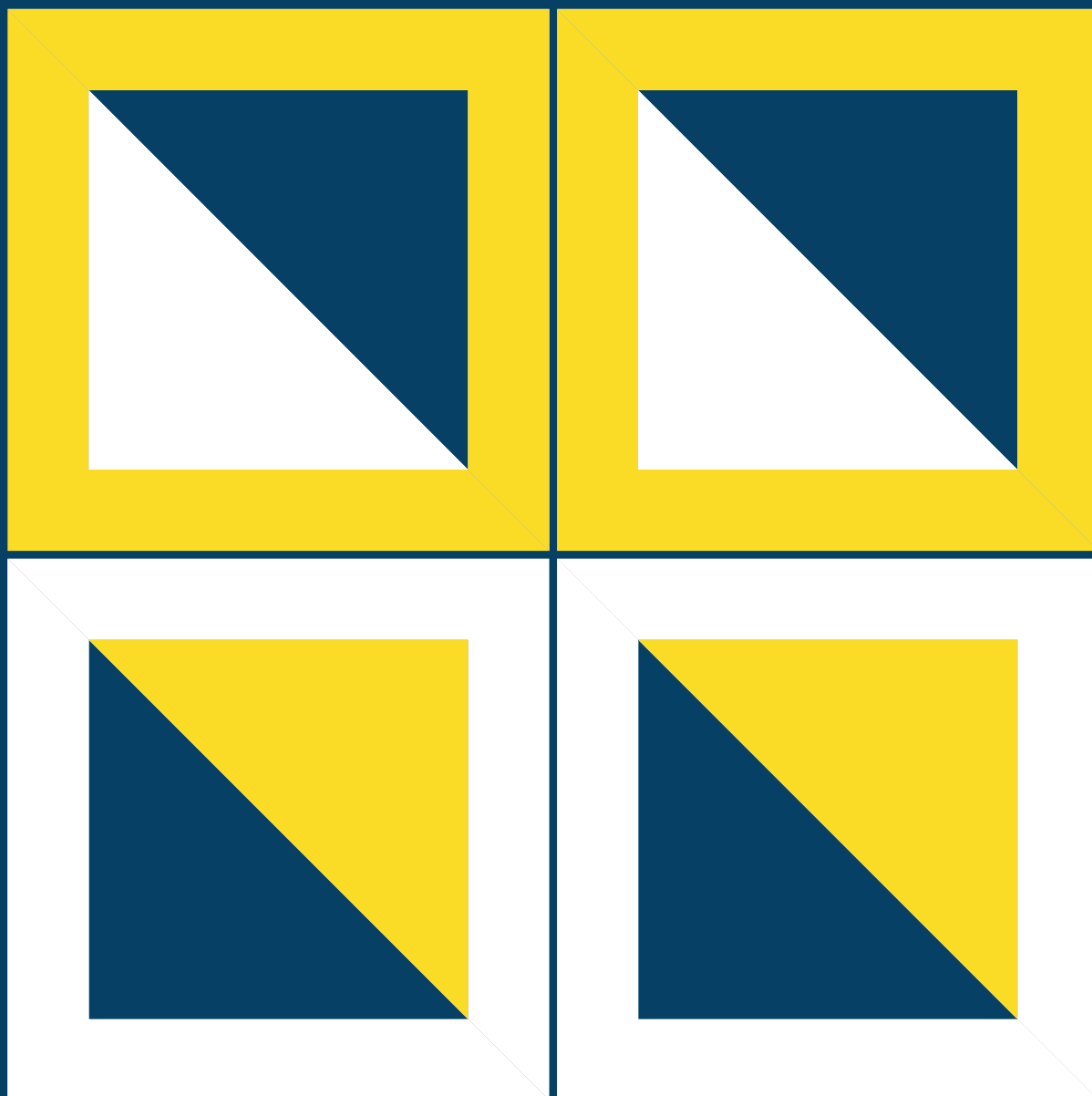


THE TEACHER PRACTICAL HANDBOOK TO EXTENDED LEARNING



XL4HET - Extended Learning for Higher Education
Teachers and Trainers



Funded by
the European Union





Call 2021 Round 1 KA2

KA220-HED - Cooperation partnerships in higher education



**Funded by
the European Union**

Project n. 2021-1-IT02-KA220-HED-000027596

This project has been funded with support from the European Commission. This document reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

IFOA



Sapere utile

**METID - POLITECNICO
DI MILANO**



**POLITECNICO
MILANO 1863**
METID
LEARNING INNOVATION

**TECHNOLOGICAL
UNIVERSITY OF DUBLIN**



MÄLARDALENS UNIVERSITY



**BELGIAN IT ACADEMY
SUPPORT CENTER**

BiASC

Belgian IT Academy
Support Center vzw/asbl
www.biasc.be

**UNIVERSITÉ DE PAU ET
DES PAYS DE L'ADOUR**



**UNIVERSIDAD MIGUEL
HERNÁNDEZ DE ELCHE**



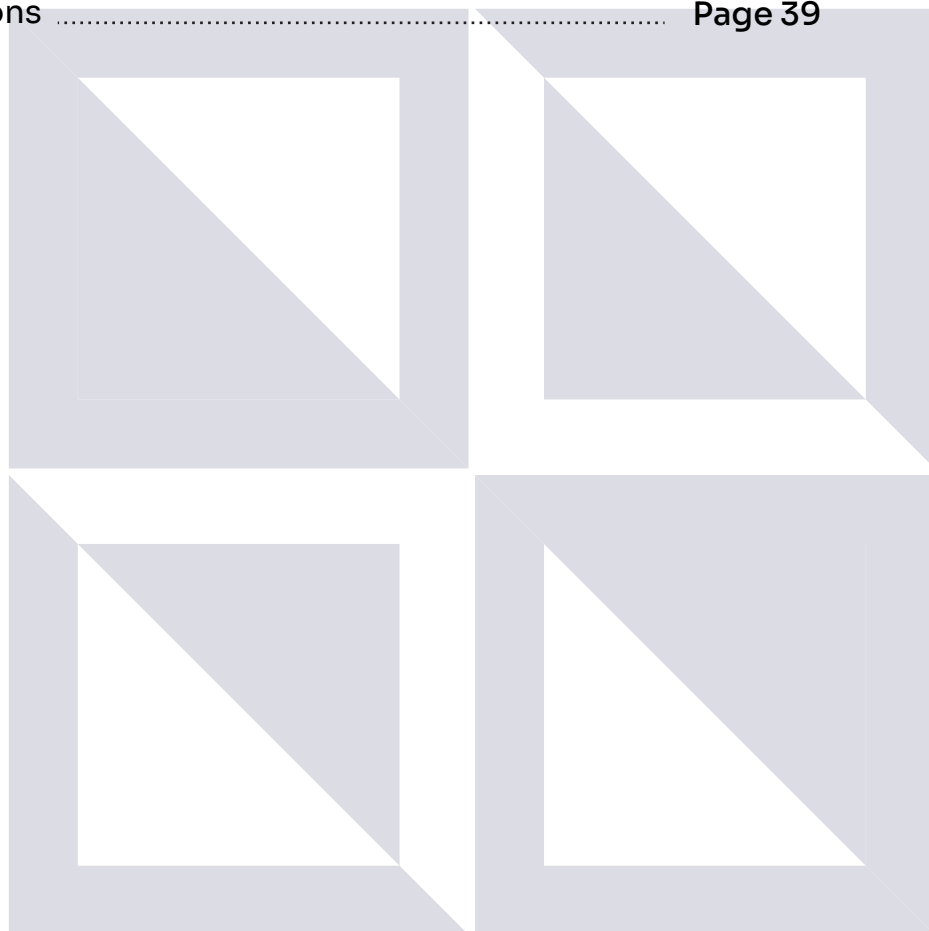
**Funded by
the European Union**

INDEX

1. Executive summary	Page 1
1.1 Project background	Page 2
2. Extended classroom design methodology	Page 4
2.1 The importance of design and the Smart Learning Design (SLD)	Page 4
2.2 The framesets	Page 6
2.3 Smart Learning Design and the frameset within the XLHE project	Page 8
3. Guidelines for teachers	Page 9
3.1 The methodology of designing (blended) teaching	Page 9
3.2 The management of the (hybrid) teaching	Page 12
3.3 Technology recommendations to create a (Smart) Class	Page 17
3.4 Spaces to ease (active and blended) teaching and learning	Page 20
4. Partners and teachers observations	Page 23
4.1 BiASC - Belgian IT Academy Support Center (Belgium)	Page 23
4.2 IFOA - Istituto Formazione Operatori Aziendali (Italy)	Page 24
4.3 MDU - Mälardalens Högskola (Sweden)	Page 25
4.4 MDU - METID - Milan Polytechnic (Italy)	Page 26
4.5 MDU - TUD - Technological University Dublin (Ireland)	Page 27
4.6 MDU - UMH - Universidad Miguel Hernández de Elche (Spain)	Page 28
4.7 UPPA - Université de Pau et des Pays de l'Adour (France)	Page 29



5. Key issues and lessons learnt	Page 30
6. Final student's satisfaction questionnaire	Page 33
6.1 General overview of all the questionnaires	Page 33
6.2 General suggestions	Page 35
6.3 General opinion about the extended classroom	Page 35
6.4 Aspects that teachers need to take into account when designing the Extended Classroom	Page 36
7. Final project consideration	Page 39
7.1 Final partners considerations	Page 39



1. Executive summary

The lockdown has caused a **digital acceleration in education**, leading to the use of a wide range of communication channels between faculty and students. These include synchronous platforms (Zoom, Webex, Microsoft Teams, Google meet, etc.), asynchronous platforms (Moodle, Blackboard, etc.), collaboration and exchange tools such as Student Response System and shared whiteboards, potentially endless ones such as Mural or Miro, and new models of using communication tools such as WhatsApp and Slack.

