

Hybrid Blended Learning Solution for Teacher Education Innovation

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Abstract

The study reports data from the implementation of hybrid blended learning solutions (HBLS) in initial teacher training programmes for pre-school and primary school teachers. The design of the relevant university courses were revised in a transformative way, using innovative and digitally integrated approaches (DM 289/2021). Twenty teacher educators and 364 students were involved through the administration of semi-structured questionnaires whose dimensions investigated organizational flexibility to facilitate work-life balance processes, methodological quality and the role of teachers in HBLS.

Keywords: Higher Education, Blended Learning, Teacher Training, Teaching Methods, Educational technology, Work Life Balance.

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Hybrid Blended Learning Solutions for Teacher Training

The effective introduction of information and communication technologies (ICT) in education requires solid design skills on the side of the teachers. Indeed, the ability to integrate different types of knowledge is required: disciplinary content expertise, knowledge of appropriate methodological approaches and on the pedagogical affordances of digital tools. This unique amalgam of competencies has been framed in research as the Technological Pedagogical Content Knowledge framework (TPCK – Mishra & Koehler, 2006; Angeli & Valanides, 2009). The implications of digitally integrated

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teaching practices have been studied extensively over the last two decades, highlighting a paradigm shift in didactics geared towards fostering innovative teaching-learning processes. Literature has shown that the reasoned use of ICT promotes flexibility of space and time through student-centered approaches (Tondeur et al., 2017).

Moreover, with the advent and consolidation of ICT use in the synergy between formal, non-formal and informal learning contexts, new models of integrated teaching - known as hybrid instruction solutions, have spread and continue to be perfected. The term 'hybrid solution' (often used interchangeably with 'blended solution') is broad and encompasses a variety of teaching formats including blended learning (Kaleta et al., 2007; Millichap & Vogt, 2012). The literature agrees in interpreting this approach fundamentally as a combination of face-to-face and distance learning activities, technologically integrated (Graham, 2006). Indeed, the realization of hybrid didactic solutions can take many forms: among others, integrating technology into face-to-face teaching in a fluid dynamic (Trentin, 2015), deploying multiple methodological approaches, tools and didactic formats between presence and distance (Millichap & Vogt, 2012; Philipsen et al., 2019). The educational quality of hybrid solutions is based on their ability to foster active learning, to support collaborative, student-centered instruction and to enable sustainability processes in a work-life balance perspective (Bruggeman et al., 2021).

Instruction supported by hybrid blended learning solutions (HBLS) can be developed with different approaches in the organization of learning processes. These may range from the addition of online activities to a traditional in-presence classes; to the instructional design of blended learning pathways with the flexible spatial/temporal distribution of activities between presence and distance; to the use of specific platforms as integrated learning environments (Alammary, 2014). Various forms of HBLS have long been introduced in university education for some positive implications:

- 1) it allows for flexible curricula (Bruggeman, 2021);
- 2) it allows for the enhancement of learning personalization (Boelens et al., 2018);
- 3) it allows for improved class engagement and student collaboration.

However, the preparedness of teaching staff and institutions for the integration of digital tools in education has not always produced quality results, and this critical issue became particularly evident when the Covid-19 pandemic forced the online transition (De Rossi & Trevisan, 2022; Trevisan & De Rossi, 2022; Trevisan et al., 2021; Zhang et al., 2022). On a global scale, through the many studies that have been produced in the time of the pandemic, clear criticalities have emerged: poor quality of educational

provision; lack of teacher training and inequality in access to education for students; infrastructural, personal and contextual hindering issues (Manca & Delfino, 2021).

In vocational training courses, as in the case of initial teacher training, the challenges are:

- 1) the implementation of curricula organized to develop practical skills and competences;
- 2) active, multimedia and multi-modal methodological approaches to knowledge representation;
- 3) the greater involvement of students by encouraging collaborative processes to train them to work in teams (Marzano & Calvani, 2020).

This challenge was taken up in 2021-22 by the Master's Degree Course in Primary Education at the University of Padua, in which it was decided to exploit the opportunities offered by the integration of ICT in teaching. As per the Ministerial Decree 289/2021, up to the 10% of the total number of class hours were provided remotely through the reasoned use of ICT.

