units interconnecting (for example, SWA/PTSO projects and student questionnaires), useful for reconstructing the social impact of the measures adopted on school careers and further education choices. Following this brief description of the background to the SWA/PTSO projects, the steps of the web research will be outlined in the

⁴ See note 3.

⁵ The surveys will initially be aimed at grade 11 students (and their teachers/tutors), interviewed in three time intervals (subsequently in grade 12 and 13). The aim of the longitudinal design is to reconstruct the effects of participation in projects on the educational careers of the pupils after school (employment, tertiary education, etc).

following paragraphs, with focus on the results obtained and how their interconnection can be used to determine the next research steps.

2.1 The web research on SWA/PTSO projects

In selecting the schools for the exploratory study, two variables were considered: *i.* the territorial partition of the 100 schools sampled by the Invalsi (North East; North West; Centre; South; South and Islands); *ii.* type of school: (High School, Technical School, Vocational Training School). In the selection, project material on the websites of the 100 sampled schools was explored, and the following were selected and collected:

the SWA projects promoted in the school years 2016/2017 - 2017/2018;

PTSOs: *i.* implemented in the years 2017/2018, during the SWA-PTSO transition period; *ii.* in the years 2019/2020, and *iii.* planned for the three-year period 2019/2022 - these PTSOs were selected from the section «educational offer» of the TYEP published on the websites.

A total of 109 projects was downloaded from the websites of 22 schools, and from the *Miur Platform of Alternance Histories*.

Initially, 198 projects were selected. Then, 109 projects were downloaded from the websites of the 22 schools involved in the exploratory study. The structure of these projects is very heterogeneous: *i.* some projects are articulated in objectives, outcomes, teaching methods; *ii.* other projects are essentially narratives of the experiences of the schools; *iii.* some projects are included as attachments to the TYEP.

At this phase of analysis, projects published on the *Miur Platform of Alternance Histories* were also selected. The platform collected 89 project-sheets referring to the SWA⁶ experiences promoted by schools throughout Italy. The 198 projects selected were distinct from others, in that they followed the same divisional format: context data of the training project, duration of the project, design of the project and description of activities.

Technically, projects were selected by checking the websites of the 100 schools included in the Invalsi sample. Through web scraping (aimed at downloading projects, and related documents and attachments), 22 schools were identified as actually implementing projects (for a total of 198 projects), updating their websites over time, and publishing experiences/results in the special section dedicated to initiatives related to SWA/PTSO. As shown in the table below (Table 1), the survey included⁷ the upper secondary schools (divided according to high school, technical and vocational training schools)

⁶ The School Work Alternance (SWA) is the measure that has preceded the PTSOs. In the exploratory research phase, in order to reconstruct an overview of the alternance experiences of the schools, SWA projects were also included in the analysis.

⁷ The main difficulty encountered in the web scraping was the lack of updating of websites, on the part of schools, and the publication partially structured projects.

of Central Italy, the North (East and West) and the South-Islands, and the projects downloaded from the MIUR platform.

Table 1. Schools involved by geographic repartition and consistency of selected project material

Type of Institution and City	Institute Name	N. of projects
Centre		
Vocational School (Roma)	Via Sarandi	9
High School (Palestrina)	Eliano-Luzzatti	12
High School (Perugia)	Giordano Bruno	7
Technical School (Pontedera)	Marconi	5
North East		
Vocational School (Pordenone)	Zanussi	3
High School (Bologna)	Fermi	3
Technical School (Padova)	Usuelli Ruzza	3
North West		
Technical School (Milano)	Cardano	6
Technical School (Vercelli)	Avogadro	2
Vocational School (Torino)	Giolitti	3
Vocational School (Torino)	Giulio	2
High School (Mantova)	Virgilio	5
South		
Technical School (Lecce)	A. De Pace	3
Technical School (Manfredonia)	Rotundi ITI Fermi	7
Vocational School (Giulianova)	Crocetti Cerulli	5
High School (Sava)	Del Prete - Falcone	1
South and Islands		
Vocational School (Carbonia)	Beccaria	5
Vocational School (Partinico)	Corbino	8
High School (Praia a Mare)	Praia a Mare	25
High School (Stigliano)	Felice Alderisio	5
High School (Lauria)	Miraglia	3
Technical School (Messina)	Caio Duilio	12
National Network Schools - SWA		
High School, Technical and Vocational School		89

