

# Blended Learning Environment in Vocational Education\*

Mehmet Şahin

Technical Science College, Selcuk University, Turkey  
mesahin@selcuk.edu.tr

## Abstract

*Blended learning is becoming more and more prevalent and it is vital for higher education and corporate training settings to create strategic plans and directions, focusing on pedagogical techniques in blended learning to make use of this teaching and training model. This is a qualitative research using interview technique with a trainer who applied blended training model at a vocational organization. This qualitative research aims to find out whether blended learning is effective in mechanical manufacturing training based on the ideas of a trainer who applied blended training model at a vocational organization. The research indicates that blended learning can play a vital role in training sessions of vocational branches like mechanical manufacturing in the educational organizations and workplaces. It is also not only a matter of higher education. It can be used for any vocational training based on skill development for manufacturing and production at any level. The implementation of blended learning model in a very specific field of vocational education like mechanical manufacturing has shown that it can help training if it is designed well.*

**Keywords:** Blended learning, vocational education, vocational training, mechanical manufacturing

## 1. Introduction

It is an accepted fact that the model of blended learning is gaining widespread acceptance all over the world but a generally accepted definition has not emerged yet. Scholars outside of education have approached the meaning of blended learning from a scientific angle, drawing upon its title's connection to biology and botany. Sands (2002), for example, noted that since the word hybrid refers to the offspring of two different genetically dissimilar parents, teaching and learning in this framework must also involve the successful joining of opposing parts - online and face-to-face methodology. Building upon this metaphor, Osguthorpe and Graham (2003:227) described blended models as "pedagogies that change according to the unique needs of learners. Those who use blended learning environments are trying to maximize the benefits of both face-to-face and online methods - using the web for what it does best and using class time for what it does best." Therefore, according to the definition this study adopts, blended learning is a hybrid learning concept integrating traditional in-class sessions and e-learning elements (Reay, 2001; Rooney, 2003) in an attempt to combine the benefits of both learning forms. Graham (2006:5) summarizes three definitions of blended learning as the (a) combination of instructional delivery media, (b) combination of instructional methods, and (c) combination of online and face-to-face instruction. The combination of online and face-to-face instruction is the one according to which this research has been designed since defining blended learning as the combination of online and face-to-face instruction more accurately reflects "the historical emergence of blended learning systems." The

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criticism that online teaching-learning environments lack many advantages that face-to-face environments have has led to the notion of blended learning.

Blended learning is described as “integrated learning”, “hybrid learning”, “multi-method learning. However, “blended learning” is being used with increasing frequency in both academic and corporate circles. For some authors, written language is the first example of “blended” as it is the combination of language and paper. Printing press is the next stage. However, what we regard as blended learning in this research is the definition by Flexible Learning Advisory Group (2004): Blended learning is learning methods that combine e-learning with other forms of flexible learning and more traditional forms of learning. Or, Blended learning (also called hybrid learning) is the term used to describe learning or training events or activities where e-learning, in its various forms, is combined with more traditional forms of training such as “class room” training (Stockley, 2005). Bersin, (2004) outlines the evolution of learning from the traditional classrooms of the 1950's through today's blended learning environment. The last stage is Integrated Blended Learning: 2000-... which includes Web, Video, Audio, Simulation, ILT, and more.

Blended learning in this sense is a recent online innovation as a result of integrating technology into education. Advances in technology and the changes in teaching and learning approaches (from teacher centered to student centered one) facilitates the new models like blended learning to come out. Watson (2008) suggested that blended learning involves a shift in strategy in three areas: from teacher centered to student centered learning, from limited to high frequency interactions between students and resources, and from intermittent to deliberate integration of formative and summative assessments. In fact, Educators have been preoccupied with integrating technology into the classroom for decades (Dziuban, Hartman, Moskal, 2004). The rapid change in technology in our century has caused students and in general individuals and in special students to change too. Technology and students are changing rapidly and individuals have the capacity for this change, which implies that educators should be embracing “the new digital reality of the online, computerized world” (Jukes, 2008:6). Young (2002) said: “Within five years, there will be lots of blended models such as students going to school two days a week and working at home three days a week. Another blended model...is where a student takes five face-to-face courses at school and two virtual courses” (cited in Picciano & Seaman, 2009:5). In 2002, Prof. Bourne (as cited in Young, 2002) said: “within five years, you'll see a very significant number of classes that are available in a hybrid fashion .... somewhere in the 80-90-percent range.” Buckley et al. (2002) and Tagg (1995) noted a paradigm shift in higher education leading to new models of teaching and learning. Now, we are embracing rapid changes in Internet technologies that, in turn, demand that blended learning becomes an integral component of education (King, 2002).

