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Literature Review Approaches to VET Education



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01

Introduction



| WHY WE ARE CARRYING OUT THIS RESEARCH

The purpose of this literature review is to critically evaluate and synthesise the existing research on educational approaches used in Vocational Education and Training (VET) in the European Union. This involves:

1. **Identifying Key Educational Approaches:** The review aims to identify and categorise the various educational approaches currently employed in VET across the EU, including traditional, modern, and emerging practices.
2. **Analysing Effectiveness and Challenges:** The review analyses the effectiveness of these approaches in achieving the desired educational outcomes, as well as the challenges and limitations associated with each approach.
3. **Mapping Trends and Gaps:** It seeks to map the current trends in VET education within the EU and identify any gaps in the existing research or areas where further investigation is needed.
4. **Supporting Policy and Practice:** The literature review provides a foundation for recommendations on how VET educational approaches can be improved or adapted to better meet the needs of learners and the labour market in the EU.

This review serves as a critical foundation for our research by establishing what is already known about VET education approaches in the EU and where there is room for further exploration and improvement in the Smart Skills project.

02

What is VET Education?



| WHAT IS VET EDUCATION?

Definitions:

Vocational education and training (VET) is a key element of lifelong learning, which equips people with the knowledge, skills and competences required for particular occupations in the labour market and to thrive in life. It accounts for about half of upper secondary learners in the EU and enables two-thirds of EU employees to upskill or reskill.

According to the OECD (2023), VET is a crucial component of future-ready education and skills systems, serving a diverse group of young and adult learners. Because of its close ties with the world of work, VET can equip learners with a solid mix of practice-oriented and employability skills that foster their transition to work and allow them to be adaptable to change.

According to the European Commission (Directorate-General for Employment, 2018)...***Put simply, vocational education teaches you skills directly related to work.***

They go on to outline the benefits of VET education:

- By developing skills that are specific to a trade or job role, you can improve your employment prospects, get ahead in your current career... or even turn a hobby into a business.
- Some people assume vocational education and training (VET) only covers practical, hands-on subjects like plumbing, construction or childcare, but this is an old-fashioned view. Of course, these vital subjects are still taught, but vocational education has expanded and diversified over the last thirty years and now offers a huge range of choice in subjects related to a wide range of careers.
- Modern vocational education allows people to learn highly transferable creative and personal development skills, as well as practical skills and activities specific to a chosen job role. Those who undertake vocational training or apprenticeships can expect to learn a lot about themselves, and to discover talents they didn't know they had!
- What's more, vocational education is no longer only available at school. Now, across Europe, there is a vast range of full-time and part-time courses available at higher-education and vocational colleges, as well as on-the-job training and apprenticeships. You can even learn online, with a growing number of courses available on the web, delivered by specialists and professionals.
- For people who want to turn the theory into practice straight away, you can learn while you work, attending training sessions directly in the workplace. Many companies and sectors even have their own dedicated training facilities. For employers, the priority is to ensure that skills supply meets skills demand, so businesses all over the world are investing in the resources to provide high-quality vocational training to their current and potential employees.

| IDENTIFYING KEY APPROACHES:

To identify and categorise the various educational approaches currently employed in Vocational Education and Training (VET) across the EU, we can break them down into traditional, modern, and emerging practices:

Traditional Educational Approaches

- **Classroom-Based Learning:**
VET traditionally relies heavily on classroom-based instruction where students learn theoretical knowledge in a structured, teacher-led environment. This approach often includes lectures, textbook learning, and written assessments.
- **Apprenticeships:**
A long-standing method in VET, apprenticeships combine classroom learning with hands-on experience in a workplace setting. Apprentices spend a portion of their time working under the supervision of experienced professionals, gaining practical skills directly related to their occupation.
- **Work-Based Learning (WBL):**
Similar to apprenticeships, WBL involves learning through direct engagement in work processes but might not be as formally structured. It includes internships, on-the-job training, and placements within companies as part of the educational curriculum.
- **Competence-Based Education:**
This approach focuses on achieving specific competencies related to a particular occupation. It involves assessments that demonstrate a student's ability to perform tasks to the required standards in a real-world context.

