Navigating the Future of Vocational Education and Training

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The Hybrid Horizon

By

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Cambridge
Scholars
Publishing

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This book first published 2025

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-0364-5697-9
ISBN (Ebook): 978-1-0364-5698-6

This book was created with the support of the Slovenian Research and Innovation Agency through the research programme P5-0174

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INTRODUCTION

Education has always been about change – about changing minds, perspectives and possibilities. But now, perhaps more than ever, the educational landscape itself is undergoing radical shift. We are entering what can only be described as a hybrid horizon – a new era characterised by innovation, adaptability and the seamless integration of technology into traditional educational models. This book invites you to enter this horizon where blended learning is redefining the way vocational education and training (VET) is designed and delivered.

Blended learning is more than just a trend; it is a dynamic shift that promises to reshape the way educators teach, and learners engage. It combines the strengths of traditional face-to-face teaching with the vast possibilities of digital platforms to create flexible, inclusive and highly impactful learning environments. It is not just a change of tools or techniques, but a fundamental rethink of the way knowledge is delivered, absorbed and applied.

Nevertheless, it is not easy to navigate this landscape. Many questions arise for teachers, institutions and learners alike. What exactly is blended learning and how does it differ from hybrid or purely online approaches? What practical steps are required to implement such an approach effectively? And more importantly, is blended learning worth the significant investment in technology, training and curriculum redesign?

This book attempts to answer these important questions and provides a clear, comprehensive roadmap for anyone involved in vocational education – whether you are an educator, administrator or policy maker. It is a guide designed not only to inform, but also to inspire action. It offers concrete strategies and insights that illuminate the path to successful implementation of blended learning. Each chapter draws on solid research, real-world examples and best practices to make a compelling case for adopting this transformative educational model.

In **Chapter 1**, we will explore the fundamental concepts of blended learning in VET. We look at how information and communication technology (ICT) is reshaping the educational environment and present

different models of integration – from enhancing traditional teaching methods to fundamentally changing the way knowledge is delivered. We lay the groundwork by clarifying terms, setting expectations and creating a common understanding that is critical to navigating this rapidly evolving educational landscape.

In **Chapter 2**, we ask ourselves the crucial question: is blended learning worth the effort? Here we dive into the tangible benefits and explore how blended learning improves student motivation, engagement and overall performance. We also openly address potential pitfalls – by exploring the complexities of balancing student workload with the psychological impact of digital and physical interactions in the classroom. By the end of this chapter, you will have a clearer view of the real-world impact and tangible benefits that blended learning can bring to your educational context.

In **Chapter 3**, we go into the details of how learning can be blended effectively. We take you on a journey through the rich history of blended learning classifications and taxonomies and examine models developed by pioneers in educational research. You'll learn about innovative frameworks such as Staker and Horn's influential taxonomy and the GNOSIS model, each offering unique insights into creating balanced, effective blended learning environments tailored to different educational goals and student needs.

In **Chapter 4**, our journey continues to the dimensions that underpin successful blended environments. We will look at how digital spaces promote connectivity of minds by exploring theoretical frameworks such as the Community of Inquiry model and the Theory of Transactional Distance. These models help us understand how online interactions can replicate and even surpass the richness of traditional classroom instruction.

Chapter 5 further explores blended learning in digital environments, with a focus on adaptability and personalisation. Here we learn how educators can use immersive technologies and sophisticated analytics to tailor learning experiences to the diverse needs of students. You'll see how customisable platforms and data-driven insights can significantly improve student success and engagement.

Chapter 6 builds an important bridge between the digital and physical worlds of teaching. We explore how blended learning is changing the role of teachers and emphasise the need for continuous professional development. This chapter also looks at how professional shocks, such as the recent global

pandemic, can serve as powerful catalysts for innovation and change in education.

Chapter 7 offers practical guidance for the confident use of educational technology. Here we present the most important digital competency frameworks, including DigCompEdu, the UNESCO ICT Competency Framework and the iNACOL Framework. Each of these frameworks equips educators with important skills that ensure they remain confident, capable and effective when it comes to using technology to enhance their teaching practise.

Finally, **Chapter 8** summarises the findings and strategies discussed throughout the book and presents a solid blueprint for the effective implementation of blended learning in VET. This chapter is full of actionable recommendations, clearly outlined steps, and best practices – each element designed to promote the success and sustainability of your blended learning journey.

In this book, you'll find insights that are grounded not only in theory, but also in practise. We have drawn extensively on current research, expert opinion and case studies that highlight successes and failures alike. Our aim is not just to make the case for blended learning, but to equip the reader with the knowledge, tools and confidence you need to make informed decisions and implement effective, impactful educational strategies.

Blended learning holds immense potential to enrich the educational experience, prepare students more effectively for their future careers, and create more dynamic, responsive educational institutions. By the time you finish this book, you will not only understand the power and potential of blended learning, but you will also feel inspired and prepared to take meaningful action. So, let's embark on a journey together – into a new dimension of teaching and learning. Welcome to the hybrid horizon.

CHAPTER ONE

MAKING SENSE OF BLENDED LEARNING IN VET

We begin the journey into one of the most popular modalities in vocational education and training (VET) known as blended learning by examining the change that Information and Communication Technology is making in education. In this chapter, we review the role of ICT in learning environments, the way it can be used, and the way in which such models may succeed or fail in various educational settings. It is essentially beyond question that ICT has dramatically changed the method such teaching and learning occur, providing exciting new possibilities for student interaction while creating new hurdles for the educator.