Blended learning may occur at different levels of instruction: (a) at the activity level, when a learning activity contains both face-to-face and computer-mediated elements; (b) at the course level—the most common—where both face-to-face and computer-mediated activities are included as part of a course; (c) at the program level, when participants take both online and face-to-face courses in a program; and (d) at the institutional level, with organizational commitment to blending face-to-face and computer-mediated instruction (Graham, 2006). When designing a blended learning environment, the first point to be decided is to design a part of the blended subject matter as face-to-face and some as online. The more common blending technique is usually half-and half. In other words, 50 percent consists of face-to-face activities in classroom environment and the other 50 percent of activities performed in an online environment (Osguthorpe & Graham, 2003). Rossett and Frazee (2003) suggest that instruction tools and planning approaches are crucial components for a successful blending, and that all components of the instruction method can be appropriately combined. A blended model usually includes certain educational components. However, teachers have a wide range of options for blending and they are not only limited to the applications and activities previously known and used. Education might

be a combination of formal and informal approaches, technology and human-based activities, independent and enjoyable activities or direct and exploratory materials. Reay (2001) stresses that blended learning is not just adding online materials to a conventional training environment; BL must be relevant, and demand a holistic strategy leveraging the best characteristics of all learning interventions. The selected methods/techniques should be appropriate to the subject. The successful implementation and use of BL requires understanding of the strengths of different mediums; how learners engage in this type of learning process; how they use information from each different medium and how they can handle online and the traditional (face-to-face) teaching methods in a combined form (Mortera-Gutierrez, 2006). Three major components of BL that can be blended/mixed in FTF and online environments are learning activities, the students, and the teacher. As reported by Osguthorpe and Graham (2003), "If balance and harmony are the qualities that are sought for in blended environment, one must first identify precisely what is to be mixed together".

Garrison and Kanuka (2004:97) noted that true blended learning lessons do not involve supplementing with the Internet two or three times a week, merely layering repetitive online content on top of face-to-face instruction, or dressing up old content in new clothes. In their estimation, blended learning is a "reorganization and re-conceptualization of the teaching-learning dynamic." Elements from e-learning or in-class sessions should not be included arbitrarily, nor should one form of learning simply accompany the other. There is no rule of thumb determining the percentage of online and in-class phases in the concept (Reimer, 2004). Some fields are better suited for in-class methods, others clearly benefit from the use of the new media (Lang, 2002). The decisive factor in developing blended learning concepts is to combine the methods of in-class learning and e-learning in a way that is appropriate to both pedagogy and current concepts of learning (Lang, 2002). Based on the practical question of how to blend, three categories for blended learning systems exist:

1. "Enabling blends" focus on addressing issues of access and convenience.
2. "Enhancing blends" incorporate incremental changes to existing pedagogy such as offering resources and supplementary materials online while in a traditional face-to-face learning environment.
3. "Transforming blends" allow a radical transformation of the pedagogy by taking full advantage of the capacity offered by the technology (Graham, 2006).

Zukowski (2006) emphasizes five emerging ingredients as important elements of a blended learning process, including live events, self-paced learning, and collaboration, assessment, and performance support materials. Painter (2006) lists eight key steps to blended learning:

1. Prepare learners with essential skills and overall understanding to ensure success.
2. Inform learners about objectives, facts, and key concepts of the skills they are going to learn and explain the value of learning them.
3. Demonstrate procedures, principles, concepts, and processes so learners can apply the skills.
4. Provide learners with opportunities to practice newly-learned skills and build long-term retention.
5. Evaluate learners' application of new skills and provide feedback.
6. Assist learners' transfer of learning.
7. Provide tacit support of peers, mentors, or experts.
8. Allow learners to work collaboratively as a community to solve problems.

