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# Blending and flipping learning in preservice teacher education: A phenomenological study

## Blending e flipping nella formazione iniziale docenti: uno studio di caso

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**ABSTRACT** This case study explored a large cohort of preservice teachers' perceptions of a blended learning course that integrated flipped classroom elements to promote deep learning about technology integration in education. The course involved face-to-face lessons, online synchronous sessions, team debates, and peer review activities. Data from course evaluations, learning artifacts, and a post-course survey indicated that participants found the blended structure effective for achieving course objectives and fostering higher-order thinking skills like analyzing and evaluating. The flipped approach engaged students in extending their learning through active discussions and relevant activities. Overall, participants perceived coherence between the learning processes activated and the expected outcomes of applying concepts to authentic teaching scenarios. While acknowledging challenges in adapting to the flipped model, preservice teachers valued the opportunities for autonomy, peer modeling, and preparing for technology-integrated instruction. The findings highlight blended learning's potential for transforming even large cohorts of teacher education programs through innovative, student-centered pedagogies.

**KEYWORDS** Blended Learning; Flipped Classroom; Large Cohort-Preservice Teacher Education; Deep Learning; Technology Integration.

**SOMMARIO** Questo studio di caso ha esplorato le percezioni di un'ampia coorte di insegnanti in formazione iniziale sulla struttura ed efficacia di un corso blended learning che integrava elementi della classe capovolta per promuovere un apprendimento profondo sull'integrazione della tecnologia nell'istruzione. Il corso prevedeva lezioni in presenza, sessioni sincrone online, gruppi di dibattiti e attività di revisione tra pari. I dati considerano le valutazioni del corpo studentesco, quelle dei prodotti di apprendimento e un questionario post-corso. I risultati hanno indicato che i partecipanti hanno trovato la struttura blended efficace per il raggiungimento degli obiettivi del corso e per promuovere abilità di pensiero di ordine superiore come l'analisi e la valutazione delle tecnologie nell'istruzione. L'approccio capovolto ha coinvolto gli studenti nell'estendere il loro apprendimento attraverso discussioni attive e attività ritenute pertinenti. Nel complesso, i partecipanti hanno percepito coerenza tra i processi di apprendimento attivati e i risultati attesi come l'applicazione dei concetti a scenari didattici autentici. Pur riconoscendo le difficoltà nell'adattarsi al modello capovolto, i partecipanti hanno apprezzato le opportunità di autonomia, modellamento tra pari e preparazione all'istruzione integrata con la tecnologia. I risultati evidenziano il potenziale dell'apprendimento blended e flipped per trasformare anche ampie coorti di formazione primaria attraverso pedagogie innovative e centrate sullo studente.

**PAROLE CHIAVE** Blended Learning; Flipped Classroom; Scienze della Formazione Primaria; Apprendimento Profondo; Tecnologie per la Didattica.

## 1. Introduction

For more than a decade now a major challenge for higher education concerns the application of Blended Learning, henceforth BL, teaching modes (Adams Becker et al., 2017). Specifically, the BL approach has attracted much interest as a transformation of teaching in the post COVID 19 period (Kalaichelvi & Sankar 2021). The forced digitization of teaching during the pandemic, while highlighting many critical issues in higher education, presented an opportunity to question and redefine the way higher education develops teaching solutions useful to support innovation, academic quality and curricular standards (Crawford et al., 2020; Trevisan et al., 2020). Upon return to normality, the exclusively face-to-face teaching model tended to be overcome through the integration of digital means towards BL for a number of positive features: more flexible and personalized curricula (Jonker et al., 2018), acknowledgment of student diversity with active methodological approaches (Boelens et al., 2018), student engagement with learning materials (Mestan, 2019).