We are going to discuss the differentiated illustrations of blended learning, hybrid, and online education, what we have and theories that are discussing how to implement technology and why. What is important outcome is when the combination of advanced digital tools such as virtual simulations, effective learning platforms together with the utilization of such teaching strategies as project-based learning and self-learning modules is carried out in an innovative manner. However, the hiccup of requiring a massive sum of money to spend on technology, training of teachers, and redesign of curricula raises an important question- does blended learning deliver a happy return to all three aspects- students, teachers, and institutions? In the following chapter we will directly tackle the crucial question assessing its overall importance and consequences for all concerned.

Information and Communication Technology (ICT) in the educational space is a full range of digital tools and resources aimed at enhancing and supporting educational and learning procedures. According to what has been written in existing literature, ICT includes, “computers, the Internet, and electronic delivery systems such as radios; televisions; and projectors among others, which are extensively used in current educational arenas. Though ICT has an expanded mandate beyond simple hardware, however. it also incorporates purpose-designed software applications that provide

innovative approaches to learning needs of various kinds. Examples include e-books enriched with specialist reading applications, systematic vocabulary building exercises and interactive simulations relevant to acquisition of skills. The use of ICT within educational settings serves various critical roles that have been organized by Jager and Lokman (1999) into four key dimensions; (a) “ICT as Object”, wherein the technology becomes the object of the study; (b) “ICT as Assisting Tools”; (c) “ICT as Management of Learning”, and; (d) “ICT as Medium of Teaching and Learning”. This categorization in highlights the multifaceted nature of technology in educational environments. This classification demonstrates the diverse functions of technology in the educational context: as a field of study, as an instructional tool through which it is learned, as a system for managing real study processes, and as a medium for delivering the knowledge to the students. As a matter of fact, it has a relationship with all these subjects.

The integration of ICT in education has evolved through several developmental stages, reflecting advancements in both technology and pedagogical understanding. UNESCO's continuum model provides a framework for understanding this evolution, identifying four progressive stages: emerging, applying, infusing, and transforming (UNESCO 2005). In the emerging stage, educational institutions begin acquiring computer equipment and software, with educators exploring potential applications. The applying stage involves adapting curricula to incorporate specific ICT tools across subject areas. As institutions progress to the infusing stage, ICT becomes embedded throughout the curriculum, with technology infusing all aspects of teachers' professional lives in such ways as to improve student learning and the management of learning processes (UNESCO 2005). The most advanced transforming stage occurs when schools use ICT to rethink and renew institutional organization in creative ways" (UNESCO 2005, 30) with technology becoming "an integral, though invisible, part of daily personal productivity and professional practice." (UNESCO 2005, 30).

Imagine a systematic progression in which teachers learn how to effectively fuse technology in their teaching and go through various level of mastery. Research sheds light on this process revealing three hierarchical levels of ICT (Information & Communication Technology) integration: basic, focused, and creative. Each level represents a different profile of teachers attempting innovative pedagogical practices: timidly experimenting with technology to proficiently designing dynamic, imaginative lessons (Avidov-Ungar and Iluz 2014; Toledo 2005). This framework gives a

precise, steps-based guide to educational institutions on how to promote and enhance technological adoption in classrooms with precision and intent.

Key Models of ICT Integration in Education

Blended Learning

Blended learning combines the traditional in-person teaching with online activities to provide a united and flexible learning experience for the students. By means of this approach, the courses with both face-to-face classroom instruction and digital resources allow students to go through the course material in a hybrid format. Through substituting the classroom "seat time" with computer-mediated activities, which is given a proportionate weight by blended learning, each course becomes specific.

Generally, the blended learning mode is pegged at delivering 30 to 80 percent of the course content online, aside from in-person interactions (Palloff and Pratt, 2013). Students go to the actual classes while getting digital platforms for additional resources which makes them engage better and feel comfortable in both the settings. Virtual classrooms flipped classrooms incorporating gamification, and rotation models, where students alternate between online and in-person tasks are examples of the most-widespread practices (Bozkurt, 2022).

The core of blended learning is its capability of having the students learn from diverse learning preferences. It is a combination of the online materials that students complete at their own pace and the in-person sessions that are synchronous and that provide immediate feedback and interaction. The model provides room for reflection and independent exploration by means of the digital materials while the students still gain from the real-life classroom experience (Palloff and Pratt, 2013). If the teachers skilfully mix the elements, they can build diverse, inclusive learning settings that cater for the needs of a great number of learners.

Hybrid Learning

The hybrid learning method is a distinct educational approach that not only incorporates in-person and online classroom instruction but creates a flexible and cohesive learning experience. This model highlights the flexibility in time, location, pace, and learning routes that it provides by using various teaching methods, technologies, and delivery modes of learning. Bozkurt (2022) in his study about differences in regions or

education, learns that they may be known with different terminologies but hybrid learning always means the merger of the advantages of being taught in person and virtually for better student performance.

An essential feature of hybrid learning, on the other hand, is the delivery of instruction to two separate groups of students—one who is present in the classroom and one who participates online—through different channels at the same time. Such an approach does synchronous communication through different kinds virtual platforms (like Zoom) that link the students who are attending classes from home in real-time, whereas the in-class students speak directly to the teacher. In this mode of education all the learners, irrespective of their mode of attendance, are availed of a coordinated learning process.