The fear of a disorienting effect was quickly overcome because it was understood that if communication occurred clearly and the tools were explained effectively students were able to easily adapt to these changes and move within them very easily. With the **return to the classroom**, often alternating with new interruptions in attendance by groups of students or the entire class, this variety of tools could not be abandoned. Teachers have had to continue to live with it and to find increasingly effective ways to integrate classroom and online realities.

The need to create "**extended**" classrooms that enable both in-presence and distance learning emerged during the pandemic phases but is still now a current reality that cannot be ignored. To achieve the goal of making extended learning work effectively, it is necessary to carefully design the environment, furniture, devices and software as well as the teaching itself.

It is precisely in this context that the **XL Project - Extended Learning for Higher Education teachers and trainers** project fits in, with its main output being the creation of this operational tool, which takes the form of a handbook. The purpose is to provide teachers with a guide that can support them in designing blended learning quickly and effectively. Drawing on the 7 experimentations in active and blended teaching conducted by each partner involved in the project, the document highlights the recommendations of the different solutions tested, with respect to three main dimensions: methodology, spaces and technologies.

The project is implemented by a strong consortium of **7 partners in 6 EU countries**: Italy, Belgium, France, Germany, Ireland, Spain and Sweden, representing a competent and qualified mix of excellence in European Higher Education:

- I.F.O.A. - Istituto Formazione Operatori Aziendali (Italy)
- METID - Milan Polytechnic (Italy)
- Technological University Dublin (Ireland)
- Mälardalens Högskola (Sweden)
- Belgian IT Academy Support Center (Belgium)
- Université de Pau et des Pays de l'Adour (France)
- Universidad Miguel Hernández de Elche (Spain)



1.1 Project background

The project has five main objectives:

1. **Develop, test and adopt** in the partner institutions **new teaching and learning approaches** for Higher Education.
2. **Improve teachers' pedagogical and digital competences**, through providing them with concrete examples of tested, agile and cooperative working methods and digital tools.
3. Offer students individualised and collaborative **in-person and online learning activities**.
4. **Create an online community of teachers**, where they can exchange experiences, learn from each other and develop ideas jointly.
5. Supply decision-makers and education technology providers with **guidance on how to improve digital teaching equipment and software**.

To achieve its objectives, the project adopts an 'agile' development methodology, whereby results are generated through refinements resulting from successive iterations, to ensure rapid deployment of first solutions, however imperfect, while at the same time initiating improvement actions and ensuring that they are constantly updated. The project aims at reaching the following results:

1. **Result 1:** Develop a “Toolbox of pilot practices in extended learning”
2. **Result 2:** Develop a "Teacher's Practical Guide to Extended Learning”

The project activities for both results will be developed through an initial set-up phase (of 3 months), **three successive iterations of experimentation** (7 months each), combined with a peer-review (1 month each), and a final phase to bring the result to unity and prepare possible future activities, beyond the end of the project (2 months).

Starting from an initial analysis of their respective contexts and needs, each partner will construct, test and evaluate pilot practices of extended teaching. Each pilot will be translated into a case study accompanied by teaching materials, testimonials, video training pills, recordings, etc., and examined by the project partners in a peer-review mode. **Its pros and cons will be analysed, and will result in a teacher's guide to extended teaching, which will collect examples, materials and practical tips for educational innovation.** The same guide will also provide general policy recommendations for decision makers and suggestions for education technology providers to improve their hardware and software products.



This document is referring to the 3rd Edition of the project result 2 “Teacher's Practical Guide to Extended Learning” edited after the 3rd iteration phase (from June 2023 to February 2024) by the consortium partners.

It aims at improving the extended teaching and it is based on the 7 cases presented under the Result 1 Development of a “Toolbox of pilot practices in extended learning”. It is the final and definitive version of the document; this handbook is prepared and designed in three consecutive phases:

- in the first draft, at the end of the 11th month;
- in the second edition, at the end of the 19th month;
- in the definitive version, at the end of the project – this one.

This final version of the document is the result of the three iterations described above.



2. Extended classroom design methodology

This section presents the methodology used for the design of the 7 experiment courses carried out by each project partner in the first iteration of their pilot course, and then applied in the next two iterations as well.

2.1 The importance of design and the Smart Learning Design (SLD)

The fundamental starting point for effective teaching management in general and blended teaching in particular is to carefully design lessons. One of the first implications that the new paradigm of the extended classroom brings is the fact that the teaching process is no longer limited to what happens in the classroom but has the opportunity to encompass the entire process leading to the Intended Learning Outcomes.

Managing, however, the complexity arising from this new dimension of teaching is very complex and therefore requires the use of simple and effective tools that will allow it to be designed in the best possible way.

For these reasons we have been helped by the Smart Learning Design model, in the version developed by METID of the Politecnico di Milano, and on its basis we have designed the 7 experimental cases from which the guidelines of this paper have been derived. Indeed, the model urges us to think about the totality of the student's learning experience, developing awareness about the totality of the time commitment required and the activities needed.

In fact, talking about "**student-centered learning**" also means starting to consider not only what happens in the hours when the teaching activity is scheduled, but also the totality of the process by taking into consideration the time outside the classroom as well. Through Smart Learning Design we place attention on the individual moments of the "learning" process that result in interactions for educational purposes, and these individual moments constitute the "learning events," as they constitute recognizable units in their occurrence in time and space. The learning events are connected to each other in a systemic flow that can be emphasized by highlighting the mutual relationships, in particular by crossing the variable of time and space we get:

- **The presential dimension:** this is the context that, according to the teacher, necessarily requires physical presence in the classroom, laboratory, or physical location outside the educational institution.



- **The extended classroom dimension:** these are the situations in which the teacher believes that learning events can take place both in presence and, if necessary, online, but always in synchronous mode.
- **The synchronous online dimension:** brings together all learning events that the lecturer deems appropriate to place in online seminars (webinars) in which everyone participates online and at the same time.
- **The asynchronous online dimension:** is the context in which learning events are placed that are based on the use of digital content (Open Educational Resources, MOOCs, etc.) or on the performance of online tests/activities at a time chosen by the student, but within the framework of the schedule defined by the teacher.
- **The autonomous mode dimension:** this is the context for learning events in which the lecturer wants to leave total organisational freedom to the student in terms of both time and place and mode.

In this context, if the role of the students is to put themselves on the line, engaging in all learning events and taking responsibility for their own learning journey, the role of the lecturer is to best design and support all learning events that are useful for the effective achievement of the Intended Learning Outcomes.

Listed below are the learning events identified in the Smart Learning Design model and also used in the design of activities within the project's 7 test cases:

- **Frontal content collection:** acquisition (or collection) of information, concepts, methods, strategies through listening, reading, viewing resources (e.g., lectures, MOOCs, articles and books, videos and multimedia content, notes, etc.).
- **Interactive content collection:** acquisition of information related to concepts, methods, strategies, and processes through interaction with faculty, other students, or digital tools (e.g., virtual reality systems).
- **Content transformation:** processing of knowledge through its "manipulation" and transformation into diagrams, summaries, maps, etc.
- **Discussion:** activities that stimulate students to formulate questions, arguments and counter-arguments, reflectively and critically evaluating different points of view.
- **Practice/experience:** application of theoretical knowledge, from specific inputs (e.g., problem, case study, scenario, role play), using physical or digital tools (e.g., virtual simulations) in generic or specific environments (e.g., laboratory).
- **Production/Investigation:** production or organization of new content and specific outputs/artefacts through individual and/or collaborative work.
- **Retrieval:** retrieval (or recall) of acquired knowledge (information and data) through individual or group activities for its consolidation.
- **Reflection and metacognition:** reflection on the learning experience as a process, the relationships between components, steps taken and improvements made.



2.2 The framesets

In order to cope with the considerable complexity and variety of contexts that we may encounter in teaching practice, we have tried to identify three models that try to integrate the main variables in a coherent logic, called "framesets", that then proves to be sufficiently flexible with respect to the different interpretative possibilities required.

These three identified framesets try to be an inspiration for the design of an entire course, a laboratory, an exercise or a subgroup of lessons and proposing a coherent integration between:

- **Numerosity of students:** small-medium class, with a maximum number of 80 participants, and a large class with participants ranging from 80 to 150-200 and above.
- **Expected level/type of teacher/student and student/student interactions:** three different situations can be recognized i.e.:
 - one in which interactivity is primarily between the teacher and individual students (**teacher-student interactivity**);
 - one in which the level of teacher-student interaction increases and interactions between students, in pairs or groups, are added (**high teacher-student and student-student interactivity**);
 - a situation in which the main interactivity is between students who collaborate in content creation and manipulation while the teacher plays more of a guiding and facilitating role (**co-creation of content through interactions between students and with the teacher**).
- **Digital equipment/content:** digital tools (hardware and software) to support communication and interaction.
- **Degree of flexibility of furniture/spaces:** distinction is made between:
 - **rigid spaces** characterised by non-movable seats and desks and often also by stepped flooring;
 - **semi-flexible spaces**, characterised by chair, seats and desks that are not fixed to the floor, but can be moved with some difficulty due to their weight, absence of casters; flexible spaces, furnished with castor desks and seats, with flat flooring that facilitates their movement and sufficient space to easily reconfigure the classroom.



