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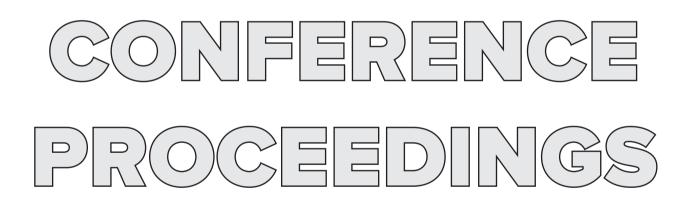
17TH INTERNATIONAL CONFERENCE OF EDUCATION, RESEARCH AND INNOVATION



11-13 NOVEMBER 2024 iated.org/iceri



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Preface

The ICERI2024 Conference Proceedings contain the papers presented at the 17th annual International Conference of Education, Research and Innovation. This conference was held in Seville from the 11th to 13th of November 2024.

This annual conference was attended by educators, researchers and technologists from more than 70 countries with the purpose of networking with other professionals and sharing their knowledge about education, pedagogical technologies, and educational innovations. To fulfil this goal, networking activities, plenary sessions, parallel thematic sessions, and networking activities and workshops were offered. Keynote speeches were delivered by global educational experts. You can see their talks at IATED Talks: https://iated.org/talks/.

ICERI2024's scope was focused on the topics listed here: Pedagogical Methods and Innovations, Technology in Teaching and Learning, Inclusive Learning, Special Education, Emerging Technologies in Education, International Cooperation, Teacher Training and Educational Management, Curriculum Design, Accreditation and Quality in Education, University-Industry Cooperation and Open Educational Resources.

The ICERI2024 International Program Committee is composed of lecturers and researchers from across the world. A blind peer review process was followed to ensure the quality of the final publication. During this process, the following criteria were evaluated: content relevance, clear structure, clarity, originality, and alignment with the conference topics and disciplines.

As IATED strives to guarantee high technical and professional quality of the publications, and that good practice and ethical standards are maintained, all authors included in this publication signed the copyright transfer agreement. More information about our publication ethics is available at: https://iated.org/publication_ethics. As always, we wish to extend our most sincere thanks and best wishes to all members and delegates who have contributed to the ICERI2024 Conference Proceedings.

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ICERI2024 Keynote Speakers

Bart Rienties - The Open University, United Kingdom



Keynote speech:

Implementing learning analytics and learning design at scale: Lessons from the Open University UK and SoLAR

The Open University UK has been designing, implementing, and evaluating how to effectively provide meaningful learning opportunities for hundreds and thousands of learners across the globe. Since 2015 a range of learning analytics studies and practical intervention studies have shown that these learning analytics and learning design decisions made by educators

substantially influence what, how and when learners are learning. However, applying and translating learning design and learning analytics in other institutions, countries and contexts is not a mere copy-paste job. In this keynote at ICERI2024 I will reflect on some of the lessons learned of how you might start to think about implementing learning analytics and learning design in your own context, if you have not already started to do so already. I will also reflect on how learning analytics and learning design has been implemented across the globe based upon the experiences within the Society of Learning Analytics Research (SoLAR).

Biography:

Dr. Bart Rienties is Professor of Learning Analytics and programme lead of the learning analytics and learning design research programme at the Institute of Educational Technology at the Open University UK. He leads a group of academics who provide university-wide learning analytics and learning design solutions and conduct evidencebased research of how students and professionals learn. As educational psychologist, he conducts multidisciplinary research on work-based and collaborative learning environments and focuses on the role of social interaction in learning, which is published in leading academic journals and books. His primary research interests are focussed on Learning Analytics, Professional Development, and the role of motivation in learning. Furthermore, Bart is interested in broader internationalisation aspects of higher education. He has successfully led a range of institutional/national/European projects, and has received a range of awards for his educational innovation projects. He is President of the Society of Learning Analytics Research (SoLAR), the largest researcher community on learning analytics. He has published over 300 academic outputs, and is the 1st most published and cited author on learning design and learning analytics in the period 2014-2023 (Drugova et al. 2023), the 2nd most published author on Networks in Education in period 1969-2020 (Sagr et al. 2022), and the 3rd most published author on EdTech in the period 2002-2022 (Aaradhi & Chakraborty, 2023).