The Case Study

The case study focuses on the didactic quality and sustainability provided by the HBLS implemented in the Master's Degree Course in Primary Education at the University abovementioned, as perceived by the main protagonists of the educational program: students and faculty. The initiative to carry out a case study on the HBLS pilot arose in a time when strictly-distance learning imposed by the pandemic emergency was slowly fading. At the time, following national regulations, all study courses traditionally performed face-to-face should have returned to conducting activities exclusively in the classroom (Legislative Decree 19/2012, DM 439/2013, DM 6/2019, DM 989/2019, DM 446/2020, DM 289/2021, DM 1154/2021). Consequently, due to the governmental instructions during that phase of the pandemic, at the University of Padua, several forms of distancing education were adopted for about two years in all Degrees. Forcedly, both completely distance teaching solutions (most suitable at times of greatest restrictions), and dual teaching solutions (i.e. classes delivered simultaneously face-to-face and remotely) were activated.

The Master's Degree Course in Primary Education has a complex organization: lectures, workshops and internships take place synergically through each semester. It is a program that requires a strong design integration of teaching courses. In addition, the target group of students consists of many workers who already teach in schools and therefore need flexibility in

schedules and activities that develop practical teaching skills. The experience of emergency remote teaching during SARS-CoV-2 virus represented a novel and fraught situation, not least because of the sudden change required in instructional delivery. However, it was also an opportunity for teachers and students to gain innovative teaching experiences through intensive use of the Zoom and Moodle platform and other digital resources to support teaching/learning processes. It was an opportunity to learn about methodological potential and organizational sustainability.

The qualification of teachers for the effective integration of technologies is not to be confused with emergency digital solutions, which are now outdated. Multidisciplinary scientific research established well before the pandemic, and acknowledged also by international policies on didactic innovation in Higher Education (EUA, 2018), clarifies effective technology integration in education's key characteristics and positive outcomes both in face-to-face and in hybrid forms such as the HBLS mode. Evidence-Based Education studies (Clark et al., 2006; Hattie, 2009; Bell, 2020; Calvani & Marzano, 2020) indicate that the teaching process, including digitally integrated teaching, is effective only in the measure that it is based on a coherent didactic design encompassing disciplinary content, methodological approaches and evaluation centered on learning processes. Crucial to this is the support offered by specific learning environments managed between the classroom and platforms (e.g. Moodle).

The end of the pandemic created a favorable context for overcoming traditional teaching formats based only on face-to-face classroom lectures. It was stimulus for transforming teaching models and approaches. Innovation was designed through HBLS teaching for 10% of all teaching hours (253 hours) of the entire 5-year Master's Degree Course in Primary Education (DM 289/2021, Annex 4). The initiative to integrate teaching with digital resources was promoted by the FISPPA Department's Teaching Improvement Project, funded by the university as an action of the faculty development project Teaching4Learning @Unipd (T4L) (De Rossi & Fedeli, 2022).

Embarking on this opportunity required comprehensive and collaborative synergy between: the Master's Degree Course coordinator, the office staff scheduling classes and the faculty. In order to ensure quality, specific attention was paid to the teacher educators' instructional design, so to guarantee consistency in the offering of activities and methodologies between face-to-face and remote (in active and collaborative synchronous, asynchronous modes). The 4 project implementation phases occurred between 2021 and 2022:

- involvement of the teacher educators (faculty) on a voluntary basis to re-design the syllabus of their courses, possibly also including the workshop, if required (May-July 2021);
- design of the courses' calendar schedule so to guarantee the optimal performance of the face-to-face lessons integrated with the remote activities carried out in synchronous and asynchronous forms (July-September 2021);
- training of teacher educators (faculty) on HBLs courses with an active learning methodological approach and open meetings for students. This phase aimed to raise awareness of the transformative elements and opportunities emerging from the reorganization of the courses for the coming academic year (June and September 2021);
- monitoring of the participant teacher educators' practices during semesters I and II of the academic year 2021-2022. At the end of each semester, a questionnaire was administered to the students and faculty (January 2022, June 2022).

Research Questions and Instruments

At the beginning of the academic year 2021-2022, the case study began following two research questions:

- what are the possible effects of HBLs on the main elements of teaching (design; methodological-technological approach; assessment) as perceived by faculty and students?
- what are the possible effects of HBLs in terms of sustainability (organizational improvement of teaching-learning processes) perceived by faculty and students?

The two focuses are closely interconnected. The first one, relating to the level of the training offered, refers to the perspective of 'quality culture', which in turn is strongly related to the construct of organizational culture, and thus the challenge of sustainability. Indeed, already in 2006, in the EUA Report "Quality culture in European universities: a bottom-up approach", the binomial quality-sustainability was defined as a driving force for innovation and faculty development.