Hybrid learning, which is a virtual learning and offline learning technique at the same time, is a significant advantage. It is different from blended learning which integrates media teaching by enhancing conventional teaching and learning with technological tools like audiovisual media, computer aid, and e-learning. Hybrid learning, on the other hand, promotes creativity through a totally different route, in its case; it resolves the issue of online learning or face-to-face learning being only by one modality. Ma (2023) supports this claim and states that hybrid learning is more excellent than blended learning because it is more flexible, and it promotes collaborative learning environments and advances technical tools to satisfy student's diverse needs.

Online/Distance Learning

Online learning, also referred to as distance learning, represents a model where educational content is primarily delivered through digital platforms with minimal or no face-to-face interaction. According to established definitions, online courses are those in which at least 80 percent of course content is delivered online (Allen 2016). This approach has gained significant traction in higher education and professional development contexts. Early definitions of distance learning defined it by the separation of teacher and learner, the influence of an educational organization, the use of technical media (primarily print), two-way communication, occasional meetings, and as an industrialized form of education (Keegan 1980). While this definition effectively distinguishes distance education from face-to-face learning and private study, it lacks clarity on the type of separation and overemphasizes print media. Holmberg (1989) described distance learning as learning-teaching activities across cognitive, psychomotor, and affective

domains for an individual learner supported by an organization, enabled by non-contiguous communication that allows learning anytime, anywhere. This definition is addressing all learning domains and flexibility but criticized for focusing on individual learners and asynchronous communication, neglecting social learning.

Online learning is broadly defined as learning mediated through digital technology, encompassing online, blended, and remote formats. It emphasizes the use of digital platforms, including social media, and highlights accessibility and interaction through technology (Singh and Thurman 2019). The definition of online learning explicitly ties learning to digital technology, including social media and online platforms, with a strong emphasis on their ubiquity and role in facilitating interactions. It highlights the integration of social media and the rapid adoption of digital tools during the COVID-19 pandemic, suggesting a broader, more inclusive technological scope that extends beyond formal education to informal and self-directed learning (Singh and Thurman 2019).

The online learning model emphasizes self-directed learning supported by digital resources, asynchronous activities, and remote instructor guidance. Authors emphasise that it requires robust technological infrastructure and well-designed learning management systems to create effective educational experiences (Greenhow, Graham, and Koehler 2022).

While early distance education definitions focus on the pedagogical and structural aspects of formal education delivered at a distance, emphasizing physical separation and intentional learning, the online learning definition highlights the broader, technology-mediated nature of learning across formal and informal contexts. Distance education definitions evolve with specific technological and pedagogical advancements, whereas online learning emphasizes the ubiquity of digital tools and social media, particularly in response to global trends and crises like the COVID-19 pandemic. The former is more academically focused, aiming to refine educational practices, while the latter reflects a societal shift toward accessible, flexible, and often self-directed learning, necessitating new research to address its implications. The complete transition to online delivery fundamentally redefines traditional educational roles and provides different opportunities for learning compared to face-to-face or blended approaches.

Defining Blended Learning

Blended learning, as both a didactic concept and practice, has experienced a surge in popularity in recent years. This instructional approach, characterized by the integration of online and face-to-face learning experiences, is designed to facilitate learning by meeting students in their own environments rather than in traditional classroom settings. For blended learning to be effective, it necessitates the availability of technology that supports student engagement, ease of use, and interpersonal interaction.

Research conducted by Powell et al. (2015) indicates that educators across all educational levels have increasingly adopted blended learning modalities to align with the connected nature of the contemporary world, in which both educators and students operate. This alignment suggests a paradigm shift in educational approaches, underscoring the importance of adapting teaching methods to enhance learning outcomes. However, there exists a significant disparity in the adoption and research of blended learning strategies between higher education and general secondary education compared to Vocational Education and Training (VET). This gap highlights a potential area for further investigation and development within the educational sector.

Technological advancements play a crucial role in the propagation of blended learning. Modern web-based learning technologies are often used alongside traditional textbooks. Additionally, educators are increasingly employing interactive tools that facilitate more effective communication with students and provide immediate feedback, which is crucial for student learning and adjustment. These digital tools not only support but are essential to one of the core features of blended learning: collaborative learning. Such collaboration is no longer confined to physical spaces such as classrooms, labs, or workshops but also extends into virtual spaces and online platforms.

From a pedagogical viewpoint, Gerbic (2011) recognizes the transformative potential of blended learning. This potential is particularly evident in its capacity to foster pedagogical innovation. Blended learning can significantly enhance the development of students' reflective practices and promote international collaborations among students. These elements are vital as they contribute to a deeper and more reflective learning experience, preparing students to operate effectively in an increasingly interconnected world.

Blended learning represents a dynamic and evolving educational paradigm that requires ongoing research and technological support to fully realize its potential. Its impact on pedagogical practices offers promising prospects for educational innovation, making it an essential area for continued academic inquiry and practical application in various educational settings.

Powell et al. (2015) define blended learning as a "hybrid learning approach" that includes the following features:

> "[Blended learning] ... combines the best features of traditional schooling with the advantages of online learning to deliver personalised, differentiated instruction across a group of learners. Students in formal blended learning educational programs learn online part of the time yet have the benefit of face-to-face instruction and supervision to maximise their learning and to best fit their own needs" (ibid. 2015, 5).

