ReCALL (2023), 35: 1, 4–18
doi:10.1017/S0958344022000118

RESEARCH ARTICLE

Towards a signature pedagogy for technology-enhanced task-based language teaching: Defining its design principles

Laia Canals
Universitat Oberta de Catalunya, Spain (ecanalsf@uoc.edu)

Yishay Mor
Consultant, Israel (yish@yishaymor.org)

Abstract

This paper reports on ongoing research aimed at characterizing a signature pedagogy (Shulman, 2005) of technology-enhanced task-based language teaching (TETBLT). To achieve this goal, we initially identified 15 pedagogical principles and practices distinctive of TETBLT. This initial set of principles and practices were motivated by second language acquisition theories (Doughty & Long, 2003), methodological approaches in foreign language teaching (Kramsch, 2014), and state-of-the-art publications on computer-assisted language learning (Chapelle & Sauro, 2017). During the first phase of the study, we consulted an initial group of 34 experts in the field, using the Delphi technique to achieve gradual consensus about the set of principles. After analyzing the first set of responses ($N = 23$) to the principles, which attained a degree of agreement averaging 71% and ranging from 48% to 96%, we refined the principles incorporating the feedback received and sent out a second questionnaire, which allowed us to reach a consensus about a set of eight robust pedagogical principles for TETBLT.

Keywords: computer-assisted language learning; computer-mediated communication; signature pedagogy; pedagogical principles

1. Introduction

1.1 Technology-enhanced task-based language teaching

As a subfield of applied linguistics, computer-assisted language learning (CALL) is largely influenced by interactionist perspectives of second language acquisition (SLA; Chapelle, 2009), sociocultural theory, and language learning theories grounded in socio-constructivism (Lantolf & Thorne, 2006; Levy & Stockwell, 2013). These theories consider that the language learning process is embedded in a sociocultural context that mediates interactions among learners. Experiential and situated learning are promoted during these interactions, where meaning is co-constructed through negotiation between learners and teachers, and among learners themselves. Therefore, the role and affordances of technology for language learning must be regarded, considering its capacity to facilitate the language learning process.

Earlier studies have put forward principles connecting technology and language use, language teaching, and language learning (Chun, Kern & Smith, 2016), and principles to create an optimal psycholinguistic environment for language learning (Doughty & Long, 2003). Doughty and Long (2003) propose a set of methodological principles – motivated by theory and research findings in

Cite this article: Canals, L. & Mor, Y. (2023). Towards a signature pedagogy for technology-enhanced task-based language teaching: Defining its design principles. *ReCALL* 35(1): 4–18. https://doi.org/10.1017/S0958344022000118

© The Author(s), 2022. Published by Cambridge University Press on behalf of European Association for Computer Assisted Language Learning.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

SLA and educational psychology – and pedagogic procedures to implement a task-based syllabus. Following González-Lloret and Ortega (2014), who detail ways to integrate principles of task-based language teaching (TBLT) to existing technology-enhanced language teaching by examining empirical studies, the current paper proposes an integrated set of pedagogical principles for technology-enhanced task-based language teaching (TETBLT), comprising CALL, mobile-assisted language learning (MALL), and computer-mediated communication (CMC). The aim of the present research is to uncover a signature pedagogy for the field of TETBLT. When TBLT is carried out in a technology-enhanced (CALL or CMC) environment, it also involves interaction "within social and material environments" (Lantolf & Thorne, 2006: 201). The technologies that mediate language learning could constitute one of these environments. These technologies, such as virtual learning environments, social media platforms, and teleconferencing tools, include several means of carrying out collaborative and cooperative action-oriented tasks and projects. All these environments in which tasks and projects can be carried out potentially constitute the core of socio-constructivist complex learning environments (Korsvold & Rüschoff, 1997: 18). Most of the above-mentioned technologies allow learners to create meaning through experience, a mainly socio-constructivist idea, while engaging in meaning-making interactions as an integral part of communicative tasks (Ortega, 2007) in a shared social context. The study of this type of interaction between learners is a shared focus of interactionist SLA research and socio-cognitive approaches to SLA (Atkinson, 2002).

