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DIGITAL LEARNING PLATFORMS: AN INTEGRATIVE REVIEW TO
SUPPORT INTERNATIONALIZATION OF HIGHER EDUCATION

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ARTIGO

**DIGITAL LEARNING PLATFORMS: AN INTEGRATIVE REVIEW TO SUPPORT
INTERNATIONALIZATION OF HIGHER EDUCATION****CLÁUDIO DE LIMA¹**ORCID: <https://orcid.org/0000-0002-4214-2547>**ROGÉRIO CID BASTOS²**ORCID: <https://orcid.org/0000-0002-3775-1516>**GREGÓRIO VARVAKIS³**ORCID: <https://orcid.org/0000-0003-2576-4835>

ABSTRACT: The process of integrating an international, intercultural, and global dimension into the purpose, functions or delivery of education defines the Internationalization of Higher Education (IoHE). Due to lack of resources for education, internationalization at home (IaH) has gained popularity. Internationalization of Higher Education involving Information and Communication Technology (ICT) opens opportunities for innovative learning approaches across nations and cultures. The purpose of this paper is to analyze the scientific publications of recent years on digital learning platforms related to IoHE. For this, a descriptive exploratory research was conducted based on an integrative literature review. Analysis of this field shows that e-learning platforms have boosted online and distance learning and diversified the IoHE landscape. Collaborative Online International Learning (COIL) programs emerge as part of IaH and reflect the growing link between ICTs, social media, and internationalization. The concept of virtual internationalization can be used as a conceptual framework to promote IoHE.

Keywords: Internationalization of Higher Education, digital platform, e-learning, MOOC, COIL.

**PLATAFORMAS DIGITAIS DE APRENDIZAGEM: UMA REVISÃO INTEGRATIVA PARA APOIAR A
INTERNACIONALIZAÇÃO DO ENSINO SUPERIOR**

RESUMO: O processo de integração de uma dimensão internacional, intercultural e global – na finalidade, nas funções ou na entrega de educação – define a Internacionalização do Ensino Superior (IES). Devido à falta de recursos para educação, a internacionalização em casa (IeC) ganhou popularidade.

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A IES envolvendo Tecnologia da Informação e Comunicação (TIC) abre oportunidades para abordagens de aprendizagem inovadoras entre nações e culturas. O objetivo deste artigo é analisar as publicações científicas dos últimos anos sobre plataformas digitais de aprendizagem relacionados à IES. Para tal, foi realizada uma pesquisa exploratória descritiva com base em uma revisão integrativa da literatura. A análise desse campo mostra que as plataformas *e-learning* impulsionaram o ensino on-line e a distância e diversificaram o panorama da IES. Programas *Collaborative Online International Learning* (COIL) surgem como parte da IeC e refletem o crescente vínculo entre TIC, mídia social e internacionalização. O conceito de internacionalização virtual pode ser utilizado como uma estrutura conceitual para promover a IES.

Palavras-chave: Internacionalização do Ensino Superior, plataforma digital; e-learning, MOOC, COIL.

PLATAFORMAS DIGITALES DE APRENDIZAJE: UNA REVISIÓN INTEGRADORA PARA APOYAR LA INTERNACIONALIZACIÓN DE LA EDUCACIÓN SUPERIOR

RESUMEN: El proceso de integrar una dimensión internacional, intercultural y global en el propósito, las funciones o la entrega de la educación define la Internacionalización de la Educación Superior (IES). Debido a la falta de recursos, la internacionalización en casa (IeC) ha ganado popularidad. La IES que involucra Tecnología de Información y Comunicación (TIC) abre oportunidades para enfoques de aprendizaje innovadores en naciones y culturas. El propósito de este artículo es analizar las publicaciones científicas de los últimos años sobre plataformas de aprendizaje digital relacionadas con IES. Para esto, se realizó una investigación exploratoria descriptiva basada en una revisión integrativa de la literatura. El análisis muestra que las plataformas e-learning han impulsado el aprendizaje online y a distancia y diversificado el panorama de la IES. Los programas Collaborative Online International Learning (COIL) emergen como parte de IeC y reflejan el creciente vínculo entre las TIC, las redes sociales y la internacionalización. El concepto de internacionalización virtual puede utilizarse como estructura conceptual para promover la IES.

Palabras clave: Internacionalización de la Educación Superior, plataforma digital, e-learning, MOOC, COIL.

INTRODUCTION

Globalization is changing the world of internationalization, which is changing the higher education world (KNIGHT, 2004). Globalization can be understood as economic, political, and social forces driving 21st century higher education towards greater international involvement (ALTBACH; KNIGHT, 2007; DAL-SOTO; ALVES; SOUZA, 2016).

Internationalization is defined as “the process of integrating an international, intercultural and global dimension into the purpose, functions or delivery of higher education” (KNIGHT, 2003, p. 2). In higher education, it entails a series of cross-cultural challenges that need attention not only in terms of theoretical curriculum development and innovative pedagogies, but also in terms of institutional drivers and how we consider the academic content quality (WIHLBORG *et al.*, 2017).