That the available documentation related to the projects (the TYEP, agreements with hosting institutions, etc.) was abundant and varied indicates the good participation of schools in open education (Dirckinck et al., 2012). This enabled school settings to be identified, highlighting their differences and particular characteristics, needed for the declination of the SWA/PTSO pathways. Hence, the analysis of the SWA/PTSO projects was combined with the analysis of the different TYEPs, to usefully reconstruct: *i.* the greater integration of each initiative within the alternance project and *ii.* the attention given by schools to some central areas of the SWA/PTSO policy, such as the bestowing of Certificates of Competency. As explained in the following paragraphs, the decision to differentiate the contexts of observation from the *web-scraping* was reflected (and in some ways had an impact) on the description of the varying pathways (see below), which have different declinations, depending on the training objectives of the 3 different types of school - *i.* technical (Technical Schools); *ii.* managerial (Vocational Training Schools) and *iii.* geared towards Further Education (High Schools).

Further, considering the contexts of schools (type of school and respective objectives, and geographical position) to reconstruct the institutional settings of the SWA/PTSO initiatives, some important areas of the survey were also considered, such as the school teaching practices, the types of pathways favoured, and the most frequent target transversal skills. These dimensions were successively included in the structure of the *content analysis as a survey*, to obtain classifications useful for future different steps in the research.

3. Content analysis as a survey of SWA/PTSO projects

The corpora analysis was carried out through the *content analysis as a survey*. The textual corpora were reported in a ‘*cases for variables data-matrix*’, which enabled the most significant associations between the elements of the projects to be analyzed (see below). The *content analysis as a survey form* was structured in two sections: the first is a list of variables contained in the official (ministerial) documents accompanying policies (*pre-coded classification*); the second is a list of variables (classified according to theme, learning objectives, activities, expected skills and teaching methods), obtained through interpretation of the textual corpora (*ex novo classification*, Table 2).

Table 2. List of dimensions: format of content analysis as a survey

Pre coded classifications
Institute name
Type of school (High School, Technical School, Vocational Training School)
Territorial Repartition (North – East and West – Centre, South and Islands)
Background
Project title
Type of project (enterprise in action, simulated training enterprise, service learning, transnational project)
Law (SWA/PTSO)
Integration in the TYEP
Registration on the MIUR Platform of the Alternance Histories
Duration
Type and number of classes involved
Partnership
Name of partner
Place of the activities implemented (school or host organizations)
Type of hosting organizations (Research Institutions; University; Other Public Institutions; Private Enterprises; Third Sector)
Location of project activity
Ex novo classifications
Project theme
Project learning objectives
Project activities
Target skills
Teaching methods/techniques
Certificate of Competency (assessment criteria – blank cells)

3.1. Descriptive-explorative analysis: pre-coded and ex-novo classifications

In terms of how far SWA/PCTO projects were integrated into school curriculums, 33,3% of the projects analysed were actually incorporated into the TYEP. Instead, the other projects (66,7%), were published on school websites, in the sections according to theme, dedicated to the description of the project activities (traineeships, workshops, training periods carried out in com-

panies, etc.), involving students in their last three years of school (III-IV-V). Half (55,1%) of the projects analysed were included in the SWA framework, according to Law n. 107/2015 of the *Buona Scuola*. Other projects came under the PTSO Law 145/2018, and others still, were implemented in the SWA-PTSO transition period.