The demographics for the participants involved is as follows:

- twenty (20) Master's Degree Course in Primary Education faculty from various scientific fields participated on a voluntary basis. All of them structured their courses in HBLs mode, devoting between 10% and 30% of their teaching hours to online activities. The scientific fields most represented were M-PED/01-02-03-04, while other disciplinary fields

participated to a lesser extent (BIO/05, L-ART/06, MAT/01 and MAT/04, M-GGR/01, M-STO/02, M-PSI/04).

- The students were involved through convenience sampling, with 364 participating on a voluntary basis (53.5% of the total enrolled for the academic year 2021-22). All the different years were involved, with higher participation for year I (22.6%), year II (29.5%) and year III (22%). Moreover, 57.7% of the students involved fully attended the proposed HBLs initiatives, while 39.3% attended partially and only 3% did not attend at all.

Two semi-structured questionnaires were administered to faculty and students alike at the end of each semester in the academic year 2021-2022. The questionnaire administered online to the students (Chronbach's $\alpha = .83$) presented five dimensions:

- (a) demographics (six multiple-choice items);
- (b) perceptions of ICT integration in university HBLs courses (13 Likert items);
- (c) perceptions of HBLs impact on instruction (12 Likert items and two open-ended items);
- (d) perceptions of the organization of HBLs workshops (11 Likert items in Likert and two open-ended items);
- (e) access to and ability to use ICT (17 Likert items and two open-ended items).

The questionnaire for teacher educators (Chronbach's $\alpha = .98$), administered online, also presents five dimensions:

- (a) demographics (four items in multiple or open-ended response);
- (b) perceptions of ICT integration in university HBLs courses (15 Likert items);
- (c) perceptions of HBLs impact on teaching (nine Likert items and one item in open-ended response);
- (d) perceptions of the role of the teacher education in HBLs teaching (11 Likert items and one item in open-ended response);
- (e) type of teaching activities proposed and digital resources used (three items in multiple-ended response).

Five-point Likert scales were used in both questionnaires, with scores of 1 = total disagreement; 5 = total agreement. In addition to the questionnaires, two focus groups were realized for both students and faculty (one at the end of each semester). Due to space constraints, we will not present these data in the current manuscript.

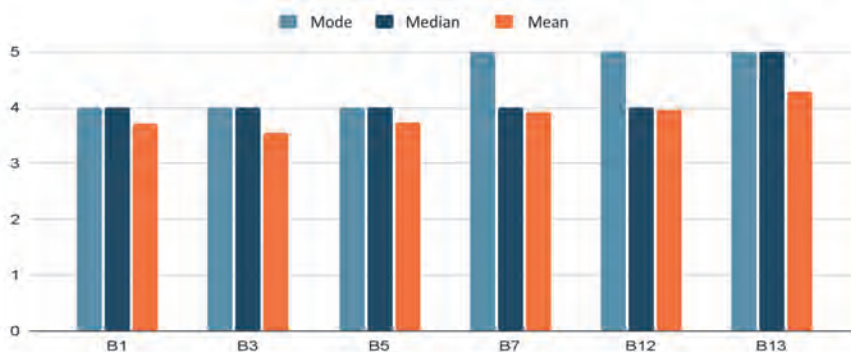
Results

We report here on the results from the questionnaires at their second administration (i.e. end of semester II, academic year 2021-2022) considering what follows:

- For the students' questionnaire we will discuss the data in the dimensions (b) perceptions of ICT integration in university HBLs courses; (c) perceptions of HBLs impact on instruction.
- For the faculty questionnaire we will report on dimensions (c) perception of HBLs impact on teaching; and (d) perceptions of the role of the teacher education in HBLs teaching.

Student answers to (b), i.e. the perception of ICT integration in university HBLs courses, were on average positive on the scale (between 4 and 5). This is especially clear in item B7 about the encouragement of students' active production of materials linked to the curriculum; in item B12 about the appreciation of the digital integration also in face-to-face activities, consistent with those proposed at a distance; and finally in item B13 on the development of students' research skills on the web (Fig. 1).

Fig. 1 - Student questionnaire: dimension (b) perceptions of ICT integration in university HBLs courses – second questionnaire



B1. HBLs activities are useful for students to deepen and broaden their knowledge of study topics.

B3. HBLs activities are useful for students to contextualise study topics from a vocational perspective.

B5. HBLs activities enable students to work collaboratively.