Due to lack of resources, student and teacher mobility has not always been a viable option. Thus, as an alternative to internationalization abroad (IA), internationalization at home (IaH) has gained popularity (POUROMID, 2019; WIHLBORG *et al.*, 2017). According to De Wit and Hunter (2015), the IaH focuses on the curriculum, teaching and learning, and learning outcomes.

Internationalization of Higher Education (IoHE) involving Information and Communication Technology (ICT), such as e-learning platforms, opens opportunities for innovative learning approaches (WIHLBORG *et al.*, 2017). These platforms represent the use of ICTs to disseminate

information and knowledge for education and training, and emerge as a paradigm of modern education (CIDRAL *et al.*, 2018). The Massive Open Online Courses (MOOCs) platforms are suitable options to support universities in building scientific knowledge and solutions to society's needs.

In this context, this paper aims to analyze the bibliometric characteristics of recent years on IoHE-related learning platforms to identify trends and thematic gaps of publications indexed in international databases. Based on this analysis, this study seeks to investigate how ICT supports IoHE, from the perspective of digital learning platforms.

The following sections are organized as follows: the following section presents the required theoretical background about IoHE and digital learning platforms. The third section describes the methodology used. The fourth section presents the results found, discusses the approaches and trends, and presents a research proposal. Finally, the final considerations are presented in the fifth section.

INTERNATIONALIZATION OF HIGHER EDUCATION

Global capital has invested in knowledge industries around the world, including higher education, reflecting on the emergence of the knowledge society (ALTBACH; KNIGHT, 2007; MOROSINI, 2011). Internationalization is an important part of the university world, and is a factor that legitimizes the circulation of knowledge and the formation of human resources (MOROSINI *et al.*, 2016). However, it is from the end of the last century that the production on the subject has expanded and now encompasses not only science, but also higher education in general (LEE; CAI, 2019; MOROSINI; NASCIMENTO, 2017).

The IoHE includes policies and practices undertaken by academic systems and institutions to deal with the global academic environment (ALTBACH; KNIGHT, 2007). International and interdisciplinary collaboration is key to solving many global problems, such as those related to environmental and health issues. National institutions and governments are making the international dimension of research and knowledge production a justification for the IoHE (KNIGHT, 2004).

Internationalization at the institutional level is often seen as a series of different strategies or activities. According to Knight (2004), these activities fall naturally into two different streams of activities. The first includes internationalization activities that take place on campus, at home. The second stream refers to activities that take place abroad or, in other words, beyond borders.

Internationalization Streams

The IoHE features two main streams, which are closely interconnected: (i) IaH; and (ii) IA. The IaH corresponds to activities that help students develop international understanding and cross-cultural, curriculum-oriented skills that prepare students to be active in a much more globalized world (KNIGHT, 2006). According to Beelen and Jones (2015, p.69), IaH is the “purposeful integration of international and intercultural dimensions into the formal and informal curriculum of all students within domestic learning environments”.

The IaH has become a strategic priority in higher education research, policy, and practice. It can serve as a means to promote common values and closer understandings between different peoples and cultures, improve cooperation between higher education institutions in their internationalization efforts, and improve the educational quality and human resources, through mutual learning and good practices exchange (ALMEIDA *et al.*, 2019).

At the same time that IaH was introduced, so was the term *cross-border* education, which is used to describe IA. The IA corresponds to all forms of education across borders, including the circulation of students, teachers, academics, programs, courses, curriculum, and projects (KNIGHT, 2006). It is important to know some terms used in the IoHE context, for example, the term *international* emphasizes the notion of nation and refers to the relationship between different nations and countries. The term *transnational* is used in the sense of between nations, and it does not specifically address the notion of relationships, and is often used interchangeably and in the same way as cross-border. The term

global, on the other hand, refers to the world in scope and substance and does not highlight the concept of nation (KNIGHT, 2006).

The IoHE gained momentum and many higher education institutions felt that they were in charge of fostering this trend. However, due to lack of resources, student and teacher mobility has not always been a viable option. Thus, as an alternative to IA, IaH has gained popularity. Empowering students by providing them intercultural competence is a major concern of this trend. According to Pouromid (2019), foreign language education within a curriculum that emphasizes intercultural interaction can play significant roles in the internationalization agenda.

Virtual exchange, virtual mobility or Collaborative Online International Learning (COIL) are recent terms that have emerged as part of IaH. They reflect the growing link between ICT, social media, and internationalization (DE WIT; HUNTER, 2015). According to Altbach and Knight (2007), the ICTs facilitate communication and enable providers to deliver programs through digital learning platforms.

Digital Platforms

The main purpose of a digital platform is to establish communication between users and to facilitate the exchange of goods, services or social currency, thus allowing the value creation for all participants. Digital learning platforms have facilitated many experiences with the form, structure, and substance of traditional education (PARKER; VAN ALSTYNE; CHOUDARY, 2016). The results of globalization include the integration of research, the growing international labor market for academics and scientists, the growth of communication companies, and the ICT use.

The ICT allows providers to offer academic programs through digital learning platforms, known by the term *e-learning* (ALTBACH; KNIGHT, 2007). E-learning is a web-based learning ecosystem that integrates multiple stakeholders with technology and processes. The use of e-learning platforms has expanded rapidly around the world as it offers people a flexible and personalized way to learn and enables low-cost on-demand learning.