Modern Educational Approaches

- **Blended Learning:**
Blended learning combines traditional classroom methods with online learning, allowing students to have flexibility in how they access course content. This approach has gained traction as digital tools have become more integrated into education.
- **Modular Learning:**
Modular learning divides the curriculum into smaller, self-contained modules, each focusing on a specific skill or knowledge area. This approach allows learners to progress through the curriculum at their own pace and often facilitates more personalised learning paths.
- **Problem-Based Learning (PBL):**
PBL is a student-centered pedagogy where students learn by solving complex, real-world problems. This approach helps develop critical thinking, problem-solving, and collaborative skills, which are essential in the modern workplace.
- **Project-Based Learning:**
Similar to PBL, project-based learning involves students working on a project over an extended period, which integrates multiple aspects of their learning. This method encourages deeper understanding and the practical application of knowledge.

Emerging Educational Approaches

- **E-Learning and Online Platforms:**

The use of e-learning platforms and digital resources is becoming increasingly prevalent in VET. These platforms offer courses, simulations, and interactive content that students can access remotely. This approach is particularly useful for upskilling and reskilling adults in the workforce.

- **Virtual and Augmented Reality (VR/AR):**

VR and AR technologies are emerging as powerful tools in VET, providing immersive, simulated environments where students can practice skills in a safe, controlled setting. These technologies are particularly useful for training in complex or hazardous occupations.

- **Gamification:**

Gamification involves incorporating game elements into the learning process to increase engagement and motivation. This approach is being used in VET to make learning more interactive and to help students master skills through repetition and competition in a game-like environment.

- **Artificial Intelligence (AI) and Adaptive Learning:**

AI-powered platforms that offer adaptive learning are becoming more common in VET. These systems adjust the learning content and pace based on the individual learner's progress, providing a more personalised education experience.

- **Competence-Oriented Assessment:**

While traditional assessments are still in use, there is a growing trend towards competence-oriented assessments that are more reflective of real-world tasks and requirements. These assessments are often integrated with AI and digital tools to ensure that learners are acquiring and demonstrating the necessary skills.

Relevant to our Smart Skills Project, the article titled "**Development and Teaching Approaches of Technical and Vocational Education Curricula**" (Rau, et al, 2006) explores how technical and vocational education (TVET) curricula can be developed and adapted to meet the demands of a knowledge-based economy. Here are the key points:

1. **Knowledge-Based Economy and Education:**

- The rapid pace of technological advancement requires individuals to develop skills in "learning how to learn" and re-learning to maintain lifelong learning abilities.
- Education, particularly vocational education, is essential in developing the technical manpower needed in this economy, emphasising creativity, innovation, and adaptability.

2. **Curriculum Development:**

- **Flexible Curriculum Structures:** Curricula should be adaptable, with a focus on both academic and vocational tracks. Academic curricula aim at holistic education, while vocational curricula are career-oriented, focusing on developing professional competences required by industries.
- **Vivid and Attractive Teaching Materials:** Materials should engage students and encourage the practical application of knowledge.
- **Competency-Based Assessment:** Assessment methods should be designed to evaluate the competencies relevant to business needs.
- **Teacher Training:** Continuous professional development for teachers is crucial to keep up with the changing demands of the economy.

3. Teaching Approaches:

- **Problem-Based Learning (PBL):** This method is highlighted as particularly effective in developing critical thinking, problem-solving, and innovation skills. PBL involves using real-world problems as a central theme for learning, encouraging students to engage in self-directed learning and collaborative problem-solving.
- **Adaptive and Flexible Teaching:** Teaching methods should be adaptable to students' individual needs and should inspire creativity and critical thinking.

4. Future-Focused Educational Strategies:

- The curriculum and teaching approaches must evolve to meet the future needs of businesses, ensuring that students are not only knowledgeable but also capable of applying their knowledge in innovative ways.