Other crucial factors have also been investigated for BL implementation, such as institutional transitions (Adekola et al., 2017) and the political influence that organizational, structural and teacher support strategies can have in the transformative action of blended learning (Graham et al., 2013). The instructional design of a BL methodological approach proved crucial to its efficacy (e.g. Mirriahi et al., 2015; Owston & York, 2018) as well as the student-centred methodological perspective (e.g. Vanslambrouck et al., 2018). However, in any process of educational transformation it is the teacher who is the main architect because this process requires much more than simply acquiring new skills or changing pedagogical roles (Bruggerman et al. 2021; Philipsen et al., 2019). It requires action that allows prospective teachers from the initial training onwards to be able to directly experience the integration of digital technologies in education so that they can address their beliefs about the design relationship of technology connected to pedagogy (Gerbic, 2011; Philipsen et al., 2019).

BL is characterized by the fusion of online and face-to-face modes and has been shown to be particularly effective in pre-service teacher education, enhancing flexibility, diversity and engagement (Alammary et al., 2014; De Rossi & Trevisan, 2023; Perry et al., 2021). Active learning fostered by the BL modality emerges as the cornerstone of this educational evolution, focusing on student engagement in knowledge construction and fostering the overcoming of traditional face-to-face only lecture-based approaches (Garcia-Ponce & Mora-Pablo, 2020; Li et al., 2023). This paradigm, within BL solutions, privileges student-centred instruction and integrated formative assessment to promote innovative and meaningful learning practices (Trentin & Bocconi, 2015).

Within the BL approach, the flipped classroom methodology further exemplifies this by reversing traditional teaching methods (Han & Røkenes, 2020) to prioritize active learning and the development of higher order cognitive skills. This factor allows alignment with Bloom's taxonomy (Chandio et al., 2016) for a structured progression of cognitive skills (Li et al., 2023). The flipped classroom methodology not only facilitates student-centred learning, but also integrates technology effectively, preparing pre-service teachers for diverse and technology-infused educational contexts (Perry et al., 2021). However, the fusion of blended active learning with flipped classroom strategies requires university teachers to design initial training teaching experiences that are engaging, coherent and contextually relevant to the students who will be future teachers, harnessing their multiple knowledge to create effective learning environments (De Rossi & Trevisan, 2023; Garcia-Ponce & Mora-Pablo, 2020). This can prepare future teachers to face many challenges when implementing the BL approach, such as new

teaching and technological skills, coping with changing pedagogical roles, or dealing with the critical design and organizational issues of innovative teaching (Vaughan, 2010).

## 2. Theoretical background

The theoretical context supporting the study proposed in this article is based on three related themes: the definition of BL didactics, the Flipped classroom methodology and deep and active learning processes. Over the last two decades, following the increased implementation of BL didactic approaches, the pedagogical concept of digitally integrated didactics has emerged as the 'new normal' in higher education (Dziuban et al., 2018; Mestan, 2019). The application of BL didactics affects both students and the various institutional systems, attitudes and pedagogical beliefs of teachers (Brown et al., 2024; Garone et al, 2022).

Although the definition of blended learning is still ambiguous (Hrastinski, 2019), the BL pedagogical concept can be understood as the designed combination of online didactics integrated with classroom didactics through active methodological approaches to support learning in a participatory and reflective form (Boelens et al., 2015). The broad meaning of this definition allows for numerous interpretations that make it very relevant to how teachers understand BL didactics and its design (Bruggerman et al., 2021; Ellis et al., 2006). Boelens and colleagues (2017) identified four key characteristics for designing BL didactics: methodological and organizational flexibility, interaction, personalization and an affective learning climate. For example, Han and Ellis' (2019) study highlighted the quality of discussions in BL teaching by emphasizing the importance of integrating online discussions with face-to-face discussions in the classroom.

The role and position of the teacher within the BL implementation process has been the subject of research attention (Brown, 2016). Indeed, teaching consists of more than a combination of skills and pedagogical roles and is considered a 'continuous process of integrating the personal and professional aspects of becoming and being a teacher' (Beijaard, et al., 2004, p. 113). This dynamic process is referred to as 'professional identity' (Beijaard et al., 2004) that can be supported during induction training to help teachers cope with change. Professional identity consists of routines, knowledge, skills, beliefs, and attitudes about one's profession, and it is based on lived experiences (Jonker et al., 2018, pp. 120-121) and for this reason, BL teaching experiences offered during initial training can have an interesting transformative meaning for students to prepare them for the challenges when they will take up their positions as teachers.