In this perspective, MOOC platforms have emerged with the promise of improving educational opportunities around the world (LITERAT, 2015). The term MOOC was coined by David Cormier in 2008 to describe a 12-week online course offered by the University of Manitoba, Canada. Twenty-five students enrolled for free to gain academic credits, while another 2,300 students participated freely (HOLLANDS; TIRTHALI, 2014). According to Parker, Van Alstyne, and Choudary (2016), institutions such as Harvard, Princeton, Stanford and many others are offering online versions of some of their most popular classes on MOOC platforms.

A MOOC platform aims to provide open access based on a distance learning model, promoting large-scale interactive participation. MOOC platforms can be divided into two categories: (i) xMOOCs, which resemble traditional classroom courses, where the figure of the teacher still plays a central role in the knowledge dissemination; (ii) cMOOCs, which is based on the networking concept and students are the course content co-authors – as they are interested on the same topic and deepen the debate, and the teacher is on the same hierarchical level as the students, contributing and guiding the discussions.

METHODOLOGY

This paper is based on an integrative literature review about the support of digital learning environments or platforms in the IoHE process. In an integrative literature review, researchers objectively criticize, summarize, and draw conclusions about a subject. This occurs through systematic research, categorization, and thematic analysis of previous qualitative and quantitative research on the subject (LOBIONDO-WOOD; HABER, 2017; TORRACO, 2005). Integrative reviews critically evaluate literature in one area and are considered the broadest category of review (WHITTEMORE, 2005; WHITTEMORE; KNAFL, 2005).

The integrative review process must follow a succession of well-defined steps (WHITTEMORE; KNAFL, 2005): (i) problem identification (theme and selection of the research

question); (ii) literature search and establishment of inclusion and exclusion criteria; (iii) data evaluation and identification of pre-selected and selected studies; (iv) data analyses and categorization of selected studies, analysis and interpretation of results; and (v) presentation of the knowledge review/synthesis.

The searches occurred in the Scopus and Web of Science (WoS) databases in June 2019. The inclusion criteria were *full journal article* as document type, and publications *from 2014 onwards*. The database searches used the keywords presented in Table 1. The search was realized by topic, i.e., the title, the abstract, and the keywords of the records were analyzed.

Table 1 - Search terms

Database	Keywords
Scopus	internationalization AND "higher education" AND ((virtual OR online OR e-) W/3 learning) OR (learning W/3 ("management system" OR environment OR platform)) OR "massive open online courses" OR "MOOC")
WoS	internationalization AND "higher education" AND (((virtual OR online OR e-) NEAR/3 learning) OR (learning NEAR/3 ("management system" OR environment OR platform)) OR "massive open online courses" OR "MOOC")

Source: Elaborated by the authors.

In the initial search with the terms presented in Table 1, 100 records were found in WoS and 137 in Scopus. Then, after applying the inclusion criteria (*document type* and *year of publication*), 40 records were selected from WoS and 41 from Scopus. The articles were grouped by database and imported into the Mendeley software, where 27 duplicates were again grouped and removed, totaling 54 articles. As a criterion of quality and additional selection, the journals in which the articles were published were checked, and the articles were classified according to the indicators presented in Table 2 (JCR, 2019; Qualis, 2019; SJR, 2019), in their most recent versions available in June 2019.

Table 2 - Journals' indicators-based classification

Classification	Indicators
A	(Qualis CAPES stratum \geq A2) OR (JCR impact factor $>$ 2)
B	(Qualis CAPES stratum \geq B1) OR (JCR impact factor $>$ 1)
C	(Qualis CAPES stratum \geq B3) OR (SJR index $>$ 0.275)

Source: Elaborated by the authors.

The abstracts of the articles were read and 30 articles were removed because they did not deal with digital learning environments or platforms in the context of IoHE, indirectly addressing the theme or dealing with other aspects of the IoHE process, leaving 24 articles. Another 3 articles were eliminated because they did not fit the established classifications (Table 2), leaving 21 articles for full reading, which represent the sample of this work. Figure 1 presents the flowchart of the research process and article selection strategy.