Pat Yongpradit - Code.org, United States



Keynote speech: AI Literacy: Teaching With and About AI

AI literacy is the foundation for realizing the benefits of AI while mitigating the risks. As AI becomes more prevalent, education systems must equip students with skills to recognize, evaluate, and create with these technologies. Beginning with an introduction to AI and its transformative impact, the session will delve into what AI literacy entails and why it is essential for educators and students alike. Rather than a general discussion of

"AI in education", attendees will gain insights into how the computer science (CS) education community has grappled with critical questions about the role of AI in the CS classroom. The session will highlight the potential of AI to enhance CS education and emphasize the opportunity to reflect on and rethink education as a whole.

Biography:

Pat Yongpradit is the Chief Academic Officer for Code.org, a non-profit dedicated to promoting computer science education, and lead of TeachAI, a global initiative to guide education leaders in rethinking education in an age of AI. His work spans policy and government affairs, curriculum and professional learning, school outreach, coalition building, and international development. Before becoming a global voice for K-12 computer science and AI education, he taught for 13 years, inspiring students to create mobile games and apps for social causes and broadening participation in computer science among underrepresented groups. He has been featured in the book, "American Teacher: Heroes in the Classroom," and has been recognized as a Microsoft Worldwide Innovative Educator. He is certified in biology, physics, math, health, and technology education. Although Pat currently spends most of his time in education policy conversations, he still finds ways to sneak into the classroom!

ICERI2024 17th annual International Conference of Education, Research and Innovation

Conference Tracks & Sessions

The ICERI2024 conference program is available online at https://iated.org/iceri2024

ORAL SESSIONS MONDAY

Assessment in the age of AI ICT Skills among Teachers Integrating Generative AI into Programming Education Entrepreneur-ship Education Workplace Learning Technology-enhanced Learning Developing Soft Skills Educational Management Health Promotion Student Wellbeing in Higher Education Sustainability in Architecture, Engineering & Construction AI Skills among Teachers Digital Repositories & Open Educational Resources Generative AI and the World of Work **Entrepre-neurial Competences** Current Issues in Work-Integrated Learning in Europe Learning Analytics Information & Data Literacy Educational Management & Leadership STEM Education (1) Student Support and Wellbeing (1) Technology-Enhanced Business Education Generative AI integration in Education e-Learning **Experiences in Programming Education** International Projects & Mobility Experiences Curriculum Design Evaluation & Assessment **Digital Literacy** Educational Management in Higher Education **Experiences in Nursing Education** Inclusion of Learners with Special Educational Needs (1) Accounting & Business Education Microlearning & Videos for Learning Best practices in Online Education Robots in Education Entrepreneur-ship Education & Competence Development Critical Thinking Online Assessment & Feedback Education in Post-pandemic Times Digital Transfor-mation of Education New Technologies in Health Sciences Education Research on Gender in Education New Trends in Architecture and Civil Engineering Education

POSTER SESSIONS MONDAY

Pedagogical Innovations in Education Challenges in Education and Research

ORAL SESSIONS TUESDAY

VLEs & LMS Game-Based Learning Challenges in Research and Development in Higher Education Student Support Sustainability & Social Impact of Education Project-Based Learning Pre-service Teacher Training (1) **Encouraging STEM Careers** Professional Development of STEM teachers (1) Innovations in Special Education Language Learning **Immersive** Technologies Gamification Industry-University Collaboration and Innovation Student Engagement and Motivation Education for Sustainability Problem-Based Learning Pre-service Teacher Training (2) Experiences in Engineering Education STEM Pre-service Teacher Training New Technologies in Special Education Language Learning Assessment Augmented and Virtual Reality **Experiential Learning** Quality in Education Student Support and Wellbeing (2) Sustainability in Higher Education Flipped and Blended Learning New Technologies for Teacher Training STEM Education (2) Professional Development of STEM teachers (2) Diversity Issues & Inclusive Education Teaching Reading and Writing Ethics in the Age of AI Pedagogical Innovations (1) Creativity & Design Thinking Tutoring & Coaching Service Learning & Community Engagement Lifelong Learning and Continuing Education Professional Development of Teachers Challenges for Computer Science Education Technology-Enhanced STEM Education Inclusion of Learners with Special Educational Needs (2) Arts and Humanities in the 21st Century **AI-Powered Education** Pedagogical Innovations (2) Collaborative International Learning Experiences Challenges for Vocational Education and Training Adult Education Work-Integrated Learning and Employability in the 21st Century Communities of Practice and Collaboration in Education STEM in Schools **Experiences in STEM Education** Inclusion & Support of Minorities Early Childhood Education

