# Technopedagogical Devices in Blended Learning in Developing Countries

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**Abstract**

Blended Learning (BL) is a mixed teaching methodology that combines learning through the Internet (e-learning) with the experience of face-to-face classes. This blended learning scenario configures new alternatives for continuous learning. The modality resorts to the diversity of technopedagogical devices, propitiating areas of encounter and didactic interaction. The structural arrangement of BL makes it emergent, while at the same time it establishes it as a standardized educational modality, basically in higher education. To this end, this study seeks to recognize the importance and recurrent use of technopedagogical devices in BL. With this intention, 45 thesis reports on various experiences based on BL, defended in Peruvian universities, were analyzed. The results reveal the significant contribution of technopedagogical devices to socio-technological immersion, as well as to digital literacy with collaborative resources; adversely, they generate little involvement in tutorial accompaniment and a limited level of learning autonomy. Basically, although the technopedagogical devices do not show substantial innovations, they are progressively improving their applications. Specifically, in Peru, BL contributes to didactic mediations that, while not being at the forefront with respect to other societies, are progressively advancing in their use and knowledge.

Index Terms: Blended Learning, Technopedagogical devices, Theses.

## 1. Introduction

Blended Learning (BL) has been instituted as a standardized educational modality, essentially in higher education, given the singularities and potentialities that characterize it. Educational institutions assume it as a response to socio-technological progress, in view of the growing changes in the ways of transmitting knowledge, by reorienting instruction towards new perspectives and strategies. The digital era transforms contemporaneity by promoting an intensive use of Information and Communication Technologies (ICT) in the development of a sense of autonomy and, therefore, of responsibility in decision making while teaching and learning in emerging scenarios [1].

In this scenario, BL enables better adaptations, not only by bringing the subjects closer to the information, but also by modifying the forms of socio-cognitive interaction with the Web [2]. The current conditions of educational transformation suggest the search for scenarios that are

closer to the users' experiences. BL allows personalization and flexibility of the instructional process to achieve more active learning, in combined didactic contexts of virtuality and presentiality [3]. In these scenarios, the pedagogical and technological components are essential to configure didactic exchanges with impacts that alter the relations of the "territories" of knowledge and power [4].

ICTs contribute in a timely and qualified manner to educational development, leading BL towards formative individualization, with autonomy; but, at the same time, in the imperative need for collaboration. The interventions favored integrate means, resources, technologies, methodologies, activities, strategies and techniques that meet specific learning needs [5] [6]. The rapid progress of the digitization of education is not expressed linearly or assumes a single nature; on the contrary, it translates into changes with multiple facets that, in many cases, are unclassifiable as entirely positive or negative [7]. In this way, new forms that make education more dynamic become visible.

The current socio-educational context is characterized by the growing openness to digital transformation, promoting spaces for renewed educational possibilities. ICTs redefine their intervention in the selection and representation of culture, knowledge and reality [6]. Thus, they build new structures that influence socialization processes, as well as cognitive and behavioral ones. In BL, they generate reconfigurations in the ways of being, thinking, acting, doing and coexisting among subjects, with the contents, with the tutors, with the digital tools, etc. In this way, they markedly amplify the influence of digital connectivity. The Internet becomes vital to place education in less idealistic levels and closer to reality.

### A. Technopedagogical devices in Blended Learning

Digital systems and technopedagogical intermediation devices foster formative scenarios, such as BL. In them, the emerging transformations give rise to "identity crises". These are not exactly negative, since they allow the role of the academic community to be resituated by elaborating and proposing responses that revitalize the humanistic notion of higher education [8]. The positions assumed modify and induce changes, as well as social, technological and pedagogical incorporations that go beyond economic demands. The demands are in favor of humanity. Within the framework of aspirations, there is room for innovations based on platforms, technologies and interactions that stimulate productivity and professionalization.