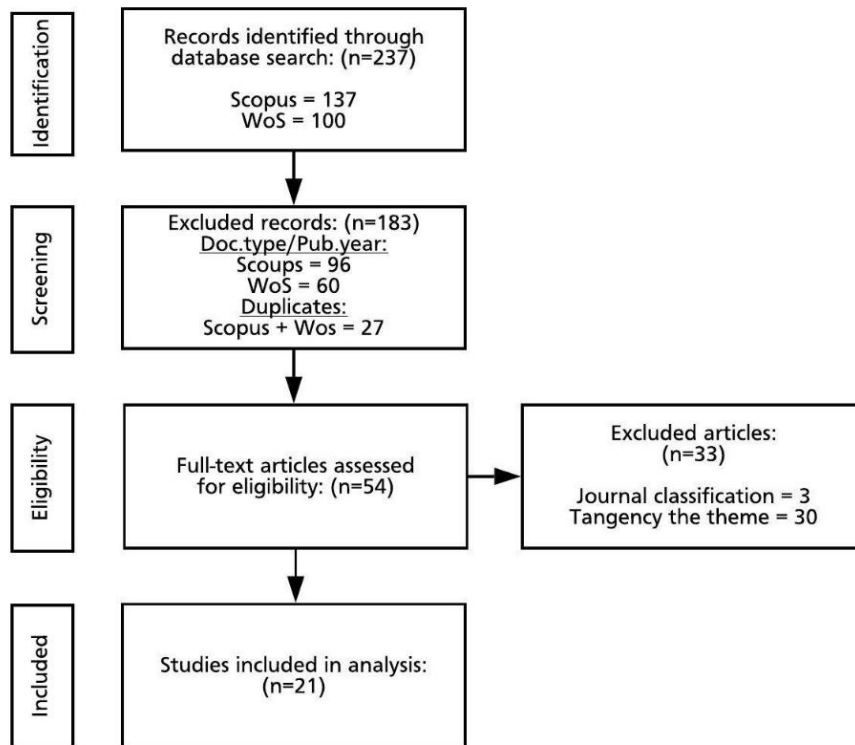
Finally, the articles were tabulated in a synthesis matrix (GARRARD, 2016; KLOPPER; LUBBE; RUGBEER, 2007), using a spreadsheet to identify similarities and categorize the articles based on similarities found in terms of objectives and types of learning approach employed. Some articles aimed to present the experiences of students, others focused on presenting models, strategies, and guidelines to support internationalization, and all were supported by some kind of digital learning platform. Online or virtual learning platforms, blended learning, and MOOCs are examples of the types of learning approaches found in the selected articles.

RESULTS AND DISCUSSION

This section presents and discusses the results found. After categorizing the publications retrieved, the section analyzes each category in more depth, trying to promote a subjective dialogue between the authors' proposals. The perspectives found in today's environments, regarding the support

of digital learning platforms to IoHE, are highlighted in the sequence. At the end of the section, converging with the perspectives pointed out in this study, a digital transformation based research proposal is presented.

Figure 1 - Flowchart of the research process

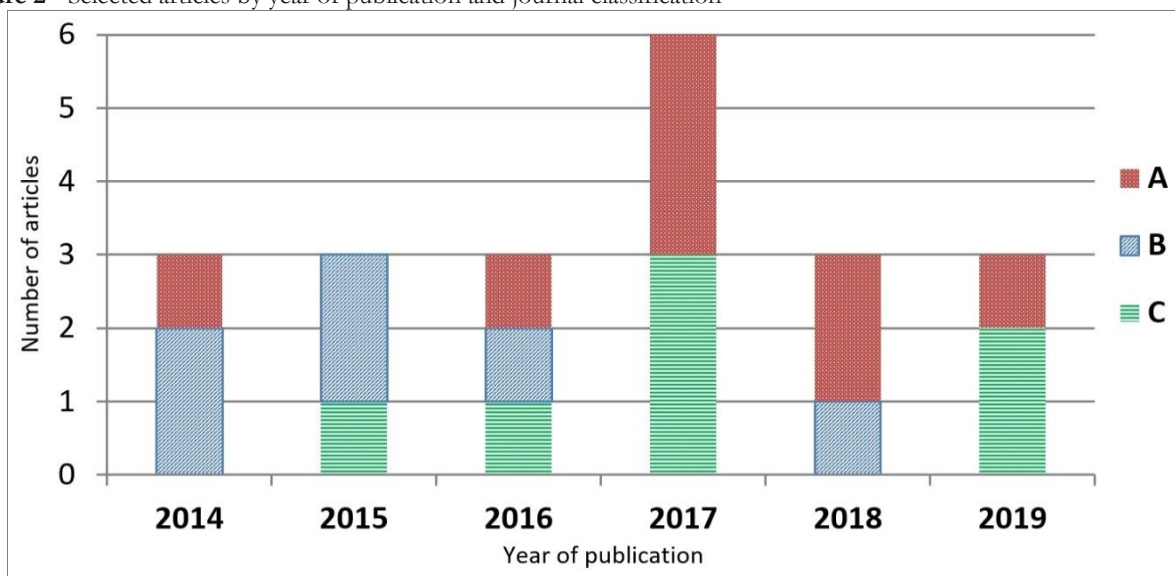


Source: Elaborated by the authors.

Analysis of Results

The publications occurred in all the years researched. Figure 2 shows the number of selected articles for this study, distributed by the year of publication and the journal classification, presented in Table 2.

Figure 2 - Selected articles by year of publication and journal classification



Source: Elaborated by the authors.

The increased interest in digital learning platforms in the IoHE context in the year 2017 may have been influenced by the major *eruptions* of 2016. According to Altbach and De Wit (2018), Brexit, followed by Donald Trump's election as president of the United States proved to be a problem. Growing problems with obtaining visas, a hostile atmosphere for foreigners and other issues caused a decline in the number of international students in the United Kingdom and the United States.

