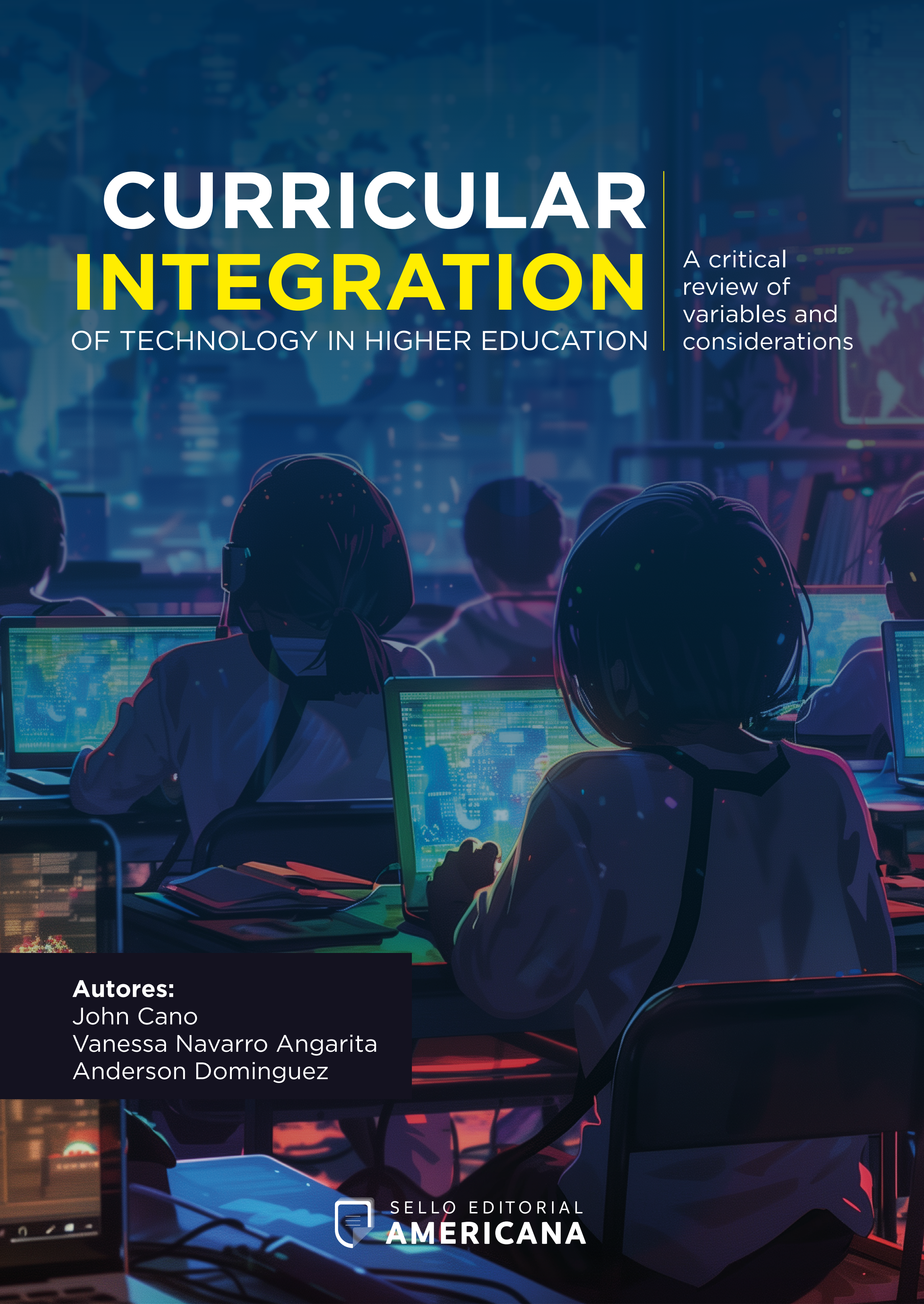

CURRICULAR INTEGRATION OF TECHNOLOGY IN HIGHER EDUCATION

A critical review of variables and considerations

Autores:
John Cano
Vanessa Navarro Angarita
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SELLO EDITORIAL AMERICANA

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In the twentieth century, society is strongly supported and guided by digital technologies. The use of these wide array of digital tools are becoming more common than ever before—from navigating on the Internet to retrieve, use, and create information/content, to work management apps (like email platforms, note taking apps—both from our computers or smartphones—calendars, and more), communication tools for both professional and social purposes (social network platforms, video calling software, instant chat apps, and others). We are living in a new age of ubiquitous digital engagement for communicative practices and processes. We all demand immediate response and access to information when looking for information or a response through a search engine; paying bills; checking our transit records; purchasing online; making doctor appointments and many more. We see all these technologies used as something common or usual (Ertmer & Ottenbreit-Leftwich, 2010).

But what about the educational context? Do we demand the same immediate and ubiquitous access from technology in learning? Some educational researchers state that the more technology is used by educators, the better results (learning, skills, competences, etc.) students will get. How true is this? Is it the case that a teacher is innovative because of the integration of technology? If we look closer at the uses some educators make of some digital technologies like Google Slides, Powerpoint, Prezi, Learning Management Systems (LMS)—like Moodle, Brightspace, Canvas, etc—Social Networks, Blogs, Wikis, etc., we might see that such uses are mainly replicating traditional teaching practices with "flair" but with no substantive evolution in the ways that such technologies could be used for learning purposes. Such surface-level uses of technologies are lacking the desired student-centered approach that is needed in today's classrooms to promote the abilities and competencies demanded by this century (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2007).

It is important that the process of integration of technology in a given curriculum in higher education is done effectively—this is, making use of technology in order to accomplish the desired outcome in students, such as learning, reflecting, changing their perceptions about a subject-matter, developing a specific competence, among others (Lawless & Pellegrino, 2007; Ertmer & Ottenbreit-Leftwich, 2010).

Variables for curricular integration of technology

Integrating technology in educators' practices in this era requires educators' willingness to consider the affordances of new technologies for fostering more active learning opportunities for students. Ertmer & Ottenbreit-Leftwich (2010) brought up four key variables to foster educators' change towards technology integration and its use for educational practices: Knowledge; Self-Efficacy; Pedagogical Beliefs; and Culture. To understand these key variables, we will go in depth for each of these variables.

Our approach in this book involves a critical review of existing literature, drawing connections between theoretical models such as:

- TPACK and empirical studies on self-efficacy.
- Learning theories and pedagogical beliefs
- Institutional culture and technology integration

Chapter 1:
Knowledge and Self-efficacy

Following the approach Ertmer & Ottenbreit-Leftwich (2010) shared about important variables for curricular integration of technology, we will deconstruct the "knowledge" and "self-efficacy" variables to provide a better understanding of why these are crucial for curricular integration of technology.

Knowledge as a key factor to integrate technology

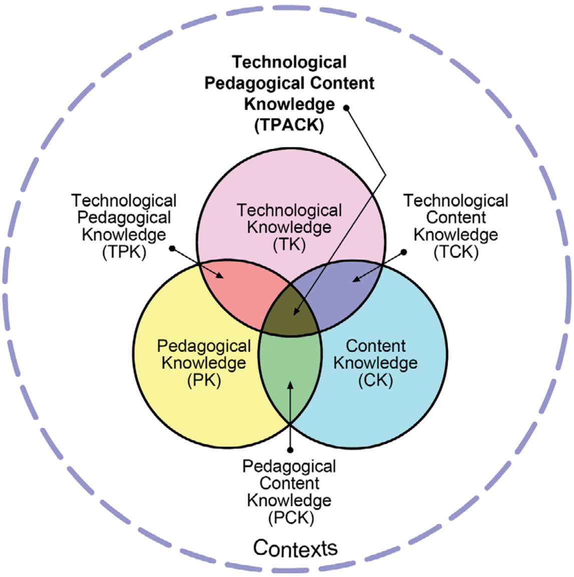
To talk about educators' knowledge, we need to cover an array of components that constitute this category: content knowledge; pedagogical knowledge; pedagogical content knowledge; curricular knowledge; learners' knowledge; context knowledge; and knowledge of educational goals and beliefs (Shulman, 1986; 1987).

However, there are different approaches and theories for curricular integration of technologies, which define a set of knowledge and skills needed to do a successful technology integration in the curriculum. There are different theories and approaches related to the knowledge one educator should develop to be able to use digital technologies for their teaching practices. In this chapter we will explore two theories or frameworks: the Technological Pedagogical Content Knowledge (TPACK), and the Digital Literacy and Competence framework.

Technological Pedagogical Content Knowledge (TPACK)

One of the most known approaches is the Technological Pedagogical Content Knowledge (TPACK), which complements the components mentioned before (Shulman, 1986; 1987) with the integration of technology in the teaching practices (Koehler & Mishra, 2009): Pedagogical knowledge, content knowledge, technological knowledge, Pedagogical content knowledge, Technological pedagogical knowledge, Technological content knowledge, and Technological Pedagogical Content Knowledge (see figure 1).

Figure 1.
TPACK model



Note: extracted from tpack.org (s.f)

The components that constitute the TPACK model are described below:

Content knowledge

The content knowledge (CK) component of the TPACK model refers to the knowledge that an educator possesses related to the subject-matter (content) they are meant to learn or teach. This knowledge is related to the foundational theories, practices and approaches that should be known and considered to deliver them to students (Shulman, 1986; Koehler & Mishra, 2009). The lack of solid content knowledge in an educator, could lead to misinformation or misunderstanding of the subject matter among students.

Pedagogical knowledge

The pedagogical knowledge (PK) component of the TPACK model refers to knowledge educators have related to teaching and learning practices. This means, how strong are the pedagogical foundations knowledge related to teaching methodologies to promote learning in students (behaviorist, cognitivist, or constructivist approaches, etc.), curriculum/lessons design, assessment, class management, knowledge of the context where the teaching happens (awareness of who the students or target audience are). The pedagogical knowledge demands a strong understanding of how people think, understand and build knowledge (Koehler & Mishra, 2009).

Pedagogical Content Knowledge

The pedagogical content knowledge (PCK) does reflect the capability of an educator to create a connection between the subject matter and the instruction: the way in which their expertise is shared with students (Benson & Ward, 2013). The pedagogical content knowledge also requires educators to be able to adapt the content, curriculum and instructional materials based on their context, students' needs, interests, experiences and prior knowledge/background (Shulman, 1986), making the subject matter content meaningful and significant to the students (Koehler & Mishra, 2009; Benson & Ward, 2013).