Singh and Reed (2001) characterized blended learning as "optimizing achievement of learning objectives by applying the „right” blended learning technique to match the „right” personal learning style to transfer the „right” skills to the „right” person at the „right” time (p. 2). Each of these workplace definitions adhered to following principles: (a) a focus on learning objectives rather than the mode of delivery, (b) a respect for learning styles in order to reach a broad

corporate audience, (c) a desire to ease the overall competitiveness of the business organization and build a sense of community, (d) an attempt to make work and learning inseparable operations and (e) embed learning in all aspects of the business from hiring to sales to product development. Although it is essential for blended learning teachers to articulate their teaching philosophies, Kanuka (2008) argued that hybrid instructors must also be cognizant of three competing psychological impressions of technology and their impact on the field of blended learning: user determinism, social determinism, and technological determinism.

## **2. The aim and Importance of the Research**

The aim of this research is to find out the opinions of trainers who train the students of mechanical manufacturing on CNC Turning by blending face-to-face classroom environment, workshop and an internet based virtual training environment.

Blended learning has been applied in higher education and workplace learning settings throughout the world and may lead to improved pedagogy, increased access and flexibility, and increased cost-effectiveness (Graham, 2006). It is a fact that mechanical manufacturing requires use of technology and training in this field should be based on the use of educational technology. Thus, blended learning may be used to “foster learning communities, extend training events, offer follow-up resources in a community of practice, access guest experts, provide timely mentoring or coaching, present online lab or simulation activities, and deliver pre-work or supplemental course materials” (Bonk et al., 2006, p. 560). In the business world, the most important reasons for developing blended solutions include the ability to match learning styles; to create individually tailored solutions; to reduce class time; to improve the learning rate; and to exploit the investments already made in re-usable training resources (Sparrow, 2003). In academia, the initial cost-saving argument for e-learning (Gayeski, 1998; Wilson, 1999) has recently been replaced with a more refined understanding of how to integrate technology into an overall learning strategy. This research relates the technology used in manufacturing with the educational technology used for training in a blended environment. In this case, the role and function of a trainer in such an environment is of importance from that trainer’s perspective. Rather than the opinions of the trainees (who are exposed to blended learning model), the opinions of the trainers are significant to assess the place of blended learning model in a technical training lesson like mechanical manufacturing on CNC turning. This model can be regarded as a novel training and learning design. The opinions of a trainer who already used this model can help educators to determine what they should do more or what they should omit.

## **3. Material and method**

This study is based on a case applied at the department of Mechanical Engineering of Technical Science College, Selcuk University, Konya. In 2009, the college realised a LdV Development of Innovation Project “Virtual Training Centre for CNC” (<http://www.vtcforcnc.com>). The Virtual Training Centre (VTC) was set up on the Internet for Computer Numerical Control (CNC) training based on virtual aids. The author of this study was involved in that project as coordinator and researcher. After the project was completed, the training tool developed was applied at the department as a part of blended learning model in the class Mechanical Manufacturing on CNC Turning by a trainer who also worked in the same project as trainer. The trainer (Ph.D) was experienced in mechanical manufacturing training using face-to-face teaching in the class environment and workshop. The author suggested the trainer adding the Turkish version of Virtual Training Centre for CNC to his training session. The trainer used classroom, workshop and the

virtual training tool for two semesters in 2009-2010 educational year. The research is based on the ideas of this trainer after applying blended learning for two semesters.

This is a qualitative research based on face-to-face in-depth interviewing. Kvale (1983:174) defines the qualitative research interview as "an interview, whose purpose is to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena". The data was collected with face-to-face interview. Thus, the synchronous communication of time and place in the interview allowed the interviewer to have a lot of possibilities to create a good interview ambience as well as to have a lot of time and cost. The meeting room was quiet, comfortable, and free from outside distractions. The author asked a series of open-ended questions from general to specific in order to get the interviewee's opinions, experiences, and suggestions. Interview was conducted by the author of the research and it was tape-recorded with the permission of the interviewee as using a tape recorder has the advantage that the interview report is more accurate than writing out notes. However, the interviewer took notes while recording to check questions and answered recorded so that they could be used for transcribing process. The information that the interview generated was coded and summarized for analysis and discovery. The researcher read the transcript, grouped and phrased the data into categories.