Trumpism, Brexit, and the emergence of nationalist and anti-immigrant policies in Europe changed the scenario of global higher education (ALTBACH; DE WIT, 2018). An alternative approach, with greater emphasis on IaH (DE WIT; JONES, 2017), for more inclusive internationalization can be seen as an opportunity, with a shift from quantity to quality. According to Altbach and De Wit (2018), IaH has entered the higher education vocabulary around the world.

The journals that most contributed to the sample ($n = 21$) were the *Journal of Studies in International Education* and *Innovations in Education and Teaching International*, with 2 publications each. Maringe and Sing (2014) wrote the most cited article of the sample, with 28 citations in Scopus and 21 in WoS. According to the classification presented in Table 2, about 67% of the sample were classified as A or B, which qualifies the sample of this study.

The articles were tabulated in a synthesis matrix to identify the similarities and were categorized based on similarities found in terms of objectives and types of learning approach employed. Considering the students' experiences using digital learning platforms, the strategies, guidelines or models presented, and the types of learning approaches, four categories were constructed – (i) Student Experiences; (ii) Strategies and Models; (iii) Blended Learning; and (iv) MOOC – as presented in Table 3.

Table 3 - Categories of selected articles

Category	Articles
Students' Experiences	(BASON; MAY; LAFOUNTAINE, 2018; GEMMELL <i>et al.</i> , 2015; HARRISON <i>et al.</i> , 2018; HYETT <i>et al.</i> , 2018; MITTELMEIER <i>et al.</i> , 2017; POUROMID, 2019; STANWAY <i>et al.</i> , 2019; WIHLBORG <i>et al.</i> , 2017).
Strategies and Models	(ALTINAY <i>et al.</i> , 2019; HOWARD <i>et al.</i> , 2017; KENT <i>et al.</i> , 2017; KUNG, 2017; MORONG; DESBIENS, 2016).
Blended Learning	(BRIDGES <i>et al.</i> , 2014; CANIGLIA <i>et al.</i> , 2017; CHEW; SNEE; PRICE, 2014; PROTSIV; ATKINS, 2016; SEVILLA-PAVÓN, 2015).
MOOC	(LITERAT, 2015; MARINGE; SING, 2014; TEIXEIRA <i>et al.</i> , 2016).

Source: Elaborated by the authors.

The first category is composed of articles that evaluate the experiences of students and use some kind of digital learning platform. Eight different studies were found since 2014, and 2 highlight the Computer-Supported Collaborative Learning (CSCL) perspective (MITTELMEIER *et al.*, 2017; WIHLBORG *et al.*, 2017), and 2 align with COIL programs (BASON; MAY; LAFOUNTAINE, 2018; POUROMID, 2019).

In the category of articles that address strategies, guidelines or models, and that use some kind of digital learning platform, 5 papers were included.

The third category presents papers that address blended learning, an e-learning form that combines face-to-face or real-time interaction with computer-assisted learning (PROTSIV; ATKINS, 2016). Five studies highlighting blended learning were found, and 2 studies (BRIDGES *et al.*, 2014; CHEW; SNEE; PRICE, 2014) evaluate the experiences of students, and 3 (CANIGLIA *et al.*, 2017; PROTSIV; ATKINS, 2016; SEVILLA-PAVÓN, 2015) analyze strategies, guidelines or models related to blended learning.

Finally, in the last category are works related to MOOC platforms, a more scalable type of e-learning that seeks to be more sustainable and cost effective.

Previous Considerations

Based on the similarities found in the objectives and types of learning approach employed, this section analyzes each category in more depth. Table 4 presents the studies of the *Students' Experiences* category. Table 5 presents the works of the *Strategies and Models* category. Table 6 presents studies that address *Blended Learning*. Finally, Table 7 presents studies of the *MOOC* category.

Table 4 - Students' Experiences

Authors	Approach
Mittelmeier <i>et al.</i> (2017)	The authors sought to encourage CSCL participation through the internationalization of online academic content used for collaborative activities. In the study, individual and group student participation was compared in an online collaborative task, which concluded that internationalization of online content can encourage individual-level participation and reduce the disparity of participation in small groups.
Wihlborg <i>et al.</i> (2017)	The authors worked on the promotion of student and educator learning through virtual collaboration, and an approach of creating meaning, all in favor of incorporating a broader understanding of a given topic. The project developed by the authors established a virtual exchange of international collaboration using the Moodle software for management of courses and Adobe Connect open access technology, and developed possibilities to address challenges and find strategies for a future higher education system that opens up dialogues around the world.
Hyett <i>et al.</i> (2018)	Aiming at exploring cultural skills learning and using affordable and low cost technology through the Skype, a virtual intercultural learning activity with undergraduate students allowed these students to practice and learn intercultural communication skills and gain greater awareness and appreciation of diversity. According to the authors, the use of virtual technologies presented new spaces for internationalization and facilitated interaction and intercultural learning.
Stanway <i>et al.</i> (2019)	The authors presented an assessment of the participation of international students as partners in an internationalization innovation, which involved incorporating a Chinese social media platform into a postgraduate learning module to form a cross-cultural bridge for better connect academics and learning support teams. The inclusion of a curriculum internationalization focus for engaging students as partners provided unique benefits, as the partnership diverted away from the default of further privileging the privileged.
Bason, May and Lafontaine (2018)	According to the authors, one way to develop international student learning experiences is through virtual internationalization, which can be promoted through the use of online international learning programs. The authors investigated the use of these programs to enhance the international experience of university students, and concluded that virtual mobility projects offer a viable method to give students international experience.
Pouromid (2019)	The author analyzed data collected from audiovisual intercultural exchanges of students involved in a COIL program. According to the author, as an indispensable component of IaH, the foreign language pedagogy bears the responsibility of equipping students at higher education institutions with intercultural competence in order to give them the ability to communicate in the target language.
Harrison <i>et al.</i> (2018)	The authors presented a deeper understanding of the learning experience of international students in an online distance-learning environment. Online distance-learning programs in higher education allow students to stay in their home country and study in institutions in other countries. The results highlighted the need for these programs fully consider individual students' contexts, regardless of where they are in the world.
Gemmell <i>et al.</i> (2015)	The authors presented a case study that describes student views on learning alongside students from different countries in an online master's program in public health.. The authors concluded that the strategic use of a wide range of learning tools and technologies that increase collaborative working such as wikis, blogs, and discussion boards enhances the IoHE benefits.