Blended learning therefore exchanges two approaches to teaching and learning: teaching methods conducted in the classroom and distance learning that takes place in online learning environments and where teacher and students are separated in space and time. Alternatively, blended learning can also take place entirely in the classroom (or different classrooms, labs, workshops etc. within the school). In this case, classroom instruction is combined with student-directed activities and content delivered via computers, various learning apps, etc. Self-directed learning and student autonomy are emphasised in this case.

Some experts point out that this gives educators more time to focus on more challenging learning objectives when the class is in school (and when the contact with the students is most authentic). In practice, there are several possibilities for implementations where blended learning takes place: it could start with the learning content and activities delivered in the classroom and followed in an online classroom or vice versa.

Blended learning can be delivered through a variety of online learning environments such as Moodle. Students have access to pre-recorded lessons, published presentations, and other learning materials, as well as worksheets and assignments for assessment. Students can also interact with teachers, classmates, mentors at the workplace etc. through webinars, online group activities and discussion forums.

One of the most important features of blended learning is that teaching, and learning can be synchronous, i.e., students and teachers working together

in real time and/or in the same room, or asynchronous, i.e., students can participate in learning activities according to their available time. Teacher, together with students decide which form of communication is more appropriate at a given time – if immediate feedback on student performance is needed, synchronous communication (e.g., audio or video conferencing) is recommended, but if the aim of the activity is for students to read something first, look it up online, etc., and then respond, then the use of asynchronous tools may be more appropriate (discussion forum, blog, etc.). The role of the teacher is as important in teaching at a distance as it is in classroom teaching and helping students to achieve their learning goals as comprehensively and effectively as possible. However, it should be stressed that the role of the teacher in this process is changing towards more mentoring, facilitating one. Blended and online teaching approaches rely more on active participation and participation of students. So, in many cases the teacher plans and moderates the activities in the online classroom together with students. Of course, the level of their autonomy and active course participation depends on many things, e.g., students' knowledge-level, experience, motivation, self-direction, etc. Nevertheless, we can argue that blended and online approaches are based on mostly student-centred teaching methods.

Implementing Blended Learning in VET

Blended learning (BL) has become increasingly popular in educational fields as a mechanism through which a more active learning can be facilitated, and student outcomes enhanced. For many people, it is a model of the 21st century learning that can increase flexibility and effectiveness in teaching and learning (Krismadinata et al. 2020). In vocational education and training (VET), blended learning has special promise: it enables the integration of multimedia sources, and self-paced learning to the theoretical aspects while retaining important face to face training on practical skills. In fact, many VET institutions have already started implementing blended models even before 2020 and the COVID-19 pandemic has accelerated this trend by pushing for a quick move towards online instruction – emphasizing the potential of this approach and the gaps regarding readiness (Ashraf et al. 2021).

Successful implementation of blended learning in VET is predicated on good pedagogical strategies that can harness the best of online and face to face modalities. One central strategy is to ensure that the correct content is allocated to each modality. Conceptual and theoretical content can usually

be presented online (as readings, videos, or interactive modules) leaving class time for applied learning, practice of skills, and discussion. This flipped classroom approach is quoted as a best example of blended learning in practice (Krismadinata et al. 2020). By pre-loading lectures or demonstrations in the form of online content, instructors can use classroom sessions for active learning: guiding practical exercises, workshops or common projects. Research supports the fact that such an approach can "promote effective learning" by the combination of online and offline classes in complementary manner (Krismadinata et al. 2020). In other words, the online component delivers flexibility and range, whereas the in-person component builds understanding through practice and critiques.

Project-based learning has been successfully adopted to blended formats in vocational training. Since many studies demonstrated that project-based learning (PBL) in vocational education provides a lot of advantages, improving not only academic but also professional skills necessary for the future career. PBL greatly enhances critical thinking and creativity as reported in the higher vocational colleges, that have found it effective in transforming curriculum pedagogy (Hao et al., 2024). Similarly, collaborative and competency-based activities are typical in blended learning designs. One study reports that blended environments can be used to "build interactions [and] create projects" where students can do realistic tasks using online tools as well as face-to-face guidance (Krismadinata et al. 2020). For instance, students may first meet online to talk about plans for their project or use a simulation tool and then meet in a lab to implement their project under supervision of an instructor.

Another Blended learning enabled pedagogical technique is the use of self-paced supplemental modules. Inside the VET programs there is a great variety of backgrounds and learning rates among students; they provide extra tutorials or practice exercises online enables students to review the basic knowledge or pursue the more advanced topics, if required. Adaptive sequencing of learning activities is a signature of blended designs (Krismadinata et al. 2020). Most vocational educators use rotational models (alternating between online and in-class stations), enriched virtual models (mostly online, but capaciously held in-room meetings), or hybrid arrangements designed for their specific subject matter (Krismadinata et al. 2020). The literature notes that there is no magic strategy because teachers tend to use diverse teaching methods and blended designs to fit their vocational field (Krismadinata et al. 2020). There is a common thread that it is pedagogy that melds with it: Blended learning into one coherent

learning experience, successful VET requires careful planning of online exercises, assessments, and face-to-face instruction.

Blended learning in VET is closely associated with the introduction of digital technologies to the curriculum. A variety of technologies are being used to support the online part of learning and to augment face-to-face training. At a basic level, almost all blended programs utilize a Learning Management System (LMS) or online platform to structure content and communications. An LMS enables teachers to distribute course materials, upload videos or presentations, collect assignments and hold discussion forums (Krismadinata et al. 2020). This central platform is key in controlling this mix between online and offline aspects, ensuring that the students access resources, even outside the classroom, and interact with their peers and teachers. According to research, blended learning's implementation requires appropriate digital content and tools (e.g. Web 2.0 technologies) for skills development and maintaining learners' motivation (Krismadinata et al. 2020). Quizzes, multimedia demonstrations, and simulations are interactive contents and can serve the varieties of learning styles and keep students engaged in the online portions.