Based on these elements, we identified three different classroom framesets:

- **Frontal class:** the low-interactivity frameset is best suited to teaching set in a basically transmissive mode; there are few exchanges and they occur mainly between the lecturer and individual students, who are required to listen carefully, take notes, and answer questions;
- **Interactive class:** in the highly interactive frameset, frequent exchanges occur between the lecturer and individual students and between students, in pairs or divided into groups. Students are asked to react to questions and prompts proposed by the teacher and to interact and compare with their peers. This model is easily applicable to small- to medium-sized classrooms but, with shrewdness in design and the support of online tools, can be adopted in large ones as well.
- **Hands-on class:** In the hands-on class, part of the content is proposed by the teacher, while the remaining content is constructed through interaction between students and with the teacher. Students are asked to interact with each other frequently to build content through an inductive process from hands-on exercises, laboratory experiments, and explorations in virtual reality settings. The teacher guides the interactions among students, facilitating the research, organisation and sharing of information, concepts, applications, etc. Such frequent interactions of this type are more easily managed in small- to medium-sized classroom settings.



FRONTAL CLASS

Low interactivity between teachers and students.
Both small and big classes

TEACHER ROLE:

Provide all the content with frontal lessons

STUDENTS ROLE:

Listen, ask questions, answer quizzes and react to solicitations



INTERACTIVE CLASS

High interactivity between teachers and students
Preferably small/medium classes

TEACHER ROLE:

Provide part of the content with frontal lessons and design interactions

STUDENTS ROLE:

Listen, ask questions, participate to activities, discuss and interact with each other



HANDS ON CLASS

Co-creation of knowledge involving students and teachers.
Just small/medium classes.

TEACHER ROLE:

Design and guide the learning process

STUDENTS ROLE:

Content built through an inductive process during students interactions



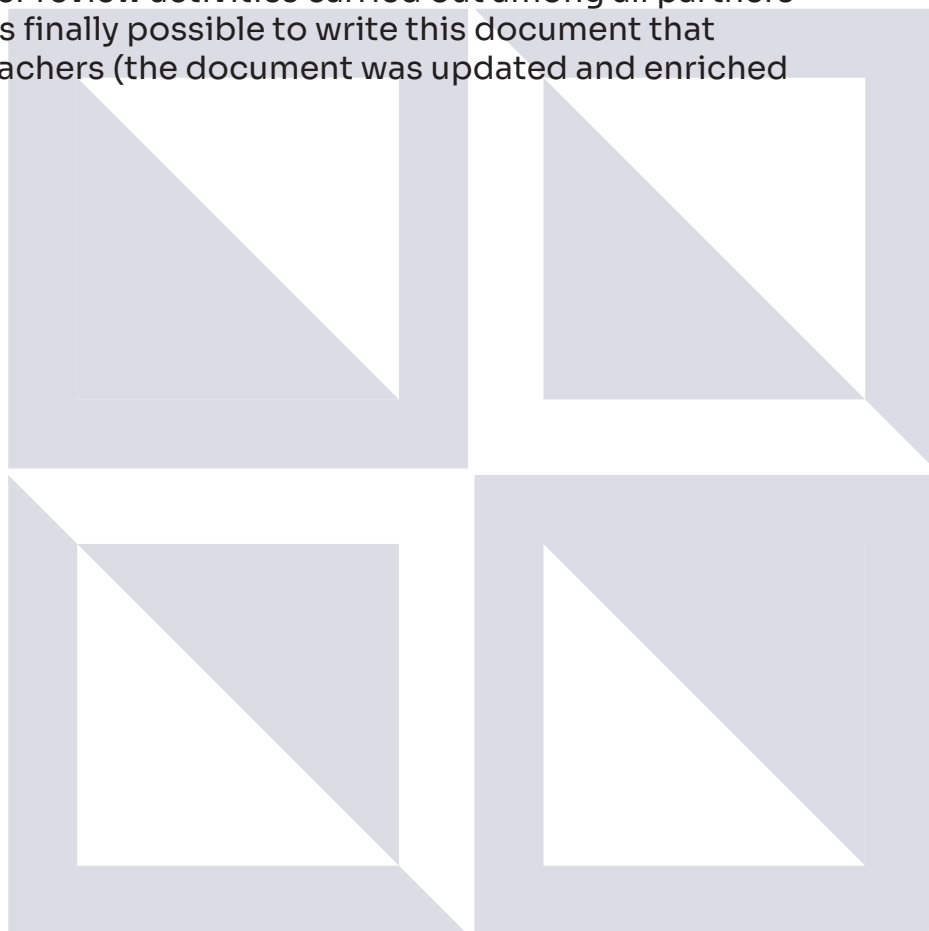
2.3 Smart Learning Design and the frameset within the XLHE project

We therefore applied the Smart Learning Design model, described in the previous paragraphs, to the experiments planned in the project.

In fact, each partner had to choose a course in which to carry out the first experimentation and had to figure out which of the three framesets (frontal class, interactive class, hands-on class) was best suited (based, for example, on the number of students, the type of spaces etc) to their classroom context. The selected course was experimented and tested during three periods (iterations) one after the other so that it was also possible to modify, adapt and improve all the dimensions proper to the blended mode.

Once the course and its related frameset had been identified, it was time to figure out how to design the lessons following the Smart Learning Design model; each partner then had to choose from 1 to 5 learning events/activities to experiment with.

Thanks to the monitoring and peer review activities carried out among all partners at the end of each iteration, it was finally possible to write this document that collects guidelines to support teachers (the document was updated and enriched in all three project phases).



3. Guidelines for teachers

The following guidelines, collected in this handbook, were identified from the three iterations throughout the project duration. They are useful for teachers in designing blended courses (but also individual lessons or labs). It was decided to divide the recommendations for effective management of blended learning into 4 categories: methodology, management, technology, and spaces.

3.1 The methodology of designing (blended) teaching

The methodological recommendations

Designing

The fundamental starting point for effective teaching management in general and blended teaching in particular is to carefully design lessons. **This means shifting from being a teacher lecturer/speaker to being a teacher designer:** it is a matter of moving from the responsibility about proper and comprehensive exposition of content to accountability about designing and managing an experience that best supports the achievement of the Intended Learning Outcomes.

As with any instructional approach, the starting point for designing Smart Learning always remains the fundamental Biggs teaching: we start with a deep analysis of the target audience, design coherent formulation of the Intended Learning Outcomes (ILO), evaluation strategies that will allow us to observe if and how the ILOs have been achieved with the creation of learning-teaching activities that are coherent as a whole.

The Smart Learning Design method, in the version designed by METID Politecnico di Milano, with its learning events helps us in the design as it allows us to break down the entire learning process, regardless of whether it takes place in the classroom or outside the classroom, into its constituent elements to enable the teacher to identify the events best suited to the individual context and re-connect them with each other in such a way as to design an overall teaching-learning experience that is functional in achieving the learning outcomes.



During the design phase of a course, the teacher has the opportunity to select events, link them together by placing them in spatial and temporal flow, and make explicit the links between individual events. He or she can also identify which events to take direct management responsibility for, because direct guidance from the lecturer is crucial to achieving the Intended Results, and which ones to suggest to the students by proposing tools and methods or leaving them free to organise themselves.

Communication

Communicating clearly what the objectives of the course are is crucial, especially in a complex context such as blended learning. It is important to make it clear from the outset how lectures will be managed, what types of tools will be used and how in-person and online will be managed, how assessment will be conducted, and in what modalities it will be expected (assessed, unassessed, and whether it will be possible to conduct them online).

Lesson Plan

Course design in general is important, but it is equally essential to design the single lessons as well. In fact, it is advisable to prepare a lesson plan with all the phases of the lesson, including theoretical moments and activities, so that you can be sure to do everything that was planned and keep to the scheduled time.

Feedback

Always provide Feedback. In fact, feedback is a very important moment throughout the course, which is why it is essential to foresee at what stages it is appropriate to provide it and in what manner. Two main phases are usually identified:

- **Intermediate phase:** after checking the students' progress, provide guidance as to whether or not the actions were carried out correctly, so that they can guide themselves in carrying out the next ones;
- **Final stage:** focus on the most common difficulties and errors, provide explanations, resolve common doubts, and comment on students' achievements, evaluating their actions when necessary/expected.



The assessment

Designing an effective assessment requires careful planning and attention to detail.

- **Define Intended Learning Outcomes:** before designing an assessment, it is important to understand what students should know or be able to do at the end of the course or unit of instruction. Define which tests can be taken online and which in-person.
- **Choose assessment criteria:** once the learning objectives have been defined, you can choose the assessment criteria that will be used to evaluate student work (it is useful to include them in an assessment rubric).
- **Develop a scoring system:** after you have chosen the assessment criteria, you need to develop a scoring system for each criterion. The scoring system should be clear and easily understood by students.
- **Design assessment tools:** assessment tools can include written tests, projects, presentations, lab reports, etc.
- **Evaluate and revise:** once assessment tools have been developed, it is important to evaluate how well they work and revise where necessary to ensure that they are effective in achieving the Expected Learning Outcomes.
- **Communicate to students:** finally, it is important to clearly communicate the assessment criteria and scoring system to students so that they can understand how they will be assessed and how they can improve their work.