Source: Elaborated by the authors.

Table 5 - Strategies and Models

Authors	Approach
Howard <i>et al.</i> (2017)	The authors evaluated the effectiveness of an online delivery model using the Adobe Connect web conferencing tool to enable students to actively participate in live study activities abroad, at home or even on campus. According to the authors, students had differing opinions on the interaction with the technology and the online group asked more questions during live meetings.
Kung (2017)	The author presented methods and strategies for working with international students in online courses and ways to teach them effectively. According to the author, there is a proven need for instructors to be more culturally aware when teaching, to enhance the online learning experiences of international students.
Morong and Desbiens (2016)	The authors presented guidelines for the culturally responsive online learning project in higher education. These guidelines provide a basis for an online design methodology to support intercultural learning and enable formative assessment of pedagogy, learning activities, and assessment applications.
Kent <i>et al.</i> (2017)	The authors discussed the strategic benefits of digital content subtitles for a wide range of students, and how increasing internationalization affects culturally and commercially subtitled options. The authors highlighted that the increase in the internationalization of education is positively affecting for more captioned content in higher education institutions.
Altinay <i>et al.</i> (2019)	The authors addressed the implementation and assessment of knowledge management and <i>e-transformation</i> strategies of higher education institutions in distance education. According to the authors, internationalization has become an important issue in higher education activities and, after an assessment of best educational practices in different countries, distance learning was considered a different strategy and was emphasized as a competitive advantage.

Source: Elaborated by the authors.

Table 6 - Blended Learning

Authors	Approach
Caniglia <i>et al.</i> (2017)	The authors presented a model that combines the use of digital technologies for global collaboration with experiences and involvement for local learning and impact. The Glocal model was designed and implemented in The Global Classroom, a collaborative project between a university in the United States and another in Germany. According to the authors, the model fills a major gap in higher education for sustainable development. At The Global Classroom, students worked closely with colleagues in their local seminar room, virtual scenarios, and real-world contexts. Implementing blended learning scenarios has expanded classroom space to online digital spaces.
Protsiv and Atkins (2016)	The authors presented a study that aimed to understand the main successes and challenges in the preparation and implementation of the blended learning environment, from the perspective of teachers who were part of the ARCADE project, using the Moodle tool. According to the authors, the participants reported that they felt that blended learning increased access to learning opportunities and made training more flexible and convenient for adult learners, and that these were the main motivations for engaging in blended learning.
Sevilla-Pavón (2015)	The author presented challenges that have arisen with the internationalization of the Portuguese language. She investigated how Computer Assisted Language Learning (CALL) and the development of a virtual learning environment that meets the language needs of international students could help address the challenges that arose with the internationalization of the Portuguese language.
Bridges <i>et al.</i> (2014)	The authors presented the experience assessment of a project for redesigning the curriculum of a college for deeper student learning. The web-based project in operational dentistry was established within the Universitas 21 (U21) network of higher education institutions to support university goals of internationalization in clinical learning, enabling distributed interactions between sites and institutions. The establishment of online student learning communities through a blended learning environment has stimulated motivation and intellectual engagement, thus supporting an approach geared at cognition.

Authors	Approach
Chew, Snee, and Price (2014)	The authors presented a research that investigated the academic and international experience of students with innovative peer reviews and online feedback. According to the authors, the research showed that the practice of peer evaluation increased the feedback experience for international students. The PeerMark tool was selected as an innovative peer review and online feedback tool in the study.

Source: Elaborated by the authors.