Analysis: The article stresses the importance of designing vocational curricula and teaching strategies that are aligned with the demands of the knowledge-based economy, focusing on developing students' abilities to innovate, learn continuously, and adapt to changing environments.

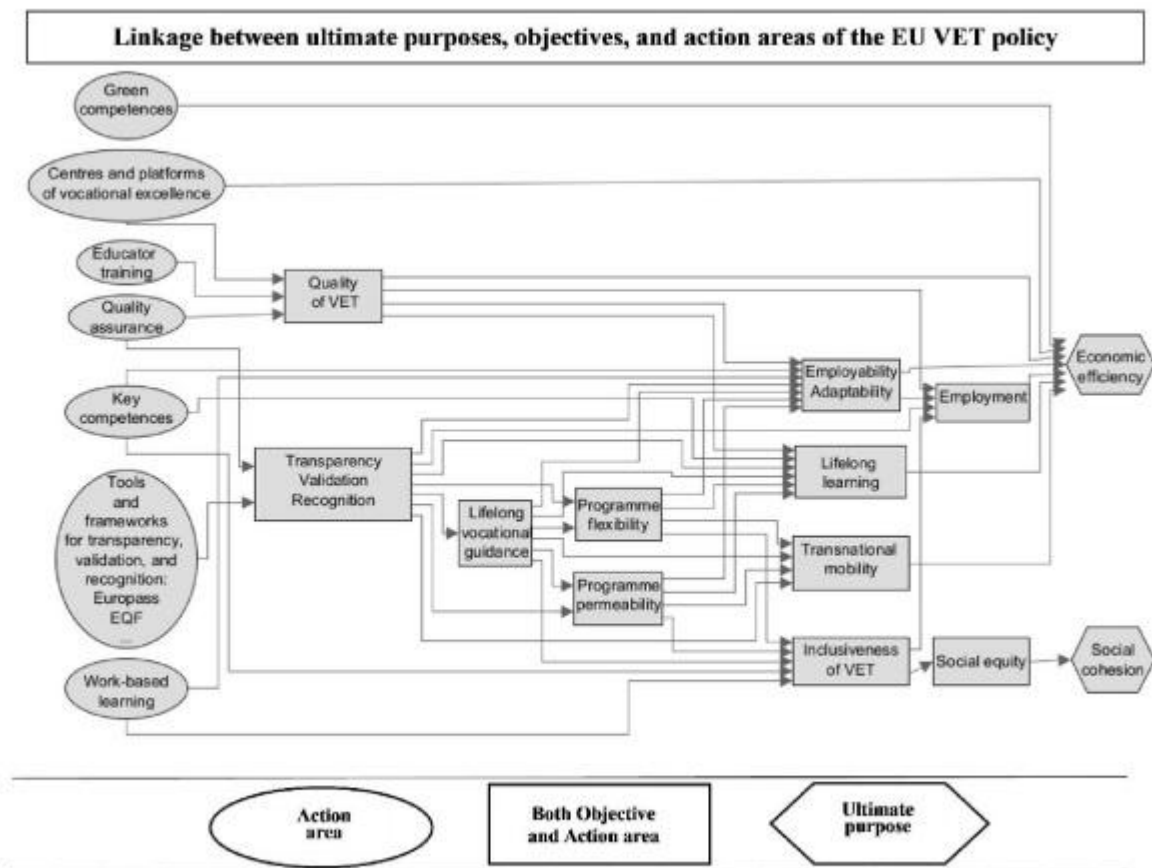
As an emerging VET approach E-learning is particularly relevant to the Smart Skills project.