Technological knowledge

The technological knowledge (TK) of the TPACK model "is always in a state of flux" (Koehler & Mishra, 2009, p. 64) since technology is an area that is in continuous development and transformation, which implies that the knowledge we got today may be antiquated tomorrow. Technology knowledge requires more than an understanding of how to use technology for a particular purpose, it does require acquiring the skills and the ability to be able to use and transform technological tools for new and innovative purposes (Benson & Ward, 2013; Koehler & Mishra, 2009).

Technological Content Knowledge

The technological content knowledge (TCK) is related to the possible uses that technology can (and cannot) offer to a specific subject-matter content or topic. The

TCK demands from an educator a thoughtful and critical view of the context where the content is being taught, being able to identify when some digital tools can bring novel and effective ways to represent content and knowledge. Not developing this component (not choosing and using a digital tool according/aligned to the subject matter) constitutes a high risk of constraining the way ideas are shared/taught, so knowledge can hardly be reproduced (Koehler & Mishra, 2009; Benson & Ward, 2013).

Technological Pedagogical Knowledge

The Technological Pedagogical Knowledge (TPK) implies an understanding of the ways teaching practices may change when certain technology is being used to teach a subject matter. This component of the TPACK implies a deeper knowledge of the possibilities and constraints of digital technologies (Benson & Ward, 2013). TPK implies understanding all the physical (e.g. possible classroom setting) and pedagogical (teaching attitude/energy) implications that technology has to be successfully implemented for teaching. Another important characteristic of the TPK is the ability educators should develop to be able to design innovative ways to use digital technologies to enhance students' learning experience (Koehler & Mishra, 2009).

Technology, Pedagogy, and Content Knowledge

The TPCK constitutes the intersection of technology, pedagogy, and content of the three main components of the model (content, pedagogy and technology), and intends to portray what effective technology-mediated teaching requires. Based on the contributions of Koehler & Mishra (2009), the TPCK implies

> ...an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones (p. 66).

Thus, to develop the deep understanding and knowledge that TPACK requires, educators need to embrace a continuous and innovative learning process—due the state-of-flux characteristic of technology—and re-thinking teaching practices (attitudes, class management skills, interactions/dynamics required by digital tools, etc.). Doing so, educators will be able to identify how to select a technological tool for their educational goal; promote the implementation of digital tools with a pedagogical purpose, allowing students to explore the subject matter content, analyze the different representational forms of content offered by the technology, and build knowledge based on the content, the instruction received by the educator and the production/construction process with the digital tool (Ertmer & Ottenbreit-Leftwich, 2010; Cennamo el al., 2010).

However, studies in higher education suggest that finding such an "ideal" or "balanced" profile based on the TPACK model may be very unlikely when technology knowledge is the strongest skill educators have. The model integration is most likely to happen when these educators have a high pedagogical knowledge (Benson & Ward, 2013).

Digital Literacy and competence

Other theories that have been used to support the explanation of the "knowledge" variable for technology integration are the constructs of "Digital Literacy" and "Digital Competence".

Digital literacy has become a very important research area in pedagogy and instruction, especially in the educational technology area. The first research made about digital literacy in higher education date to the late 90's (Gilster, 1997) and the number of studies is such topic have been rising since then; however, studies in digital competence were not done (or the term not even mentioned) until 2010 (Spante et al., 2018).

It is interesting to note that, based on a critical literature review done by Spante et al. (2018), the term "Digital Literacy" is mostly used in the United Kingdom, Ireland, and North America; in the rest of Europe (mostly Spain, Italy and Scandinavia) the term "Digital Literacy" is not very used in research. More interestingly, in South America, the term is almost not used in research.

When it comes to "Digital competence", it is important to highlight that in North America is a not-well-known term compared to "Digital Literacy", with Europe producing around twelve times more research than North America in such a topic, and South America producing almost three times more research than North America (Spante et al., 2018).

The conceptualization or definition of the concepts "Digital Literacy" and "Digital Competence" has always been in debate. Scholars around the globe have been researching it for more than two decades now (Spante et al., 2018). In this subsection, we will explore different approaches of Digital Literacy and Digital Competence, focusing on the application of these two concepts in higher education teachers (faculty). We will finish this section by sharing our position towards digital competence and digital literacy for faculty and how these concepts do align to the "knowledge" variable proposed by Ertmer & Ottenbreit-Leftwich (2010).

Digital Literacy

Gilster (1997) first defined digital literacy as the skills and abilities to comprehend and use multimodal information (multiple formats) from different sources via computers. This approach or definition has been used by many scholars throughout the years (Goodfellow, 2011; Gourlay et al., 2013; Hall et al., 2013), where the focus is mostly on the development of the skill set required to use digital technologies for different purposes (knowing how to use technology).

On the same track, scholars like Beetham & Sharpe (2011) expanded the definition of digital literacy, still focusing on the how-to skills but aligning such skills to professional and educational (or "academic", as they call them) purposes. Finally, scholars—like Chan et al. (2017)—stated that digital literacy should not only be focused on the knowledge and ability to merely use technology, but on the critical consumption of it.

Some scholars started to use the term in a plural way, assuring that we should talk about "Digital Literacies" given the array of skills and abilities that are required to deal and use technology. Machin-Mastromatteo (2012) sees digital literacy as a group of literacies involved: Information Literacy, Digital Literacy, and New Literacies. The definitions or explanations of such concepts are seen as...

> Information literacy is broadly defined as the individual's ability to handle information in general. Digital literacy refers to the ability to handle technological devices (hardware and software). New literacies are a series of new and innovative skills associated with ways of working with online content and social technologies, thus going beyond the concept of digital literacy. (p. 574)

Finally, Martin's (2006) definition embraces the all the how-to skills covered by many scholars throughout the years, and includes cognitive and critical skills that are required for the consumption and use of digital technologies, seeing digital literacy as

> the awareness, attitude and ability of individuals to appropriately use digital

> tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process. (p.165)

Martin's approach of such a construct embraces most of the components and aspects considered by many scholars that study digital literacies. However, to fully understand the "knowledge" variable for curricular integration, the development of pedagogical knowledge and skills are important. That is where "Digital Competence" becomes the main umbrella for this goal.

Digital Competence

Another of the constructs that have been used in higher education studies is "Digital competence". Similar to Digital Literacy, there have been different approaches to define Digital Competence. However, such approaches do overlap, making its understanding (and agreement in definitions among researchers) less complex than Digital Literacy (Spante et al., 2018).

As stated before, digital competence is a very well-known area of research in Europe and South America. Many scholars of such areas have brought up a definition of digital competence, such is the case of Spanish scholar Gutiérrez (2011) who defines it as the set of "values, beliefs, knowledge, capacity and attitudes to use technology in an adequate way, including computer as well as different software and Internet, which allow for the possibility of research, access, organization and the use of information to produce knowledge" (p. 201).

Other researchers, like Krumsvik (2008), added different pedagogical aspects in his definition, he understands digital competence as the skills educators have to use and implement information and communication technologies (ICT) in their professional practices, being mindful about the pedagogical and didactic intentionality of such uses, being aware of the learning strategies that can be implemented.

One interesting approach to highlight is the one used by scholars like Khan & Bhatti (2017) who define digital competence based on the following factors:

1. The knowledge of technological skills, they refer to this as "digital literacy", following the approach of the how-to skills (Gilster, 1997; Goodfellow, 2011; Gourlay et al., 2013; Hall et al., 2013).

2. The knowledge and development of pedagogical skills that allow the implementation of strategies to use technology to support teaching the subject matter, sharing the knowledge and promote learning and generation of knowledge.

As noted above, there may be different approaches to the definition of Digital Competence. Some of these concepts may have the following aspects in particular: (1) Most of them do consider the need of developing basic technological skills, this is how-to skills, often referred as "Digital Literacy"; (2) They all shared a vision of a critical and intentional (with purpose) use of technology in a context (in this case, educational). However, it is necessary to note that some of the components brought by some scholars, like the critical use and consumption of technology, have also been included by some scholars in the definition of "Digital literacy". This overlap may cause some confusion given that most research done in both areas tend not to share an explicit definition of such terms, assuming the reader knows the approach that is being used. Thus, in agreement with Spante et al. (2018), it is important that scholars position themselves in their research by giving a clear definition to the approach of either (or both) of the concepts they are using for their research.

Digital literacy as a key component of Digital Competence

As noted in the two previous sections—and in agreement with Spante et al. (2018)— the concepts and understanding of the terms digital literacy and digital competence have been widely used in different ways in research in higher education. Many times, they have been used as synonyms or seen as similar concepts (sharing many of the skills or abilities associated with them).

In their critical work, Spante et al. (2018) tried to identify to what extent these terms could be used in a more "standardized" way, so scholars could unanimously understand and refer to both. Such a thing, as happens with many other concepts, seems to be far from reality. This is why these scholars suggest that, to make it clear and prevent confusion, it is ideal that researchers justify and explain their approach to both concepts (or whichever they decide to use) in their studies. Such a suggestion may look ideal and based on common sense. However, it was surprising to notice that most of the research that used either term, did not have a definition associated with it. This is: most scholars assume that their readers understand the concept in the same way they do.

Given this issue and recognizing that creating consensus among the different groups of scholars working in such topics. We decided to share how we position ourselves, as scholars, towards digital literacy and digital competence.

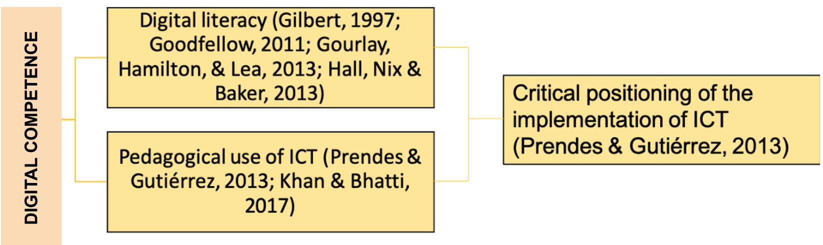
Gutiérrez's (2011) approach of Digital competence goes beyond the most common and used approach of Digital Literacy (development of how-to skills with technology). This definition implies that a digital literate educator should be able to embrace technology and know how to use it for different purposes, but also implies a critical use of such technologies which implies some extra skills beyond the sole use of a set of digital tools—like dealing with information, being able to create multimodal artifacts, problem solving with the support of ICT, among others.