BL, as a territory of encounter and interaction among participants, resorts to emerging technologies and diverse modes of linkage. The structure of the training process responds to pedagogical and didactic decisions that define what and how to learn. In BL, formative interactions are promoted in situated contexts that tend to be integrated, due to the confluence of media and resources [9][10]. Therefore, conceiving technopedagogical processes adapted to the uniqueness, adaptability, flexibility and personalization that define BL is a challenge [3]. It calls for technopedagogical transitions that range from combining the virtual with the presential, integrating it, up to envisioning formative convergence.

The evolution of BL takes into account pedagogical activities, the relationship between presentiality and virtuality, such as flipped classrooms, the internet of things, among other innovations [11][12]. In its development, it considers the surrounding continuity of processes and resources, such as: i) the location (at home, public or specific place; ii) the means of distribution (of materials and resources), iii) the type of instruction (lecture, active, etc.) and

iv) the synchrony (simultaneity, deferred time) [13]. In essence, the dichotomy of face-to-face and virtual seems to be diluted, towards an unquestionable technopedagogical convergence. The integration of face-to-face and virtual spaces responds to the adaptation, interests and motivations for a flexible and ubiquitous didactic-methodological action [14], and therefore, personalized.

In BL scenarios, technopedagogical devices develop learning capacities and activities in virtuality, without the direct mediation of face-to-face pedagogical action. In it, the didactic dimension of the technopedagogical device emerges as a possibility for subjects to deploy their instructional potential. In this way, they face curricular educational objectives and contents. Their action goes beyond the transmission and application of knowledge; it aims at the ideological and spiritual emancipation of man [4]. In this evolution, the technopedagogical devices become essential components in the formative mediation, whose potentiality surpasses social regulation and educational discipline.

Technopedagogical devices in BL derive from and contribute to the need of understanding the effects of their determination, trends, research interests, approaches and areas of opportunity and outstanding findings [15]. Addressing them involves an analytical review of the formative experiences developed in Peruvian universities. From this perspective, their achievements and difficulties are recognized, and the technopedagogical resources and tools are identified as devices that mobilize the dynamics of BL. It also makes it possible to foresee thematic lines of continuity and sustainability of scenarios and conditions. In this sense, the systematic review contributes to the evaluation of the relevance and timeliness of the technopedagogical interventions.

## 2. Methods and Materials

For this study, the Systematic Literature Review (SLR) is used, specifically the Scoping Review design. This methodology makes it possible to identify, evaluate, interpret and synthesize relevant aspects of a topic, based on the study of previous research. The materials for the analysis are constituted by the reports of theses on BL defended at Peruvian universities. The Systematic Literature Review favors the construction of relevant knowledge due to its rigor and objectivity, informative detail, selective and critical character, as well as unitary and overall organization.

The research purpose consisted on defining and organizing the information in order to answer the following research questions:

1. What techno-pedagogical devices of BL contribute to the socio-technological culture?
2. How do the techno-pedagogical devices contribute to BL?
3. How is tutorial support developed in BL?

The criteria used were as follows:

- Inclusion criteria: i) Search terms: "Blended Learning", ii) Temporality of reports: 2011-2022; iii) Full access to thesis reports and 4) Thesis reports of an empirical (non-theoretical) nature.
- Exclusion criteria: i) Thesis reports due to system failure and ii) Improvement/business/innovation/trial plan reports (non-thesis).

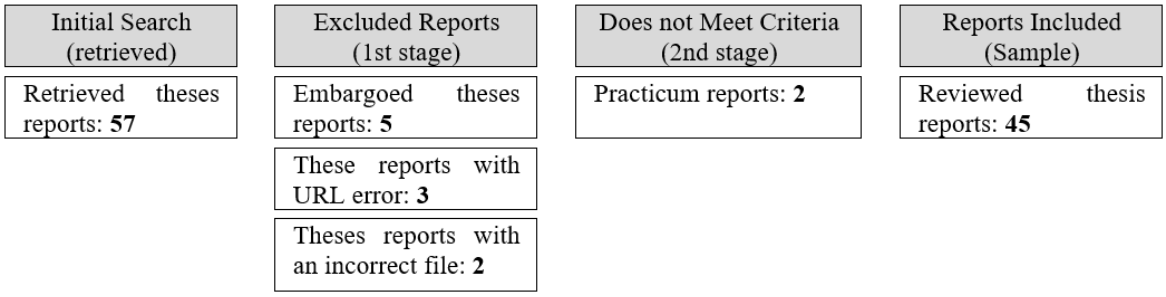


**Fig. 1.** Selection of the sample for analysis.

The National Repository of Research Papers (RENATI) http://renati.sunedu.gob.pe/ was used to retrieve the thesis reports. Finally, according to the procedures described (Fig. 1), the sample consisted of 45 thesis reports on BL defended in Peruvian universities.