#### 4. Findings and Discussion

The researches on blended learning are mainly on the use and advantages of blended learning from the perspective of the students. This research poses a difference from them in that this one is based on a blended learning case to train the students about mechanical manufacturing on CNC turning lathe by using virtual training centre in addition to face-to-face teaching in the classroom and practice in the workshop. In this research, the lesson is mainly based on application rather than theoretical information. The transfer of theory to practice is important. In this context, the categories formed from the interview are as follows:

- The aim of this lesson is to teach programming, not operation. If a student does not know multiplication table, he can not know how a calculator works. At the first stage, the codes to be used in CNC programming are to be learnt. The virtual environment used as a part of blended model helped students to apply the programming commands on the simulations and then they used these commands on the actual CNC lathe. Especially while teaching such cycles as G00-G01 and G02-G03, the virtual environment contributed much to face-to-face and workshop models. The students could make up a product by putting what they learnt from the virtual environment and the theoretical information into practice on the CNC lathe. This also increased the enjoyment of students. The professional skill of teachers about what to blend and how to blend is crucial and the aim and approach of the teacher who is to teach a lesson is the determinant factor. In this research, the trainer preferred the Virtual Training Centre as an internet based virtual environment as the trainer believed that this virtual training tool has ample amount of materials ranging from abstract to concrete to make use of the materials presented in the blended environment. For Graham et al. (2003), blended learning was developed for its potential advantages in offering a more effective education, convenience, and access to teaching-learning environments. Blended learning brings traditional physical classes with elements of virtual education together (Finn & Bucci, 2004). For Julian & Bone, (2001), "Blended learning solutions deliver a comprehensive learning experience using various methods (e.g., instructor-led training, CD-ROM, or eLearning)." "Blended learning combines the best attributes of electronic and traditional classroom experiences to present and reinforce learning" (Anderson, 2001:12). For Osguthorpe and Graham (2003:227), "Blended

learning environment is used to try to maximize the benefits of both face-to-face and online methods- using the web for what it does best, and using class time for what it does best”.

- The trainer found out that some students were not so efficient in learning some cycles and commands. The trainer asked them to repeat the lesson in a different time to learn efficiently. The virtual environment helped them to repeat and felt that they learnt in this way out of class too. Thus, all the students had the same level soon with the help of blended learning. Blended learning takes advantage of the power of technology to deliver training "just in time," anywhere and anytime. It helps us to provide materials to all students even if they are physically out of class. If a student can not attend a lesson, he or she does not miss the lesson or materials. This helps the trainer to provide students the same materials and to present the same lessons. But, everything depends on the student and his or her interest in lesson. In blended learning model, learning can be more focused, delivered bite-size, anytime, anywhere and unlimited distance is reached with flexible time (Alvarez 2005; Thorne 2003). Kibby (2007) noted that one advantage of adopting a blended stance is the ease of course revision and speed of replacing activities that are often problematic in the live classroom.
- Interestingly, the rate of absence was lower than before. The trainer observed that the students were more enthusiastic about getting involved in training and learning more. The trainer claimed that the blended learning model contributed much to this thanks to the fact that blended learning model eliminated the boredom and encouraged the students more. Another advantage of blended learning is pacing and attendance. In most blended learning classrooms, there is the ability to study whenever the student chooses to do so. If a student is absent, she/he may view some of the missed materials at the same time that the rest of the class does, even though the student cannot be physically in the classroom. This helps students stay on track and not fall behind, which is especially helpful for students with prolonged sicknesses or injuries that prevent them from attending school. These “self-study modules” also allow learners to review certain content at any time for help in understanding a concept or to work ahead for those students who learn at a faster pace (Alvarez, 2005). In this model, learning materials are easily accessible and distance and time pose no problem (Alvarez 2005; Thorne 2003). Aycok et al. (2002) report student engagement and interactivity increases in the blended format. Blended learning environment integrates the advantages of e-learning method with some advantageous aspects of traditional method, such as face-to-face interaction.
- The students got the chance to learn as much as they wanted. Some students came to the classroom and workshop after they learnt the content from the virtual environment used for his purpose. The students who worked at the same time in an office while they were having training benefitted much from this model. In this way, the students learnt how to learn as a part of lifelong learning. Readiness of the students increased the motivation of all students and trainer too. Even if some students could not be present in some training sessions, they completed their training using the internet based learning environment as a compensating tool. Buckley (2002) and Barr and Tagg (1995) placed emphasis on student centered learning paradigms, new technologies like internet and personal computers, and new theories such as brain-based learning, cooperative learning and social constructivism to work together to form the new models. Watson (2008) suggested that blended learning involves a shift in strategy in three areas: from teacher centered to student centered learning, from limited to high frequency interactions between students and resources, and from intermittent to deliberate integration of formative and summative assessments.
- The trainer observed that the students worked together and produced something based on coloration. Learning together and producing together increased the communication