POSTER SESSIONS TUESDAY

Emerging Technologies in Education and Research Educational Trends and Experiences

VIRTUAL SESSIONS

DIGITAL & DISTANCE LEARNING

Blended, Hybrid & Mobile Learning Distance Education in Times of Crisis e-Learning Experiences LMS & VLEs MOOCs & Open Educational Resources

DIGITAL TRANSFORMATION OF EDUCATION

21st Century Skills Data Science & AI in Education Emerging Technologies in Distance Learning Digital Transformation Educational Programming & Robotics

INNOVATIVE EDUCATIONAL TECHNOLOGIES

Chatbots & Robots Generative AI in Education Technology Enhanced Learning Videos and Social Media in Education Virtual & Augmented Reality

ACTIVE & STUDENT-CENTERED LEARNING

Active & Experiential Learning Developing Soft and Transversal Skills Gamification & Game-based Learning Pedagogical Innovations Problem & Project-Based Learning

ASSESSMENT, MENTORING & STUDENT SUPPORT

Assessment & Evaluation Mentoring & Tutoring Student Support & Motivation Student Wellbeing

TEACHER TRAINING & ED. MANAGEMENT

Educational Management ICT & Digital Skills Professional Development of Teachers Teacher Training and Support

QUALITY & IMPACT OF EDUCATION

Challenges in Curriculum Design Links between Education and Research Mobility & International Projects Quality in Education Sustainability & Social Impact of Education University-Industry Collaboration

EDUCATIONAL STAGES & LIFE-LONG LEARNING

From Pre-school to Secondary Education Higher Education and the Labour Market Life-long & Workplace Learning Vocational Training Non-Formal and Informal Learning

MULTICULTURALITY & INCLUSION

Diversity Issues Inclusive Education Multicultural Education Special Educational Needs

STEM EDUCATION

Computer Science Education Engineering Education Mathematics & Statistics STEM Experiences

LANGUAGE LEARNING AND TEACHING

Foreign Languages Language Learning & Translation Studies New Technologies in Language Learning

DISCIPLINE-ORIENTED SESSIONS

Architecture & Design Education Business & Tourism Education Health Sciences Education Military Education and Training

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TRAINING VOCATIONAL STUDENTS IN TECHNOLOGY-BASED COMPANIES

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Abstract

In 2022, following the recommendations of the European Union, the Spanish Government approved the Organic Law 3/2022 on the Organization and Integration of Vocational Training. The new Vocational Education System proposed by this law is based on the co-responsibility of vocational training centers and companies in the training of students.

It is expected that the company participates in the achievement of certain learning outcomes of the student's degree in addition to the outcomes expected from the student's own work activity in the company. This is a challenge in terms of the dedication of the company's personnel, and in particular of the student's tutor in the company and requires prior programming and a method that makes the learning process effective and not too burdensome for the company in terms of the time of dedication of its personnel to the educational tasks.

Therefore, from the working group of the Erasmus Plus project "Building the vocational training of the future: companies and educational centers facing the challenge of the organization and integration of a more inclusive and digital VET" we have developed the "Training course for companies on how to implement the new mobilities". This course is aimed at company technicians who can act as tutors for students. We propose in this course a methodology based on critical thinking skills to organize the student's training during their stay in the company.

The methodology we propose is based on the preparation of a digital notebook for programming the student's training in the company, of which we present a concrete example in this communication. The notebook will contain brief information about their personalized training program, but the bulk of the notebook will be filled in by the students themselves. They will have to write down all the experiences related to their job: objectives, experimental protocols, information on occupational risk prevention specific to their job, waste management. They will also collect all the results obtained, for example, experimental results of quality control analysis, designs, management documents and others. They will also have to answer questions and do exercises that will help them achieve the expected learning outcomes.

Keywords: Vocational training, technology, critical thinking, methodology, research, students, evaluation.

1 INTRODUCTION

There is already a broad consensus in the European Union that vocational education systems should take full advantage of the contribution of enterprises in the training of students [1]. This is not new; the value of curricular or non-curricular internships for students in companies located in the vicinity of the educational center or in other regions or countries has always been recognized. In these placements, students have their first immersion in a working environment and are confronted with working methods that are completely different from those of the academic environment and which enable them to acquire essential tools for their professional career.