## 3. Results

### A. BL Technopedagogical Devices for a socio-technological culture

In BL, the mastery of educational content is vital to access a variety of resources and practices that contribute to the formation of a socio-technological culture [1]. The so-called digital culture is essential for the legitimization of hegemonic discourses and actions based on ICTs. Such actions are consolidated from technopedagogical devices. In this understanding, resources and tools become technopedagogical devices that integrate communication and interaction spaces to generate meaning and learning. The recognition of their triggering character is recognized from the key words, in the sense that they generate terminologies associated with a type of culture.

The formative demands raised by BL contribute in various ways to the socio-technological culture (Fig. 2). Some of the demands are scarcely mentioned (11%: Integration, Strategies, Interactivity, Information, Success), as they refer to situations compatible with the acquisition of skills demanded by today's world [9]. Others arouse medium attention (36%: Design, Communication, Innovation; Digitization, Knowledge), by extending and transforming the demand for new formative demands that induce emerging formats and designs [13]. And a few are more representative (53%: Culture, Interaction, Audiovisual, Literacy, Competence), given the context of interactivity and permanent interactions that encourage new competences.

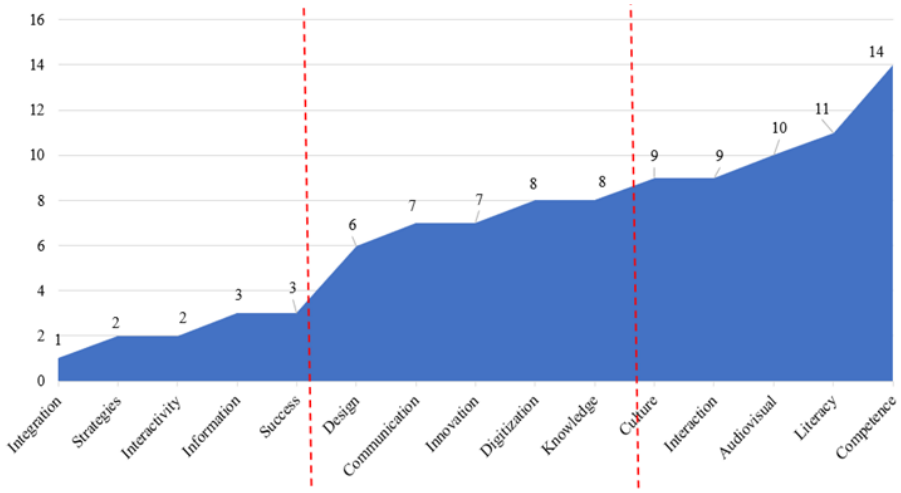


**Fig. 2.** Formative demands for a sociotechnological culture.

## B. Technopedagogical devices in BL-based training experiences

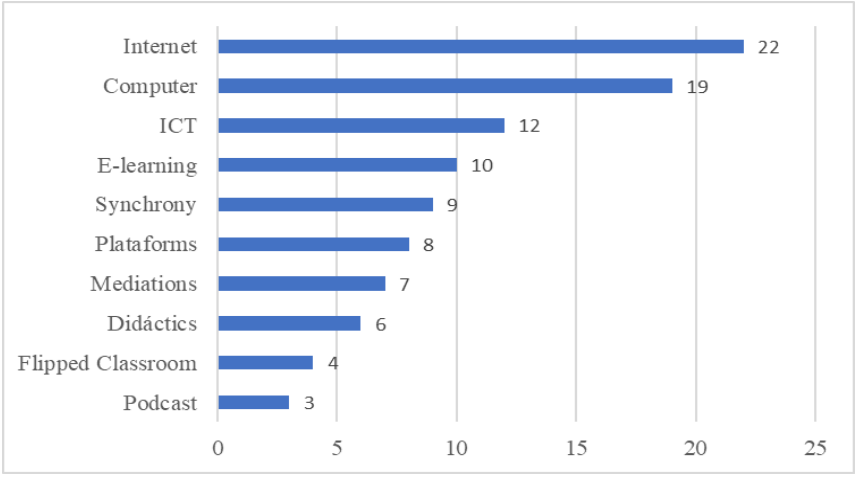