A particularly useful methodology in implementing the BL approach is the flipped classroom, which facilitates experiential learning and supports the active construction of knowledge (Awidi & Paynter, 2019; Cecchinato et al., 2019). Another factor in favor of the flipped classroom methodology is that it enhances social learning (Lai & Hwang 2016; Wanner & Palmer, 2015) which promotes the generation and connection of ideas, as well as intellectual convergence. Social learning would support the development of meaningful learning (Jonassen, 2007) by emphasizing the importance of learners' interaction with peers, teachers and others to deepen the meaning of their learning experience (Biggs, 1996). In fact, according to Jonassen's (2007) interpretation, learning is meaningful when it is an intentional, premeditated, active, conscious, constructive practice that includes the reciprocal activity of action and reflection. Accordingly, the learning environment can be defined as a dynamic and open environment that allows subjects to experience active and flexible learning.

A study analyzing the literature on the flipped classroom by Abeysekera and Dawson (2015) highlights multiple factors that promote meaningful learning: the satisfaction of learners' needs for com-

petence, autonomy and relationships and thus increased levels of intrinsic and extrinsic motivation. According to the researchers, the cognitive load of students can be reduced through instructional actions designed according to the students' level of competence. In this way, a sense of competence, autonomy, security and relatedness is likely to positively influence students' engagement in the flipped learning environment.

However, based on Awidi and Paynter's (2019) review of the literature, it is pointed out that the evaluation of the flipped classroom is contingent on ascertaining the motivations and intentions of teachers who design and plan instructional action from a BL perspective. In numerous research (e.g. Abeysekera & Dawson, 2015; Kim et al., 2014; McNally et al., 2017), the complexity of measuring the impact of the flipped classroom in the totality of its aspects with regard to the development of meaningful learning has been highlighted as the variables to be considered are multiple. The variables relate to the characteristics of the proposed teaching activities, which for the purpose of developing meaningful learning should be: active, collaborative, conversational, reflective, intentional, constructive so that the student internalizes a certain methodology that makes him or her autonomous in the cognitive journey (Jonassen, 2007).

From this perspective of analysis, the literature on the innovations of the flipped classroom methodology indicates that the design focus of teachers has been on student engagement and student-centred teaching and learning processes with encouraging results particularly with regard to motivational aspects, active learning and, to some extent, outcomes (Bates, 2015, 2018; Bishop & Verleger, 2013; Lim & Libing, 2016, McNally et al., 2017).

## 3. The study

This study is grounded in social constructivism for educational research, which positions participants and their processes of meaning-making at the center of understanding a phenomenon (Creswell & Creswell, 2018). From this epistemological stance, the study acknowledges the pivotal role of context in shaping individual interpretations. This necessitates a research design that is methodologically aligned with such assumptions. Accordingly, a case study approach was adopted (Stake, 2006; Yin, 2008), consistent with a constructivist paradigm that seeks to interpret participants' constructions of reality and thereby gain insight into their behaviors within a specific context (Baxter & Jack, 2015). Furthermore, this approach aims to capture the complex dynamic and unfolding interactions of events, human relationships and other factors within each unit of analysis, i.e. case (Cohen, 2017). The specific case at stake was an elective blended course on teaching methodologies and educational technologies offered during the 2023-2024 academic year at a mid-sized European university's initial teacher education program. The course integrated flipped classroom elements into a blended learning environment to foster active learning and engagement with course materials before and during class meetings.

The case study explored the students' perceptions on the following issues:

1) Effectiveness of the course's blended structure in facilitating course objectives.
2) Effectiveness of the course's flipped approach in promoting deep learning.
3) Coherence between the processes activated during the course and the expected outcomes at the end.