Currently, the recommendation of the European Union goes further and aims for a commitment to dual training. In Spain, the new Vocational Training System defined by the Spanish Organic Law 3/2022 of 31 March 2022 on the Organization and Integration of Vocational Training [2] is being implemented. The new regulation establishes co-responsibility between companies and educational centers in the training of students at all educational levels of vocational training. This means that at least 25% of the curriculum must be taught in the company, and that this teaching must include expected learning outcomes in specific subjects of the degree of the student, not only in transversal subjects and not only in those skills that arise directly from immersion in the working environment.

There is no doubt that this is a major challenge for small and medium-sized companies wishing to participate in this educational program. It is a challenge in terms of the dedication of their staff to the tasks of tutoring students, and also to the development of educational methodologies appropriate to the new situation, which will clearly have to be very different from those used in an educational center and will have to be adapted to each particular company. It is also a challenge for schools to find enough companies willing to intervene in the teaching of their students in an effective way.

The Erasmus + project 'Building the vocational training of the future: companies and schools facing the challenge of organizing and integrating a more inclusive and digital VET', FUTEREVET [3], aims to develop methodologies that can facilitate the teaching work of technical teams in technology-based companies. We have sought a method that would adapt to the workplace environment and at the same time focus on a way of developing tools that students can use throughout their professional careers related to new technologies. We pay special attention to critical thinking tools, autonomous learning, teamwork, honesty and perseverance among others.

We explained our proposal in an open access course '*Training course for companies on how to implement the new mobilities*' (accessible on the Virtual Inclusive Education platform) [4], addressed to students' company tutors. In this paper we briefly summarize the key aspects of our proposal. We try to emphasize that the type of training we are looking for the student to acquire during their period of stay in the company does not arise spontaneously from the performance of a job, but that it is necessary to design and program specific activities so that the student acquires the knowledge and skills we are looking for. One example is the skills of autonomous learning. Depending on the job in which the student is introduced, they may have to develop very specific and protocolized tasks that do not require them to search for information, analyze it critically, understand it and organize it, ask fundamental questions and look for answers, etc. In order to contribute to the development of these skills, a series of specific activities should be planned.

This programming is set out in a '*Notebook for the programming and monitoring of the training plan*', where the activities to be carried out by the student are listed and the way in which both the results obtained in the workplace and those of the training activities carried out are critically analyzed. In the course we propose to the company technicians who follow the course to build a notebook applied to their own company. In the following sections we develop an example of a notebook applied to a real pilot case.

2 METHODOLOGY

Students at their educational center will probably be following a methodology based on blackboard classes, study of subject notes taken in class or bibliography recommended by the teacher, problem solving individually or in groups, and workshop or laboratory practice. During their stay in the company, the teaching methodology must necessarily be different, it is not expected, nor is it desirable, that the teaching in the company tries to imitate the teaching in the educational center. A different methodology is expected, closer to the methods that the professional will have at their disposal when seeking to acquire training throughout their professional career.

The approach to on-the-job training must take into account that we are not training a worker to perform this position in the company for a long period of time, but that this is one more activity within a basic training that must serve them throughout their professional life. In this sense, we focus on actions that make the student not only follow established protocols in a precise way, but also try to understand in depth the principles that govern the activity they are carrying out. Our aim is that the student wants to have sufficient competences and wants to act in their work with the aim of contributing to the success of the task they carry out. Our training plan includes a series of training actions that guide the student on how to acquire the necessary knowledge and, as they may not have a teacher to ask throughout their professional life, teach them how to do it autonomously.

In this sense, the methodology we propose seeks to achieve the basic learning results expected, but also to have an impact on the competence of *learning to learn*. One of the key aspects of training students for a professional career is the development of tools and skills related to critical thinking. Critical thinking is essential at all stages of any student's education and applies to all aspects of life [5,7].

Acquiring critical thinking tools will advance the student's ability to evaluate their own reasoning and activity, search for information critically, understand and organize it, define objectives and pose and solve problems, pose relevant questions, propose hypotheses and contrast them with the tests performed, perform their work with an open mind, with intellectual honesty, perseverance, or to communicate effectively orally and in writing.