Table 7 - MOOC

Authors	Approach
Literat (2015)	The author's analysis focused on four issues that proved to be significant in defining the future of MOOC as an equalizing force in higher education: credit, pedagogy, internationalization, and legal and financial aspects. According to the author, the recent rise of MOOCs can be understood as the convergence of some key trends in higher education, such as globalization and the drive for internationalization, and increasing personal access to technology and social media.
Maringe and Sing (2014)	The authors presented pedagogical strategies that addressed class size and diversity issues, including MOOCs. According to the authors, commodification, increased student mobility, massification in higher education, and stagnant university staff have all combined to cause a ripple effect of change on both demographics and the size of college classes around the world. This has implications for the quality and fairness of learning and for the need to examine and transform pedagogical practices.
Teixeira <i>et al.</i> (2016)	The authors presented an integrated approach based on the iMOOC model, which implies a complete adaptation not only to the participant's personal profile, but also to the mobile devices used. The iMOOC pedagogical model introduced the principle of diversity in the MOOC project, allowing a clear differentiation of learning paths as well as virtual environments.

Source: Elaborated by the authors.

Perspectives and Trends

Highlighting some selected environments, this section analyzes how digital learning platforms support IoHE, and presents the perspectives and trends found in today's environments.

IoHE and ICTs Perspectives

Inequality of access to higher education is widespread in developed and developing countries. In addition, students whose mobility is limited by their socio-economic background are less likely to participate in an exchange program and, therefore, have limited access to an international experience (BRUHN, 2018; POUROMID, 2019). Digital platforms have the potential to increase participation in higher education, contribute to social inclusion, and support IoHE (ALTINAY *et al.*, 2019; LITERAT, 2015; STANWAY *et al.*, 2019; TEIXEIRA *et al.*, 2016).

From the perspective of digital learning platforms, the ICTs have boosted online and distance learning in mainstream higher education and further diversified the landscape of internationalization (BRUHN, 2018; COURTNEY; WILHOITE-MATHEWS, 2015). Open and distance applications, which form the basis of the concept of strategic competitiveness between institutions, contribute to educational processes in today's intensive efforts to improve quality and internationalization, and are necessary for changes in education and for innovations to adapt to today's world (ALTINAY *et al.*, 2019; COURTNEY; WILHOITE-MATHEWS, 2015).

The efforts to internationalize the curriculum with ICTs may also extend to the use of relevant digital materials, including open educational resources and MOOCs (BRUHN, 2018), which expand the possibilities for democratization of education (LITERAT, 2015; MARINGE; SING; 2014; TEIXEIRA *et al.*, 2016). Some Brazilian universities use MOOC as teaching support. One of them is the Federal University of Rio Grande do Sul, which launched the Lúmina platform. Nonetheless, according

to Literat (2015), a better understanding of how students from different educational, cultural, and social backgrounds navigate on MOOC platforms is needed.

To improve educational opportunities, it is necessary to know what motivates students and why they may fail or give up (LITERAT, 2015). According to Morong and Desbiens (2016), a *responsive design* must recognize that culturally diverse students in different socioeconomic and political situations have different levels of access and infrastructure, and can create an unequal technological field of action.

The increasingly ubiquitous nature of online learning, in new contexts and through new technologies, has changed pedagogical approaches in the 21st century (ALTINAY *et al.*, 2019; COURTNEY; WILHOITE-MATHEWS, 2015). Digital platforms overcome the limitations of time and space, and should offer a good pedagogical structure to ensure the learning quality (MIRAGAIA; SOARES, 2017). According to Altinay *et al.* (2019), it is essential to take seriously quality standards and accreditation studies that allow internal and external controls, even for open and distance learning applications.

Flipped classroom learning, online learning, and intelligent learning foster the essence of transformational learning and seek to shed light on digitization and a new pedagogy (CHRISTIE *et al.*, 2015). In a blended learning classroom, online and traditional teaching methods are used to provide a more effective learning experience for students (BRIDGES *et al.*, 2014; CANIGLIA *et al.*, 2017; CHEW; SNEE; PRICE, 2014; PROTSIV; ATKINS, 2016; SEVILLA-PAVÓN, 2015). Combining digital platforms and face-to-face classes, blended learning offers opportunities for timely, continuous, and flexible learning.

It is important to highlight that the cultural competence, in increasingly globalized and cosmopolitan societies, is fundamental to the employability of higher education students. The IaH initiatives, which use digital platforms, have the potential to facilitate transformative intercultural learning experiences and build intellectual and cultural skills (GEMMELL *et al.*, 2015; HYETT *et al.*, 2018). Nonetheless, according to Bruhn (2017), there is a gap in the literature when it comes to conceptualizing a structure that covers the various ways in which ICTs can be used to support IoHE.

Virtual Internationalization

Virtual international exchanges open innovative contexts of communication and learning between nations and cultures. Internationalization is much more than student and teacher mobility. The IaH should receive more attention to support teacher-student collaboration, learning, and professional development (POUROMID, 2019; WIHLBORG *et al.*, 2017). In this context, the potential of so-called virtual internationalization to extend access to an international experience to disadvantaged students becomes important to explore (BASON; MAY; LAFOUNTAINÉ, 2018; BRUHN, 2018).

Based on Knight (2003, p.2)'s definition of internationalization, Bruhn (2017, p.2) defines virtual internationalization at the national, sectoral, and institutional levels as “the process of introducing an international, intercultural, and global approach in the goal, functions or delivery of higher education with the help of ICT”. The IoHE supported by ICTs is understood as a form of internationalization itself, covering different levels and dimensions of education. According to Bruhn (2018), virtual mobility is a term that refers only to curricular internationalization, and virtual internationalization is a broader concept.