The article on the use of e-learning in Vocational Education and Training (VET) (Belaya, V., 2018) concludes that e-learning offers significant advantages in this educational context. These advantages include:

1. **Flexibility:** E-learning allows learners to choose the location, time, and pace of their learning, making it highly adaptable to individual needs.
2. **Cost-Effectiveness:** It reduces costs associated with travel, accommodation, and physical training facilities, making it an economical option for both learners and providers.
3. **Increased Motivation:** The use of multimedia and interactive elements in e-learning can enhance learner engagement and motivation, leading to improved learning outcomes.
4. **Broad Accessibility:** E-learning enables the rapid dissemination of new learning content to a wide audience, regardless of geographical location, making it especially valuable for companies with multiple locations or those in remote areas.
5. **Customisation and Personalisation:** It allows for the customisation of learning content to meet specific learner needs, which can result in a more efficient learning process.

This all suggests that these benefits make e-learning a promising and forward-looking approach in VET, especially when combined with traditional face-to-face learning methods in a blended learning model. This combination can mitigate some of the challenges associated with e-learning, such as the need for self-discipline and the potential for reduced social interaction.

The European Union Policy for Vocational Education and Training states that Vocational education and training (VET) has the distinctive objective of providing learners with knowledge, competences, and qualifications, enabling them to be operational in the exercise of a profession (Tchibozo, 2022). The policy has developed into a substantial set of actions that are now integrated into a coherent and ambitious model in the service of identified goals. The graph below illustrates this model.



03

Research Analysis



| ANALYSIS OF THE EFFECTIVENESS AND CHALLENGES OF EDUCATIONAL APPROACHES IN VET ACROSS THE EU:

Traditional Educational Approaches

1. Classroom-Based Learning

Effectiveness:

- a) Provides a structured environment that facilitates the transmission of theoretical knowledge.
- b) Offers opportunities for direct teacher-student interaction, enabling immediate feedback and clarification of concepts.
- c) Familiar and well-established method, which is straightforward to implement and assess.

Challenges and Limitations:

- a) Often criticised for being too rigid and not sufficiently aligned with the practical demands of the workforce.
- b) May fail to engage students who benefit more from hands-on, experiential learning.
- c) Can be less effective in developing practical, real-world skills that are crucial in VET.

2. Apprenticeships

Effectiveness:

- a) Highly effective in developing practical skills and competencies directly related to specific occupations.
- b) Facilitates a smoother transition from education to employment by integrating learners into real work environments.
- c) Strong alignment with industry needs, ensuring that skills acquired are relevant and up-to-date.

Challenges and Limitations:

- a) Can be resource-intensive for companies, requiring significant time and effort from experienced staff.
- b) Quality of training can vary significantly depending on the employer and the work environment.
- c) May limit learners to the practices of a particular company, potentially narrowing their broader employability.

3. Work-Based Learning (WBL)

Effectiveness:

- a) Offers real-world experience and helps learners to apply theoretical knowledge in practical settings.
- b) Promotes the development of soft skills, such as teamwork, communication, and problem-solving, which are essential in the workplace.

Challenges and Limitations:

- a) Requires strong partnerships between educational institutions and businesses, which can be difficult to establish and maintain.
- b) Learners may face challenges if the workplace environment is not conducive to learning or if they do not receive adequate mentorship.
- c) The variability in work environments can lead to inconsistent learning experiences among students.

4. Competence-Based Education

Effectiveness:

- a) Focuses on the mastery of specific skills and competencies, making it highly relevant to occupational demands.
- b) Allows for flexible progression, enabling learners to advance at their own pace once they demonstrate competency.
- c) Aligns well with industry needs by emphasising practical skills that are directly applicable in the workplace.

Challenges and Limitations:

- a) Can be difficult to implement across diverse learning environments, as it requires consistent standards and assessments.
- b) The focus on specific competencies may limit the development of broader, transferable skills.
- c) Assessment of competencies can be complex and resource-intensive, requiring significant effort to design and administer.

Modern Educational Approaches

1. Blended Learning

Effectiveness:

- a) Combines the strengths of traditional and online learning, providing flexibility and accessibility for students.
- b) Enables personalised learning paths, allowing students to engage with content at their own pace.
- c) Supports continuous learning and skill development through digital resources and tools.

Challenges and Limitations:

- a) Requires access to technology and digital literacy, which can be a barrier for some learners.
- b) The quality of online content and the effectiveness of digital learning platforms can vary, affecting learning outcomes.
- c) Managing the integration of online and face-to-face components can be complex for educators.

