

EXPLORING THE EFFICACY OF A RANGE OF CRITICAL THINKING AND PROBLEM SOLVING TECHNIQUES IN DEVELOPING AN INSTRUCTOR GUIDE

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Abstract

Six European educational institutes have come together to explore the development of a workbook to help adult educators incorporate blended activities into their teaching process. To develop this workbook, representatives from each of the European institutes attended a two-day workshop where a range of critical thinking and problem-solving techniques were employed to develop the table of contents (and some preliminary content) of the workbook.

Four techniques were used for the workshop, with the first focusing on an overview of the topic of Blended Learning, the second concentrating on the details of that topic, the third was designed to bring the discussion back to a higher-level overview, and the final one to dive into the details and questions again. This pattern of *Overview-Detail-Overview-Detail* was designed to ensure that the topic was fully explored. The partners spent 30-45 minutes on each of the techniques, followed by a 30-45 minute general discussion on the outcomes of the activity.

Using an exploratory qualitative study approach, where the focus was on the number of unique ideas that each technique generated, the following results were found for each technique: Triadic Elicitation (51 unique ideas), Ishikawa Diagram (34 unique ideas), PESTLE (13 unique ideas), and a MindMap Activity (26 unique ideas).

Keywords: Blended Learning, Ishikawa diagrams, PESTLE Analysis, MindMaps.

1 INTRODUCTION

Staff from six third-level institutes have come together to develop a range of resources to help teachers and lecturers who wish to explore new ways to blend the content of their courses. The term “blended learning” refers to educational experiences that combine online teaching with traditional classroom-based teaching [1]. Graham [2] defines the term “blended learning” as a system that “combine face-to-face instruction with computer-mediated instruction”. Similarly, Garrison and Kanuka [3] define it as “the thoughtful integration of classroom face-to-face learning experiences with online learning experiences”.

Many researchers, including Allen, Seaman, & Garrett [4], suggest that when mixing classroom and online content to produce a blended lesson, there is a minimum component of each aspect that must be present to qualify it as being “Blended Learning”. The table below suggests that for something to qualify as blended it must be somewhere in the range of 30% online and 70% classroom, to 79% online and 21% classroom. So if the teaching is fully online, e.g. getting the learners to use a MOOC or other exclusively online content, then it isn’t typically considered Blended Learning.

Table 1. Blended Learning Mixes.

Content Delivered Online	Content Delivered in classroom	Type of Course
0%	100%	Traditional Classroom
1-29%	71-99%	Web Facilitated Classroom
30-79%	21-70%	<i>BLENDED LEARNING</i>
80-100%	0-20%	Online Teaching

Oliver and Trigwell [5] raise arguments against the usefulness of the term "blended learning". They point out that the majority of learning is already "blended" to some extent (combining verbal and visual typically), and that "learning" would tend to suggest that the focus is student-centred, whereas, in practice, the majority of literature concerning "blended learning" treats it more so as a model of instructional design, and therefore is a teacher-centred phenomena. However, it is worth noting that in more recent times, e.g. Hrastinski [6], the term is identified as an umbrella term, and it is accepted to mean different things to different people depending on the context. For clarity, in the completed workbook, the term "bended learning" is eschewed where possible, and term "blended activities" is preferred, when referencing these approaches. Moskal, *et al.* [7] note that Blended Learning should not be treated as something that is exclusively the concern of teachers and students, but rather as something that needs to be the concern of the whole educational organization. They state that a successful blended innovation must be supported by a reliable and robust infrastructure where a range of staff, including management staff, support the blending process. In Jared Carman's 2005 seminal report [8], they outline five key ingredients that should be present for a successful Blended Learning experience, these are:

- **Live Events:** These are events where all students are together in a teacher-led learning session, that can be either virtual or real.
- **Online Content:** This refers to learning content that the students can explore at their own pace, in whatever location they prefer.
- **Collaboration:** This refers to creating communication opportunities between the students, and includes emails, forums, and chat tools.
- **Assessment:** This refers to any form of assessment, including pre-assessment to determine prior knowledge, and post-assessment to measure learning transfer.
- **Reference Materials:** This refers to additional online and off-line content that enhances student comprehension and retention.