The course structure comprised two face-to-face lessons and one synchronous session per week, over 5 weeks (total: 30h). The face-to-face sessions focused on analyzing authentic teaching scenarios through various theoretical frameworks for educational technology, e.g. Technological Pedagogical and

Content Knowledge (TPACK – Koehler & Mishra, 2005); Replacement Amplification Transformation (RAT) and Passive Interactive Creative RAT (PICRAT – Kimmons et al., 2020), Extend Enhance Engage (EEE – Kolb, 2020), Interactive Constructive Active Passive (ICAP – Chi & Wylie, 2014), and Technological Pedagogical Reasoning & Action (Loughran, 2019; Trevisan & Smits, 2023). Collaborations were established with practicing teachers and researchers, who contributed to course delivery. Volunteer in-service primary school teachers provided video scenarios of their classroom practices with technologies, stimulating discussions among preservice teachers. University-affiliated researchers also participated, engaging in discussions on the frameworks and their cross-contextual applications.

Students had the option to form teams and sign up for team-based online debates during the weekly remote session. These teams debated the qualities of teaching scenarios either available online or provided by in-service teachers, based on the week's framework. Teams recorded and uploaded their debates to the course's Learning Management System platform, allowing for peer feedback using a shared rubric. The instructor assessed each debate and peer review using the same rubric, providing formative feedback to individuals and sharing score trends with the entire cohort to demystify and foster learning (Ritchhart, 2015; Ritchhart & Church, 2020). Participation in debates and peer reviews were voluntary, and only the highest score per task would contribute to the overall course grade. Ongoing feedback on processes (e.g., class participation) and products (e.g., debates and peer reviews) aimed to facilitate learning through reasoning (Ritchhart, 2015; Ritchhart & Church, 2020).

### *3.1. Participants*

The participants were the 250 preservice teachers enrolled in the Educational Technology course at the University of Padova during the fall semester of 2023-2024. At the end of the course, they were voluntarily invited to complete an online survey (convenience sampling – Creswell & Creswell, 2018). Their participation and survey responses had no bearing on their course assessment. Participants were fully informed about the aims of the survey.

Nearly all participants (99%) were second-year preservice teachers, aged 20 on average, with 97% being female. While course attendance was elective, 75% of the participants reported attending more than 75% of the sessions, whether face-to-face or remote.

### *3.2. Data collection and analysis*

Given the elective nature of the course, attendance and engagement in tasks were monitored. Grades from the debates and peer reviews were considered evidence of the learning processes activated during the course.

Additionally, a survey was conducted at the end of the course, with 100 volunteer respondents completing it. The structure of this survey is summarized in Table 1. Participation in the research component of the course (i.e., the survey) was voluntary and had no bearing whatsoever on students' assessment or grading for the course itself.

As the instructor of the course, the primary researcher and first author paid particular attention to issues of positionality and potential bias. In line with constructivist case study principles, the researcher is understood as a participant in the construction of meaning, not an objective outsider (Stake, 2006). This perspective aligns with the understanding that complete objectivity is unattainable in qualitative research,

and the researcher's experiences and perspectives inevitably shape the interpretation of data. To safeguard ethical and methodological rigor, several strategies were implemented: survey participation was anonymous, strictly voluntary, and conducted post-course to eliminate any link to students' grades. Additionally, transparency with participants was maintained regarding the research purpose, and data were analyzed with a conscious effort to bracket personal assumptions, in alignment with reflexive qualitative practices (Baxter & Jack, 2015). Finally, regular discussions with external researchers (e.g. second author) not involved in the course were held to challenge assumptions and interpretations.