It is also important to provide for informal assessment moments that do not involve an actual grade to realise where students are in achieving the objectives. Synchronous activities can be provided as well as asynchronous moments such as for word processing to be left to the students' complete self-organisation.

Assessment Rubrics

Preparation of Assessment Rubrics is recommended. It typically includes a set of criteria or standards, along with a system of scores or achievement levels for each criterion.



The criteria and achievement levels are used to guide assessment and provide a clear and consistent framework for evaluating student work. Rubrics are often used in education to assess student work in subjects such as writing, research and problem solving. They are very useful for holding students accountable for what items will be assessed during formal exams; in fact, it ties in with the recommendation to always communicate with students clearly and effectively. In this case by designing Assessment Rubrics it will be clear to students what the teacher is going to assess on the exam.

Monitoring

Always provide steps to monitor students' work, intervening if they encounter difficulties. You can make use of tools such as online quizzes (e.g., Wooclap, Mentimeter, Socrative...) and shared documents (e.g., Google Spreadsheet, OneDrive...) to keep participants aligned to understand even with short activities where students stand in expected performance.

Follow up

Provide moments of recap to remind students of what has been done up to that point. Useful in this context is the collection of material produced during course activities and the preparation of useful content to be taken up during subsequent classroom lectures.



3.2 The management of the (hybrid) teaching

The management recommendations

Number of students

Carefully evaluate the number of students who will attend the class before choosing the activity. As the number of students (both online and in-person) increases and decreases, the type of activities and lessons that can be conducted also changes. With lower numbers of students, for example, it is possible to manage group activities more effectively while, on the other hand, with higher numbers it would be better to prefer activities with Student Response Systems that allow the activities of a high number of students to be collected and are easy to manage synchronously in extended mode.

Online managing dimension

Managing an online class requires some preparation and organisation. Here are some steps you can follow to manage an online lesson effectively:

- **Prepare lecture materials:** prepare the lecture materials before the lecture so that you can share them with students during the lecture.
- **Test the technology:** make sure you have a good internet connection and have tested all the features of the video conferencing platform before the lecture.
- **Create an interactive learning environment:** encourage students to actively participate during the lecture through questions, discussions, exercises and other interactive activities.
- **Use feedback:** ask students to provide feedback on the lesson and use this information to improve future lessons.
- **Use chat:** ask online students to use the chat tool to ask their own questions so that the lecturer can arrange predetermined times when they can answer any questions.
- **Organise time:** manage class time so that all scheduled topics are covered and leave time for any student questions.



Managing the in classroom lesson

- **Communicate clearly:** communicate clearly to students the expectations and rules of the lesson.
- **Flexibility:** be flexible and ready to adapt to any technical or unforeseen problems that may occur during the lesson.
- **Set a follow-up time:** set a follow-up time for students who may have questions or problems after class.

The management of the classroom, i.e., in-presence, does not differ much from the management that existed when the hybrid context did not exist. What really changes and what you need to always keep in mind is that there is a second context that is added to the presential dimension, which is the online one. So it is necessary to never forget that the students you are lecturing to are not only the in-presence ones but they are also the online ones and therefore it is necessary to provide for their involvement in the lesson. Having them interact with the activities and students in the classroom becomes essential.

Managing the hybrid lesson (online and in-presence)

Managing a hybrid class, which combines elements of in-person and online teaching, can be more complex than a traditional in-person-only or online-only class. Here are some steps that are useful to follow:

- **Prepare teaching materials:** in the hybrid context, it becomes critical to prepare teaching materials for both in-presence and online teaching environments so that they can be shared with students during the lesson. It is important to keep in mind that it will probably not be the same material and that students may also use it in different modes.
- **Test the technology:** as mentioned earlier, it is helpful to make sure that you have a good Internet connection and that you have tested all the features of the technology tools you intend to use before the lesson.



- **Create an interactive learning environment:** encourage students to actively participate during the lesson through questions, discussions, exercises and other interactive activities. It is important to select tools that allow both online and in-presence students to perform activities synchronously.
- **Synchronise content:** ensure that the content taught during the in-presence and online portions are synchronized and that students can access all study materials.

In addition to these aspects peculiar to hybrid classes, it is useful not to forget the recommendations already proposed for managing in-presence or online classes such as the use of feedback, attention in organizing time and in clear and effective communication, and the ability to be flexible and be able to adapt to situations.

Managing the hybrid lesson (online and in-presence)

With the development of Student Response Systems that allow frequent individual or group micro-activities to be stimulated and outcomes to be quickly synthesized to build individual and collective feedback, the role of activities in integrating synchronous and asynchronous moments is asserted with a power not previously possible. The activities, which are short and mostly individual, do not change the traditional lecture set-up, but are primarily intended to awaken attention, stimulate comprehension of complex content and encourage memorization by students. Short activities help in:

- Reactivate students' attention.
- Stimulating cognitive load and prompting participants' initial transformation and appropriation of content.
- Emphasising the crucial aspects of the topic being presented.
- Push students to make the connection between concrete aspects, such as examples, case studies or Experiments, and theoretical aspects.
- Intercept misleading perceptions or aspects not understood.



The teacher has an immediate feedback of how many are responding and can thus optimise the timing based on the actual response of the class, prompting students or closing the activity as soon as everyone has responded; the overall results, which can be viewed instantly, allow for immediate feedback on content comprehension or gather insights and reflections from the entire classroom.

With small- to medium-sized classes, Student Response Systems also make it possible to propose and manage more **structured activities for discussion and interaction among groups of students**. One can divide the in-presence students into groups and the online students into interactive sessions (i.e., sublayers linked to the main online lecture room and manageable directly by the teacher, which can be activated in all the main web conferencing tools) and stimulate them to reflect or compare with each other; by defining a concise and clear output for the activity of the subgroups (e.g., prioritising a list of factors, indicating the three main elements of difficulty encountered or selecting the correct answer to an exercise) it is possible to break up the narrative of the lecture by inserting quick moments of content processing and interaction.

In contexts where one is unwilling or unable to "disrupt" the structure of a course by inserting structured moments of collaborative activities of transformation or production of new content or discussion and comparison, one can support the learning process by proposing retrieval activities distributed throughout the course. Students can be asked at the beginning of the lesson, for example, to take quizzes on the content of the previous lesson; quizzes can be closed-ended or hybrid, that is, alternating closed-ended and open-ended questions. Or students can be asked to test themselves on topics covered a few lessons earlier.



The effort students have to put into answering an open-ended question or quiz on topics seen some time before allows them to reinforce the mnemonic track and encourage making connections between "old" information and the information they are about to hear or read. In addition, the opportunity to test one's memory and preparation often and frequently provides each student with individual feedback and a cue to evaluate his or her learning process and implement correctives.

Managing of medium-long activities

Medium-long activities require more planning than fast activities. These are the points of attention that need to be taken into consideration:

- **Intended Learning Outcomes:** Selection of ILOs to "invest" in activities and ILOs to be achieved through face-to-face teaching.
- **Assessment:** assessment must be done in consistency with the designed Assessment Strategy.
- **Numerosity of students:** Useful to distinguish between small-medium classes (max 70-80 students) and large classes (100-150 students and above).
- **Time:** Define the time to be devoted to the activities. Depending on the size of the network, more time will be needed for the information useful for carrying out the activities to spread.
- **Physical space, tools, digital infrastructure:** Design the activities having in mind the resources available.

It is useful to ask for feedback from students regarding the activities carried out, the following are some aspects on which it may be worthwhile to get feedback in progress from the students:

- the commitment required by the teaching experiment and the overall timelines;
- the perceived effectiveness of the individual activities and any suggestions;



Managing activities in couples or in groups

- the quality of feedback provided by teachers with respect to the activity carried out;
- any concerns about assessment methods (if provided during the activities).

First, it is important to **observe the classroom**, to **monitor** how well the proposed activities are going and how students are responding: you can, for example, see if participation is forced or students are focused, if some phases of the activities are too condensed or if, on the contrary, there is downtime that could be eliminated.

It is also important to always **ask online students** how the activities are going and if they have been divided into breakout rooms go into each of them to ask how the activities are progressing. It is necessary to always have a high level of control and to act as a guide when conducting group activities so as to be sure that everything is working properly. Even in the case of group activities, it is useful at the end to ask for feedback on the activities carried out, particularly from the groups that have done the work online.



3.3 Technology recommendations to create a (Smart) Class

The technological recommendations

Recordings

Schedule course **moments to be recorded** in anticipation of further study or recall during subsequent theory classes. Web Conference platforms all allow this function.

Correct functioning

Always make sure that everything is **working properly** before the lesson and that students do not have difficulty using the workstation and the tools you are going to use. In fact, it is important to always take a brief moment to explain how the technology tools work, how they will be used and why.

Synchronous online

It brings together **all learning events** that the lecturer deems appropriate to place in online seminars (webinars) in which everyone participates online and at the same time. There are some times when classroom presence (not even some of the students) is not always necessary, e.g., expert speaking moments or online seminars on particular topics. In these cases, it is useful to design these events so that all students can participate online through the use of webconference platforms.

Asynchronous online

This is the context for learning events that are based on the use of digital content (**Open Educational Resources, MOOCs**, etc.) or the performance of online tests/activities at a time chosen by the student, but within the framework of the schedule defined by the lecturer. In these moments, students view materials provided by the lecturer outside of classroom time (whether in-person or online), often in an autonomous mode. These moments free up classroom time for more challenging activities and interaction.