2 DESIGNING THE WORKBOOK

To design and develop the workbook, a group of 12 blended learning experts from 6 partner institutes were brought together for a two-day workshop (10am-4pm on both days), where participants undertook a range of Creativity and Critical Thinking activities to explore and ideate the potential contents of the workbook. The activities can be grouped into four main types, with each one followed by a 30-45 minute general discussion session.

2.1 Terminology Discussion Activity

The participants were presented with a range of terms associated with Blended Learning and asked to explain these terms (as they understood them) to each other, and to discuss each of the terms as they relate to Blended Learning. The terms discussed were: "Online learning", "E-Learning", "M-Learning", "D-Learning", "E-Assessment", "Computer-Aided teaching", "Flipped classrooms", "Virtual learning environment", and "Synchronous and asynchronous learning".

The goal of this activity was introductory in nature, both to help the participants to get to know each other, and to ensure that all participants had a shared understanding of some of the key terms associated with Blended Learning (BL). The participants were then asked to work in small groups and to write each of these terms on Post-it Notes, and to categorise them as being in one of three categories: "Closely Related to BL", "Somewhat Related to BL", "Distantly Related to BL". The actual outcome of this categorisation was less important than the fact that an open, relaxed, and friendly discussion was undertaken about the themes of the workbook. Some key points that were uncovered during this activity include the following:

- The importance of encouraging people to try taking a pilot approach to BL
- To consider the importance of copyright and creative commons
- To encourage the develop of content that is accessible and usable
- To identify blending tools and to look at alternative tools

- To think about how to evaluate the outcomes of blended content

The discussion activity that followed centred on a general outline of the workbook to be developed, looking at what would be the main sections of the workbook. Following that there was also some discussion on what should be some of the key themes to be threaded throughout the workbook to link the distinct chapters together.

2.2 Ishikawa Diagram Activity

Ishikawa diagrams (also called Fishbone or Herringbone Diagrams) were developed by Kaoru Ishikawa in the 1960s to explore the potential causes of a specific event [9]. The diagram places the issue or challenge at the “head” of the fish, and the causes extending to the left as fishbones; the ribs branch off the backbone for major causes, with sub-branches for root-causes, to as many levels as required. In different scenarios, “ribs” are labelled with different terms, and in this activity the ribs were labelled with the questions: “Why”, “How”, “Where”, “When”, “Who”, and “What”. The issue in this case was stated as “What are the important things a novice should know about blended activities as they begin their journey to blending”. The participants were initially given crayons and coloured markers to work on the diagrams individually.

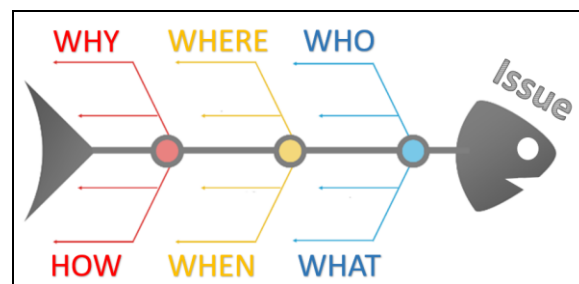


Figure 1. Ishikawa Diagram with the 5 Ws and a H.

Following this, the participants were asked to work in small groups to generate questions that are important about the workbook. Some of the key questions uncovered were:

- Why do Blended Learning?
- When to use Blended Learning?
- Who should be involved?
- Where to use Blended Learning (and for what audience), and where not?
- Where can I find answers?
- How to start Blended Learning, how to continue with Blended Learning (and how to finish)?
- How can I cover the costs of doing this?
- How do I prepare my manager for this? (money, reputation, publicity)
- How do we evaluate this?
- How to motivate teachers?
- What are the typical mistakes?
- What do I need to know about tools and technologies?
- What are some bad practices?