between the students and between the trainer and students. The trainer observed more socialization during training. In this model, learners can interact with the tutor and their peers (Alvarez 2005; Thorne 2003). According to Dziuban et al., (2004:3), "Blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment."

- Since the virtual environment has the necessary training tools, the trainer did not spend time to get prepared for the lessons. Blended learning environment supported the trainer by presenting ready materials in the classroom and workshop environment. The trainer remarked that student learnt how to train themselves in a short time and he was pleased to experience that he didn't need to spend much time to control the students thanks to the blended learning. The students were so engaged in training that the role of the trainer was only to guide them rather than lecturing the content.
- The trainer remarked that the number of the CNC lathes was limited and this caused students to spend more time for practice on CNC lathe. It was clear that the number of training tools was important for a qualified learning environment.
- The trainer complained about the number of students, which were about 40. According to him, this number was too high to apply this model. When he tried to encourage all the students to be engaged in the same task at the same time, it took longer time to use blended model. He agreed that the more blended a model is, the fewer students should get involved in it.
- The trainer should find a balance in using the each blended method not to make students bored. When the trainer used the internet based learning environment longer, he observed that students got sleepy and bored as a sign of their boredom. The trainer should be aware of students' concentration duration while teaching and learning. By combining online and face-to-face formats, educators may achieve the inherent benefits of both types of instruction through a harmonious balance of virtual access to knowledge and physical human interaction; such an approach has been labelled as blended learning (Osguthorpe & Graham, 2003).

## 5. Conclusion

According to Brown (2003), blended learning supports all the benefits of e-learning including cost reductions, time efficiency and location convenience for the learner as well as the essential one-on-one personal understanding and motivation that face-to-face instructions presents. Osguthorpe and Graham (2003) identified six reasons why institutions and faculty would see added value in creating blended learning environments: (1) pedagogical richness, (2) access to knowledge, (3) social interaction, (4) personal agency, (5) cost effectiveness, and (6) ease of revision. These reasons are best understood when grounded in the benefits and challenges of blended learning environments. Access to education is one of the key factors which ensure development of distance education environments. Ease of access has increasingly become more important as more mature students with different external responsibilities are increasingly in need for more additional training. Blended education environments are regarded as a way of increasing conveniences while maintaining and balancing personal communication at the same time (Morgan, 2002; Collis, 2003).

As indicated in the research, there are several advantages when incorporating online learning into various forms of blended solution, such as, learning can be more focused, delivered bite-size, anytime, anywhere; learners can interact with the tutor and their peers; learning materials are easily accessible; different techniques can be utilized by maximizing different technologies; cost expenses decrease; unlimited distance reached; flexible time (Alvarez 2005; Thorne 2003).

However, the blended learning is a new concept combining with e-learning, the information is still being developed. If people are interested in blended learning, they need to know where to get the right information. People do not know anything or not much about blended learning and therefore, the blended learning potential is not being well-known (Thorne, 2003).

Thanks to "... blended learning becoming more and more prevalent, it is vital for higher education and corporate training settings to create strategic plans and directions, focusing on pedagogical techniques in blended learning" (Bonk et al., 2006). This research indicates that blended learning can play a vital role in training sessions of vocational branches in the educational organizations and workplaces. It is also not only a matter of higher education. It can be used for any vocational training based on skill development at any level. The implementation of blended learning model in a very specific field of vocational education (footwear design training) has yielded positive results. To be sure of other vocational branches in which blended learning model can be used, more researches should be carried out with emphasis on application and practice rather than theoretical knowledge.

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