The project material consisted of: *i.* 109 projects, selected from the website of the 22 sampled schools, and *ii.* 89 projects uploaded on the MIUR web platform. Most of the SWA projects were carried out in the period 2014-2017 (55,3%); PTSO projects were carried out between 2018 and 2019 (22,8%). The projects examined were divided into 51 in absolute value (a.v.) (25,9%) with a duration of one year and 43 in a.v. (21,7%) in a period of more than three years, while only 25 in a.v. (12,6%) recorded a commitment from a week to less than two months. In addition, the projects involved all the various classes of 3rd, 4th and 5th year students. Most of the projects analysed were carried out in cooperation with hosting organizations, according to principles of *business in action* (59,9%), whereby students could learn to manage real businesses, creating a product or offering a service. Other projects offered *simulated business training* (24,9%), and some others, *service learning* (12,2%). A very small number of projects required students to spend a short period of time training in a foreign country (*transnational mode* - 3%).

Project activities were mainly carried out by and at the school themselves (67,2%), followed by projects involving hosting organizations. The planning of SWA/PTSO projects could involve various partners, both public and private, particularly: private enterprises (13,3%), public institutions (excluding universities and research institutes, 10,1%) and tertiary sector organisations (9,6%).

The project material selected is extremely heterogeneous, appearing in: *i.* a structured format, articulated in objectives, outcomes, teaching methods; or, *ii.* an unstructured format with narratives of experiences, or, *iii.* attachments to the TYEP. To reconstruct the content of the various project sheets, an operational definition was adopted, to identify the following aspects: (a) the themes; (b) the learning objectives; (c) the activities carried out; (d) target skills and (e) the methods and techniques employed.

Most projects come under the theme *i.* «Prototyping, information and communication technologies» (27,3%). Next come projects under the themes of: *ii.* «Support of social inclusion and spread of civic values» (23,2%); *iii.* «Sustainable development and critical consumption of territorial landscape structures» (16,7%); *iv.* «Simulation and study of strategic marketing and the economic-financial balance of enterprises and business organisations» (6,6%) - (Table 3).

Table 3. Classification of project themes (Frequency Distribution).

Classification of project themes	a.v.	%
Economic and business organization	27	13,6
Commercialisation, marketing and internationalization	13	6,6
Staff selection and human resources management	6	3
Taxation and financial resource management	3	1,5
Sustainable development and critical consumption	33	16,7
Social inclusion and civic sense	46	23,2
Prototyping, information and communication technologies	54	27,3
Scientific research	11	5,6
Not specified	5	2,5
Tot.	198	100

The educational objectives of the projects are summarised in Table 4. Most of the objectives concern students in vocational training courses, aimed at technical know-how learning, and the design and producing of prototypes (62,2%).

Table 4. Classification of project learning objectives (Frequency Distribution).

Classification of project learning objectives	a.v.	%
Learning technical know-how related to the design and production of prototypes	122	62,2
Promoting traditional craft industries	15	7,7
Acquisition of management and information technology skills	16	8,2
Development of environment and landscape heritage	7	3,6
Promotion of legal-administration and inter-institutional dialogue	5	2,6
Promotion of cultural activities of artistic and social interest	13	6,6
Not specified	20	9,1
Tot.	198	100

Most of the project activities involved students in creative and (theatre) scene writing laboratories (23,2%) or in visits to businesses and business training (21,7%). As regards helping students to enter the job market through SWA and PTSO projects, a fair proportion of the projects (20,2%) analysed

involved students simply taking part in theoretical courses on work safety issues (table 5).

Table 5. Classification of project activities (Frequency Distribution).

Classification of project activities	a.v.	%
Writing and multimedia laboratories	46	23,2
Design and creation of prototypes	16	8,1
Company visits, training, job shadowing and vocational courses for job placement	43	21,7
Guided tours of a cultural nature	19	9,6
Theoretical courses and lectures	40	20,2
Not specified	34	17,2
Tot.	198	100

Almost a third of project activities (28,3%) involved developing transversal skills related to strategic thinking, such as problem solving or project management, one sixth (15,2%) concerned how to create a positive? socio-cultural impact, and another sixth (14,1%) referred to activities aimed at improving student socio-emotional skills (table 6).

Table 6. Classification of target skills (Frequency Distribution).