**Fig. 3.** Technopedagogical supports of BL.

The instructional process requires supports for the development of BL, essentially technopedagogical tools and resources. These provide didactic mediations and interactions (Fig. 4). The processes developed both virtually and presentially are based on technological devices and resources (platforms, computers, podcasts, tools, etc.), as well as pedagogical ones (Flipped Classroom, E-learning, etc.), for the strengthening of BL experiences. The diversity of technopedagogical devices that promote accelerated participation and collaboration [4] comes from the integration of media and resources that meet the training requirements [6][7].

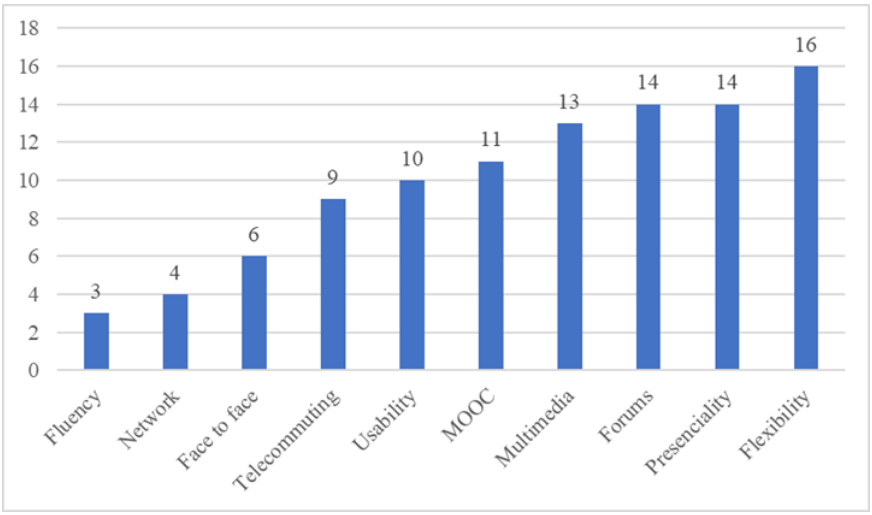


**Fig. 4.** BL characterization scenarios.

In BL, the configuration elements are important because of their impact on the achievement of competencies [3]. In turn, they enable involvement in the digital society, given the variety of applications and resources used [1]. Therefore, BL components from various perspectives (face-to-face, virtual, blended, multimedia, etc.) contribute to sociotechnological integration (Fig. 5). In BL environments, the participation and use of various learning resources (MOOCs, wikis, blogs, news syndication, discussion forums, concept maps, etc.) contribute to the overall development of the individual and his or her satisfaction with the media (usability, etc.), in various aspects, such as telecommuting and communication fluency.

### C. Development of tutorial accompaniment in BL

The tutorial function in BL is instrumental in the achievement of academic objectives, since it provides support for the exchange and interactions in the construction of knowledge or learning. In BL, not only specific or precise collaborations are required, but also a permanent and sustained tutorial accompaniment, in order to contribute to the discursive mediation of the participants [5]. In the theses analyzed, references are made to tutorial limitations, which in the literature are known as didactogenies (pathologies generated by poor teaching), given that the tutor manifests a certain passivity, in some cases, and, in others, intensities of intervention, distant or inappropriate for the formative purpose.