Therefore, the training methodology we propose is based on the development of a digital notebook for the programming of the student's training in the company through which the student will develop the key skills of critical and scientific thinking. In order to meet this objective, the notebook is above all an aid to reflection both when programming a specific experimental task and for the study and understanding of concepts related to the expected learning outcomes, the search for bibliographical or technical information, the resolution of problems that arise in the work or problems or questions of an academic nature. It facilitates the monitoring and evaluation of the work and the acquisition of both specific competences of the training degree or specialization course or certificate of professionalism and transversal competences for the development of professional life.

3 RESULTS

We present the results of the implementation of this methodology in the company Ikasia Technologies, Valencia (Spain) for the preparation of a month-long mobility of a VET student in computer science from 1st Epalgematiko Lykeio Kato Achaias, Kato Achaia (Grecia).

Ikasia Technologies is a technology-based company specializing in the field of 3D printing. The student is going to join a work team that is currently developing software that facilitates the programming of the control files of the printing machine and their Wi Fi transmission to the machine from an external device. Therefore, in order for our student to contribute to the solution of a problem or to contribute new ideas to their job, they need to know the principles that govern 3D printing. On the other hand, the stay in the company should contribute to certain learning outcomes related to the module Software Installation of their degree. It should be noted that we are always within the framework of dual training centered on the learner, as clearly set out in Organic Law 3/2022.

3.1 Notebook for the programming and monitoring of the training plan

This notebook is a guide for the student in their training process and should provide the company and the educational center with a follow-up that allows the student's activity to be redirected at any time in order to make the most of their work. It also facilitates a final evaluation of the competences acquired and allows conclusions to be drawn for the programming of other students in the future. It is designed to advance the development of critical thinking tools and skills. It is up to the student to fill in each table cell.

3.1.1 PART 1. Details of the stay

PART 1 contains the summary of the Training Plan agreed between the school and the company, including the personal and contact details of the trainee and their tutors in the company and in the school, and the learning outcomes for which the company is responsible, and which are to be developed during the training period in the company. For privacy reasons we include here only the Template.

Notebook for the programming and monitoring of the training plan

Student:

Educational center:

Company:

Starting date of the training:

PART 1		TRAINING PLAN		
Course		Company		
Educational Grade / Specialization Course / Certificate of Professiona	alism			
Student			e-mail:	Phone:
Training center			e-mail:	Phone:
Tutor at the training cent	er		e-mail:	Phone:
Tutor in the company			e-mail:	Phone:
Special features			·	
Training period in the co	mpany	Calendar / timetable / period		
Total hours				

Learning outcomes in in-company training periods			
Professional Module	Code	Learning Outcomes	Activities
		Ra1	

Signed: Tutor in the company	Signed: (student)	Signed: (tutor at the training center)
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3.1.2 PART 2: WorkPlace

PART 2 of the notebook for the programming and monitoring of the training plan is aimed at the work placement in the company. When the trainee arrives at the company, they will meet with their company tutor who will explain their job position, the working methods in the company, the objectives set for their work and how they fit into the company's business plan, also the work plan and the study plan for their stay in the company. The student will fill in the first section 'overview' of this part 2 of the notebook with this information.

PART 2 Workplace. Overview		
Task Title:	Folder / Server:	Date:
Brief Description		
Area of the company or project in which it is framed:		
Objectives		
Hypotheses, solutions that can be anticipated, and expected results.		
Equipment / Machinery		
Elements of occupational risk prevention:		
Waste management.		
Available Procedures (include a brief summary or notes of documents in annexes in the work folder, indicating here the <i>Include as many pages as needed</i>		•

Then, the student will find a series of questions that aim to direct their learning of the technologies involved in their workplace. In this case they are questions related to 3D printing. The student has not studied anything related to it in their school before. They should be made aware that this is a situation they will face frequently in their professional career and that it is worth learning how to deal with it. In order to answer these questions, they will seek out the necessary information, analyze it critically and make the effort to understand the information thoroughly. These questions are posed with empathy, for our methodology to be effective we will have to put ourselves in the student's shoes, take into account their previous training and not set them unattainable challenges or challenges that take longer than the time specified for their training. The tutor will help the student to find sources of information, such as books or articles in the company's documentation, websites, and artificial intelligence tools. Colleagues in the company and the teachers at school will be available to ask about specific questions as well.

PART 2.- Workplace. Conceptual issues.

Explain the concepts in a clear and concise way and solve the exercises in the following cells.

Question 1. Explain briefly the concepts and differences between additive and subtractive manufacturing

Question 2. In which of the before mentioned categories does 3D printing fall? Justify your answer.