Classification of target skills	a.v.	%
Ability to engage with others in activities with a positive socio-cultural impact	30	15,2
Strategic thinking ability (problem solving, project management)	56	28,3
Improving social-emotional and group interaction skills	17	8,6
Negotiation and communication skills both at school and work	28	14,1
Not specified	75	33,8
Tot.	198	100

Among the most commonly applied methods is the use of simulation (problem solving and case studies - 17,7%), followed by business life cycle analysis (which generally precedes an internship in a company- 15,1%) and planning digital activities (such as website building or starting social awareness campaigns - 12,4%) (table 7).

Table 7. Teaching methods/techniques (Frequency Distribution /multiple choice questions)

Teaching methods/techniques	v.a.	%
Personal model canvas; Brainstorming; Coaching and Silent-Coaching	60	10,8
Problem solving and Case studies	99	17,7
Role play and staff selection simulation	63	11,3
Life cycle data analysis	84	15,1
Prototype construction (robotics, etc.)	54	9,7
Communication planning and other digital activities	69	12,4
Crowdfunding activities	3	0,7
Tot.	432	100

4. Multiple Correspondence Analysis: school-work alternance as a cultural project

To identify the main cultural directions of the different schools promoting the SWA/PTSO projects, we proceeded with a multivariate analysis technique - the *Multiple Correspondence Analysis* (MCA) - focusing our attention on the first two factors extracted⁸.

The table shows a synoptic classification scheme of active and illustrative variables (active and illustrative) included in the MCA model (table 8).

Table 8. Set of variables included in the model

Set of active variables
Themes
Learning objectives
Target skills
Teaching methods/techniques
Description of activities
Set of illustrative variables
Type of project
Law (SWA/PTSO)
Integration into the TYEP
Registration on the MIUR Platform of Alternance Histories
Duration of project
Type and number of classes involved

⁸ The two extracted factors produce a total of 18.8% common inertia. The weight of the two factors is distributed as follows: 11,9%; 6,21%.

4.1. First factor: transversal skills of citizenship vs vocational skills

The first factor concerns projects aimed at developing *transversal skills on citizenship and civic sense* (negative semi-axis) opposed to projects aimed at the transfer of *vocational skills and job placement* (positive semi-axis). In detail, the first semi-axis factor includes all the projects aimed at:

i. enhancing and promoting knowledge of artistic and craft traditions of a given area, to encourage teamwork, in activities with a positive socio-cultural impact;

ii. promoting a civic sense and sense of legality, by organising theoretical courses in cooperation with public institutions and local administrations.

The project activities aim to develop transversal skills, regarding citizenship and culture (MIUR Guidelines). Students are required to show commitment to others, and empathy in group interaction, through participation in social and cultural activities. There are itinerant tours of the territory, structured in cycles of guided visits, when students are often offered the opportunity to interact with tertiary sector organizations or the public sector, animating local communities and contributing to the renewal of the crafts, and landscape, artistic and cultural heritage, of a territory. On the other hand, the other semi-axis of the factor refers to one of the main aims of technical and vocational training schools (of all geographical areas), i.e. the transfer of: *i.* technical skills to produce prototypes, in a laboratory or during work experience, according to the *Business in action method*; or, *ii.* management and managerial skills related to problem solving, project management, according to the *Simulated Business training* method (Tables 9-10).

Tab. 9. Active variables-modalities significantly related to 1st Factor

Variable label	Modality label	T.V.
Life cycle data analysis [YES/NO]	No	-10.61
Business skills [YES/NO]	No	-9.93
Communication planning and other digital activities [YES/NO]	No	-8.28
Problem solving and case studies [YES/NO]	No	-7.89
Prototype production [YES/NO]	No	-7.47
Project theme	Social inclusion and civic sense	-7.12
Role-playing and staff selection simulation [YES/NO]	Yes	-6.64
Target skills	Ability to engage with others in activities with a positive socio-cultural impact	-4.92
Target skills	Ability to create trust, feel empathy	-4.25
Skills in cultural awareness and expression [YES/NO]	Yes	-3.63