The first potential area for virtual internationalization is IaH. Among the most visible approaches in this area are virtual mobility projects such as COIL, which connects students on campus with colleagues abroad through online exchange programs (BRUHN, 2018; POUROMID, 2019). The strategic use of digital technologies, enhancing collaborative work, offers many benefits to IoHE (BASON; MAY; LAFOUNTAINÉ, 2018; CANIGLIA *et al.*, 2017; GEMMELL *et al.*, 2015; MITTELMEIER *et al.*, 2017; POUROMID, 2019; WIHLBORG *et al.*, 2017).

The second potential area is transnational education (TNE), which comprises learning by students in a country other than that of the granting institution. Recently, combined forms of delivery such as blended learning and flipped classroom have clearly prospered and broadened the possibilities

(BRUHN, 2018; POUROMID, 2019). The Collaborative Online International Learning, which was developed at the New York State University, is a successful virtual mobility model (BRUHN, 2017). According to Guth (2013), by bringing together classes from two (sometimes more) countries online, the COIL method promotes shared interactive courses, emphasizing experiential learning and giving fellow students a chance to get to know each other while developing meaningful projects together.

In this context, exploring the potential of virtual internationalization to increase access to an international experience becomes important and strategic for non-traditional students and disadvantaged parts of the population (BASON; MAY; LAFOUNTAIN, 2018; BRUHN, 2018). The ICT enables providers to offer academic programs through digital learning platforms, facilitating communication, and enabling the storage, selection, and dissemination of knowledge (ALTBACH; KNIGHT, 2007).

Given the challenges and opportunities exposed, the proposal, based on digital transformation, which addresses the support of digital platforms to IoHE, corresponds to the research and experimentation of modalities and models of support for: (i) represent information in different platforms, formats, and languages; and (ii) provide a character of ubiquity to information and, consequently, expand its flow and the potential to generate information and knowledge. Both suitable for the concept of virtual internationalization and the collaborative model of international online learning.

This proposal considers, in its construction and development, the use of KM and knowledge engineering (KE) tools. The KM is treated as a process that promotes the knowledge flow between individuals and groups in an organization (LIAO; CHUANG; TO, 2011; DURST; EDVARDSSON, 2012). The KM approach in educational institutions is necessary to gain competitive advantage, and to increase institutional and pedagogical productivity in applications.

Knowledge management projects are based on the organization's value creation goals, and how this value is associated with its business processes. The KE is one of the tools available to support KM to this end (SCHREIBER *et al.*, 2000). The KE defines methodologies and tools for acquiring and modeling knowledge in order to make it independent of people, formalizing and allowing ownership and reuse by organizations or systems (HASSLER *et al.*, 2016; NAZARIO; DANTAS; TODESCO, 2014).

It is essential that technology is used correctly at the right time and restructured to provide solid educational opportunities. The KM systems and digital learning platforms are significant approaches to evaluate and restructure the higher education system based on quality principles.

CONCLUSION

Globalization has increasingly resulted in greater internationalization of higher education environments. Contemporary universities today have communities working in increasingly globally connected environments, thus introducing new challenges in the higher education sectors. Online communication is a daily activity. Faculty members conduct teaching, scholarship, and research activities, provide services, and communicate online with others around the world. Collaboration with overseas partners is an ongoing and expanding process.

The migration of education to the world of platforms can change education in a way that goes beyond expanded access, however important and powerful as it is. The IoHE involving digital platforms opens opportunities for innovative learning approaches across nations and cultures. Digital learning practices, in partnership with ICTs, have boosted online and distance learning and further diversified the landscape of internationalization, helping to provide equal opportunities in education.

Technology-enhanced teaching methods link universities globally and support internationalization. Universities in the future will increase their e-learning efforts and make more use of ICT-based conferences. Tools such as Adobe Connect and Moodle are presented as suitable alternatives, according to the articles selected in this study. The later one can even serve as a base platform for creating a MOOC environment. Because of their free and open dimension, MOOC platforms improve the possibilities of education democratization, as they have the potential to increase participation in higher

education, and contribute to IoHE, social inclusion, knowledge dissemination, and pedagogical innovation.

It is important to distinguish the use of technology to improve the administrative processes from its application as a tool to improve the learning process. A combination of these is very interesting to address the current students profile and the dynamics of the job market. Allied to a good pedagogical structure to guarantee the quality of learning, the use of technology in the classroom and the incentive to digital platforms should be institutional strategies.

Conceptualizing a framework that encompasses the various ways in which ICTs can be used for IoHE is a gap in the literature. The COIL programs emerge as part of IaH and reflect the growing link between ICT, internationalization, and social media. The concept of virtual internationalization can serve as a conceptual framework for promoting IoHE. The combined forms of delivery expanded the possibilities for virtual internationalization.

A new learning environment architecture under development integrates context awareness and ubiquitous learning: u-learning. Ubiquitous learning is about the constant opportunity to have the right content at the right time and in the right format. Certainly, this new architecture opens up opportunities for innovative action, including support for virtual internationalization and the IoHE process.

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