In this context, we also recommend the use of open or accessible teaching resources, which are materials associated with licences that ensure their reusability and modifiability, are increasingly numerous in both English and other popular languages, and can also be found in expressly dedicated portals such as Open Courseware.

Web-conferences platform

Arrangement of a **web conference platform** that enables the conduct of a blended lecture (ensures that online students can participate in the lecture). The classroom and online synchronous platform channels have developed a level of hybridization never before seen in educational contexts and only partially explored in business meeting support contexts.

Student Response Systems and Learning Management Systems

It is recommended to use your university's own Learning Management System since asynchronous platforms, such as **Moodle**, have the ability to integrate tools of all kinds such as Student Response Systems. Having a web-based Student Response System integrated into an asynchronous platform enables new educational scenarios, such as the possibility of accessing web-based tools using the same credentials used for the institutional Learning Management System, and the possibility of integrating outcomes into the records and assessment systems connected to it.

MOOCs and recordings

MOOCs are very useful allies in the realisation of the learning event defined from the student's point of view as "low-interactivity content collection."
It is the moment when the student acquires information related to concepts, methods, strategies, processes through the "non-interactive" fruition of a source, for example, listening to a frontal lecture or reading a book, or precisely the fruition of a MOOC video.
Lectures also can be recorded and made available through asynchronous platforms at times after they are actually delivered.



The lockdown period and distance learning, but also subsequent blended (or mixed) teaching, have facilitated the creation of very large quantities of recorded lectures that remain available to faculty (and students) for subsequent years. These are often low quality materials from an audiovisual point of view that cannot be used as stand-alone content, but could find interesting uses in supporting teaching activities even in terms of individual segments. The use of these kinds of sources frees the synchronous blended lesson from having to share content that is instead left to students' self-study to do more challenging activities instead.

Collaboration tools

Collaboration tools give the ability, now enabled by so many tools (think of the entire Google Drive suite), to work synchronously "many-handed" and then leave the content created available and editable online for later times. Collaboration channels used synchronously during the lesson become asynchronous workspaces between lessons and then become synchronous again in the next lesson.

Basic technological tools

The technological tools that we have defined as basic are those tools that we believe are essential for successful blended teaching:

- **Web conferencing tools** (such as Zoom, Teams, Webex, Big Blue Botton, etc.).
- **Classroom equipment**, hardware and software for managing the extended classroom
- **Learning Management System** (such as Moodle, Blackboard, etc.) in which to activate spaces to support courses to share materials, recordings, organisational communications, deliverables.



Interaction technological tools

They are the **Student Response Systems** useful for launching and managing quizzes and quick activities during classroom time (such as Wooclap, Kahoot, Socrative, etc.), online collaborative whiteboards (such as Miro, Mural, etc.), for collaborative content production and transformation, and tools for collaborative annotation of texts, videos, podcasts, and for peer-review activities. These are all useful tools for fostering student interaction and engagement both online and in-presence.

3.4 Spaces to ease (active and blended) teaching and learning

Spaces

Classroom

- centred on the needs of students rather than teachers;
- provided with technologies and furnishings that support students in developing activities related to specific content, then to the Expected Learning Outcomes;
- structured with flexible materials and furnishings that are ergonomically comfortable and multifunctional so as to provide the flexibility to organize activities based on different pedagogical and multidisciplinary approaches.
- flexibility to different pedagogical approaches;
- reconfigurability in order to adapt to needs that may emerge in the future;
- courage to choose technologies beyond those commonly tested and used;
- creativity to inspire and motivate teachers and students;
- customization to best develop students' potential;
- resourcefulness to adapt to different goals.



Fornitures

A smart classroom must also function well in terms of "building envelope" and furniture:

- **Floor:** Flat and free from elements that prevent the ability to move, facilitating the movement of equipment in an agile manner. The counterfloor also becomes the container for electrical power systems and telematic networks.
- **Ceiling:** Designed and equipped with an appropriate false ceiling, to allow technical systems to be housed and projectors, cameras and amplifiers to be anchored. It is often critical for acoustic comfort.
- **Walls:** Used as additional blackboards, when the surface permits, with a coating of waterproof paint that allows writing and erasing with appropriate black or coloured markers.
- **Tables:** Modular tables with casters to facilitate quick reconfiguration of the classroom and facilitate group work in general.
- **Seating:** Casters with locks and adjustable height to make configurations suitable for active learning easier. Informal seating to create a relaxed atmosphere aimed at stimulating the creative side.
- **Blackboards:** Slate blackboards can be kept as support for managing the change process so as not to make the use of interactive monitors exclusive. Small blackboards useful for group activities.

Technological equipment

The minimum technological equipment that a classroom should have in order for blended teaching to be best managed is composed as follows:

- **Environmental microphones** designed to pick up the audio of group discussions;
- **Cameras;**
- **Screens/interactive whiteboards:** integrated sharing of multiple sources, analog and digital, to optimise frontal teaching processes and encourage their evolution towards dynamic active classroom dynamics.
- A control console for session initiation.



- **Web-conferencing systems** supplemented by microphones and cameras for the purpose of enabling users to use them remotely and also to record the lecture for follow-up at a later time.
- **Equipping classrooms** with increasingly targeted and advanced technological solutions must go hand in hand with the design of activities with the aim of relating, by finding the right mix, the technological dimension with the educational dimension.



4. Partners and teachers observations

Based on what was done during the second extended class experimentation/iteration, these are the considerations of the teachers and partners:

4.1 BiASC – Belgian IT Academy Support Center (Belgium)

- **Guiding remote students:** to ensure the success and engagement of remote students in the extended classroom, it is imperative to have a facilitator or proxy who can serve as a guide and motivator. This individual plays a crucial role in bridging the physical distance between the remote students and the classroom environment, providing necessary support and assistance throughout the learning process.
- **Emphasizing the importance of high-quality equipment:** In order to emulate real-life experiences and provide students with practical skills, it is crucial to prioritize the use of high-quality equipment in the extended classroom. By utilizing state-of-the-art technology, such as advanced laboratory equipment, simulation tools, and industry-standard software, students can gain hands-on experience and develop proficiency in their chosen fields.
- **Ensuring excellence in professional education:** The extended classroom should strive to deliver education of the highest quality to prepare students for the demands of their future careers. This entails focusing on rigorous curriculum development, engaging teaching methods, and knowledgeable instructors who possess real-world expertise. By maintaining a high standard of professionalism, the extended classroom can instill the necessary skills and knowledge required for professional success.
- **Creating high-quality content through videos and podcasts:** Enhancing the extended classroom experience involves producing high-quality educational content in various formats. By creating informative and engaging videos and podcasts, educators can deliver complex concepts and topics in a visually appealing and accessible manner. These multimedia resources can be easily shared with students, enabling them to review and revisit the content at their own pace.
- **Prioritizing student activities during class sessions:** In order to promote active learning and foster student engagement, the extended classroom should place a strong emphasis on student activities during class sessions. This can be achieved through group discussions, problem-solving exercises, case studies, and hands-on projects. By providing opportunities for active participation, the extended classroom becomes a collaborative space where students can apply theoretical knowledge to real-world scenarios.



- **Utilizing interactive activities with immediate feedback:** Interactive activities that offer immediate feedback play a vital role in the extended classroom. Through the use of online quizzes, gamified learning platforms, and interactive simulations, students can actively participate in their own learning process and receive instant feedback on their progress. This not only enhances their understanding of the subject matter but also encourages self-assessment and continuous improvement.
- **Teaching students how to learn outside the classroom:** In addition to providing academic knowledge, the extended classroom should also equip students with the necessary skills to learn independently outside traditional classroom settings. By teaching effective study strategies, research techniques, critical thinking, and self-directed learning, students become empowered to explore new subjects, acquire new information, and continue their education beyond the confines of the classroom.

4.2 IFOA - Istituto Formazione Operatori Aziendali (Italy)

Although we succeeded to improve the second iteration, there is still room to improvement namely we have learnt that:

- **Enhancing teacher training:** Providing comprehensive and ongoing training for educators is crucial to improve their methodology, strategies, and techniques in the extended classroom. This training can focus on incorporating technology effectively, designing engaging online activities, and adapting teaching methods to the blended learning environment. By equipping teachers with the necessary skills and knowledge, they can deliver high-quality instruction and effectively engage students.
- **Supporting tutors with additional training:** In order to facilitate smooth class management, it is beneficial to provide tutors with additional training and support. Tutors can play a key role in assisting with different tasks, facilitating discussions, and providing individualised support to students. By equipping them with the necessary skills and resources, tutors can contribute to a more effective and well-organised extended classroom experience.
- **Building awareness and confidence in blended learning:** It is essential to build awareness and confidence among both students and instructors regarding the effectiveness of the blended learning approach. This can be achieved through informative sessions, workshops, and showcasing success stories of blended learning implementation. By promoting the benefits and outcomes of blended learning, students and instructors are more likely to embrace and actively participate in the extended classroom.