Description of activity	Cultural guided tours	-3.58
Project learning objectives	Promoting traditional craft activities	-3.21
Project learning objectives	Promotion of cultural, artistic and recreational-social activities	-3.15
Project learning objectives	Encourage awareness of the area's artistic and craft traditions during employment	-3.11
Project theme	Sustainable development and critical consumption	-2.18
Project training objectives	Promotion of legal-administrative culture and inter-institutional dialogue	-2.12
Description of activity	Cultural guided visits	-2.07
Origin of axes		
Project learning objectives	Management and computer programming	2.15
Project learning objectives	Learning technical knowledge of prototype design and production	3.18
Description of activity	Prototype design and creation	3.26
Competences in cultural awareness and expression	No	3.63
Target Skills	Ability to negotiate and communicate constructively both at school and work	3.91
Project theme	Economic and business organisation	4.10
Description of activity	Company visits, training, job shadowing and job placement courses	5.13
Project theme	Multimedia technologies, information technology and communication	5.32
Target skills	Strategic thinking ability in problem solving and managing ambiguities	5.72
Role-playing and staff selection simulation [YES/NO]	Yes	6.64
Prototype construction (robotics, etc.) [YES/NO].	Yes	7.47
Problem solving and case studies [YES/NO]	Yes	7.89
Communication planning and other digital activities [YES/NO]	Yes	8.28
Business skills [YES/NO]	Yes	9.93
Life cycle data analysis [YES/NO]	Yes	10.61

Table 10. Illustrative variables-modalities significantly related to 1^o Factor

Variable label	Modality label	T.V.
File uploaded in the MIUR platform of SWA projects? [YES/NO]	No	-6.67
Does the Project fall under SWA or PTSO law?	PTSO	-4.91
Is the project included in the TYEP? [YES/NO]	Yes	-4.43
Number of students involved	Up to 20	-4.10
Type of project	Service Learning	-4.09
Type of host structure	Third Sector	-3.78
Site where the project activities are carried out	School and Hosting Organization	-3.48
Project target classes	III-IV-V	-3.12
Type of host organization	Public institutions	-2.64
Geographical partition	North West	-2.33
Project year recoded	2019 to 2022	-2.22
Site where the project activities are carried out	School and Host Organization	-2.14
Type of host organization	Training organizations and universities	-2.04
Origin of axes		
Number of students involved	Up to 30 students	2.21
Geographical partition	All geographical partitions	2.34
Project duration	Biennial	2.46
Number of students involved	Up to 20 students	3.27
Does the Project fall under SWA or PTSO law?	SWA	4.27
Site where the project activities are carried out	School	4.32
Is the project included in the TYEP? [YES/NO]	Yes	4.43
Type of project	Business in action	4.75
Type of host organization	Private business	5.56
Sheet uploaded in the MIUR platform of SWA projects?	Yes	6.67

4.2. Second factor: learning by doing vs learning by thinking

The second factor identifies the learning context and methodology of projects aimed at transferring transversal or vocational skills.

Regarding teaching methods, SWA/PTSO projects provide practical training based on 'doing' - *learning by doing*, or 'training' - *learning by thinking*.

As indicated the following tables (Tables 11-12), the first semi-axis of the factor consists of a set of significant dimensions of projects aimed at promoting the business culture of *learning by doing*, by company visits, training, job shadowing, and professional job placement courses. To guide students in

understanding the requirements of future employment, periods of *learning by doing* is organized, so students can experience organizational dynamics and contacts with private business.

On the other semi-axis of the factor, however, we find projects aimed at *learning by thinking*, which use methods, such as, cooperative learning, role playing and simulation. To encourage students to learn management skills, particularly in communications, web marketing and managerial planning, interactive dialogue is encouraged in class, involving business experts, as well.