In following discussion session, the participants were asked to answer these questions, and it became apparent that an important part of the workbook would be to give different guidance to different stakeholders of the blended process, for example, a chapter for the students, a chapter for the teacher, a chapter for the academic manager, and a chapter for the programme evaluator.

2.3 PESTLE Analysis Activity

The third activity with the participants was to undertake a PESTLE analysis, where “PESTLE” is an initialism for analyzing a scenario using the following factors:

- Political factors
- Economic factors
- Social factors
- Technological factors
- Legal factors
- Environmental factors

These factors are useful to explore when thinking at a topic or theme, and is credited to Francis Aguilar in his 1967 book “Scanning the Business Environment” [10]. The purpose of this activity was to change the type of discussion from a detailed-focused one (because of the previous activity and discussions) to a more philosophically-oriented one where the focus is on the macro topics rather than the micro detail.

The topic that was discussed was “How can we ensure that Blended Learning is successfully adopted, and what are the potential barriers?”. This was done in small groups, and a representative sample of one of outcomes of this activity were as follows:

Table 2. P.E.S.T.L.E analysis results.

Political Factors	<ul style="list-style-type: none"> • We need an overall political strategy in terms of giving recognition to teachers that undertake training in Blended Learning (at the moment it’s only encouraged) • Writing books about Blended Learning can help change the world
Economic Factors	<ul style="list-style-type: none"> • It’s worth noting that there is no immediate return on investment (Explain planning in terms of Short-term, medium-term, and long-term outcomes) • How do you start Blended Learning in an affordable way?
Social Factors	<ul style="list-style-type: none"> • We need to undertake a needs analysis • We need to consider people with special needs • We need to consider people with different languages
Technological Factors	<ul style="list-style-type: none"> • It’s difficult to find someone who is both a good educator and a good technologist (so we need partnerships) • We need to teach the educators how to achieve high quality Blended Learning with minimum skills, technology, and money
Legal Factors	<ul style="list-style-type: none"> • We need to explore accreditation for the learners, for both non-formal to formal learning • We need to look at issues like copyright and plagiarism
Environmental Factors	<ul style="list-style-type: none"> • We need to do this in an environmentally friendly way • We need to create a manifesto

Following this activity, a general discussion was held where the technological and pedagogical aspects of Blended Learning were discussed, and out of that discussion the importance of creating an inclusive, accessible, and an environmentally friendly workbook emerged. This activity also resulted in adding detailing how to make the teaching and technological content more usable to as wide a range of people as possible. Also, as the participants were from different disciplines of teaching, including computer science, journalism and language teaching, there was a good discussion of how each of these disciplines approach the teaching process, and what techniques from each should be used in the workbook. There was unanimous consent that specific teaching approaches from computer science would be extremely useful in the workbook, including the use of analogies, leveraging peer-to-peer support, focusing on real-world exemplars, and cultivating a growth mindset amongst the students.

2.4 MindMap Activity

The final major activity that the participants engaged in was to develop a MindMap [11] to describe some of the major content of the Blended Learning Workbook. The participants were instructed on how to create a MindMap and were given crayons and coloured markers to work on a MindMap in small groups focusing on four main concepts “Teaching”, “Technology”, “Evaluation” and “Management”. There were 7 MindMaps produced, and a summary of the common themes is presented below in Figure 2.

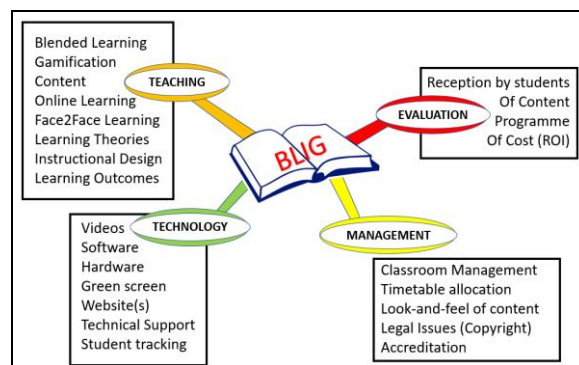


Figure 2. MindMap with Potential Workbook Content.