The definition shared by Krumsvik (2008) focuses also on the pedagogical aspects that should be considered to use technologies for educational purposes. With these aspects added to the how-to and critical skills brought by Gutiérrez (2011), we can see Digital competence as an umbrella that allows faculty to understand how to use technology for different purposes—such as every-day, professional, and educational tasks—which do connect and overlap with the main vision of Digital Literacy (Gilster, 1997; Goodfellow, 2011; Gourlay et al., 2013; Hall et al., 2013), and the abilities and skills needed to use technology in educational contexts for teaching practices.

As a scholar in educational technology, we can position ourselves in a direction like information scientists Khan and Bhatti (2017) since they do consider digital literacy as a key component of digital competence. This approach does align to the fact that being "competent" in something, does not only require some knowledge (subject matter), but also the capability of being able to use such knowledge in a contextualized way (the pedagogy required for teaching in higher education) and through different ways to support the use of such knowledge (the use of different digital tools—digital literacy). That stated, our vision of digital competence embraces both Prendes & Gutiérrez (2013) and Khan & Bhatti (2017), and it is graphically represented in figure 2.

Figure 2.

Components of Digital Competence.



Note: Constructed based on Prendes & Gutiérrez (2013) and Khan & Bhatti (2017).

Following this approach, developing the "knowledge" required for an efficient curricular integration of ICT implies two core areas: Digital Literacy (how to use digital tools), and the Pedagogical knowledge (how to articulate technology to the pedagogical practices and curriculum outcomes). There is a final area that results from the two previous knowledge components: Critical positioning of the implementations of ICT, this is: how educators can reflect and evaluate their designed pedagogical experiences with technology in order to improve their future practices.

When it comes to the curricular integration of technology, acquiring the technical and pedagogical knowledge is an important variable. Nevertheless, confidence in using technology is another variable that determines how likely it is for educators to integrate technology in the curriculum (Ertmer & Ottenbreit-Leftwich, 2010).

Technology Self-efficacy

As shared the previous section("knowledge"), technology is in an ever-lasting changing process, and this characteristic makes it impossible to embrace absolute knowledge or develop a definitive skillset to use technology. However, research has also proved that knowing-it-all about technology is not the only factor that is important to educators to use and integrate technology in their teaching practices and curriculum, there is another important variable that is important in the equation: Self-efficacy.

Self-efficacy, as Kagima & Hausafus (2000) stated—based on Olivier (1985) and Compeau & Higgins (1995)— "refers to perceptions about one's capabilities to organize and implement actions necessary to attain a designated performance skill for specific tasks" (p. 222). This is why educators need to develop confidence towards their capabilities of using technology for teaching and learning (Ertmer & Ottenbreit-Leftwich, 2010; Kagima & Hausafus, 2000).

Research has found that self-efficacy constitutes a strong factor for educators to successfully integrate technology in their curriculum, this is because confidence allow educators to explore and try using digital technologies without feeling fear of exploring new and innovating practices (Wozney et al., 2006; Kagima & Hausafus, 2000; Morales & Maldonado, 2013; Bauer & Kenton, 2005).

However, it is important to highlight that many educators might not have a good perception of their abilities of using technology for instruction because they have only been exposed to experiences where technology is used to accomplish institutional-related administrative tasks (Ertmer & Ottenbreit-Leftwich, 2010). This is why it is important the implementation of strategies to foster self-efficacy in educators (Ottenbreit-Leftwich, 2007; Wozney et al., 2006; Mueller et al., 2008; Ertmer & Ottenbreit-Leftwich, 2010); working along with a more experienced colleagues who can guide them through their technology explorations (Ertmer et al., 2006; Ottenbreit-Leftwich, 2007; Putnam & Borko, 2000). These strategies might help educators in building confidence in their capabilities and openness to use technology for instructional purposes.

Synopsis of Chapter 1: Knowledge and Self-Efficacy

In Chapter 1, we explore the pivotal role that "knowledge" and "self-efficacy" play in the effective integration of technology within higher education curricula. Building on Ertmer and Ottenbreit-Leftwich's (2010) framework, we share a critical reflection on why these variables are fundamental for shaping educational practices in technologically enriched environments. We highlight the following key ideas:

1. **Knowledge as a Foundation for Technology Integration:**

- We address knowledge in its multifaceted nature, as introduced by Shulman (1986; 1987), which includes content knowledge, pedagogical knowledge, and contextual understanding. To better understand the integration of technology into the curriculum, we engage with two dominant frameworks:

- Technological Pedagogical Content Knowledge (TPACK): This model expands upon Shulman's categories, integrating technology into teaching, and illustrates how technological tools can enhance pedagogical practices (Koehler & Mishra, 2009).

- Digital Literacy and Competence: Here, we examine the distinctions and overlaps between digital literacy and digital competence, underscoring the importance of both in preparing educators to navigate digital environments effectively (Gilster, 1997; Spante et al., 2018).

2. **Self-Efficacy as a Catalyst for Action:**

Self-efficacy is another critical variable we explore in depth. It refers to the confidence educators need to implement technology in their classrooms. We propose that high self-efficacy fosters a willingness to experiment with digital tools, reducing fear and hesitation when trying innovative teaching methods (Kagima & Hausafus, 2000; Ertmer & Ottenbreit-Leftwich, 2010).

Main Conclusions:

We conclude that effective curricular integration of technology depends not only on the acquisition of technological knowledge but also on the development of strong self-efficacy among educators. Educators must continuously engage in professional growth, fostering both their knowledge of digital tools and their confidence in applying them. We suggest that without a balanced combination of these elements, technology integration risks becoming superficial or ineffective. This chapter lays a foundation for understanding the challenges educators face and the strategies needed to overcome them, encouraging a holistic approach to professional development in higher education.

Chapter 2:
Pedagogical beliefs: Understanding instructional practices/approaches

The use of technology in teaching practices can be tied and dependent on different variables. Some of these are dependent on educator's knowledge (subject matter content, skills, experiences lived, and others), confidence in using technology, institutional culture (e.g., infrastructure, pedagogical support, etc.), and their pedagogical beliefs (Ertmer & Ottenbreit-Leftwich, 2010; Ertmer et al., 2012).

Pedagogical beliefs refer to the strategies and ways in which educators perceive, understand, and teach. The experiences educators have—culture, professional development, values, philosophies—shape their perceptions, understanding, and execution of their pedagogical practices, and—by consequence—the way they do the curricular integration of technology (Ertmer & Ottenbreit-Leftwich, 2010; Hermans et al., 2008).

The always called "traditional" education usually "discourages constructive thinking with goals of transmitting existing knowledge that conflicts with any real attempt to generate new understanding" (Nanjappa & Grant, 2003, p. 43). When educators with such "traditional" pedagogical beliefs implement technology, they usually replicate dynamics that are common in traditional instruction, not taking advantage of the many possibilities and affordances that many digital tools offer to enhance a better classroom experience. On the other hand, educators with a constructivist pedagogical belief tend to foster collaboration with technologies, allowing to create a more learner-centered experience (Ertmer & Ottenbreit-Leftwich, 2010).

In this chapter we will explore different instructional strategies based on three learning theories (behaviorism, cognitivism, and constructivism). We will explore the different teaching approaches or instructional strategies that are tied to such learning theories. An exploration of the learner-centered approach will be done and a connection of how such an approach can be reflected and applied with the use of Information and Communication Technologies (ICT). Also, a discussion about how educational technology should be connected to a more constructivist approach (student/learner-centered) to promote a more meaningful experience to higher education students.

Instructional practices based on learning theories

Based on Ertmer & Newby (2013), it is crucial to understand learning theories to identify the best instructional strategies (teaching practices). That stated, we can say that learning theories do shape the way educators teach and apply teaching strategies in their classes. Ertmer & Newby (2013, p. 46) shared seven questions that could serve as a reference to understand and analyze each learning theory. The first five questions—that were based on Schunk (1991)—are focused mainly in how learning is seen and understood in each theory:

1. How does learning occur?
2. Which factors influence learning?
3. What is the role of memory?
4. How does learning occur?
5. What types of learning are best explained by the theory?

The last two questions—proposed by Ertmer & Newby (2013), and related to the purpose of this chapter—explore how such theories are connected to the instructional practices/strategies:

6. What basic assumptions/principles of this theory are relevant to instructional design?

7. How should instruction be structured to facilitate learning?

In this section, we will go through three different learning theories covering such questions, but specifically focusing on the last two questions proposed by Ertmer & Newby (2013) related to the instructional design and instructional practices tied to such theories.

Behaviorism

The behaviorism approach emphasizes how educators were able to produce outcomes in students that could be observable and measurable (Lee & Lin, 2009). Learning was conceived as an expected response to a specific action done by the teacher, and the most common strategies used were "reinforcement, reward, and punishment" (p. 59). In this approach, the main concern is "how the association between the stimulus and response is made, strengthened, and maintained" (Ertmer & Newby, 2013, p. 48).

When it comes to the way learning and knowledge is constructed, behaviorism does not consider or focus on how such a process happens or is structured by students. Students are expected to be reactive to the conditions, settings and instructions provided by the teacher (Winn, 1990; Ertmer & Newby, 2013). Another aspect that behaviorism considers is the importance of environmental conditions, this is: the set of arrangements between how the stimuli (instruction and curriculum) and possible consequences (rewards or punishments) are established in the classroom environment (Ertmer & Newby, 2013).

When it comes to learning, students' readiness is seen as one of the main important factors to determine how effective the process of knowledge acquisition was. For many of us memory plays an important role in students' readiness (Ertmer & Newby, 2013). However, memory per se is not commonly addressed by behaviorists, they talk about "habits" and how constant reinforcement (by practicing) and review does help students to keep such knowledge active and, thus, their ability to be always ready to respond correctly. On the other hand, the application of the learned knowledge (also referred to as "transfer") is the result of generalization, which means that students should acquire knowledge that could be similarly applicable to different contexts (Schunk, 1991; Ertmer & Newby, 2013).