- **Integrating the course with flipped classroom methodology:** Incorporating a flipped classroom methodology can be highly beneficial in the extended classroom. This approach involves providing students with pre-recorded lectures or interactive content to review before class, allowing for more engaging and interactive discussions and activities during synchronous class sessions. By combining frontal instruction with interactive content collection, students can have a more immersive and participatory learning experience.
- **Upgrading technological resources and infrastructure:** Upgrading technological resources and infrastructure is vital to support a seamless blended learning experience, although financial limitations may exist. Investing in reliable internet connections, appropriate hardware (e.g., laptops, tablets), and software tools can enhance the delivery and accessibility of online content. Additionally, ensuring technical support and troubleshooting resources are available can help overcome any technological challenges that may arise.

4.3 MDU - Mälardalens Högskola (Sweden)

In order to foster greater student engagement and active participation in lab work, it is recommended to incorporate **activities like the hybrid lab** more frequently. This approach has demonstrated success in the past, as it allows students to actively apply their theoretical knowledge in practical settings, thereby deepening their understanding of concepts and developing laboratory skills.

On the other hand, it is worth noting that while seminars have been well-received by students in face-to-face settings, challenges arise when attempting to ensure a satisfactory experience for online students. Currently, no optimal solution has been identified to address this issue. The asynchronous nature of online learning can impede real-time interaction and meaningful engagement during seminars, resulting in a less effective learning experience for remote participants.

Acknowledging this limitation, ongoing exploration of strategies and solutions is recommended to bridge the gap between face-to-face and online seminar participation. This may involve leveraging technology to facilitate synchronous online discussions, providing alternative activities or resources specifically designed for remote students, or seeking innovative platforms that promote interactive engagement in virtual seminar settings. While the search for the most suitable approach continues, it is important to remain committed to ensuring equitable opportunities for all students, both in-person and online, to have meaningful and enriching learning experiences.



4.4 METID – Milan Polytechnic (Italy)

After the testing of the pilot, we found that the SLD model was useful for teachers to manage the complexity of a blended learning course because it gives the possibility to:

- **foster creativity:** gives the opportunity to design courses in new ways generating new ideas; by providing teachers with the opportunity to design courses in innovative ways, it encourages them to think outside the box and explore unconventional teaching methods. This can lead to the development of engaging learning experiences that capture students' attention, spark their curiosity, and stimulate their creativity.
- **support a coherent design of the course:** utilising tools that support a coherent design of the course can greatly benefit educators. Through visualisations that depict all the elements comprising the course and their relationships, teachers can gain a comprehensive understanding of the course structure. This visual representation allows them to identify the strengths and weaknesses of the course, enabling them to make informed decisions regarding instructional strategies, content organisation, and assessment methods. This, in turn, promotes effective alignment between course Intended Learning Outcomes, instructional materials, and assessment strategies, enhancing the overall coherence and quality of the learning experience.
- **enhance the integration of active methodologies in the learning and teaching experience.** Following the SLD model, teachers design the learning process starting from the learning events conducted by students, not from the contents they need to deliver in class;
- **focus on the "before" and after "course":** to enhance the extended classroom experience, it is valuable for teachers to focus not only on the course itself but also on the preparation before the course and the consolidation and self-study activities that follow. By placing emphasis on the "before" and "after" aspects of the course, educators can provide students with a more comprehensive and effective learning journey. Prior to the course, it is essential for teachers to emphasise the background knowledge required for students to fully engage with the course material. This may involve providing pre-course readings, resources, or assignments that familiarise students with the foundational concepts, theories, or skills relevant to the upcoming course. By setting this foundation, students can enter the course with a solid understanding of the subject matter, enabling them to actively participate in discussions and engage more deeply with the content. Similarly, after the course concludes, it is important to design activities that promote consolidation and self-study.



These activities allow students to reflect on what they have learned, reinforce key concepts, and extend their understanding beyond the confines of the course. This may include assignments, projects, or independent research tasks that encourage students to explore related topics, apply their knowledge in real-world contexts, or delve deeper into specific areas of interest. This approach recognizes the importance of building a strong foundation of knowledge and skills prior to the course and supports students in independently exploring and reinforcing their learning beyond the structured classroom environment. Ultimately, by incorporating these considerations, educators can foster a lifelong learning mindset and empower students to take ownership of their educational growth and development.

- **calculate the correct amount of time:** by visualising the entire course picture, including all its dimensions and components, educators can accurately estimate the amount of time and effort required for students to achieve the Intended Learning Outcomes (ILOs). This comprehensive view enables educators to make informed decisions regarding the pacing and workload distribution throughout the course, ensuring that students have a realistic understanding of the expectations and demands they will encounter.
- **focus on all the possibilities teachers have:** in terms of different scenarios to support learning in-presence and extended, online synchronous and asynchronous, autonomous mode. Leveraging these different scenarios means taking several linked decisions about the organisation of the actors involved in the process, about the activities to organise, about the contents to use and also about the integration of the external world.

4.5. TUD – Technological University Dublin (Ireland)

To enhance the upcoming iteration of the course, there is a hopeful aspiration to acquire high-quality teaching devices. The intention behind this endeavour is to explore the potential for improving the overall experience of remote learners.

By incorporating these advanced teaching devices, it is anticipated that the extended classroom can be further enriched, fostering greater engagement and participation among remote learners. The introduction of high-quality teaching devices holds the promise of expanding the range of instructional resources available to instructors. These devices can offer innovative features such as interactive displays, collaborative tools, and enhanced multimedia capabilities. With access to such devices, instructors can create more dynamic and immersive learning experiences, thereby capturing the attention and interest of remote learners.



Moreover, the addition of these advanced teaching devices has the potential to bridge the geographical gap between remote learners and the physical classroom. In summary, the aspiration to acquire high-quality teaching devices for the next iteration of the course reflects the commitment to enhancing the experience of remote learners. The potential benefits range from expanding instructional resources and creating dynamic learning experiences to bridging geographical barriers and increasing learner motivation. By exploring the possibilities offered by these advanced devices, the extended classroom can strive towards greater inclusivity, engagement, and overall educational excellence.

4.6 UMH - Universidad Miguel Hernández de Elche (Spain)

To optimise the extended classroom experience, it is crucial to give careful attention to the setup and revision of the audio input and output within the classroom environment. This entails ensuring that audio equipment, such as microphones and speakers, are properly configured and functioning effectively. By prioritising clear and reliable audio communication, both face-to-face and online students can actively engage in discussions and interact seamlessly, enhancing the overall learning experience. In addition, it is important to provide guidance and advice to face-to-face students regarding their online interactions.

When it comes to planning interactive moments in massive blended scenarios, particularly in seminars for Computer Science and Telecommunications degree students, thoughtful planning is essential. The goal is to ensure that both face-to-face and online students have equal opportunities to participate and engage in the seminar activities.

This may involve utilising technology platforms that facilitate synchronous interactions, implementing breakout sessions for group discussions, or incorporating online collaboration tools to encourage active involvement from all students, regardless of their physical location. In summary, giving careful consideration to audio setup, providing guidance to face-to-face students regarding online interactions, and thoughtfully planning interactive moments in blended scenarios are critical steps to create an inclusive and engaging extended classroom. By implementing these strategies, the seminar experience for Computer Science and Telecommunications degree students can be enriched, fostering a collaborative learning environment that embraces the diversity of students' learning modalities.



4.7 UPPA - Université de Pau et des Pays de l'Adour (France)

To enhance the extended classroom experience, it is highly beneficial to establish asynchronous interactions with each student to assess their progress in labs. By engaging in individualised communication, educators can effectively monitor and provide feedback on students' lab work. Furthermore, promoting collaboration among students in projects can greatly enrich their educational experience. By providing collaborative tools such as chat platforms or online collaboration tools, students can actively engage in discussions, share ideas, and work together on projects. This collaborative approach not only enhances their teamwork and communication skills but also fosters a sense of community and shared learning within the extended classroom. In addition to asynchronous interactions and collaborative projects, there is a need to incorporate more synchronous interactive activities to keep students actively engaged. While asynchronous communication and project work provide flexibility, synchronous activities, such as live discussions, virtual lectures, or interactive workshops, offer real-time engagement and immediate feedback. These activities can help maintain student motivation, encourage active participation, and facilitate dynamic exchanges of ideas among students and instructors. In summary, the combination of asynchronous interactions, collaborative tools, and synchronous interactive activities plays a vital role in enhancing the extended classroom. By embracing these approaches, educators can effectively monitor students' progress, promote collaboration and teamwork, and ensure students remain actively involved in their learning journey. Ultimately, this multifaceted approach contributes to a more engaging, interactive, and enriching educational experience in the extended classroom.



5. Key issues and lessons learnt

The partners' experiences in the XLHE project have provided valuable insights into the strengths and weaknesses of blended learning.