Most importantly, digital technology in VET is not confined to generic e-learning tools; it is getting more and more incorporated with specialized software and simulations that resemble actual vocational tasks in the real-world. For example, in technical trades and engineering training the use of the virtual simulators and virtual laboratories allows students to practice procedures in a safe controlled digital environment. Researchers in China recently indicated that many higher vocational institutions use virtual simulation training systems and digital instructional materials in their blended learning programs (Zhang et al. 2024).

These tools can supplement or indeed, temporarily take the place of physical equipment, which was extremely useful while pandemic restrictions restricted access to campus workshops. Augmented reality (AR) and virtual reality (VR) are also appearing as such: a systematic review revealed that AR has a very positive effect on vocational training and improves learners' skill acquisition through the overlay of digital guidance over physical activities (Wang et al., 2020). Through the offering of immersive, interactive environments, VR/AR technologies are capable of increasing knowledge retention and enabling students to practice skills with a reduced risk that will supplement the hands-on training that students are required to complete later in person (Ravichandran and Mahapatra 2023).

One of the important parts of technology integration is the use of digital tools to close the gap of classroom and workplace learning. VET programs target preparing students for the real-world job environments. technology can make one more closely interact with the practices of the industry. For instance, internet communication tools allow vocational students to discuss with the industry experts or mentors online. According to a study in 2024, the incorporation of digital technology in vocational education can "reduce the gap between the classroom and the workplace by allowing for constant interactions with industry experts" which can enhance students' learning experience and make them satisfied (Zhang, Qian, and Chen 2024). In combined apprenticeship or internship programs, trainees could learn theory online, while at the same time following virtual meetings with their workplace supervisors. This constant link enables students to use what they learn online to their on-site training and vice versa, so that the learning process has a more uniform nature. Overall, the digital technologies utilized in blended VET include standard e-learning platforms through to advanced simulations and communication tools. Their effective integration is key: Studies indicate that careful application of technology can radically change the learning paradigm, promote interactive engagement, and can foster student participation in a manner which simple traditional teaching may not (Zhang, Qian, and Chen 2024). Used effectively, these technologies do not only enhance instruction but also provide examples of technologically literate behaviour required in today's workplaces.

The combination of sophisticated digital technologies in a thoughtful manner, along with innovative pedagogical approaches including project based learning and self-paced instruction modules, illustrates the ability of blended learning to transform vocational education and training (VET). This approach uses the combination of online resources and face-to-face instruction while generating flexible, interesting and relevant to the industry learning environments, which can address the diverse needs of students and to prepare them for the real-world professional challenges. However, such a complex system and methods implementation poses an important question: is there a good return on the heavy investment in technology, educator training, and curriculum redesign in terms of student success, the efficiency of the institution and long-term educational effects? We will discuss this question further in the next chapter, evaluating the overall value of blended learning for all stakeholders.

CHAPTER TWO

IS BLENDED LEARNING WORTH IT?

As we outlined in the previous chapter, a critical component of blended learning is the ability to provide personalised learning experiences that allow learners to choose the pace, time and place of their learning (Graham 2005). The introduction of blended learning in education can have a variety of effects. This approach requires a fundamental shift in perspective in relation to students, who must be placed at the centre of educational planning in conjunction with the intended learning objectives. On the other hand, this teaching strategy promotes a more customisable and interactive learning environment that considers the different needs and preferences of learners. Teaching methods should be carefully selected, considering students' prior knowledge, their individual interests and the characteristics of the classroom. In this section, we briefly outline the value that blended learning can have on student achievement and motivation.

How Blended Models Reshape the Learning Experience

The essence of blended learning lies in its ability to fuse the optimal elements of conventional classroom teaching with digital learning resources to promote a comprehensive learning experience. Blended learning has its origins in distance education and computer-based learning and embodies the fusion of established pedagogical methods with cutting-edge technological advances, redefining pedagogical approaches and student engagement with subject matter (Radovan and Makovec Radovan 2024).

The integration of educational technologies is central to the rise of blended learning as a leading pedagogical technique. As the technological landscape has expanded, so has the ability of educational institutions to seamlessly integrate traditional classroom instruction with online and virtual platforms. Technological innovations such as learning management systems (LMS), interactive digital content and real-time communication tools have not only facilitated the spread of blended learning but have also refined its implementation in various educational institutions (Güzer and Caner 2016). This technological dynamic allows for an unprecedented level

of customisation of learning to a wide range of learning styles and preferences. Garrison and Vaughan (2008) conceptualise the use of technology in education as a strategic and pedagogically motivated integration of online and face-to-face elements. This integration aims to improve educational quality, promote student flexibility and engagement, and challenge outdated models. Building on the foundational insights of Garrison and Vaughan on the strategic integration of technology in education, Picciano (2017) refines this approach by advocating a close alignment of technological tools with pedagogical goals and emphasising the adaptation and effectiveness of educational strategies to the individual needs of learners. Same author emphasises that technological tools must be aligned with pedagogical goals to ensure that technology serves to enhance specific educational objectives and not as an end. He also points to the importance of adaptive learning technologies in tailoring the learning experience to individual needs, as well as the crucial role of technology in enabling effective assessment and feedback mechanisms, which are essential for evaluating and promoting learners' progress (ibid.). The latter can lead to positive pedagogical effects, with the role of the teacher being particularly important.