In behaviorism, the role of educators is expected to be focused on triggering the right (desired) answer from students, and such action is only possible through instructional cues—that help students in delivering the desired response—; the articulation of such knowledge with the current setting in a practical way; and the reinforcement, which allows to have higher probabilities that students will maintain the acquired knowledge and its application (Gropper, 1987; Ertmer & Newby, 2013).

Finally, it is important to highlight how the behaviorist theory has been long used as a principle for instructional design and instructional strategies/practices. In fact, it was the first foundation to instructional design models and practices. Some of its principles are listed by Ertmer & Newby (2013) and are shared next:

- Outcomes are observable and measurable, such as behavioral objectives or task analysis.

- Students' pre-assessment will help in identifying how to start instruction ("diagnostic assessment").

- Sequencing of instructional presentations. This is: helping students master basic levels of performance before working on more difficult levels.

- Performance can be improved by reinforcement. (p. 49-50)

In a broad picture, behaviorism tries to bring a set of instructional strategies that allow students to respond to a specific stimulus, such as "instructional cues, practice, and reinforcement" (Winn, 1990; Ertmer & Newby, 2013, p. 49; Lee & Lin, 2009). Schunk (1991) shared that the principles of behaviorism can hardly allow the development or practices of higher-level skills, such as problem solving and critical thinking. That stated, the scripted approach of behaviorism is considered to be highly effective when the learning outcome is focused on recalling, generalization, applying explanations, and replicating a specified process (Ertmer & Newby, 2013; Lee & Lin, 2009; Schunk, 1991).

Cognitivism

Cognitivism, as a learning theory that started in the 1950s, started as a try to move from an observational approach that was mostly focused on knowledge transmission, to a more "process-oriented" approach (Ertmer & Newby, 2013). Cognitivism focuses on more complex cognitive processes like problem solving, concept construction, critical thinking, and information processing (Ertmer & Newby, 2013; Snelbecker, 1983).

Learning, from cognitivists' approach, is understood as the capability students should use previous knowledge and use it to understand new information. Here, students take a more active role compared to the behaviorist approach (Jonassen, 1991; Ertmer & Newby, 2013).

It is interesting, though, that some of the factors that influence learning in cognitivism are also taken into consideration by cognitivists—learning is guided by instruction, modeling, descriptive examples, and feedback. However, as stated before, even though students' responses are still important, is the "thinking process" the main consideration and important factor for learning in cognitivism, this may include how students are able to categorize, process and use information, and later apply it in context—always taking into consideration their ideas, values, beliefs, and attitudes (Winne, 1985; Ertmer & Newby, 2013).

In the learning process, memory plays an important role. Learning happens when students are able to organize pieces of information in their memory with meaningful connections. Not being able to create solid connections of the information retrieved, may be a causality of lack of proper instructional strategies—not using effective cues to help students connect such information with their prior knowledge, for instance (Ertmer & Newby, 2013).

For cognitivists, "transfer" can be considered effective when students are able to (1) organize the information given by educators; (2) store them in an organized way in their memory; and (3) are able to use it in a specific context. This is why designing meaningful and contextualized learning experiences is key as an instructional strategy for cognitivists (Schunk, 1991).

As stated at the beginning of this section, there are some similarities between cognitivism and behaviorism, being the goal of instruction the most remarkable one: both look for knowledge transmission or communication (Bednar et al., 1991). The main difference with behaviorism, is the fact that behaviorists allow students to go beyond knowledge acquisition and foster higher cognitive processes.

In cognitivism, instruction should be structured in ways that allow students to organize it and use it in meaningful ways. Thus, educators "are responsible for assisting learners in organizing that information in some optimal way" (Ertmer & Newby, 2013, p.52). This is done by considering what students already know, and how such knowledge can help them retrieve and understand the new information. Some of the instructional strategies that best fit this approach—given its affordances to trigger higher cognitive processes in students—are using metaphors or analogies, having students organize information, identifying key concepts/pieces, and concept mapping (Ertmer & Newby, 2013).

Finally, it is key to highlight how the cognitivist theory brings important pieces of its principles to instructional design and instructional strategies/practices. Such principles, based on the contributions made by Ertmer & Newby (2013), are listed below:

- There is a high emphasis on the active involvement of students in their learning process.

- Focus on the structure, organization, and sequence of the information that is being facilitated to allow high cognitive processes (highlighting the most important points of the information that is shared during instruction, summarizing and organizing information, among others.)

- Fostering the use of students' prior knowledge with the new material/information, so they can easily create meaningful connections (making use of examples/analogies, modeling, etc.). (p. 53)

In sum, cognitivism allows educators the execution of higher cognitive processes in students, focusing on how new information is processed and stored (in an organized way) in students' memory. Knowledge is constructed based on the students' ability to integrate and connect their prior knowledge to the new information that is being presented to them. Such connection and integration of new information is only possible if educators apply meaningful instructional strategies, making sure that the information they are bringing to their students is well structured, organized, and articulated to students' experiences (so they can be relatable). Using examples, analogies, and information processing strategies (identifying key ideas, summarizing, concept mapping, among others) are considered effective strategies to foster such connections, knowledge acquisition and, finally, learning. Feedback, as in behaviorism, is considered a key aspect of instruction. However, its approach is focused on how to help students make such cognitive processes meaningful in order to learn new knowledge (instead of the reinforcement approach of behaviorism).

(Social) Constructivism

The constructivist approach of education conceives learning as a social process where communication and interactions are constituted as one of the main pillars. In constructivism, students can share and build knowledge with others (peers or professors), resulting in the construction of solid cognitive structures (Vygotsky, 1978; Marks, 2000; Heritage, 2010). It is important that educators promote social interactions within the classroom, since these have shown outstanding results in students' learning, especially when learning activities are designed considering the students' interests and previous experiences/knowledge. The constructivist approach of teaching sees the learners as active stakeholders in the process of creation and recreation of knowledge and sees such processes as the best way to foster learning (Jha, 2017).

For constructivists, the main goal of instruction is not the memorization or mere acquisition of facts. The purpose of the interactions that constructivists foster is the elaboration and interpretation of information. This means that "memory" is always "under construction" and constantly shaping based on the different interactions and lived experiences—contrary to the "formalized" acquisition and storing process described in cognitivism (Ertmer & Newby, 2013).

The understanding of "transfer" in constructivism is defined as the way a concept acquires meaning through a specific context or situation. This means that a context should be tightly connected to a specific content, so knowledge is built into it (Bednar et al., 1991).

It is worth mentioning that, according to scholars like Jonassen (1991), constructivist learning may be highly effective for advanced and expert knowledge acquisition. This suggests that, for basic knowledge acquisition, behaviorist or cognitivist approaches tend to be a better option to establish the conceptual foundations that can be later shaped, discussed, modified or removed (depending on what is needed at that point) in a constructivist way. Jonassen's suggestion, though, does not imply that a constructivist approach cannot be used to build basic or advanced conceptual knowledge.

On the other hand, the role of educators changes for constructivists, going from being the owner of the "ultimate" knowledge and the main and sole source of information to students, to becoming a facilitator and guide that "engenders social and intellectual climates, where collaborative and cooperative learning methods are supported" (Nanjappa, & Grant, 2003, p. 45). That stated, in a constructivist experience, educators should use strategies that can support students' learning process, like coaching, modeling, and scaffolding. Additionally, it is important that educators "create instructional goals, offer diverse knowledge construction paths, promote diversity in ideas, and encourage creative and inclusive social learning processes" (Lee & Li, 2009, p. 66).

Finally, it is important to highlight how constructivism's principles are important to instructional design and instructional strategies/practices. Ertmer & Newby (2013) shared such contribution which we list next:

- It is important to identify a context where skills will be learned and applied (designing learning experiences in a meaningful context).

- See learners as active actors of the process. Giving them agency on how to deal and manipulate the information.

- Present information in multiple ways. This is: giving the learners the chance to revisit content at different times, so they can get a glance of how such concept/content is used and applied in different contexts and for different purposes.

- Support and apply high cognitive level skills, like problem solving, since they allow students to go from the knowledge acquisition to a more critical use of such knowledge. (p. 58)

To summarize, similarly to cognitivism (which some consider is the root of constructivism), constructivism understands the learning process as a mental activity, where students "create meaning as opposed to acquiring it" (Ertmer & Newby, 2013, p. 55). The designed learning experiences must be relatable to students' previous experiences and knowledge. Constructivist practices can be seen as very effective, especially when students have a solid foundational knowledge of a concept (Jonassen, 1991), however this does not mean that such knowledge cannot be constructed with a constructivist approach as well. In the constructivist approach, the conception of what is true or valid changes. This happens given that constructivists give value to each person's experiences and knowledge—considering that every person sees, grasps and processes the information differently—where no point of view is usually seen as more privileged than others' (Lee & Lin, 2009; Boghossian, 2006). It is key to reckon that "to be successful, meaningful, and lasting, learning must include all three of these crucial factors: activity (practice), concept (knowledge), and culture (context)" (Ertmer & Newby, 2013, p. 56).

From a teacher-centered to a learner-centered paradigm

The learner-centered is a teaching approach that tries to replace passive learning dynamics or strategies, such as knowledge transmission—which is one of the main purposes or intentions of the behaviorist approach—to a more active learning experience, which puts the students in the center of their learning process through problem solving, critical and creative thinking. The learner-centered paradigm is based on cognitivism and constructivism (Reigeluth et al., 2016).

In agreement with Reigeluth et al. (2016), in order to talk about instructional design, one should also include other educational theories: Curriculum planning, assessment, and the use of digital technologies. These scholars propose five principles of what a learner-centered approach should manifest: Attainment-based instruction; Task-centered instruction; Personalized instruction; Changed roles; and Changed curriculum. These principles will be described next.

Attainment-based instruction

A learner-centered instruction should be designed focused on students' learning rather than content coverage in a specific period of time. Attainment-based instruction focuses on students' accomplishments, including, besides the content mastery, their dispositions (morals, ethics, values, and attitudes), and emotional development (Reigeluth et al., 2016). This approach allows students to work on their learning at their own pace, allowing them to master the content before advancing to more complex one (Reigeluth & Karnopp, 2013), not affecting "faster learners" in the process, and being assessed based on their own accomplishments (criterion-referenced) instead of being compared to other students' attainments (norm-referenced assessment).