**Table 1.** Survey structure.

| Area of inquiry | Survey items (type and number) | Survey items (example) |
|---|---|---|
| Demographics and background | Six, multiple choice | How often did you attend synchronous online sessions? |
| Effectiveness blended course structure (Research focus 1) | Five 5-point Likert (1: not at all effective; 5: fully effective) | How effective did you find asynchronous debate peer-reviews (thinking of the course objectives)? |
| | Bloom's taxonomy, six 5-point Likert items (1: never; 5: always) | How often did you feel engaged in applying ideas and concepts in different contexts? |
| Effectiveness flipped course structure (Research focus 2) | Five 5-point Likert (1: not at all effective; 5: fully effective) | How effective did you find asynchronous debate peer-reviews (thinking of your learning)? Would you like to elaborate on your answer? |
| | Triple E checklist (Kolb, 2020): seven items for Engagement; three items for Enrichment and Extension. All items were 3-point Likert (1: not at all; 3: definitely) | Did the suggested activities promote active content-focused discussions between students and/or the teacher? (Engagement) |
| | | Were the contents and activities relevant to your future profession? (Extension) |

Coherence among processes and products (research focus 3) was measured considering the paired scores for each of the five items about course objectives, and learning: digital agenda/book of the course; strategies in synchronous face-to-face lessons; online-based debates; online-based debates' peer-review; formative assessment/feedback strategies.

## 4. Findings

As for course attendance and student engagement, an average of 200 students decided to attend face-to-face lessons every week. A total of 194 students participated in one debate session and 138 to two (a total of three debate rounds were possible overall). A total of 185 students participated in two peer review sessions and 168 in three (the maximum possible), over the five weeks of course.

As for evidence of the learning processes during the course, both the debate and peer review scores increased steadily throughout the weeks, with a steeper trend in the students who engaged in these tasks multiple times. A summary of the results is available in Table 2.

Upon being asked to hypothesize why during one of the classroom discussions, the students pointed out the usefulness of peer modelling through previous videos, reviews and matching feedback on the course platform. The main results of the survey on course structure and quality are summarized in Table 3.

**Table 2.** Course evaluations.

| Evaluation instance | | Mean | SD | Mode | Range |
|---|---|---|---|---|---|
| Participation in debates | One round (n=194) | 25.2 | .82 | 25 | 25-29 |
| | Two rounds (n=138) | 27.8 | .76 | 27 | 25-29 |
| Participation in peer review | One round (n= 5) | 25.8 | 1.23 | 26 | 16-28 |
| | Two rounds (n= 185) | 27.3 | .97 | 28 | 16-29 |
| | Three rounds (n= 168) | 28.6 | .96 | 29 | 16-30 |
| End of course evaluationa | Who engaged in tasks (n=140) | 28.95 | 1.6 | 30 | 18-30 |
| | Who did not engage in tasks (n=63) | 27.5 | 2.5 | 28 | 19-30 |

a. Some of the enrolled students did not take the end-of-course evaluation task immediately after the course. Those results were not included in this analysis.

**Table 3.** Survey scale results (average and mode).

| Area of inquiry | | Scale range | Scale average | SD | mode | N |
|---|---|---|---|---|---|---|
| Effectiveness Blended course structure | Strategies and activities (course objectives) | 1-5 | 4,35 | 0,79 | 5 | 100 |
| | Bloom-remember | 1-5 | 2,72 | 1,30 | 1 | 100 |
| | Bloom-understand | 1-5 | 3,18 | 1,41 | 2 | 100 |
| | Bloom-apply | 1-5 | 3,88 | 0,94 | 3 | 100 |
| | Bloom-analyze | 1-5 | 4,13 | 0,78 | 4 | 100 |
| | Bloom-evaluate | 1-5 | 4,54 | 0,61 | 5 | 100 |
| | Bloom-create | 1-5 | 2,77 | 1,40 | 1 | 100 |
| Effectiveness flipped learning | Strategies and activities (learning) | 1-5 | 4,30 | 0,79 | 5 | 100 |
| | EEE-Engage | 1-3 | 2,65 | 0,49 | 3 | 100 |
| | EEE-Enhance | 1-3 | 2,83 | 0,40 | 3 | 100 |
| | EEE-Extend | 1-3 | 2,63 | 0,50 | 3 | 100 |

The data appears to indicate the effectiveness of the blended course structure (research focus 1), as evidenced by the positive evaluation of the *strategies and tasks employed for achieving course objectives* (mean = 4.35, SD = .79). Additionally, the data suggests the recognition of higher-order cognitive levels from Bloom's taxonomy, such as *analyze* and *evaluate*, which were reported to occur frequently (M = 4.13, SD = 0.78; evaluate: M = 4.54, SD = 0.61).