Question 3. Enumerate the most common 3D printing techniques and their basic working principles.

Question 4. Describe the working mechanism of extrusion-based 3D printing.

Question 5. What are the main steps in the 3D printing process, from the parts CAD model to the final object?

Question 6. It is commonly said that 3D printing is in facts "2.5 D printing", what is meant by this affirmation?

Question 7. In what consists the slicing process?

Question 8. What is GCODE?

Question 9. What function is performed by the printer firmware?

Question 10. A GCODE file is not universal, explain its tailoring from both the hardware and the software perspective.

Question 11. How 3D printers are usually operated and controlled?

Question 12. What options are available for the remote operation of 3D printers?

Question 13. 3D printers are seldom prepared for their connection to remote networks. What hardware changes are commonly needed?

Question 14. Name the ready available mechanisms allowing the operation of a 3D printer from a mobile device.

Question 15. Explain how said mechanisms work to stablish a wireless connection to a 3D printer.

Question 16. What are their main advantages, drawbacks and limitations?

reference where you have studied these concepts, it can be a web page or a chapter of a textbook or some notes of a subject from your	Think and write very briefly how you decided on one type of bibliographic source or another.
training center. (to be filled by the student)	

PART 2 Workplace. Technical Information.
Look for the following data or technical characteristics.
Question 1. Look for the rep rap wireless communication protocols.
Question 2. Find which web programming languages are able to operate/implement said protocol.
Question 3. Find which of the languages can be universally run and optimized for mobile devices.
Question 4. Design and define the webpage menu and button layout.
Question 5. Define which compiler should be used to program the language in Question 2.
Question 6. Verify the software used is free of charge and/or open source.
Question 7. Look for online communities able to back you up and aid you if needed.

Question 8. Find programming libraries for your language.

Question 9. Look for means of protecting and encrypting files saved in an online database.

Question 10. Search the libraries for precompiled functions on how to stablish a wireless connection with rep rap printers.

Question 11. Search the libraries for precompiled functions on how to connect a database to the webpage.

Question 12. Search the libraries for precompiled functions on how to encrypt of ensure the anonymity of the stored files.

Question 13. Search the libraries for precompiled functions on how to implement a password enabling the wireless connection.

Question 14. Search the libraries for precompiled functions on how to send information through wireless.

Question 15. Search the libraries for precompiled functions on how to display a warning signal requiring an input from the user before printing starts.

Question 16. Search the libraries for precompiled functions on how to implement a panic button function.

PART 2 Workplace. Processing, storage, and presentation of results.		
Carry out the following exercises.		
Exercise 1. Write a table summarizing the suitab	le programming languages.	
Exercise 2. Produce a scheme with the physical	layout for the application.	
Exercise 3. Create and organize an offline datab	ase to store all produced data.	
Question 4. Produce a scheme synthetizing the steps needed for the application programming.		
Question 5. Demonstrate the application function	ning on a mobile device.	
Bibliography search: Include here the reference where you have studied these concepts, it can be a web page or a chapter of a textbook or some notes of a subject from your training center.		

3.1.3 PART 3. Workplace tasks and Results.

PART 3 of the notebook is the part where the student will collect day by day their results, like a laboratory notebook. This part of the notebook is intended to lead the student to reflect on each of the tasks they is responsible for. The notebook has an entry for each assignment. It will be given a title and the student will write a brief description of the task to be performed and which, naturally, will have been explained to them by their tutor or other technicians in the company. In line with critical thinking the task will be posed as a problem to be solved, and the student is also asked to make it explicit. A point that we consider important in this approach is the establishment of a hypothesis. With the experience of the company and with what the student can deduce from previous tasks or from conversations with their tutor and with other people in the company, before starting a task they should express in writing the expected result to be obtained. This is one of the keys to scientific thinking, expressing a hypothesis and contrasting it with the results obtained from experimentation in order to then accept it as valid or modify or reject it. In our case, we also use it as a way of forcing reflection on the result obtained from a given test.