Table 11. Active variables - modalities significantly related to the 2° factor

Variable label	Modality label	T.V.
Skills in cultural awareness and expression [Yes/No]	No	-6.03
Activity description	Company visits, training, job shadowing and job placement courses	-5.81
Problem solving and case studies [Yes/No]	No	-5.08
Project theme	Economic and business organisation	-5.01
Prototype construction [Yes/No]	No	-4.81
Project learning objectives	Learning technical knowledge of prototype design and production	-4.29
Project theme	Commercialisation, marketing and internationalisation	-3.61
Target skills	Ability to engage with others in activities with a significant socio-cultural impact	-3.43
Activity description	Theory courses and lectures (safety, sustainability, etc.)	-3.42
Role-playing and staff selection simulation [Yes/No]	No	-3.24
Target skills	Strategic thinking skills in solving problems and managing ambiguities	-2.93
Communication planning and other digital activities [Yes/No]	No	-2.87
Personal model canvas; Brainstorming [Yes/No]	No	-2.84
Labour market study; Business life cycle analysis [Yes/No]	No	-2.69
Project theme	Staff selection and human resources management	-2.59
Business skills [YES/NO]	Yes	-2.48
Origin of axes		
Target skills	Ability to create trust, to feel empathy (social-emotional skills)	2.10

Project Theme	Multimedia technologies, information technology and communication	2.21
Learning objectives of the project	Increase in awareness of the environmental and landscape heritage	2.22
Business skills [Yes/No]	No	2.48
Project theme	Social inclusion and civic sense	2.50
Learning objectives of the project	Promoting traditional artisan skills	2.61
Analysis of business life cycle data [Yes/No]	Yes	2.69
Personal model canvas;Brainstorming [Yes/No]	Yes	2.84
Communication planning and other digital activities [Yes/No]	Yes	2.87
Role-playing and staff selection simulation [Yes/No]	Yes	3.24
Project theme	Sustainable development and critical consumption	3.26
Activity description	Writing and multi-media laboratories (creative writing, theatre, digital, music...)	3.53
Target skills	Ability to negotiate and communicate constructively both at school and work	4.18
Activity description	Design and creation of prototypes	4.34
Prototype construction [Yes/No]	Yes	4.81
Learning objectives of the project	Management and computer programming	4.95
Problem solving and Case studies [Yes/No]	Yes	5.08
Skills in cultural awareness and expression [Yes/No]	Yes	6.03
Activity description	Cultural guided tours	7.11

Tab. 12 - Illustrative variables-modalities significantly related to the 2° Factor

Variable label	Modality label	T.V.
Type of school	Technical school	-4.52
Type of host organization [specify]	Private enterprise	-2.76
Project duration	Annual	-2.37
Origin of axes		
Type of host organization	No partnership	2.26
Project duration	Annual	2.64
Project classes	III	2.74
Type of host organization	Public Institution	2.80
Type of school	High school	4.46

5. SWA/PTSO projects: typology of projects

By combining the MCA with the bivariate and trivariate analysis, distinct types of training pathways could be identified, on the basis of:

a different articulation of subjects, objectives, and target skills. Specifically, the pathway goes from vocational training skills (vocational training project, VTP), to managerial skills (managerial training project, MTP), to communication skills, and cultural awareness and knowledge of a territory (cultural training project, CTP);

various teaching methods to integrate school and hosting organizations (meetings with experts, company visits, business simulation, project work in and with companies, internships, entrepreneurship projects, etc.).

5.1. Vocational training paths based on learning oriented action (VTP)

These consist of technical-laboratory pathways aimed at training highly-skilled professions, involving complementary learning contexts (school and hosting organizations), with modules and study-work initiatives (training periods). The school and the company/hosting organizations are no longer seen as separate entities, but as one, in a coherent pathway to develop skills typically required of students at technical and vocational training schools located in Central and Northern Italy. Then, at the hosting organization, students are given the opportunity to develop transversal, expression and communication skills (*i.* increase in socio-emotional and group interaction skills; *ii.* strategic thinking skills, problem solving, project management). This first type of project more fully unifies the objectives of job orientation and professionalization of knowledge (Costa, 2012; Morel et. al, 2009), characteristic of the SWA cultural project.

Table 13. Constitutive dimensions of VTP

Context of implementation	Technical and Vocational schools (Central and Northern Italy)
Law	SWA
Type of project	Business in Action
Co-design and engagement of other partners	Private businesses and public institutions
Main area of project focus	Economic and business organisation; sustainable development and critical consumption
Learning objectives	Learning technical knowledge related to prototype design and production
Project activities	Prototype design and production
Skills	<i>i.</i> Ability to improve social-emotional and group interaction skills; <i>ii.</i> Strategic thinking skills (problem solving, project management).