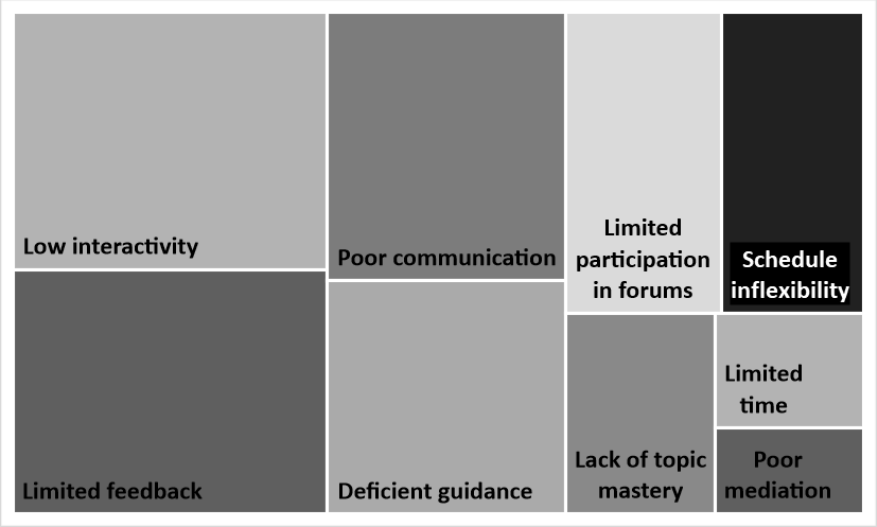


**Fig. 5.** Main references of tutorial accompaniment in BL.

The tutorial accompaniment of BL represents a substantial intervention [3]. Tutoring, whether for support needs, on extensions or explanations of academic work, or for the management of technology, lacking mastery, among other requirements, is an essential component in BL [10]. Deficiencies or limitations to the tutorial function, from the virtual or face-to-face accompaniment, do not contribute to its timely and appropriate development; in fact, they cause learning problems [9] due to ignorance of functions, lack of programming or coordination, etc.

Tutoring provides core benefits in BL, ranging from the use of technology, didactic interaction, feedback, etc.; it takes advantage of the potential for improvement based on the flexibility of access or self-regulation [12]. In that intention and, if a suitable tutorial action is given, the teaching actions improve, and undoubtedly, learning is increased by constructive didactic interactions. In BL, the effectiveness of tutoring is a defining feature [11], and is widely considered by the participants. Therefore, inflexibility and time restrictions do not fit in the tutorial exercise, given the learning rhythms and the unique demands of the training to which they respond.

## 4. Discussion

The analytical-documentary study on the technopedagogical devices in the intermediation of BL in Peru evidences a diversity of situations that occur in training scenarios. Its approach reveals similarities and, at the same time, distinctions and drawbacks [14]. Peru, as an emerging economy, reveals shortcomings and limitations of its educational system, where

digital gaps persist and inhibit further development of BL; even so, it arouses a growing research interest [10]. In this sense, the identification and analysis of studies related to technopedagogical devices in BL define aspects that describe and explain their implications and impact on the sociotechnological culture.

The results related to the construction of a socio-technological culture from BL are revealing, expressing the significant contributions that the formative experiences promote. The ways of structuring and organizing the components of BL manage to generate immersion in the use of digital resources and tools [14][12]. The approach to the technopedagogical task demands competencies that require literacy spaces and processes, given by a formal and recurrent learning in the management of information, such as media and other technological devices [8]. There is no doubt that in BL, participation and collaboration accelerate the benefits provided by the technopedagogical devices [4].

The findings recovered from the experiences based on BL translate considerations regarding technopedagogical devices. The didactic processes are widely considered and valued for their diversity and effectiveness in collaborative learning, networking, etc., as well as the complementary activities that induce multi-literacy. In this intention, the technological resources and tools are less valued due to their restricted use, despite the diversity of devices used, which would correspond to limitations due to Internet connectivity. The worrying aspect of this consideration lies in the insufficient tutorial accompaniment, which has been greatly weakened by practices contrary to the work of BL, revealing the scarce mastery of tutoring as a formative resource.

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