This approach allows students to build their knowledge using the required knowledge (prior knowledge and foundational content-knowledge) to have a solid understanding of the subject matter (Bransford et al., 2000; Reigeluth et al., 2016). The criterion-referenced assessment allows educators to identify which areas need to be strengthened in students in order to foster their progress and understanding of the subject matter and select the most appropriate instructional materials to foster such content understanding (Miliband, 2006).

Task-centered instruction

The task-centered instruction principle of the learner-centered paradigm requires instruction to be based on relevant and collaborative tasks that can trigger students' interest and that are challenging enough (an appropriate level) based on their knowledge. These activities should include different types of "learning by doing" tasks, like problems, projects, among others. An instruction based on this principle helps students to become more motivated about the subject matter and, thus, triggers their interest in constructing knowledge about the subject matter (Reigeluth et al., 2016). These approaches can foster students' motivation and allow them to be self-directed while they develop skills like problem solving, communication, collaboration, and critical and creative thinking.

To be able to apply these strategies, Reigeluth et al., (2016) recommend educators to design a task environment and promote scaffolding in students. For the task environment, they do suggest that a well-designed task should trigger students' interest, meaning that it should be relevant to them; be of significant duration; happen in an immersive context (real or virtual environment); and should be authentic or realistic (which may imply connections with other disciplines).

Educators should allow scaffolding to happen when the learning activities or tasks implemented become too challenging or difficult for students. For this, Reigeluth et al. (2016) suggest three different levels of scaffolding: Adjusting, coaching, and instructing. Adjusting means that the tasks should be adjusted to fit to the current level of students' knowledge or skills, to prevent frustration or boredom because of unadjusted difficulty. Coaching refers to the importance of educators noticing when students are struggling with basic conceptual knowledge (usually easy-to-learn) that prevent them to be able to execute/participate in the tasks, for this sort of situation, an immediate informative and instructional session should take place, so students do not feel that they are being left behind. Finally, the Instructing scaffolding refers to those situations when students show a gap in foundational knowledge (that usually cannot be filled in a short coaching session) that completely prevents them from completing the task. For these scenarios, the task should be suspended, and an in-depth instruction should be provided to the students.

Personalized instruction

The personalized instruction principle of the learner-centered approach implies a set of aspects of instruction in which educators should try to become closer to their students. These aspects include goals, task environment, scaffolding, assessment, and reflection (Reigeluth et al., 2016). These aspects are described next.

The ***personalized goals*** principle refers to the need of educators to create spaces to discuss with students their short-term goals—like subject matter learning goals, discussions related to the subject matter or projects executed in class—that might shape the next steps in regular instruction and, if needed, rethinking the tasks' design. Long-term goals—e.g. Career and life goals—should also be discussed by educators, proving a more personal and motivational environment for students.

The ***personalized task environment*** principle refers to the need educators have to shape the tasks based on students' goals, interests, and prior knowledge. This is to guarantee the complexity of such tasks is appropriate to students' skills and knowledge. It is also important to decide in which situations it is ideal to promote collaboration and how teams will be organized (Felder & Brent, 1996). Self-regulation should also be promoted based on students' skills and needs.

For the ***personalized scaffolding*** principle, it is necessary to provide the ideal quantity of coaching or instruction to help students' learn the required skills to reach the desired goals. Also, scaffolding should be done with quality, which means that educators should be aware of the learning styles of students, meaning that some may require more support (coaching and instructing) than others.

When it comes to the ***personalized assessment*** principle, as stated before, educators should provide feedback on students' performance based on their own attainments. The personalized reflection refers to the space that should be provided to students to reflect on their own learning (during and after every execute task), and on their final product or performance (this could be the final result or artifact created during the task, or what they learned).

Changed roles

The learner-centered approach of education requires changes in those actors of the learning process: Educators, students (or learners), and technology.

In their work, Reigeluth & Karnopp (2013), shared the importance of educators switching their role in the teaching/learning process, from being the "sage on the stage" to becoming a resource and guide to the students. Such a new role must allow them to be co-designers of the students' work, a facilitator of the process, and a "caring mentor" (by motivating, guiding, and giving emotional support to the students).

The role of the learners (or students), should evolve from a passive position (watching, reading, and listening) to a more active position (learning by doing). Students should also become more self-regulated, and this should be a scaffolded process—considering this may be harder to foster in older students. Finally, learners should be given the chance to have spaces to engage in teaching things they have learned, this is a great opportunity for both teachers and students since it allows the construction of more solid cognitive structures (Reigeluth et al., 2016). The third aspect that needs a change of role is technology, which should switch from being a sole resource for educators, to becoming an important support and resource for students' learning process. The technology role in the learner-centered approach will be broadly explained in the following section of the chapter.

Changed curriculum

The curriculum, in the learner-centered approach, does require to be rethought. There are aspects that are needed to be fostered and taught to students, these include emotional, social, physical, and cognitive development. And, as stated before, the learning experiences design should try to be interdisciplinary (getting closer to real-life and future experiences), and relatable or aligned to students' lives (Reigeluth et al., 2016).

It is also relevant to mention the importance of fostering, across the curriculum, creative thinking, critical thinking, collaboration, communication, innovation, problem solving, new literacies (information literacy, digital literacy, and media literacy), and, finally, life and career skills—including aspects of social and emotional development (Partnership for 21st Century Skills, s.f.; Reigeluth et al., 2016).

Research studies have found that learner-centered experiences foster in students a higher interest in the subject matter, boost their motivation and engagement, and allow them to build more solid knowledge about the content (Felder & Brent, 1996). A learner-centered learning environment should "represent significant potential for optimizing the capabilities of both technology and learners" (Hannafin & Land, 1997, p. 172).

Information and Communication Technologies (ICT) as an ally for the design of learner-centered experiences

The rapid evolution of Information and Communication Technologies (ICT) has made multiple researchers and communities of educators rethink education and how these technologies do change or affect the way humans learn, and—most importantly—how teaching practices change when these technologies are used (Lee & Lin, 2009)

Some of the possibilities and affordances that ICT must create learner-centered instruction were shared by Reigeluth (2016). He highlighted that, in the learner-centered paradigm, technology should: Support both the work of the learner, and also support the work of educators; be designed to empower learners and support their self-directed learning; be implemented to create immersive, authentic, motivating learning environments and tasks; be used to provide learners with just-in-time coaching and instructional support; be used to embed authentic assessment within the learning environment; be used to personalize instruction to individual learner needs and preferences; free educators from many of their routine and monotonous tasks; facilitate communication and collaboration among learners, and between learners and educators.

Digital technologies have further expanded the possibilities to generate social interactions in educational contexts (Jha, 2017). A well-designed constructivist learning environment should aim to foster motivation in students to learn about the course materials and explore beyond what is shared during the class time (Juniu, 2006).

However, it is important to know that, in many cases, the curricular integration of technology is done without a deep pedagogical planning—and therefore no keeping the learning outcomes in mind or as a priority—leaving the designed experience solely focused on the use of technological tools (Ertmer & Ottenbreit-Leftwich, 2010; Juniu, 2006).

Another important affordance of ICT tools is that they allow students to become designers and analyzers of the world from their own perspectives, this is: they can access, organize, and interpret the information to later represent it in many possible ways, taking advantage of the multimodality aspects of digital technologies (Nanjappa, & Grant, 2003; Jonassen, 1999).

Among the collaboratives strategies with technologies we can find the use of Web 2.0 ("social Web") technologies or tools, which are available on the World Wide Web (Internet) and allow to easily create (and re-create) multimodal content to be shared online; and which can be helpful to promote students' motivation, interests, social skills and competences—e.g. collaboration, teamwork, problem solving, critical thinking—and learning (Bennett et al., 2012).

These tools, besides their pedagogical affordances, also have the advantage that are not expensive to use (some of these are totally free), easy to adapt, and to make them scalable, allowing faculty to re-think their practices and improving their curriculum design for future applications (Lee & Li, 2009).

Another implementation of technology that has proven to facilitate a learner-centered experience is Mobile learning (M-Learning), which is defined as the application and use of digital mobile devices (e.g., laptops, tablets, smartphones, among others.) for learning purposes (Nguyen et al., 2015). Many scholars have studied many of the possibilities digital devices have to offer enhanced learning experiences to students (Alyahya & Gall, 2012; Fontelo et al., 2012; Diemer et al., 2012). However, it is important to separate these views into two different aspects: The use of mobile devices for personal learning and the use of these devices to support the curricular outcomes (pedagogical practices).

When it comes to the use of digital mobile devices for personal learning, there are many uses of these technologies that fall into this category. To get a better understanding, personal learning will refer to the practices that students have in order to learn the subject matter or content presented in class such as note taking, time management and organization, among other practices (Nguyen et al., 2015). There have been many scholars who have done research where these activities are very well perceived and adopted by students who prefer to use mobiles devices, such as tablets, for their regular school activities (Fontelo et al., 2012; Diemer et al., 2012).

Researchers like Alyahya & Gall (2012) and Lindsey (2011) noted how many higher education students used mobile devices to organize their studying and learning activities by making use of mobile apps such as calendars, tasks reminders, emails, reading in digital format (to save printing costs) and notes-taking apps.

Mobile devices have also been proved to be useful for many educational practices during instruction. Research studies have found that there is a wide versatile set of mobile apps that can offer many possible uses for educational practices and instruction. Some of these studies have focused on the possible options to foster collaboration among students using mobile apps like Google Drive, Skype, Facetime (for iOS), building conceptual and mind maps, creating graphs or collaborative presentations (Alyahya & Gall, 2012).

Also, mobile devices allow instant access to information online which could be useful for class discussions (Diemer et al, 2012; Fontelo et al., 2012); and to use and/or create multimodal materials or projects for different subject matters (Diemer et al, 2012; Mayfield et al., 2012).

It is relevant to mention that all these practices can be effectively included in instruction if the curriculum responds articulately to the use of these technologies (Brand, 2011). This means, when mobile devices are thought of as a support to help educators with the classrooms' dynamics (discussions, collaboration, among others) and students achieve the curriculum outcomes.

These are some of the many possibilities technology has to offer to support the transition to a learner-centered approach to education. The key factor here is how such tools or resources are selected and used for instructional purposes and for fostering students' learning.