2. Modular Learning

Effectiveness:

- a) Allows for greater flexibility in learning, enabling students to focus on specific skills or knowledge areas as needed.
- b) Facilitates personalised learning and can be more easily adapted to individual career paths.
- c) Supports lifelong learning by allowing learners to accumulate modules over time.

Challenges and Limitations:

- a) May lead to fragmentation of knowledge if modules are not well-integrated into a coherent curriculum.
- b) Learners may struggle with the lack of a clear, linear learning pathway, which can impact motivation and progress.
- c) The modular approach requires careful coordination to ensure that all necessary competencies are covered.

3. Problem-Based Learning (PBL)

Effectiveness:

- a) Encourages critical thinking, problem-solving, and the application of knowledge in real-world contexts.
- b) Promotes active learning and engagement, which can lead to deeper understanding and retention of material.
- c) Prepares learners for complex and dynamic work environments by simulating real-life challenges.

Challenges and Limitations:

- a) Can be challenging to implement effectively, requiring significant time and resources to design and facilitate.
- b) Not all students may be comfortable with the self-directed and collaborative nature of PBL, potentially leading to disparities in learning outcomes.
- c) Assessment of learning in PBL can be complex, as it often involves evaluating processes and outcomes rather than standardized tests.

4. Project-Based Learning

Effectiveness:

- a) Facilitates the integration of knowledge and skills across different domains, leading to more holistic learning.
- b) Encourages collaboration, communication, and project management skills, which are valuable in the workplace.
- c) Provides opportunities for students to engage in meaningful, real-world projects, increasing relevance and motivation.

Challenges and Limitations:

- a) Requires significant time and effort to plan, manage, and assess projects, which can be a challenge for both educators and students.
- b) The success of project-based learning depends on the availability of suitable projects and resources, which may not always be accessible.
- c) Students may struggle with the open-ended nature of projects, particularly if they lack prior experience with this type of learning.

Emerging Educational Approaches

1. E-Learning and Online Platforms

Effectiveness:

- a) Provides flexibility and accessibility, allowing learners to study at their own pace and on their own schedule.
- b) Enables access to a wide range of resources and learning opportunities, particularly for those in remote or underserved areas.
- c) Supports continuous learning and upskilling, which is essential in rapidly changing industries.

Challenges and Limitations:

- a) Relies heavily on learners' self-motivation and discipline, which can be a barrier for some students.
- b) The lack of face-to-face interaction may limit opportunities for social learning and peer support.
- c) Quality control of online content and platforms can be inconsistent, potentially affecting the quality of education.

2. Virtual and Augmented Reality (VR/AR)

Effectiveness:

- a) Provides immersive, hands-on learning experiences that can enhance understanding and retention of complex concepts.
- b) Allows learners to practice skills in a safe, controlled environment, particularly in fields where real-world practice may be risky or costly.
- c) Supports experiential learning and can simulate real-world scenarios that are difficult to replicate in traditional settings.

Challenges and Limitations:

- a) High cost of developing and implementing VR/AR technologies can be a barrier for many institutions.
- b) Requires specialised equipment and technical expertise, which may not be widely available.
- c) The novelty of the technology may distract from learning objectives if not carefully integrated into the curriculum.

3. Gamification

Effectiveness:

- a) Increases student engagement and motivation by incorporating game-like elements into the learning process.
- b) Can make learning more interactive and fun, which may enhance retention and understanding of material.
- c) Supports the development of skills such as problem-solving, strategic thinking, and perseverance.

Challenges and Limitations:

- a) The effectiveness of gamification depends on the design and implementation of the game elements, which can vary widely.
- b) May not appeal to all learners, particularly those who prefer more traditional or structured learning environments.
- c) Overemphasis on game elements could detract from the educational content if not carefully balanced.