- **IFOA** recognized that to improve the extended classroom experience, it's crucial to provide comprehensive training for educators and support for tutors, while building awareness and confidence in blended learning. Integrating flipped classroom methodology and upgrading technological resources and infrastructure can enhance the delivery and accessibility of online content. By equipping teachers and tutors with the necessary skills and knowledge, promoting the benefits of blended learning, and investing in technology and technical support, the extended classroom can provide a more effective and engaging learning experience..
- **POLIMI-METID**'s retains that the SLD model can be beneficial for teachers in managing the complexity of a blended learning course. It fosters creativity, supports a coherent course design, and enhances active methodologies. Teachers can also focus on the before/after course, estimate the amount of time required and explore different scenarios. By emphasizing these aspects, educators can provide a comprehensive and effective learning journey, encouraging students to take ownership of their educational growth and development..
- **UPPA** highlights that to enhance the extended classroom experience, it is highly beneficial to establish asynchronous interactions with each student to assess their progress in labs. Providing collaborative tools can greatly enrich the educational experience by promoting teamwork and community. Additionally, incorporating more synchronous interactive activities, such as live discussions, virtual lectures or interactive workshops, can help maintain student motivation and encourage active participation. By embracing these approaches, educators can effectively monitor students' progress, promote collaboration and teamwork, and ensure students remain actively involved in their learning journey. Ultimately, this multifaceted approach contributes to a more engaging, interactive, and enriching educational experience in the extended classroom..
- **UMH**'s experience in implementing pilots underlines that to optimise the extended classroom experience, it is crucial to ensure clear and reliable audio communication, both face-to-face and online, and provide guidance to face-to-face students regarding their online interactions. Thoughtful planning is also essential to create an inclusive and engaging learning environment that embraces the diversity of students' learning modalities. This may involve utilising technology platforms, breakout sessions for group discussions, or online collaboration tools to encourage active involvement from all students. By implementing these strategies, the seminar experience for Computer Science and Telecommunications degree students can be enriched and a collaborative learning environment can be fostered.



- **TUD's** experience highlighted that to enhance the upcoming iteration of the course, there is a plan to acquire high-quality teaching devices with the aim of improving the experience of remote learners. These devices can offer interactive displays, collaborative tools, and enhanced multimedia capabilities, expanding the range of resources available to instructors and creating dynamic and immersive learning experiences. Moreover, these devices can bridge the geographical gap between remote learners and the physical classroom, increasing learner motivation and striving towards greater inclusivity, engagement, and overall educational excellence..
- **Mälardalens Högskola** (Sweden) found that to enhance student engagement in lab work, it is recommended to incorporate activities like the hybrid lab more frequently. This approach has demonstrated success, deepening students' understanding of concepts and developing laboratory skills. However, challenges arise when ensuring a satisfactory experience for online students during seminars, as the asynchronous nature of online learning can impede real-time interaction and meaningful engagement. Ongoing exploration of strategies and solutions is recommended to bridge the gap between face-to-face and online seminar participation, such as leveraging technology to facilitate synchronous online discussions or seeking innovative platforms that promote interactive engagement in virtual seminar settings. It is important to remain committed to ensuring equitable opportunities for all students to have meaningful and enriching learning experiences
- **Belgian IT Academy Support Center** (Belgium) found during their experiments that to ensure success in the extended classroom, it's crucial to have a facilitator who can guide and motivate remote students. High-quality equipment and engaging teaching methods, including multimedia resources and interactive activities with immediate feedback, promote active learning. Emphasizing professional education and equipping students with effective study strategies and self-directed learning skills prepares them for future careers and lifelong learning.

The lessons learnt from the XLHE project's partners can be summarised as follows:

- Comprehensive training for educators and support for tutors is essential
- Upgrading technological resources and infrastructure can enhance the delivery and accessibility of online content
- Establishing asynchronous interactions with each student and incorporating more synchronous interactive activities can maintain student motivation and active participation
- Ensuring clear and reliable audio communication is crucial
- Creating inclusive and engaging learning environments is important



- Acquiring high-quality teaching devices and incorporating hybrid labs can enrich the learning experience
- Having a facilitator to guide and motivate remote students is beneficial
- Emphasizing professional education and effective study strategies is important
- Training students and teachers on digital tools, promoting engagement, addressing technical issues, and finding innovative ways to encourage interaction and collaboration are key to achieving educational excellence in blended learning.



6. Final student's satisfaction questionnaire

In order to also have a different point of view from that of the teachers, it was deemed necessary to understand what the students thought of the extended classroom experimentation. For this reason, a questionnaire was shared to all students who participated in the courses to find out what were their perceptions and what, if anything, needed to be changed and improved.

The document "**Final students satisfaction questionnaire**" holds significant value as it gathers feedback from students regarding their experiences and satisfaction with extended classrooms. The questionnaire aims to assess the opinions and perspectives of students who have participated in blended learning environments, combining both in-person and online learning. By soliciting feedback directly from students, the document recognizes the importance of incorporating student voices in shaping the future of education. It acknowledges that students' experiences and perspectives are crucial in understanding the effectiveness and impact of extended classrooms. The questionnaire delves into various aspects of the students' experiences, including their appreciation and concerns regarding online lessons, their preferences for attending lessons in person or online, and their opinions on the advantages of face-to-face instruction. It also investigates the usefulness of different activities in enhancing understanding and retention of concepts. The document recognizes that student feedback is vital for educational institutions and teachers to continually improve and enhance the learning process. By seeking input from students, it enables educators to identify strengths, address challenges, and adapt teaching methods to better meet the needs and preferences of students in extended classroom settings.

Overall, the document underscores the significance of student feedback as a valuable resource for promoting a student-centred approach and fostering an experience collaborative learning environment. By considering students' perspectives on extended classrooms, educational stakeholders can make informed decisions and implement effective strategies that optimise the learning for all students.

6.1 General overview of all the questionnaires

The questionnaires provide an extensive and comprehensive overview of student feedback and opinions regarding their learning experiences. They serve as a valuable resource for assessing the effectiveness of teaching methods, course content, interactivity, and overall satisfaction among students in a university or educational setting.

These questionnaires cover a wide range of topics, allowing students to express their thoughts and provide valuable insights into various aspects of their educational experience.



One of the key areas explored in the document is teaching methods. Students offer their perspectives on the effectiveness of different instructional approaches, such as group work, collaborative projects, and interactive activities. They emphasise the importance of engaging and interactive learning experiences that promote critical thinking, problem-solving, and teamwork.

Course content is another focal point of the questionnaires. Students provide feedback on the relevance and usefulness of the material covered, expressing their appreciation for lessons that incorporate real-life examples, practical applications, and opportunities for creative thinking. They also highlight the value of clear explanations and instructions that facilitate understanding and comprehension. Interactivity and collaboration among students are key themes in the document. Students suggest incorporating more group projects and activities that encourage teamwork and peer interaction. They express a desire for improved communication and connectivity, both among their peers and with professors. The document also acknowledges the importance of maintaining a balance between online and in-person classes to foster global interactions and enhance the learning experience for all students.

Technical issues and the extended classroom format receive considerable attention in the document. Students provide feedback on audiovisual quality, technical difficulties faced during online sessions, and the need for better equipment. They also express their opinions on the extended classroom model, which combines in-person and online participation. While some students appreciate the inclusive nature and flexibility it offers, others prefer the immersive experience and stronger social connections associated with in-person classes. The document concludes by summarising students' suggestions for improvement. These include enhancing communication, addressing technical issues, incorporating more interactive activities, and providing clearer instructions. Students also emphasise the importance of a supportive and inclusive classroom environment that fosters collaboration and offers flexibility to cater to individual preferences and circumstances.

Overall, the document serves as a comprehensive and valuable resource for educators and institutions to assess student satisfaction, identify areas of strength, and make informed decisions to enhance the learning experience. It highlights the significance of interactive and engaging teaching methods, effective communication, and the need to address technical challenges to create a positive and effective learning environment for all students.



6.2 General suggestions

- **More group projects:** Students expressed a desire for increased opportunities for collaborative work and group projects.
- **Address technical issues:** Students mentioned the need for better internet connectivity and resolving technical problems, such as echo in online calls, to ensure a smoother learning experience.
- **Include more exercises:** Some students suggested incorporating additional exercises to make the lessons more engaging and interactive.
- **Conduct joint lessons with students from other locations:** One student proposed having lessons together with students from different locations, emphasizing the value of cross-cultural collaboration.
- **Use real-life examples instead of YouTube videos:** A student recommended creating lessons that focus on practical applications and real-world problems rather than relying solely on YouTube videos.
- **Address repetitive content:** One student mentioned that some lessons felt repetitive and suggested finding ways to introduce more variety in the course material.
- **Improve communication between students:** Some students highlighted the importance of effective communication among peers and suggested enhancing interactions and discussions between students.
- **Enhance the classroom environment:** A student suggested organizing lessons in the same physical location to foster a sense of togetherness and improve the overall classroom experience.
- **Offer more flexibility and options:** Students appreciated the flexibility of online classes and suggested continuing to provide options for both online and face-to-face instruction to cater to individual preferences and circumstances.

These suggestions reflect the students' desire for a more interactive, engaging, and inclusive learning environment, as well as their concerns about technical difficulties and communication challenges in online settings.

6.3 General opinion about the extended classroom

- **Positive views:** Several students expressed that they found the extended classroom to be a useful and interesting way of teaching. They appreciated the opportunity to use different tools, learn from different perspectives, and involve all students.



- **Better interaction and communication:** Some students mentioned that the extended classroom allowed for better interaction and communication among peers. They believed that more classes should be conducted in this format in the future.
- **Preference for in-person classes:** Some students stated a preference for in-person classes, citing better interaction and productivity. They felt that face-to-face classes were more productive and facilitated increased attention.
- **Benefits of online component:** Students acknowledged the advantages of the online component, such as the ability to review recorded lessons multiple times and the convenience it offered for those who may not be able to attend classes in person. They recognized that online classes could be beneficial for certain subjects and activities.
- **Flexibility and accessibility:** Students appreciated the flexibility of the extended classroom, recognizing that it allowed individuals from various locations to participate and learn. They believed it provided options for students who may not be efficient in every work environment.
- **Mixed opinions:** Some students expressed neutral or mixed opinions about the extended classroom, considering it okay or stating that it depends on specific circumstances and the educational approach.