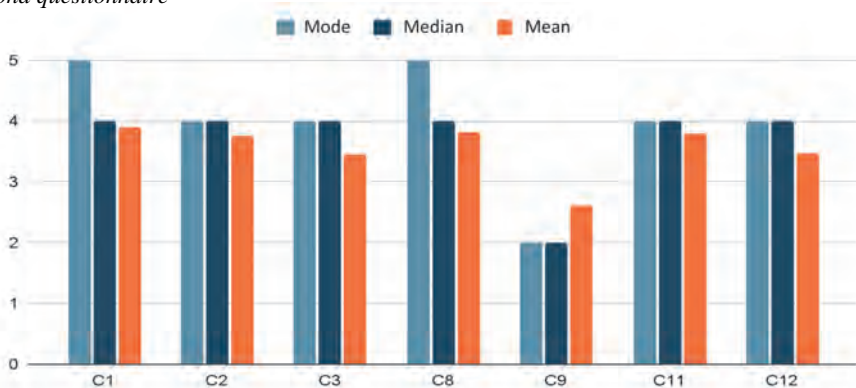
B7. HBLs activities enable students to produce materials (teaching projects, term papers, presentations...).

B12. It is important to use ICT also in face-to-face activities.

B13. Knowing how to explore the Web helps students find materials and information useful for their learning.

Considering the students' perceptions of the HBLS impact on teaching organization (dimension c), at the second questionnaire administration, average positive values emerged. Specifically, students perceived effective HBLS organization in relation to providing: more flexible study times (item C1); the possibility of carrying out exercises on the Moodle platform for exam preparation (item C2); a better reconciliation of study and life times (work-life balance, item C8); coherent teaching design between face-to-face and remote activities (item C11). Moreover, they did not consider any support offered by e-tutors as necessary (item C9 - Fig. 2).

Fig. 2 Student questionnaire: dimension (c) perceptions of HBLS impact on instruction – second questionnaire

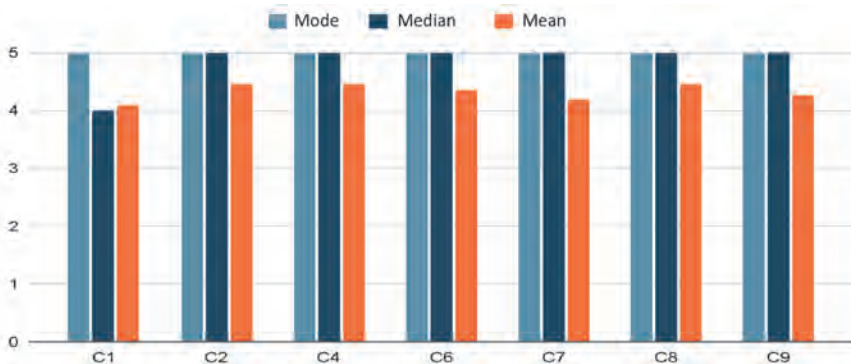


- C1. The HBLS didactic delivery allowed me a flexible organization of study time.
- C2. HBLS teaching enabled me to carry out useful exercises in preparation for the examination.
- C3. HBLS teaching has given me the opportunity to use different forms of assessment (in-progress assessment).
- C8. The organization of HBLS teaching enabled work life balance processes.
- C9. In courses delivered in HBLS mode, I believe I would have benefited from the presence of an e-tutor (technological and methodological expert supporting on-line activities).
- C11. The HBLS teaching design made the activities offered in presence and at a distance consistent.
- C12. HBLS teaching methodologies facilitated my learning process.

Similarly, teacher educators positively answered also to dimension (c) perception of HBLS impact on teaching (mean values between 4 and 5) (Fig. 3). The HBLS structure seems to have fostered greater teacher focus on: the design and organization of teaching activities (item C2); the use of active, collaborative and reflective methodological approaches, through the use of the platform's digital resources (item C4); the improvement of communication with students in the delivery of the program (item C6); the development of student autonomy through the assignment of productive tasks (item C8).

Finally, an interesting finding emerges from the faculty's perception of the overall improvement in students' final exam results (item C9).

Fig. 3 Faculty questionnaire: (c) perceptions of HBLS impact on instruction – second questionnaire



C1. HBLS didactics allowed me to innovate teaching methodologies.

C2. The delivery of teaching in HBLS mode required precise planning to give coherence to the activities to be carried out in presence and at a distance (synchronous and asynchronous mode).