4. Artificial Intelligence (AI) and Adaptive Learning

Effectiveness:

- a) Provides personalised learning experiences by adapting content and pacing to the individual needs of each student.
- b) Can identify and address learning gaps more efficiently than traditional methods, leading to improved outcomes.
- c) Supports data-driven decision-making in education, allowing for continuous improvement of teaching and learning processes.

Challenges and Limitations:

- a) Implementation of AI in education requires significant investment in technology and infrastructure.
- b) Concerns about data privacy and security may arise with the use of AI systems that track and analyse student performance.
- c) The effectiveness of AI-driven learning depends on the quality of the algorithms and data used, which can vary.

04

Conclusion



| CONCLUSION:

This literature review on VET education in the EU highlights several key trends and gaps that are crucial for the future development of vocational training, particularly in the context of sustainable smart agriculture. As VET evolves to meet the demands of a rapidly changing labour market, it must also address the specific needs of the agricultural sector, which is increasingly influenced by technology and sustainability concerns.

Gaps in Current VET Approaches

1. **Integration of Sustainability Concepts:** While there is a growing emphasis on sustainability across various educational approaches, there is still a notable gap in the comprehensive integration of sustainability concepts within VET curricula. This is particularly significant in agriculture, where sustainable practices are crucial for long-term environmental health and economic viability.
2. **Technological Adoption in Agriculture:** The adoption of advanced technologies such as AI, robotics, and data analytics in agriculture is advancing, but VET programmes have not fully caught up with these trends. There is a gap in providing the necessary skills and knowledge that align with the technological advancements in smart agriculture.
3. **Flexibility and Adaptability of VET Programs:** Although modular and blended learning approaches offer flexibility, VET programmes often lack the adaptability to quickly respond to emerging needs in sectors like agriculture. There is a need for more agile educational structures that can incorporate new technologies and sustainable practices more rapidly.

Emerging Trends

1. **Blended and E-Learning:** The shift towards blended learning and e-learning platforms is a significant trend, offering flexibility and broader access to education. For the agricultural sector, these approaches can facilitate continuous learning and upskilling, especially in remote or rural areas where traditional educational institutions may not be easily accessible.
2. **Competence-Oriented Assessments:** There is an increasing focus on competence-oriented assessments that reflect real-world tasks and requirements. In agriculture, this means equipping learners with practical, hands-on skills that are directly applicable in the field, ensuring that they can contribute effectively to sustainable farming practices.
3. **Focus on Lifelong Learning:** The importance of lifelong learning is being recognised, with VET programmes evolving to support continuous education and skill development. This is particularly relevant in agriculture, where ongoing learning is necessary to keep pace with technological advancements and changing environmental regulations.

Supporting Policy and Practice in Sustainable Smart Agriculture

1. **Curriculum Development:** To address the gaps, it is essential to develop VET curricula that integrate sustainability and technological literacy as core components. This involves collaboration between educational institutions, industry stakeholders, and policymakers to ensure that curricula are aligned with the needs of modern agriculture.
2. **Promoting Technological Literacy:** VET programmes should emphasise the adoption of smart technologies in agriculture, equipping learners/farmers with the skills needed to operate and innovate with new tools and systems. This could be supported by partnerships with tech companies and agricultural businesses to provide practical training and real-world applications.
3. **Enhancing Flexibility and Accessibility:** Policies should support the expansion of blended and e-learning options, making VET more accessible to a wider audience. This is particularly important in agriculture, where learners may be spread across large geographic or rural areas and require flexible learning schedules.
4. **Encouraging Industry Collaboration:** Stronger collaboration between the agricultural industry and VET providers can help ensure that training programmes are relevant and up-to-date. This could include joint initiatives for developing training modules, providing apprenticeships, and facilitating knowledge exchange.

To conclude, this review demonstrates that while VET in the EU has made significant strides in adapting to the needs of various industries, there are still critical gaps that need to be addressed, particularly in the context of sustainable smart agriculture. By focusing on curriculum innovation, technological integration, and flexible learning models, VET can play a pivotal role in supporting the transition to more sustainable and technologically advanced agricultural practices.

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