Overall, the opinions on the extended classroom were diverse, with some students embracing its benefits and others expressing a preference for traditional in-person classes. The responses reflected the students' individual experiences and preferences regarding the effectiveness and suitability of the extended classroom model.

6.4 Aspects that teachers need to take into account when designing the Extended Classroom

Based on the feedback provided by students in the document, several key aspects should be taken into account by teachers when designing the extended classroom.

Flexibility and Options

Students appreciate the flexibility offered by the extended classroom, allowing them to choose between online and in-person participation based on their preferences and circumstances. Teachers should consider providing options for both modes of instruction to accommodate individual student needs.



Communication and Interaction

Effective communication among students and with the teacher is crucial in the extended classroom. Teachers should prioritize creating opportunities for meaningful interactions, discussions, and collaboration among students, both online and in person. Incorporating interactive activities, group projects, and platforms for virtual communication can help foster engagement and build connections.

Technical Infrastructure

Teachers need to ensure that the technical infrastructure supports a seamless learning experience. This includes addressing issues such as internet connectivity, audiovisual quality, and hardware/software malfunctions. Providing reliable equipment, clear instructions on technical setup, and troubleshooting support can help minimize disruptions and enhance the overall learning experience.

Inclusive and Engaging Content

Teachers should strive to design inclusive and engaging content that caters to the diverse needs of students in the extended classroom.

Flexibility and Options

Incorporating real-life examples, practical applications, and varied teaching methods can enhance student understanding, motivation, and active participation. Teachers should also consider incorporating interactive activities, problem-solving exercises, and opportunities for creative thinking to foster deeper engagement.

Balancing In-Person and Online Experiences

While the extended classroom offers the advantages of both in-person and online participation, it is essential to strike a balance. Teachers should ensure that in-person sessions provide immersive experiences, facilitate strong social connections, and allow for meaningful interactions. At the same time, online components should offer flexibility, accessibility, and the ability to review content at one's own pace.



Support and Resources

Teachers should provide adequate support and resources to help students navigate the extended classroom effectively. This includes clear instructions, access to learning materials, technical assistance, and guidance on utilising online platforms. Offering ongoing support and addressing student concerns can contribute to a positive learning environment.

By considering these aspects and incorporating student feedback into the design of the extended classroom, teachers can create a more engaging, inclusive, and effective learning experience that meets the needs and preferences of their students.



7. Final project consideration

7.1 Final partners considerations

After the three iterations of the project experimented with extended learning practices, these are the the aspects that the partners involved in the project considered important and that other teachers and trainers should consider when managing hybrid teaching:

BiASC - Belgian IT Academy Support Center (Belgium)

- A code of proper conduct needs to be enforced. Lessons can only be successful with interactive students.
- If students are only interested in feigning presence there is not much you can do about it.
- You cannot have the same impact with online lessons than on-campus. Individually helping students, looking them in the eye, it is different when online.
- Hard and software need to be of highly professional quality. Also, video and sound need to be of very good quality.
- Integration of all tools is essential for a fully acceptable learning and teching experience.
- Automation tools for managing the system setups are extremely useful to make the job of a teacher possible.

IFOA - Istituto Formazione Operatori Aziendali (Italy)

- The effective integration of interactive digital tools is crucial for engaging learners in both physical and virtual environments.
- Offering flexibility in course delivery, such as providing both in-person and remote options, is essential to meet diverse student needs and preferences.
- Continuously gathering and responding to feedback is vital for the ongoing improvement of teaching methods and the successful integration of technology in hybrid learning environments



MDU - Mälardalens Högskola (Sweden)

- Keep students on their toes by continuous work and examinations
- If you organize students in groups, try to make the groups performanswise homogenous
- Try to organize student activities in face to face or remote. Hybrid activities is hard if you want students to inteact.

METID - Milan Polytechnic (Italy)

- **Interactive and Inclusive Teaching Methods:** Design lessons that actively engage both in-person and online students. This could involve group activities where students from both modalities work together, or using polling and Q&A sessions during lectures to ensure participation from all students.
- **Regular Feedback and Support:** Provide regular feedback to students on their progress and be available for support. It's important to recognize the unique challenges that students in an extended classroom might face and offer support accordingly.
- **Flexible and Diverse Assessment Methods:** Use a variety of assessment methods that cater to both in-person and online students. Online quizzes, open-book assessments, project-based learning, and oral presentations via video conferencing can provide diverse ways for students to demonstrate their learning.
- **Interactive and Inclusive Teaching Methods:** Design lessons that actively engage both in-person and online students. This could involve group activities where students from both modalities work together, or using polling and Q&A sessions during lectures to ensure participation from all students.
- **Leverage Technology Effectively:** Utilize digital tools that facilitate interaction and collaboration among students, regardless of their physical location. Tools like collaborative documents, virtual whiteboards, and learning management systems can bridge the gap between in-person and remote students. It is important to remember to design dedicated moments to explain how to use the digital tools to the students underlying their importance and the goals on using them.



TUD - Technological University Dublin (Ireland)

- Preparation beforehand to ensure vevox polls are populated and ready. There is extra work involved.
- The technical solution does not have to be very expensive. Use of the Owl and Panasonic speaker are good examples. Too much emphasis on technical solution?
- Simple easy to use Interaction tools such as Vevox and use of Notability with Ipad and Pen improves the student experience

UMH - Universidad Miguel Hernández de Elche (Spain)

- Sound input and output quality, a single microphone system and a single classroom audio system, use of a screen larger than 70" instead of a projector for visualization in the face-to-face classroom.
- the balance of students between online and in person, essential for the interaction to be more fluid.
- the students were very motivated by the hybrid format and participated enthusiastically in the results presentation in hybrid format of the projects of the last activity of the pilot.

UPPA - Université de Pau et des Pays de l'Adour (France)

- When creating activities, the instructor should put themselves in the virtual shoes of online students, contemplating the potential barriers they may encounter due to the physical distance separating them from the traditional classroom setting. This empathetic approach helps identify and address issues related to technology, accessibility, and participation. By thinking about these challenges, the instructor can enhance the online learning experience. This involves choosing tools, environments and technologies that are user-friendly, widely accessible, and conducive to remote collaboration.
- The blended classroom should be inclusive for the online students, they should feel involved with the in-person students. The instructor should strategically design activities that actively involve online students. This not only addresses the common tendency of online learners to feel less engaged, but also ensures that their unique perspectives and contributions enrich the overall class experience.



Adding collaborative tools, discussion forums, and interactive platforms to the online learning environment fosters a sense of connection and community among all students.

- Designing effective assessment methods that accommodate both in-person and online students is essential. We explored different assessment techniques, including virtual quizzes, online discussions, project-based evaluations, and online exams with camera and microphone turned on. Ensure assessments align with learning objectives and consider the varied learning environments. This approach guarantees fair evaluation for all students, promoting a comprehensive understanding of the material while accommodating the diverse needs of both in-person and online participants. Establishing clear and fair assessment criteria contributes to a supportive learning atmosphere for all students.

In synthesizing the findings from various educational institutions on managing blended learning, it becomes evident that the success of such programs hinges on several critical factors. Foremost among these is the need for a robust and reliable technological infrastructure, which serves as the backbone for delivering an effective blended learning experience. Equally important is the development of innovative teaching methodologies that prioritize interactive and engaging learning experiences for students, regardless of their physical or digital classroom presence.

The role of continuous feedback mechanisms cannot be overstated, providing essential insights that guide the adaptation and improvement of teaching strategies. This, coupled with diverse and inclusive assessment strategies, ensures that all students are fairly evaluated and supported in their learning journeys.



Another significant finding is the importance of empathy and understanding towards the unique challenges faced by online learners. **Creating a learning environment that fosters a sense of community and belonging**, even in a digital space, is key to sustaining student motivation and participation. Additionally, the exploration of **new technologies**, particularly **artificial intelligence** tools such as ChatGPT, has opened up novel avenues for enhancing teaching and learning. These technologies offer personalized learning experiences, making education more accessible and engaging for students.

This comprehensive guide underscores the dynamic and evolving nature of education in the digital age. It calls for educators to embrace **flexibility, innovation, and a student-centered approach** to the teaching and learning experience. By doing so, institutions can navigate the complexities of blended learning, ensuring that education remains inclusive, engaging, and effective for all students. Teaching in this age where the digital dimension is becoming increasingly important certainly brings with it difficulties and criticalities that can only be overcome by careful designing of the whole teaching and learning process.

The "Smart Learning Design" (SLD) method, developed at METID–Politecnico di Milano, emerged as a strategic response to these challenges, offering an instructional design approach to navigate the complexities of the new teaching paradigm. This approach emphasizes the creation of a cohesive learning environment that integrates physical and digital spaces, catering to the full spectrum of teaching and learning dimensions—presence, online, synchronous, and asynchronous. The SLD method delineates "**learning events**" as the cornerstone of this model, encapsulating activities that span knowledge acquisition, application, and consolidation, thereby facilitating a more effective and inclusive blended learning experience.

The experience gained from three iterations of the project clearly indicates that managing a hybrid classroom poses unique challenges, distinct from those of traditional, frontal classrooms. These challenges necessitate meticulous lesson planning. The Smart Learning Design (SLD) method has proven invaluable in this context, offering structured support for hybrid classroom management. Through careful design and implementation of lessons, educators and teachers can effectively address and surmount the hurdles presented by the new dynamics of blended teaching and learning environments.