Synopsis of Chapter 2: Pedagogical Beliefs: Understanding Instructional Practices and Approaches.

In Chapter 2 we explore the critical role pedagogical beliefs play in shaping how educators integrate technology into their instructional practices. Our focus was on providing a critical understanding how these beliefs, informed by knowledge, experience, and institutional contexts, influence the strategies educators use when adopting technology in the classroom. We highlight the following key ideas:

1. **Impact of Pedagogical Beliefs on Technology Integration:**

We argue that an educator's pedagogical beliefs significantly influence their use of technology. Those with traditional, teacher-centered beliefs often use technology in ways that replicate conventional methods, failing to exploit its potential for transforming learning. In contrast, educators with constructivist beliefs tend to use technology to foster collaboration and active learning, emphasizing a student-centered approach. This distinction highlights the importance of beliefs in determining how technology is use in classrooms (Ertmer & Ottenbreit-Leftwich, 2010).

2. **Learning Theories and Instructional Practices:**

We analyze three major learning theories and their corresponding instructional strategies:

- **Behaviorism:** We highlight how behaviorism, with its focus on observable outcomes and reinforcement, is often associated with practices like rote learning and task repetition. While effective for basic skill acquisition, its application to higher-order thinking skills tends to be limited.

- **Cognitivism:** We emphasize that cognitivism focuses on mental processes such as organizing and retrieving information. Instructional strategies based on this theory encourage deeper cognitive engagement, making it suitable for tasks that require problem-solving and critical thinking (Ertmer & Newby, 2013).

- **Constructivism:** We discuss constructivism's emphasis on learning as a social and active process, where students construct knowledge through experience and interaction. This approach, we argue, is well-suited to leveraging technology for creating dynamic, learner-centered environments (Vygotsky, 1978).

3. Shifting to a Learner-Centered Paradigm:

We advocate for a shift from traditional, teacher-centered approaches to a learner-centered model. This paradigm place students at the core of the learning process, encouraging active participation and critical engagement. We propose that technology could significantly enhance learner-centered instruction by providing opportunities for collaboration, exploration, and problem-solving (Reigeluth et al., 2016).

4. Role of ICTs in Supporting Learner-Centered Instruction:

Finally, we examine the role of Information and Communication Technologies (ICT) in supporting this shift. We argue that technology needs to be strategically aligned with pedagogical goals to enhance learning effectively. When integrated with purpose and careful planning, ICT could facilitate meaningful learning experiences, but when used without consideration of pedagogical objectives, their potential remained underutilized (Ertmer & Ottenbreit-Leftwich, 2010).

Key Conclusions:

We conclude that the effective integration of technology in higher education is largely dependent on educators' pedagogical beliefs. Constructivist approaches offer a great potential for creating meaningful, learner-centered environments when combined with technology. While behaviorist and cognitivist approaches provide valuable insights, we argue that constructivism allows a deeper and more interactive use of digital tools in teaching. Our findings underscore the need for educators to critically reflect on their own beliefs and instructional strategies to ensure that technology integration serves pedagogical purposes and enhance student learning.

Through this chapter, we hope to encourage a rethinking of how technology is integrated into the curriculum, advocating for practices that align with constructivist ideals and support the development of active, engaged learners.

Chapter 3: Institutional Culture

Curricular technology integration requires a set of key variables to be considered. Ertmer & Ottenbreit-Leftwich (2010) shared that faculty's knowledge (digital competence) in technology and their self-efficacy affect their visions or possibilities to integrate technology in their teaching practices. They also mentioned how faculty's pedagogical beliefs shape the way they use (if they do) such technologies for instruction, this could be from a behaviorist, cognitivist, or constructivist approach, and furtherly see how such practices align to a teacher-centered or student/learner-centered paradigm. Finally, the last key variable that these scholars brought up is the institutional culture, which refers to the support faculty receive from the institution to integrate technology. These aspects include, but not limited to, aspects like:

- Technological infrastructure and resources the institution provides to faculty (equipment available to use).
- Pedagogical support and/or consultation provided by the university to faculty to help them develop their digital competences, motivation, pedagogical practices, etc.—e.g. learning how to use digital technologies (how-to skills); understanding and implementing technologies based on their technological and pedagogical affordances.

In Research Universities, faculty tend to be well trained when it comes to their field of knowledge (subject matter knowledge), and how to conduct research in such a field. However, they tend not to be trained enough when it comes to teaching and pedagogy, including the use of digital technology for teaching and learning (Ragupathi & Hubball, 2015). This is why, to technologies to be effectively used and integrated, universities need to provide faculty enough resources—such as technological infrastructure, training, consultation, and support—to make their uses and integrations viable and effective (Keengwe et al., 2009; Zellweger, 2007). Other aspects that are also needed are faculty's recognition of such opportunities or resources given by the campus, and, finally, faculty need to be motivated to take such opportunities and integrate technology in their practices (Perkins, 1985; Surry & Land, 2000; Ragupathi & Hubball, 2015; Orr et al., 2009).

In this chapter we will share a framework proposed by Surry & Land (2000), where four categories—that universities' administrators should consider fostering faculty's motivation and initiatives to integrate technology in their teaching practices—are shared: "Attention gaining", "Relevance", "Confidence building", and "Satisfaction". This framework will be used as the foundation to explain the different aspects in which universities should provide support to faculty. The focus of this chapter will be made in the "confidence building" category, given this is where most of the investment (timewise and pedagogical wise) is done by consultants/staff while providing support directly to faculty members.

Supporting faculty's technology integration

Surry & Land (2000) shared a framework that considers four aspects of how university administrators should promote motivation among faculty to change their perspectives or opinions of technology to help them learn, use, adopt and integrate them in their teaching practices and curriculum. Such strategies imply an active involvement of universities' administrators to foster faculty's motivation through, to mention some, modeling, training, incentive, rewards, proving support, among other factors that will be further described. The four aspects shared by these scholars are "Attention gaining", "Relevance", "Confidence building", and "Satisfaction". Each of these aspects or categories will be described in the following section.

Attention gaining

The attention gaining category of the motivational framework shared by Surry & Land (2000) addresses the need that universities' administrators have to foster faculty's awareness of the different sorts of technology that are available and their potential uses and possibilities. Some of the strategies suggested to foster faculty's awareness of the affordances of digital technologies are, but not limited to, the following: newsletters, peer demos, conferences (campus-wide, national or international) about successful cases of technology integration, demonstrations of the latests digital tools available for education, among others (Surry & Land, 2000; Keengwe et al., 2009; Orr et al., 2009; Bennett & Bennett, 2003). It is worth noting that every strategy will be effective at different rates among faculty, this does depend on their prior technological knowledge, technology self-efficacy, and the instructional/teaching strategies they use.

Relevance

The relevance category refers to the need of providing support and guidance that allow individual faculty make use of technologies depending on their specific needs, hopes, and expected goal or outcomes (Surry & Land, 2000). Also, giving the high amount of time and effort (sometimes with a no very rewarding outcome) technology integration represents to faculty, relevance refers to the fact of having technological integration as one of the possible factors to be considered for the faculty retention, tenure and promotion process (Surry & Land, 2000; Birch & Burnett, 2009). Some strategies suggested are the following: provision of lab/facilities with technological resources that may be needed for the desired implementation; rewards related to their retention, tenure, and promotion; mini-grants (for those faculty who are insecure about how to best integrate technology, but still want to try it in their classes); grants (for those faculty who have higher technological skills and self-efficacy; also for those who have gone through the mini-grant and have achieved higher technological skills and confidence). By applying such strategies, the technological and innovative initiative faculty decide to do (and try) might not be considered as wasted time (Surry & Land, 2000; Villena-Alvarez, 2016; Birch & Burnett, 2009).

Confidence building

The confidence building aspect of the framework refers to the importance that universities' administrators support has in fostering faculty members' digital skills. This category also refers to the need of having strong technological infrastructure, and staff that provides consultation and support in how to use the available resources (Surry & Land, 2000; Keengwe et al., 2009; Zellweger, 2007; Bennett & Bennett, 2003). The university should provide a solid technological infrastructure that allows different levels of digital technologies to be used and implemented in classes by faculty (stable campus-wide Wi-Fi, computer labs, digital devices in classrooms—computer, projector, etc.—, Learning Management System [LMS]—like Moodle, Blackboard, Canvas, among others). Also, hands-on sessions or training to faculty, so they can experience the process of using and adapting the technological tools—that the university can provide to them—for their teaching purposes (Surry & Land, 2000; Keengwe et al., 2009; Butler & Sellbom, 2002; Orr et al., 2009; Zellweger, 2007; Birch & Burnett, 2009).

For confidence building, it is important that universities establish a "support system" or "team" that can provide support to each faculty's skills development and self-efficacy (confidence)—during, and after (consultation) the respective training sessions (Geoghegan, 1994; Surry & Land, 2000; Keengwe et al., 2009; Birch & Burnett, 2009). It is also important that the strategies implemented to foster higher faculty's confidence or self-efficacy should always focus on how faculty need to give equal attention to technology, organization, and pedagogy; this is because a sole-technology oriented training or support may result in an inadequate or not pedagogical-based implementation of such technologies (Ragupathi & Hubball, 2015).

In the following two subsections, we will cover some aspects that university consultants or staff should foster and aim through their training/consultation process with faculty: technological skills (how-to skills or Digital Literacy) training, and Instructional (pedagogical) training.

Technological training (fostering faculty's digital literacy and technological self-efficacy)

Universities, as mentioned above, should provide spaces for faculty to foster the development of their digital skills (digital literacy) and their technological self-efficacy (confidence). These spaces should be provided taking into consideration that faculty may have different levels of digital proficiency or skills (Surry & Land, 2000; Bennett & Bennett, 2003).

It is well known that, given the fact that technology evolves in a fast-paced way, constant learning and training is required when it comes to technological skills. It is impossible to grasp or acquire the "ultimate knowledge" when it comes to digital tools (Ertmer & Ottenbreit-Leftwich, 2010). This is why university administrators (staff or technological consultants) "must facilitate an environment that helps faculty to familiarize with technology and its potential uses, and to learn and use technology effectively" (Keengwe et al., 2009, p. 27).