The effectiveness of the flipped learning approach (research focus 2) can be found in the favorable assessment of the strategies and tasks in facilitating a meaningful learning experience (mean = 4.30, SD .79) and the different dimensions of the *EEE* framework (with means above 2.6 for all three dimensions). Within scale 8 (table 3), the lowest score was attributed to the item "*How effective did you find the flipped strategies during face-to-face lessons (for your learning)?*" (*M*= 3.85, *SD*=0.8).

The coherence between the processes activated and the expected products (research focus 3) was examined by comparing the scores for strategies and tasks related to course objectives (1) and meaningful learning experiences (8 – Table 3). As shown in Table 3, participants perceived coherence in this dimension, with nearly identical scores on the two scales in terms of mean, standard deviation, and mode.

## 5. Discussion and conclusion

The findings from this case study shed light on the participant preservice teachers' perceived benefits of the blended learning course structure and flipped classroom approach in promoting active learning and higher-order thinking. Participants recognized the activation of various cognitive processes throughout the course, with a notable emphasis on the higher levels of Bloom's taxonomy. The flipped approach was perceived as an engaging strategy that enhanced and extended their learning experiences.

Furthermore, the data revealed coherence between students' perceived effectiveness of the processes activated during the course (aimed at fostering meaningful learning), and the accomplishment of expected final products (aligned with the course objectives). This coherence suggests that, from the participants' perspectives, the blended learning course structure and flipped classroom approach of this course supported them in deeply engaging with the content, applying critical thinking skills, and reflecting on their learning processes and future teaching practices.

While these findings underscore preservice teachers' positive perceptions of the innovative pedagogical models in enhancing their learning outcomes, some challenges were also perceived. Notably, participants' unfamiliarity with the flipped approach and their ingrained experiences with traditional teaching methods posed hurdles. The lowest-rated item pertained to the perceived effectiveness of flipped strategies during face-to-face lessons for learning. These results highlight participants' perceptions of the demands of the flipped approach, which requires greater responsibility, organization, autonomy, and self-direction from students (Garcia-Ponce & Mora-Pablo, 2020).

While this study underscores the transformative potential of integrating technology and innovative teaching methods within teacher education programs, the findings also revealed that the transition to these innovative pedagogical models necessitates a gradual acclimation process for learners to develop the required autonomy and organizational skills. Overcoming these perceived challenges may involve implementing a supportive "flipped learning continuum" to progressively familiarize students with this new learning paradigm, thereby enhancing their readiness for the demands of contemporary educational settings (Tomas et al., 2019).

## 6. Limitations and future directions

This study was limited to a single course context at one university, with a relatively homogenous sample of preservice teachers. Future research should explore BL and flipped approaches across multiple teacher education programs with large cohorts, to enhance transferability. Moreover, a deeper qualitative approach, e.g. through interview studies, could shed light into students' experience of the phenomenon. A longitudinal approach tracking preservice teachers' experiences as they transition into the profession could provide insights into how their training influences classroom implementation of technology-integrated reasoned pedagogies. Additionally, investigating faculty perspectives on redesigning courses and overcoming institutional barriers to BL would complement the student view presented here. Examining specific learning outcomes and achievement data could further substantiate self-reported perceptions of the effectiveness of these innovative models. As BL teacher education evolves, continuous research will remain crucial for refining best practices in preparing future educators for technology-integrated teaching and learning environments.

## 7. Author contributions

Ottavia Trevisan: abstract, sections 3, 4, 5.
Marina De Rossi: sections 1, 2, 6.

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