C4. The HBLS mode enabled the use of collaborative tools on the platform.

C6. The setting up of a communication space on the platform was useful in providing students with methodological guidance for tackling the required tasks.

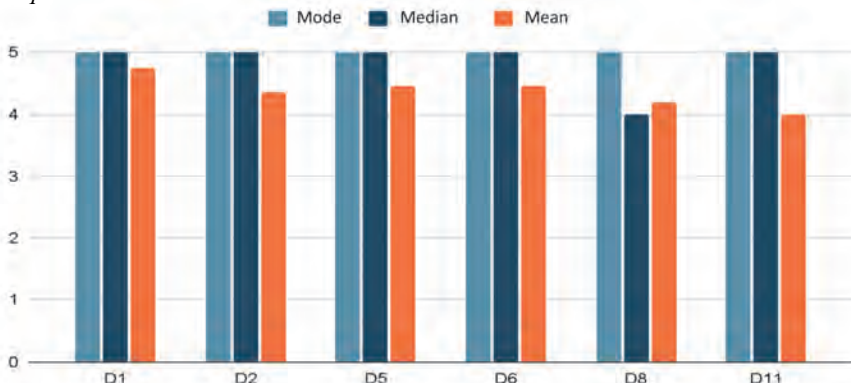
C7. The HBLS mode made it possible to organize activities in such a way that students could develop autonomous learning processes.

C8. The HBLS mode enabled students to develop original products.

C9. The HBLS mode enabled an improvement in learning outcomes.

Finally, lecturers' questionnaire dimension (d) refers to their perception on their role determined by the HBLS mode (dimension d) (Fig. 4). Findings were particularly homogeneous and toward the upper end of the scale for all the items involved.

Fig. 4 Faculty questionnaire: dimension (d) perception of the teachers' role in HBLS teaching – second questionnaire



D1. In the didactic design of an HBLS course, it is necessary for the teacher to integrate disciplinary knowledge with methodological-technological knowledge to give coherence to the activities.

D2. In the didactic design of an HBLS course, the teacher facilitates the personalization of students' learning by making the time-space of their engagement flexible.

D5. For teaching activities delivered asynchronously, it is important that the lecturer stimulates students' autonomous production (preparation of materials, production of projects, videos, etc.).

D6. For teaching activities delivered synchronously (Zoom), it is important for the teacher to use technological resources to promote student involvement (Padlet, Wooclap, surveys, etc.).

D8. In HBLS teaching the teacher is facilitated in the use of diversified modes of formative assessment (projects, reports, tests, presentations, peer assessment).

D11. HBLS teaching in workshop mode facilitates the development of professionalizing competences.

Discussion and Conclusion

Overall, the analysis of the student and faculty questionnaires showed a good appreciation of the quality of the HBLS experience. They agreed on the effective use of digital resources and environments for flexible teaching and learning times and spaces (face-to-face and distance). In addition, teacher educators reflected on the impact of HBLS modalities in their own teaching actions and the transformation of their own role in the educational process. The HBLS modality possibly fostered in the faculty a greater propensity to assume the role of facilitators rather than knowledge providers. Particularly interesting was the clearly perceived link between the HBLS modality and the need to revise their instructional design from a learner-centered and active learning perspective.

The students also perceived a good quality level in the teaching activities offered in HBLS mode. The technology integration in university courses and the HBLS organization seems to have enabled better performance in the learning process and in the final results.

The two groups of participants also aligned in terms of their perception of the educational sustainability offered by HBLS. The potential offered by technology integration was clearly perceived, in more design-organizational terms (for faculty), and in work-life balance ones (for students). Considering the findings of this case study, some elements emerge as positive components of the case study:

- 1) Faculty training on HBLS instructional design, methodologies and technologies for teaching;
- 2) Intensive communication with students to prepare them for the transformative experience through plenary meetings held before the start of the project;

3) Good technological and infrastructural endowment offered by the University.

These considerations are in line with what has been stated by the research already cited, which calls for a rethinking of all elements of the teaching organization, considering the type of technologies in use, the specific teaching methodologies and the teacher's role within an HBLs perspective. Only through a systemic and comprehensive design is it possible to concretely realize didactic innovation by putting learning at the center (see e.g. Boelens et al., 2017; Bruggeman et al., 2021).

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Authorship: O. Trevisan: Research questions and instruments; Discussion and conclusion; M. De Rossi: Hybrid Blended Solutions for Teacher training; The case study; results.

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