Scholars, like Surry & Land (2000) and Orr et al. (2009), strongly recommend the establishment of instructional-technological services that can offer campus-wide workshops to the faculty community about different technologies that could be integrated in their curriculum; one-to-one consultation for those faculty who are willing to implement—or already implementing—technological tools in their teaching practices.

These technological-oriented training strategies are seen as important given the fact that, since the appearance of Web 2.0 in the 2000's (including tools like Blogs, Wikis, Social Networks, to mention a few), a more specialized and higher technical skills are required to be taught and fostered to faculty (Orr et al., 2009; Abrahams, 2010). Also, participating in such training processes will help faculty to have a more positive perception of technology, and become more confident of their capabilities to use and include technology in their practices (Keengwe et al., 2009). Some of the skills and knowledge that should be fostered in faculty are, but not limited, to the following (Nakano et al., 2013; Johnson et al., 2012; Coll, 2004):

- Utilization of digital open educational resources.
- Design of own digital resources (multimodal/multimedia artifacts to support teaching).
- Use of Learning Management Systems (LMS).
- Collaborative digital tools/resources—Web 2.0 (Wikis, Blogs, etc.).
- Mobile Learning strategies (use of smartphones, tablets, laptops for learning).
- Virtual reality.
- Augmented reality.
- Games for learning (gamification, gamified learning experiences).

This set of skills will allow faculty to provide a learning environment where hypertextuality, interactivity, collectivity, and connectivity are possible (Coll, 2004; Nakano et al., 2013).

Without the proper development of their technological skills or Digital

Literacy, faculty will find the effective curricular integration of technology challenging. The design of learning activities and the teaching strategies with technology do require—at least—a foundational knowledge or skills of digital tools, and these skills will serve as a starting point to develop more advanced digital skills and boost their technology confidence or self-efficacy (Keengwe et al., 2009).

It is important to mention that senior's faculty members might be more likely to lack digital skills given the different strategies and modalities that they were trained to teach in, so training them may suppose a higher investment in terms of time. However, as Journet (2007) stated, universities administrators/consultants, should aim to fill up that technological (and, eventually, instructional) gap so these group of faculty members given that they will become "powerful allies in efforts not just to use but also to advocate for technology" (p. 108) taking into consideration the many experiences they have collected throughout the years with their teaching and research within the university culture.

Overall, in this phase, faculty should be able to learn how to use technology and visualize how such digital tools might have affordances to enhance their teaching practices and help their students' learning. However, an effective curricular integration of information and communication technologies does require a change of instructional practices or teaching practices (Keengwe et al., 2009). This is why technological training should become the backbone of the instructional training process, where the acquired technological skills are implemented in the instructional design process and its assessment (scaffolding).

Instructional (pedagogical) training

The pedagogical (instructional) consultation/support provided by university staff or administration, should serve as a complement to the technological support (focused on outreaching faculty to train them to foster their digital competence and technological self-efficacy/confidence). The pedagogical/instructional training should be seen as a bridge to connect the digital competence and confidence acquired in the technological training "phase" provided with the pedagogy required to use such knowledge in their teaching practices (Zellweger, 2007; Batson, 2011).

The instructional/pedagogical training should provide resources and constant advising and support to faculty in order to (1) help them prepare and (re) design their courses/curriculum; (2) rethink or enhance their teaching practices;

and (3) provide spaces where pedagogical reflections can be done—evaluating how the new designed experiences worked or not, and identifying what aspects should be improved (Zellweger, 2007).

The development of faculty's digital competence is an important factor and a foundation to understand and identify the potentiality and affordances of technological tools. Although many of the digital resources/tools available to users tend to be user-friendly or easy to learn and use, most of them were not designed for educational purposes. This fact implies that the sole understanding of these tools' functionality and mastering their use will not result in a "natural" and immediate effective and pedagogical integration in the curriculum (Nakano et al., 2013; Batson, 2011).

The pedagogical training and consultation must orient faculty members to identify and make use of those digital resources or technologies that can provide a better approach to help their curricular outcomes (Orr et al., 2009; Nakano et al., 2013). For this, identifying if the curriculum has been designed based on a behaviorist, cognitivist, or constructivist approach will help in the process of choosing which may be the best tools to include and use for such purposes.

To take advantage of most of the affordances provided by technological tools, a strong focus should be made in providing pedagogical support to faculty in the design of learner-centered activities, moving towards an active learning approach where collaboration, interactions, knowledge construction, and other strategies—based on the constructivist learning theory—should be implemented (Orr et al., 2009). However, this does not mean that administrator or consultants should force faculty to switch their teaching approach from a behaviorist-oriented to a constructivist-oriented, given that such transition—desired but not totally required—does take time depending on each faculty's profile and pedagogical belief (Keengwe et al., 2009; Ertmer & Ottenbreit-Leftwich, 2010; Surry & Land, 2000).

Based on faculty's pedagogical belief and the curricular outcomes, consultants can help in providing tools that could help in representing subject matter content through multimodal artifacts like videos, hypertextual content, simulations, among others (Nakano et al., 2013). Also, if a faculty is more constructivist-oriented, technology can help in creating learning spaces for social interactions for knowledge construction by using Web 2.0 applications (Nakano et al., 2013; Johnson et al., 2012). If faculty are teaching online or blended courses, consultants should provide different alternatives (most of the time going beyond the set of tools provided by the institutional Learning Management System) of creating a meaningful and engaging learning environment for students (Johnson et al., 2012; Fathema et al., 2015).

Considerations and recommendation for faculty's training

There may be different strategies and routes to support faculty and foster their digital competence and self-efficacy, and their pedagogical knowledge so they can transform—and be more mindful—about their instructional practices or teaching approaches. Johnson et al. (2012) highlighted that, although there might be a solid number of universities providing faculty training to use and integrate technology in their teaching practices, many of these foci only on the technological aspects (first training aspect mentioned in the "confidence building" section), leaving the pedagogy component behind. They suggest that learning by doing tends to be the most effective way for faculty to learn how to use and implement technology in their curriculums.

Many universities do have technologically well-equipped classrooms, it does become significant to provide faculty a solid knowledge of how to manage such tools, so they can feel confident while using them during instruction (Butler & Sellbom, 2002). Also, it is recommended that the classrooms' technological tools should be as similar as possible given the chances that faculty tend not to teach a unique place every academic year; for this, a clear and reachable (e.g. inside the classroom and/or a website) documentation of classroom is recommended—besides the technological training administrators should provide (Butler & Sellbom, 2002).

In sum, providing faculty with the technological and pedagogical training and support (consultation) will facilitate higher rates of integration of technology, and a higher number of significant and successful experiences from such integrations both from the students' and faculty's perspectives (Orr et al., 2009). In order to integrate information and communication technologies in their curriculum and teaching practices, as Keengwe et al. (2009) stated:

> Faculty need to familiarize themselves with the technology, utilize the technology, integrate the technology into their teaching, transition to the reorientation phase, realign their teaching and student learning outcomes with the technology, and finally become revolutionized in their teaching practices where technology usage is evident, and the process facilitates the quality teaching and active student learning mission. (p. 28).

The promotion of such training (as mentioned in the first part) will allow faculty to develop their Digital Competence, where their technological knowledge or skills (Digital Literacy), and their pedagogical knowledge (that allows them to effectively and meaningfully integrate different ICT tools in the curriculum) are developed. With such competence being developed, faculty can become more confident and more likely to design learning experiences that take advantage of the different affordances of technology to increase the chances of achieving the curricular goals in a higher scale (Nakano et al., 2013).

Satisfaction

The last aspect shared by Surry & Land (2000) is "satisfaction", which can be understood as the importance of providing rewards to faculty who decide to integrate technology in their curriculum, and ways to encourage those who have not decided to do so (Surry & Land, 2000). Some of the strategies to foster such satisfaction among faculties are, but not limited, to the following: technological equipment upgrades, establishing campus-wide teaching technology awards, public recognition, special compensation for the time investment in the design and integration process, providing grants to allow faculty to present their successful experiences in national or international conferences, including the technological planning, integration and innovation as part of their retention, tenure, and promotion process (Surry & Land, 2000; Villena-Alvarez, 2016; Orr et al., 2009).

Synopsis of Chapter 3: "Institutional Culture"

In Chapter 3 we examine the importance of institutional culture in supporting the integration of technology into teaching practices and how faculty knowledge, self-efficacy, and pedagogical beliefs are influenced by the institutional environment. We also explore how institutional strategies—like professional development opportunities for faculty and incentives—foster curricular integration of technology. We highlight the following key ideas:

1. **Institutional Support as a Key Factor:**

We argue that technological integration is not solely a matter of faculty competence or pedagogical beliefs, but also heavily dependent on the resources and support offered by the institution. This includes technological infrastructure, such as equipment and software, as well as pedagogical support, which helps faculty develop the skills needed to use technology effectively in their teaching (Keengwe, Kidd, & Kyei-Blankson, 2009).

2. **The Role of Institutional Culture in Motivation:**

We examine Surry and Land's (2000) framework for fostering faculty motivation to integrate technology, which includes four categories: "Attention Gaining," "Relevance," "Confidence Building," and "Satisfaction." These categories provide a structured approach for administrators to promote technology use by making faculty aware of technological tools, aligning technology use with their professional goals, building their confidence through training and support, and offering rewards for successful integration.

3. Focus on Confidence Building:

While all categories in Surry and Land's framework are important, we focus particularly on the "Confidence Building" category, as it directly addresses the need for institutions to provide robust technological infrastructure and ongoing training. We discuss how this support enables faculty to develop digital skills and pedagogical expertise, which in turn boosts their confidence to integrate technology into their teaching practices (Zellweger, 2007).

Key Conclusions:

We conclude that institutional culture is a fundamental variable in the successful curricular integration of technology. Without adequate infrastructure, training, and motivational incentives, faculty are unlikely to feel confident or motivated to adopt technology in their teaching. We emphasize that universities must not only provide access to technological tools but also offer continuous pedagogical support and recognize faculty efforts through rewards and incentives. This holistic approach creates an environment where faculty can confidently experiment with and implement digital tools in ways that enhance student learning outcomes.

Through this chapter, we underscore the importance of a supportive institutional culture that fosters both the technological competence and pedagogical growth of faculty. By doing so, institutions can ensure that technology integration is not only possible but also meaningful and aligned with educational goals.