Research shows that a blended learning approach can **improve learning outcomes** (e.g., Deschacht and Goeman 2015; Sahni 2019; Harris and Tan 2020). This flexibility allows students to access course materials and participate in online discussions at their convenience, promoting self-paced learning and accommodating diverse learning needs and life phases (Müller and Mildenberger 2021). To improve learning outcomes and effectively implement blended learning, it is critical to thoughtfully consider instructional design and pedagogical strategies. Neglecting the design for effective learning can render other elements of blended learning unproductive (Tan et al. 2021). Garrison and Kanuka (2004) emphasize the importance of integrating face-to-face and online components. This integration can be achieved through various teaching strategies, such as flipped classrooms, where students engage with online materials before class, and face-to-face sessions are dedicated to interactive activities and discussions (Bergmann and Sams 2012).

When properly planned, blended learning can also offer **students autonomy** (Pouzergues 2022) and flexibility (Simons et al. 2018). When students can learn at their own pace and then when it suits them, they are more likely to develop a degree of independence. They may also develop greater intrinsic motivation and become engaged in their learning. Working online, where they have access to a wide range of up-to-date resources, gives

them more time, flexibility, and freedom to shape their learning according to their individual needs. A study by Kong (2014) confirmed that appropriately designed digital environments with teacher support can enhance students' information literacy and critical thinking skills. Research also shows that this approach improves student achievement and reduces dropout rates, which is particularly important for vocational education (Kuo and Kuo 2015).

Another prominent teaching approach in blended learning i**s the use of active learning strategies** (Bonwell and Eison 1991). This approach encourages student engagement, critical thinking, and problem-solving skills. Research taken by Makovec Radovan and Radovan (2023) shows that active teaching methods such as online group projects, frequent quizzes or assignments, activities with interactive videos, online materials to improve professional skills, and feedback from teachers through online channels are more strongly associated with higher forms of student learning (e.g., applying, analysing, and evaluating) than other approaches. This finding is supported by other previous studies (such as: Abrami et al. 2015; Kearns 2016; Khan et al. 2017). In a blended learning environment, active learning can be facilitated through online discussions, collaborative projects, and problem-based learning activities (Means et al. 2013).

Finally, we emphasize **student participation**. The quality of learning achievements can depend largely on student engagement in the learning process and in practical work with the material. Various studies and meta-analyses have shown in the past that learning achievements are better and more sustainable when students are not just passive listeners or observers, but actively participate in the learning process (Alfieri, et al. 2011; Cornelius-White 2007). This can be achieved by encouraging individual and group learning activities that allow students to try out their own ideas, integrate the ideas of others and develop a deeper understanding of what they are learning.

Blended Approaches Drive Learning Motivation

Numerous research studies have looked at the impact of blended learning on student motivation, and the results generally show good results. According to a study by López Pérez et al. (2011), students were more motivated in a blended learning environment than in a traditional classroom. In addition, Means et al.'s (2010) analysis found that student satisfaction and attitudes toward learning increased when blended learning approaches were used. The personalized, flexible, and interactive nature of blended

learning appears to create a learning experience that is responsive to diverse learning preferences and ultimately leads to the positive achievements mentioned earlier (Graham 2013; Graham and Halverson 2023). Although satisfaction is an important factor of motivation, there are many other determinants that shape students' engagement during their course. Studies show that blended learning environments can effectively engage students through several strategies. First, improving input from all stakeholders, including students, teachers, and the external environment, can improve student engagement in learning (Li et al. 2023). Second, incorporating online activities and resources, such as asynchronous online videos and activities, can create an ideal blended learning environment (Goodfellow and Liaskos 2023). It is also important to ensure that technology integration adds value by promoting higher level cognitive skills and enabling differentiated learning (Sibanda and Josua 2022). By integrating blended learning into the curriculum, schools can improve student learning and engagement, which ultimately enhances the overall quality of education and produces better graduates.

Research on motivation has also emphasized the significance of teachers in determining the effectiveness of blended learning, such as the study conducted by Min and Yu (2023) through their systematic review, wherein they found that instructor attributes like attitude, technology skills, and teaching style have considerable effects on students' achievement and motivation. The latter construct was analysed in the context of self-determination theory using four different dimensions: interest, effort, perceived competence, and value (Deci and Ryan 2015). The results of study of Makovec Radovan and Radovan (2023) revealed various significant correlations, with one being the significance of teacher feedback—all four motivational dimensions were strongly correlated with the frequency of feedback and teacher support during blended learning. The results also suggest that feedback and instructor presence significantly influence both student engagement and learning during blended learning in online academic environments (ibid.). This finding is consistent with similar studies examining the nature and frequency of feedback provided by instructors (Erbilgin et al. 2023; Jensen et al. 2021; Tanis 2020). Makovec Radovan and Radovan (2023) research also shows that group projects, small group work, and ongoing assessments were significantly related to motivation, mainly through perceived competence. Interactive videos as learning materials were associated with more significant interest in the subject and a heightened sense of competence. Materials aimed at vocational skill acquisition were related to interest and perceived usefulness of the subject matter.