Following this activity, a general discussion was held amongst the participants who agreed to six types of blending approaches that the workbook should focus on, and those were:

1. Presentations, and Prezi
2. Podcasts, and soundscapes
3. Videos, and subtitles
4. Documents, and interactivity
5. Games, and gamification
6. Searching, and WebQuests

These approaches were determined to be ones that were easy for beginners to start with, but all have the scope to develop to be more complex and sophisticated, as the expertise of the teachers and lecturers continues to grow. These were also ones that could be used to make the content more accessible, as well as being used in a variety of contexts and be developed using a range of technology tools. This discussion also further emphasized the importance of developing these resources in a way that is accessible to people with special needs, and to those for whom English is not their first language, thus Universal Design for Learning was explored as part of developing the workbook [12]. One topic in particular that was emphasized repeatedly was the notion of evaluation, and in particular how different people may evaluate the outcomes of the blended activities, such as Pedagogical evaluation, Financial evaluation, Theoretical Models of Evaluation, and Qualitative models of evaluation.

3 IDEAS GENERATED

All of the outputs of each of the four Creativity and Critical Thinking activities (including notes and rough work) were collected and analyzed. Using an exploratory qualitative study approach, a spreadsheet was created logging all the ideas generated by each of the 12 Blended Learning experts. Duplicate ideas were noted, and the follow results were noted for each of the techniques: Triadic Elicitation (51 unique ideas), Ishikawa Diagram (34 unique ideas), PESTLE (13 unique ideas), and a MindMap Activity (26 unique ideas). It is worth noting that the techniques were ordered to have the first one taking a high-level perspective on Blended Learning, with the next taking a lower-level view, the next bringing it back up to a higher level, and the final one back to a lower level. It is clear that the first pair of techniques generated the majority of ideas (85 unique ideas), but the second pair repeated many of those initial ideas, and also generated an additional 39 unique ideas.

Following this, a colour coding approach was used to identify the main themes that emerged from the Idea Generation process, to aid in structuring the workbook. The key themes that emerged were:

- Defining Blended Learning
- Starting small, creating a simple Blended Learning activity
- Copyright and Creative Commons
- Accessibility and Universal Design
- The role of the Blended Manager
- Exploring different Blended Technologies
- Evaluation of Blended Learning

These themes, in conjunction with the six types of blending approaches that emerged, were used to guide the overall structure of the workbook.

4 WORKBOOK CONTENT

Based on the two-day workshop, the following table of contents was agreed for the workbook:

- Chapter One: An introduction which outlines some of the basic ideas around Blended Learning, focusing on what it is and what it isn't.
- Chapter Two: A chapter outlining a Pilot Approach to including simple blended activities into an educator's teaching.
- Chapter Three: Some of the key considerations that are important to think about as a teacher dealing with Blended Learning activities, such as copyright and accessibility.
- Chapter Four: This chapter presents tutorials for using technology tools to create e-learning materials such as presentations, podcasts, videos, games and WebQuests.
- Chapter Five: This chapter looks at the Blended Learner and suggests some skills that these learners need to develop to help them navigate the blended activities.
- Chapter Six: This chapter focuses on helping the Blended Manager and suggesting ways that management might support blended teaching activities.
- Chapter Seven: This is the Blended Technologies chapter, and it presents an overview of alternative tools to supplement the technologies described in Chapter 4.
- Chapter Eight: This chapter looks at a range of approaches to evaluating the blended teaching and learning process.