Chapter 4: Conclusions & Discussions

There has been much research done in the last twenty years related to the potentials and affordances information and communication technologies (ICT) must enhance and transform teaching practices in higher education. Many scholar (Koehler & Mishra, 2009; Ertmer & Ottenbreit-Leftwich, 2010; Benson & Ward, 2013; Prendes & Gutiérrez, 2013; Khan & Bhatti, 2017) have highlighted the importance of the development of skills or competencies for faculty that enables them to integrate technology in their pedagogical practices.

The approach shared by Ertmer & Ottenbreit-Leftwich (2010) results in an interesting way to see how such technological knowledge and technology self-efficacy are tied to the ways faculty see, integrate, and use technology in their curriculum. For the "knowledge" variable, there are different constructs that can be used to represent and understand it (TPACK model, and Digital literacy and competence). Out of these two constructs or approaches to understand the "knowledge" variable, we find Digital competence as the clearest one.

That stated, it is important to share that the TPACK model, while being an interesting approach to understand "knowledge" as a variable, does not make a clear distinction of how educators may fit in the overlapping circles the model presented, and, also, it is not clear why such overlapping circles are represented as equally important and not dependent among them. Part of this issue is covered and explored by Benson & Ward (2013) who do consider the TPACK as a good foundation to identify different faculty "profiles" based on their content, pedagogical and technological knowledge. Also, it is necessary to highlight that such study may serve as a good foundation for further and deeper exploration of ways to expand or revise the TPACK model.

On the other hand, when it comes to Digital literacy and competence as a construct to define the "knowledge" variable, Spante et al. (2018) share an interesting finding from a critical literature review of the way such terms have been used throughout the years, and how the many approaches shared by many scholars for around twenty years can be confusing, especially when many definitions may overlap to some extents, this is why scholars need to have a clear positioning towards the digital literacy and competence constructs in their studies so it can be clear from which perspective such concepts are being used.

From our perspective, talking about the knowledge required from faculty to incorporate or integrate technology in their curriculum implies talking about digital competence. Developing such knowledge would mean faculty should be able to (1) learn how to explore and use digital tools for different purposes (Gilster, 1997; Goodfellow, 2011; Gourlay et al., 2013; Hall et al., 2013), (2) being capable to analyze their affordances for their pedagogical practices and purposes, by identifying how a digital tool can serve as a good resource to mediate the teaching process, for example: evaluating the best ways to share the subject matter content with a tool; identifying the affordances of a technology to reach the desired curricular outcome; or using a digital tool to afford collaboration or any pedagogical strategy that fits with their pedagogical approach (Prendes & Gutiérrez, 2013; Khan & Bhatti, 2017). Finally, a digital competent faculty should be able to critically analyze and evaluate their use of technology in their curriculum. Doing so will allow them to improve the aspects that did not meet their expectations or did not successfully help in reaching the curricular outcomes. This last component of digital competence allows faculty to constantly reflect in how their teaching practices with technology can be improved based in their needs, the context (e.g. who their students are, what the content is, etc.), and their expectations (Prendes & Gutiérrez, 2013).

As a complement to the development of their Digital Competence, it is important for faculty to develop technology self-efficacy. It has been proved that the higher the levels of technology self-efficacy of faculty, the more chances are they feel motivated or encouraged to integrate technology in their pedagogical practices, even when their Digital Competence is not as high as expected (Ertmer &

Ottenbreit-Leftwich, 2010; Kagima & Hausafus, 2000).

There is a need to keep exploring how faculty are integrating technology in their different teaching practices and how these two variables are triggering and affecting such practices.

There are many approaches to instruction that can take place in higher education. While it is true that such approaches are based on different learning theories (behaviorism, cognitivism, and constructivism), there is no “right” or “wrong” approach to embrace as an educator. This will always depend on what we want to accomplish through our instruction.

It is also important to consider that many instructional strategies tied to a learning theory can be combined to reach a specific goal, for example: if we are looking to instruct students (who have not taken a class in the subject matter) about basic conceptual knowledge of chemistry, an implementation of a total constructivist approach will become harder than a behaviorist approach. In this specific scenario, there is a need to foster the acquisition of foundational knowledge in order to scaffold to higher cognitive activities—cognitivist and constructivist practices (Reigeluth et al., 2016; Jonassen, 1991).

That stated, the intentionality of the integration of technology is strongly connected to the instructional approach we, as educators, are taking. For example: it is hard, from a behaviorist approach, to take advantage of all of the affordances that Web 2.0 has to offer to promote collaboration and foster a higher level of cognitive activity in students—e.g. discussions, critical and creative thinking, problem solving, project execution, etc. (Ertmer & Newby, 2013; Snelbecker, 1983; Lee & Lin, 2009; Schunk, 1991; Reigeluth et al., 2016).

Navigating through the cognitivist and constructivist learning theories and using them as a support or base for instructional strategies may constitute an ideal track to transition from a teacher-centered paradigm to a learner-centered paradigm. This process may not be a “straightforward” path neither for educators nor for learners, but a scaffolded process might help in achieving it.

Designing effective collaborative experiences using technology and promoting a participative learning environment are ones of the right paths to take to create in-classroom moments where academic and social strategies come together to promote engagement and motivation. This will allow educators to get their students thinking, interacting, researching, discussing, planning, fostering critical thinking and skills that will help them to increase their participation in the class and the society and, finally, manipulating the information collected by them to start building knowledge (Van Lier, 2007; Pryor & Crossouard, 2008; Heritage, 2010; Arnett, 2016; Schindler et al., 2017). Making the transition to a learner-centered approach will become an opportunity to create meaningful experiences for students and make education a meaningful, relatable, and satisfying process to go through.

Based on the contributions of scholars in educational technology and higher education pedagogies, there are many strategies that universities can implement and adopt to foster curricular information and communication (ICT) technologies integration by faculty members (e.g. Surry & Land, 2000; Perkins, 1985; Orr et al., 2009; Ragupathi & Hubball, 2015). We do consider that the strategies highlighted by Surry & Land (2000)— "Attention gaining", "Relevance", "Confidence building", and "Satisfaction"—, despite the time they were proposed, still cover the main aspects universities are trying to work on to create an ideal and successful scaffolded process to motivate faculty to use and adopt technology—with a pedagogical intention—for their teaching practices.

In agreement with these scholars, we do strongly believe that to "sell" the affordances, possibilities and potentialities of ICT tools, it is important to start by showcasing what is possible and what other people (scholars) are doing with technology in different contexts, and also having university administrators (staff or consultants) designing workshops where faculty can explore various technological tools (Surry & Land, 2000; Keengwe et al., 2009; Orr et al., 2009; Bennett & Bennett, 2003). A broad and not-in-depth exploration of technological tools might help scholars to develop more interest in technology as a resource for their teaching practices ("Attention gaining" aspect). To us, it is important to keep in mind that faculty—like any other human beings—do have different interests, and ways of engaging in such explorational practices. That stated, giving agency to faculty to choose whatever fits better to their interest may be the best strategy to prevent their frustration while exploring the use of such tools (especially when it comes to newcomers, who may want to start with "not-high-end" technologies).

A way to promote such curricular technological integration, faculty need to see such implementations as a relevant act. This means, there are implications of benefits of trying technological tools in their teaching practices, for instance: doing so will help them to get a promotion or help them in the tenure process (Surry & Land, 2000). However, something we would complement Surry & Land's approach of the "relevance" aspect, is the fact that Universities administrators need to be mindful about the time investment a technological integration takes. By doing so, they would allow those faculty who, voluntarily, decide to get trained and supported in integration of digital technologies in their curriculum. Another important aspect of the "relevance" aspect is the need of budgets or grant available for faculty who decide to learn technologies, re-design (or design from scratch) the curriculum, implement it, and evaluate and reflect about it after it is applied (Surry & Land, 2000; Villena-Alvarez, 2016; Birch & Burnett, 2009).

For the "Confidence building" aspect, we do agree with Keengwe et al. (2009) about the perspective that "keeping the equation balanced" between technological skills and knowledge, and pedagogical knowledge is necessary. Only one sort of training is not enough to make a substantial change in faculty's instructional practices. Technological and pedagogical consultants are indeed required to support faculty members in developing their technological self-efficacy through training focused on their technological knowledge/skills (Geoghegan, 1994; Surry & Land, 2000; Keengwe et al., 2009; Birch & Burnett, 2009).

These technological skills, then, will complement the pedagogical component of such training. Focusing only on technology training would result in an unbalanced and not meaningful curriculum design (Ragupathi & Hubball, 2015). This is especially critical given that a good number of digital tools, available on the Internet, were not originally designed to be useful or used for educational purposes.

That stated, a good pedagogical training will allow faculty to identify, based on their curricular goals or objectives, what are the technological tools that may provide enough affordances for the learning activity design, and, thus, promote a better learning experience in students (Keengwe et al., 2009). Also, we strongly believe that faculty's pedagogical beliefs will shape the nature of the learning activities they design (behaviorist, cognitivist, or constructivist) and the form/way that the selected technological tools are going to be used during instruction (Keengwe et al., 2009; Ertmer & Ottenbreit-Leftwich, 2010; Surry & Land, 2000).

Finally, the "satisfaction" aspect proposed by Surry & Land (2000) is an interesting way of rewarding faculty's effort to learn new (for some) digital technologies and integrate them pedagogically in their curriculum. Sometimes showing casing to the university community a faculty's achievement may result is a "preaching" strategy that might convince others to try it out and visit the technological and pedagogical consultants to transform their practices (Surry & Land, 2000; Villena-Alvarez, 2016; Orr et al., 2009).

It is important to note that the promotion of faculty's motivation to use technology in their teaching practices is a non-linear process. This means that every faculty in a university will agree in learning, using and implementing technologies for their specific goals or curricular outcomes in different times or moments. Some may agree in doing so from the very first moment, with a single exposure to digital tools being enough to make the change. Some may take longer, and this may be for many possible reasons: not having security of how to implement technology; the need of witnessing how other colleagues are doing with technology and having success with it; the need to reaffirm from others experts (inside or outside of campus) how technology has helped in improving the teaching experience (Surry & Land, 2000).

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A CRITICAL REVIEW OF VARIABLES AND CONSIDERATIONS

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