The relationship between collaborative teaching approaches and positive attitudes towards blended learning—including support, preference, and motivation—highlights the effectiveness of collaborative methods in increasing student engagement and fostering positive perceptions. Research conducted by Radovan and Makovec Radovan (2024) indicates that blending online elements with teacher interaction enhances high school students' motivation across subjects. According to some studies, effective implementation requires clear guidelines, technological reliability, and active teacher engagement. Additionally, practical simulations and experiments are key in stimulating student interest (Radulovič et al. 2023). Although teacher participation is vital in blended learning success, motivation also hinges on online resource accessibility and peer interaction opportunities (Schechter et al. 2017). Let us dwell a little longer on cooperative learning, which has also proven to be important for increasing student motivation and perceived competence (Johnson and Johnson 1999). In addition, interactive multimedia content such as videos has been shown to increase student interest and engagement, supporting the idea that multimedia resources can promote feelings of increased competence (Mayer 2017). Learning professional skills through hands-on materials is also consistent with the theoretical approach to adult learning that emphasizes the importance and application of learning in real-world situations (Roberts 2017). The combination of collaboration, multimedia use, and professional development appears to reinforce observed patterns in motivation and perceived competence, despite possible differences in delivery methods and educational environments (Makovec Radovan and Radovan 2023).

Balancing the Scale of Student Effort in Blended Learning

Just as proper planning can improve learning success and motivation, inadequate planning, e.g., too many activities or an inappropriate choice of approach, can have negative effects.

The literature indicates the challenges associated with managing such workload, highlighting its potential negative impact on students' study behaviours. Aristeidou and Cross (2021) have documented the difficulties encountered in managing workload in the context of distance learning during the COVID-19 pandemic, noting its adverse effects on study habits. Similarly, Cope and Staehr (2005) found that students' perceptions of their workload could motivate them to engage more deeply with course content. Furthermore, research by Kember and Leung (1998) suggests that the allocation of class time has a greater influence on students' workload

perceptions than the time spent on independent study, a finding particularly relevant in the secondary education sector, where structured timetables predominate. Kyndt et al. (2013) argue that additional variables, including students' time management skills, task prioritization abilities, and the overall learning environment, also significantly affect their workload perceptions. Ibrahim and Ismail (2021), as well as El Sadik and Al Abdulmonem (2021), underscore the importance of carefully considering workload in the implementation of blended learning strategies to alleviate potential challenges. It is very important that teachers ensure that students' workload does not exceed that of a traditional lesson, as excessive workload can affect the quality of school work and lead to absenteeism or poor performance. Ibrahim and Ismail (2021) and El Sadik and Al Abdulmonem (2021) point out that workload, which is an often overlooked aspect of implementing blended learning, requires special attention when it comes to implementing blended learning. Teachers often wonder how much time should be spent on face-to-face teaching and online activities when switching to blended learning. The question is of course very relevant, because the time component brings with it a double loop: on the one hand, the teacher must be careful not to overburden the students, and on the other hand, the transition also means a greater time burden for the teachers. The latter is often the reason why blended learning programmes are not successful (Drent and Meelissen 2008). Napier et al. (2011) state that the chances of success of blended learning programmes decrease with increasing workload. In the context of stress, we highlight two aspects:

- **Impacts of Asynchronous and Synchronous Learning:** When considering pedagogical approaches and their impact on student workload in blended learning environments, differences between asynchronous and synchronous learning show different effects on student motivation and perceived workload. Synchronous learning (such as live sessions, expert discussions, and the use of VR/AR technology) is associated with increased mental demands and frustration and provides limited opportunities for students to engage or demonstrate value in real-time sessions (Radovan and Makovec Radovan 2024), approaches, such as group work, frequent quizzes, and online professional skills courses were more likely to be related to time burden (Makovec Radovan and Radovan 2023). Conversely, asynchronous learning increases flexibility but does not contribute significantly to motivation, suggesting that additional pedagogical strategies are required to fully engage students (ibid.). Some authors (e.g., Hrastinski 2008; Varkey et al. 2022) acknowledges the benefits of asynchronous learning in terms of flexibility and self-directed

learning, but also points to its limitations in fostering community and providing immediate feedback, which is reflected in research findings by Radovan and Makovec Radovan (2024). Although time is of the essence (Kyndt et al. 2013) when planning, the teacher must be aware that the student's perception of workload is not synonymous with, but can be influenced to a small degree by, the amount of time spent studying. In addition to the time component, another important realization was that some activities are more strenuous for students, and this must be considered when planning learning activities (Baba et al. 2020; Kyndt et al. 2013; Kember 2004).

- **Psychological and Emotional Workload:** The effects on psychological and emotional workload in blended learning environments suggest that the blended learning approach may influence students' psychological and emotional distress. Participation in synchronous learning increases demands and frustration due to the need for real-time participation, while asynchronous learning requires effective time management. However, assessment and feedback mechanisms can alleviate frustration, suggesting that well-designed assessments can mitigate some of the emotional distress associated with learning (Radovan and Makovec Radovan 2024). Research conducted by Novotny et al. (2022) has highlighted the potential for increased workload and stress in learning scenarios, particularly when synchronous components are involved. Observations of Radovan and Makovec Radovan (2024) are consistent with these findings on emotional workload and continue the debate on how different aspects of learning either exacerbate or mitigate workload and stress. Some studies suggest that strategically designed asynchronous activities can mitigate these challenges, which is consistent with our discussion of assessment and feedback (Mehrpouyan 2023; Quesada-Pallarès et al. 2019).