The following is an example of one of the tasks given to the student:

PART 3 Activities. Task				
Task Title: Implement the online connection	Folder / server *:	Date:		
Brief description Connect the webpage to the 3D printe	r so files can be sent thr	rough the network.		
The problem at hand.				
Hypotheses, solutions that can be anticipated, and e	Hypotheses, solutions that can be anticipated, and expected results.			
Methodology and work plan:				
Initial information available (include a brief summary or notes of the documents already available, include the documents in annexes in the work folder, indicating here the name or reference of the file)				

Include the pages you need

PART 3 Task results			
Title: Implement the online connection	Folder / serv	er:	Date:
Additional information obtained during the task: Alternative testing methodologies, sources in which to contrast the data obtained, etc. Include the related files as attachments in the folder, indicating here the name or reference of the file.			
Experimental protocol (if there is already a written protocol in the company, just indicates its reference; if not, briefly detail the steps of the experimental procedure)			
PART 3 Results of task			
Title: Implement the online connection	Folder / serv	er *:	Date:
Experimental results (if written by hand or printed by the device, photocopy or scan and copy them here as an image. Videos, photographic images, and other material will be added as attachments in the work folder, writing the name or reference of the file here) (add as many pages as needed, copying the entire table)			
PART 3 Analysis of the results of task			
Title: Implement the online connection	Folder / Serv	/er *:	Date:
Assessment of the result: Assess the reproducibility of the assay; does it match what was expected? If so, what is the reason why a result very different from the one found was expected?			sult accepted?
Notes on conversations with the supervisor or other team members			
Conclusions (propose here the solution to the problem posed, but also the detailed conclusions about the task itself, about the experimental procedure, suggestions for new tests, etc.)			

3.1.4 PART 4. Contents of the syllabus.

We pose to the student a series of questions, issues or problems that will lead them to search for information, analyze it and understand it. We would order these questions by learning outcome and include a cell for the student to collect the sources where they have studied this topic and the site for them to write why they has confidence in them.

PART 4.	Training	contents
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Explain the concepts in a clear and concise way and solve the exercises in the following cells. The questions are sorted by topics related to the training outcomes we hope to achieve during your stay at the company. Before you start writing, you'll need to look up information on the topic and study that information.

Topic 01: Module "Software installation".	Bibliography search: Include in this cell the
	reference where you have studied this topic, it can
	be a web page or a chapter of a textbook or some notes of a subject from your training center. Think and write very briefly how you decided on one type
	of bibliographic source or another.

1. How important is it to check the system requirements before installing software?

Reflect on the possible problems that can arise if the minimum requirements are ignored and what solutions you could apply.

2. Before connecting the 3D printer via Wi-Fi, what information do you need to obtain about the network and the device?

Think about things like network type, router settings, IP address and the printer's compatibility with the network.

3. Investigate the steps for setting up the Wi-Fi connection on a 3D printer. What differences might you find depending on the printer model or operating system?

Reflect on how the processes may vary depending on the software interface or operating system you are using (Windows, macOS, Linux).

4. What problems can arise when trying to connect a 3D printer over Wi-Fi and how would you solve them?

Consider common difficulties such as lack of signal, network password errors, or interference with other devices.

5. What are the advantages and disadvantages of connecting a 3D printer via Wi-Fi instead of using a USB cable or SD card?

Evaluate factors such as ease of use, file transfer speed, and connection stability.

6. Imagine that the 3D printer does not appear in the software even though it is connected to the Wi-Fi network. What steps would you take to diagnose and fix the problem?

Think about diagnostic tools such as network pings, firewall settings, and checking the printer's IP address.

7. How does the security of the company's Wi-Fi network affect the connection of 3D printers? What measures could you implement to protect the printer and corporate data?

Reflect on the impact a security breach could have on the company's systems and what security and encryption policies could be implemented.

8. Considering a business environment, how does the quality of the Wi-Fi signal influence the productivity of remote 3D printing? What solutions could you propose to improve connectivity in the company?

Investigate solutions such as improving the network infrastructure, using additional access points or implementing company private networks.

4 CONCLUSIONS

We believe that with the proposed methodology, based on the preparation of a digital notebook for programming and monitoring the student's training plan, the company, even small or medium size, can collaborate effectively in the training of VET students. The success of this methodology will require the student to dedicate some time each day, within their working hours, to study and to record in the notebook the results of their tasks in the company and their progress in the understanding of the concepts and technologies related to this work and to the learning outcomes for which the company is responsible. We believe that this effort and work time will be amply compensated by a better integration of the student in the company's team, with greater interest in their work and greater capacity to contribute

to the company's objectives. The student will acquire tools for autonomous learning that will be valuable for the rest of their studies and for their professional life in general.

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