Following the workshop, one of the partner institutes agreed to write a first draft of one of the chapters, to help decide on some of the key elements of the workbook (for example, structure, format, use of language, use of imagery, and use of checklists). This was done within two days of the completion of the workshop, and consisted of a 20-page chapter on how to develop a pilot for adding blended content into a lesson, and includes checklists, flowcharts, and blank forms. This draft was shared between all partners, and many suggestions were incorporated so that it became the template for all subsequent writing on the workbook.

There were six types of blended approaches agreed upon in the workshop, as many as the partner institutions involved in the development of the workbook, so it was decided that for Chapter 4 (containing the tutorials on each approach) and Chapter 7 (containing alternative technologies that could be used for each approach), each partner would focus on a single approach, and develop the associated contents, this resulted in a rapid completion of those two chapters. Overall, the writing process took three months to complete, and another two weeks to use the Overleaf tool (an online LaTeX editor) to put the workbook into its final format.

In the subsequent months the workbook was translated from English into German, Slovenian and Spanish, and each translation process uncovered some interesting challenges, including the use of idioms and region-specific concepts that were either removed or annotated on all subsequent versions of the workbook. This helped make contents more internationalized and universally applicable.

5 DISCUSSION AND CONCLUSIONS

The process undertaken for the development of the workbook uncovered three crucial dimensions in developing blended activities: the types of blended activities (Presentations, Podcasts, Videos, Documents, Games, and Searching), the types of people involved (the teachers, the students, the management, and the evaluators), and the types of teaching approaches that can be incorporated (using analogies, leveraging peer-to-peer support, focusing on real-world exemplars, and cultivating a growth mindset). To accompany the workbook, an online resource was developed to illustrate the technologies discussed in the workbook which helped readers understand how to use the tools and provides links to download free resources.

Since the workbook was completed before the COVID-19 pandemic, there was a significant opportunity to test the workbook as a result of the move of most forms of education from face-to-face classrooms to an online setting. The workbook became a matter of enormous importance for teachers in many countries, and many have contacted the developers of this workbook to give helpful feedback and express their gratitude. Additionally, 25 teachers from a range of nationalities were given the workbook as an aid during the pandemic. They were asked to give feedback in the form of highlighting the Strengths, Weaknesses and Alternatives of the workbook. Some of the strengths that the reviewers expressed included: *“This workbook saved my life, I wouldn’t have gotten through [the first few months of the lockdown] without it”, “I love the Pilot chapter, it allowed me to dip my toes into the water before having to try something too hard”, and “The different tools and techniques listed in here are great.”* Some of the weakness included: *“I love it a lot, but it’s a long book, could you do a shorter version?”, “The Blended Manager chapter doesn’t need to be a part of the workbook”, and “I don’t like that some the forms span over two pages”*. Some of the Alternatives mentioned were: *“It would be better if there were some case studies of blended activities”, “Is there any chance that more blended activities can be added?” and “I would prefer if the workbook was a wiki instead of a PDF”*.

Based on this feedback, two 40-page versions of the workbook were developed to make the content more focused and less daunting. These mini-workbooks looked at “Blended Assessment” and “Blended Teaching” respectively.

Additionally, to address the case studies issue, a new partner consortium is building upon this work to develop a train-the-trainer workshop-based short course based on case studies to empower blended champions to share their knowledge and skills with their colleagues in their workplaces. The general layout of the Blended Learning case studies will be as follows: Table 3. Case studies structure.

Title	<ul style="list-style-type: none"> Title of the case study
Introduction	<ul style="list-style-type: none"> Time, place, people, and ethics
The Case	<ul style="list-style-type: none"> Evidence, Situation before intervention, The Intervention, After the intervention
Issues	<ul style="list-style-type: none"> Key issues of the case, Complexity of the case, Confirming or disconfirming evidence
Conclusions	<ul style="list-style-type: none"> Summary, Themes that emerged, Questions raised, Reflections

This template will be used in further research to develop case studies that can be used either individually or in groups to compare and contrast scenarios that lead to successful teaching outcomes.

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