While blended learning is a compelling and promising paradigm for modern education, realising its full transformative potential requires proactively and strategically addressing several key challenges. These include dealing effectively with potential student motivation gaps, skilfully managing the inherent limitations of the technology and ensuring teachers are adequately prepared and supported. The true optimisation of blended learning goes beyond the mere strategic redesign of course content and the choice of modalities – for the various learning activities – be it online or face-to-face. A concerted effort to improve student engagement throughout

their educational journey is also critical. To ensure successful and effective implementation of blended learning initiatives, careful planning, comprehensive training and ongoing support for teachers, and robust evaluation mechanisms are indispensable. Such targeted measures are essential to cultivating an environment that promotes student achievement and overall success.

When discussing blended learning, it is important to move away from the simplistic notion that integrating technology into the classroom automatically leads to better learning outcomes or fosters innovation. The superficial understanding that simply equates blended learning with adding more technology to existing practices or moving traditional live teaching to an online platform fails to recognise its transformative potential. Rather, the true essence of blended learning lies in the thoughtful planning and seamless integration of pedagogical approaches that are precisely tailored to the specific content, unique context and diverse needs of learners. Only when technological tools are strategically combined with innovative teaching strategies can blended learning truly revolutionise education. This requires a profound rethinking of our fundamental approaches to both teaching and learning. We need to move decisively away from conventional methods and cultivate learning experiences that strategically utilise the different capabilities of traditional and digital resources. Ultimately, it is this synergistic combination of different elements, rather than technology in isolation, that will enable blended learning to drive meaningful and lasting change and open new and exciting possibilities in the ever-evolving educational landscape.

Unlocking the Potential of Blended Learning in VET

Introducing blended learning might bring certain benefits for the school, teachers, and students. We must not forget that whether blended learning is useful or not in VET depends on many circumstances (school organisation, teachers' understanding/skills, workplace integration, students' understanding/motivation, etc.).

Benefits for schools:

- **Promoting digital literacy and critical thinking.** Through blended learning, students can develop digital literacy and critical thinking (Garrison and Kanuka 2004). To achieve this, independent work and research are encouraged, and teamwork skills are developed. Studies

also show that a blended learning approach increases student achievement (e.g., Bernard et al. 2014; Means et al. 2013).

- **Adapting to teachers' and students' needs**. Blended learning initially requires a high level of commitment from both school leaders and teachers, but once it is in place, schools can better adapt their working methods to meet teachers' and students' needs. This approach can also be partly associated with better utilisation of classrooms.
- **Better collaboration**. Blended learning offers many opportunities for better collaboration and exchange of knowledge and experience between relevant actors in this process (schools, businesses, industry sectors). It also makes it possible for students to gain more relevant work experience and work knowledge.
- **Professional development of teachers.** Because blended learning and technology-use are very intertwined, there are many opportunities for professional development of teachers' digital competencies. This could consequently provide students with quality teaching and training - and ensure equal access to "quality teachers."

Benefits for teachers:

- **Course delivery**. Teachers can deliver the course in a more vivid and creative way than if it were delivered in the classroom, school workshops etc. The study by Bliuc et al. (2012) showed that teachers can have very different views on what blended learning is, and their approaches vary accordingly.
- **Time organisation**. Blended learning allows the teacher to engage students in deeper and more meaningful learning. It is important to note that the initial steps of planning and implementing this type of work can be stressful and time-consuming for the teacher, but later the teacher can make better use of the face-to-face learning time with students by spending less time on traditional forms (lecturing) of teaching and more time on individual or small group work, supporting those students who need extra explanation and help.
- **Support**. Online teaching cannot replace face-to-face communication, but it can broaden, extend, and deepen communication with students. In school, the teacher's time with students is limited depending on the timetable, but in the online learning environment, and different apps for communication this contact can be further extended using email, discussion forums, chat rooms or video conferencing. These tools can also be used to provide students with additional learning

support outside the classroom. In the online classroom, the teacher can with integrated learning analytics check the performance of individual students or the whole class and get better feedback on students' work.

Benefits for students:

- **Autonomy and flexibility**. Students could develop autonomy when they learn at their own pace and when it suits them. They can also become more intrinsically motivated and engaged in their learning, while online work, where they have access to many up-to-date resources, gives them more time, flexibility, and freedom to shape their learning as it suits their individual needs. On the other hand, teachers should be careful about the amount of material made available to students. Online resources can lead to an overwhelming amount of content and challenge students' ability to focus and work effectively.
- **Promoting digital literacy and critical thinking.** Through blended learning, students develop digital literacy and critical thinking. Independent work and research are encouraged, and teamwork skills are developed. Research also shows that this approach increases student achievement and reduces dropout, which is particularly important for VET.
- **Learning to learn**. Active learning, independent use of learning materials and engagement with activities in online classrooms can have an impact on the development of students' self-regulated learning skills. Online classroom activities encourage students to organise their own work and set their own learning goals, thus taking responsibility for their own learning.
- **Digital literacy/skills**. Students can use a variety of digital and online technologies in blended learning to improve their digital skills and, with appropriate support, make better use of these technologies.
- **Student activity and participation**. The quality of learning outcomes can be highly dependent on student activity in the learning process and hands-on work with the material. Different studies and meta-analysis in the past showed that learning outcomes are better and more sustainable when students are not just passive listeners or spectators, but active collaborators in the learning process (e.g., Alfieri et al. 2011; Cornelius-White 2007; Hattie 2009). This can be achieved by encouraging individual and group learning activities, allowing students to test their own ideas, synthesise the ideas of