5.2. Management training paths based on simulated action learning (MTP)

This project type includes PTSOs simulating settings to develop management skills. *Business simulations* are widely used in vocational training schools (in Central and Southern Italy) in teaching economics, to encourage students to acquire administration and management skills in present day businesses.

Table 14. Constitutive dimensions of MTP

Context of implementation	Vocational and High Schools (Central Italy and the South)
Law	SWA and PTSO
Type of project	Simulated training enterprise
Co-design and engagement of other partners	Private enterprises
Main area of project focus	Computer prototyping and communication technologies; personnel selection and human resources management; commercialisation, marketing and internationalisation;
Learning objectives	Management and computer programming
Teaching methods/techniques	Problem solving and case studies; role playing and personnel selection and simulation
Skills	Strategic thinking skills (problem solving, project management).

5.3. Cultural training paths aimed at enhancing civic engagement (CTP)

These projects aim at enhancing community artistic and craft traditions, by raising critical awareness of material and immaterial heritage in students (High School of North-East), through engagement in activities with a relevant socio-cultural impact (Sen, 2000).

Table 15. Constitutive dimensions of CTP

Context of implementation	High schools (North-East)
Law	PTSO
Type of project	Services Learning
Co-design and engagement of other partners	Social Private and Tertiary Sector
Main area of project focus	Sustainable development and critical consumption; Social inclusion and civic sense
Learning objectives	Enhancement of the environmental and landscape patrimony
Project activities	Guided cultural tours; Theoretical courses and lectures
Skills	Ability to engage with others in activities with a positive socio-cultural impact

To summarise, three different types of *alternance* pathways have been identified according to:

i. the target skills in students - business skills (VTP), management skills (MTP), and expression and communication and social skills (CTP);

ii. the multiple teaching methods used in co-planning school-work alternance. In particular, in the VTP, integration of school with the business world is more evident, with use of classic solutions for work experience (traineeships..). In PTMs, work experience activities are replaced by business simulation activities (human resources management, working methods within an organisation). CTPs include all those projects of civic education, cultural promotion and artistic training, aimed at enhancing the non-material heritage of the territory.

6. Conclusions

From its onset (web scraping), the research procedure reported here was flexible enough to allow reconstruction of the contexts within which the SWA/PTSO projects were set up, so enabling the different typologies of the SWA/PTSO projects to be identified and described. However, the analysis of the projects was affected by a number of limitations related to the schools' not updating the websites that are supposed to contain the SWA/PTSO projects. This limitation is expected to be remedied in the future, with the second step of the research involving the setting up of a platform where schools will be asked to upload projects. Through the platform, and more importantly, through agreements made with schools, the number of projects can be expanded, while at the same time differentiating their characteristics in analysis (school address, geographical partition..).

In selecting the schools (and then the projects to analyse), two specific context variables were taken into account: *i.* the territorial partition of the school and *ii.* the specific type of training course. Then, the different declinations of the training objectives, educational methodologies and target skills as reconstructed in the projects, were identified. For the PRNI survey, in this exploratory research phase, conducted using a content analysis as a survey of the SWA/PTSO projects, the aim was to both validate existing classifications (*pre-coded* classification) and develop new ones (*ex novo* classification). The results could then be used to design the tools for the web surveys to be completed by students, SWA/PTSO tutors (school and host organisations), and school leaders, on the *PTSO Platform*. The platform acts as a repository or *crowd sourcing* (Rogers, 2016) of the questionnaire responses; communicating research outcomes to the different stakeholder communities (schools, hosting organisations and students). Digital methods mainly contribute to the development of complex research designs in the following ways: *i.* im-

mediate space-time connection across different observation contexts; *ii.* efficacy of the storage/downloading procedures of extensive databases; *iii.* databases and so different information units (e.g. between SWA/PTSO projects and student questionnaires) are interconnected, enabling comparative analyses to reconstruct the social impact of the adopted measures on the school careers of students in their last three years of schooling, and on the choices they make after school, both in terms of further education and employment.

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