Several authors such as Chapelle (2009, 2014) and Zuengler and Miller (2006) point out the need for creating an integrative approach to technology-mediated TBLT that includes both socio-cultural and cognitive views, backed up by Ellis (2003) and Swain and Lapkin (1998). We believe the adoption of such an approach would be beneficial in the field of CALL due to the increasing interest in technology-enhanced environments for language teaching and learning. Even though cognitive, sociocultural, and socio-constructivist theories have different epistemic premises, they may complement one another when trying to conceptualize language learning and teaching. The fields of CALL and CMC focus on various aspects that cover a wide range of areas, from materials and task design to opportunities for providing comprehensible input, to connecting individuals who engage in holistic language learning practices. Chapelle (2009: 748) argues that "a perspective for combining these approaches into a metatheory ... would put the theory pieces together to create a fuller picture." Chapelle (p. 751) also points to the need to draw on contrastive language acquisition and language learning theories to develop pedagogical methodologies for CALL. Similarly, Foster and Ohta (2005: 404) also note that despite their "differences, researchers using each of these approaches share a strong interest in how learners develop facility in an L2 via social interaction. ... Both are interested in how it is that interaction promotes SLA."

CALL can take many shapes and forms, but TBLT lends itself especially well to providing a context suitable for technological designs for language learning (Chapelle, 2003). In particular, TBLT addresses issues around how learners relate to and learn together with other learners through interactions that are often mediated by digital devices (González-Lloret, 2007). There have been some attempts to bridge the fields of TBLT and CALL, but there is still a need to conduct more studies that explore "how to integrate new technologies and language tasks into an organic and mutually informative whole" (González-Lloret & Ortega, 2014: 4). Rather than adapting TBLT principles to CALL, as has already been attempted (González-Lloret & Ortega, 2014), in the present article we seek to create a unique set of pedagogical principles of TBLT and CALL and articulate an additional set of consensually agreed principles based on current developments in CALL by both examining existing literature and drawing on the expertise of renowned scholars in the field.

The term we will use throughout the paper is technology-enhanced task-based language teaching (TETBLT) given that CALL has been the term historically adopted in the field, although it has been challenged as a problematic and outdated term in some respects (Jarvis & Krashen, 2014). When referring to technology and language learning, we refer not only to computers but

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

also to handheld devices, such as tablets and mobile phones (MALL), and any other means of creating technology-enhanced language learning experiences.

1.2 Signature pedagogies and signature epistemologies

Our endeavor rests on two fundamental claims:

- Every domain of knowledge or practice has its *signature pedagogies*: "the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions" (Shulman, 2005: 52).
- These signature pedagogies reflect the domain's *signature epistemology*: the system of practices by which knowledge is asserted by experts in this domain.

The notion of *signature pedagogies* emerged from the study of professional training (Shulman, 2005) and was later expanded to other knowledge domains, such as literary studies, history, fine arts and design, computer science, and engineering (Chick, Haynie & Gurung, 2009; Lucas & Hanson, 2016; Thomson, Hall, Jones & Sefton-Green, 2012). It is instrumental for practice-oriented teacher education approaches (and hence for training second language teachers), as it highlights the complexities and nuances of educational work. It recognizes that the ways in which we teach are subtle and diverse, reflecting unique cultures of meaning-making and action.

Implicit in the articulation of signature pedagogies is the assumption that each domain of knowledge or practice has its canonical set of *epistemic practices* (Kelly & Licona, 2018): the methods by which knowledge is constructed, validated, and communicated. We find it fitting to refer to this set as the domain's *signature epistemology*. This concept is akin to the concept of *argumentative grammar* (Cobb & Gravemeijer, 2008): the substrate of rules and assumptions that binds the discourse of a community and the logical system by which claims are presented and justified. A signature epistemology expands on the notion of argumentative grammar in that it includes the whole scope of actions taken to generate and disseminate knowledge, not just the linguistic and discursive ones. The practical and personal dimensions of a signature epistemology are related to the work on personal epistemology (Hofer, 2001), which identifies the processes by which individuals establish and validate truths. However, the literature in that field tends to focus on universal practices, ignoring the differences between domains.

Signature epistemologies are rooted in a combination of endemic and cultural factors. Endemic factors refer to the nature of knowledge in the domain. In mathematics, new knowledge is derived by logical deduction from previously established knowledge; in biology, it is established by observation and experimentation; and in literary hermeneutics, by verbal manipulation. Cultural factors refer to the norms and linguistic structures of the community.

The ultimate purpose of any pedagogical practice is to enculturate learners into the epistemic practices of the domain: when teaching mathematics, we ideally want to bring learners to "think as a mathematician"; when teaching a language, we aim to lead learners to internalize the rules of the target language and become proficient language users and effective intercultural and multilingual communicators. Hence, we expect a close correspondence between a signature pedagogy and the signature epistemology it aims for. Thus, articulating these structures and identifying the links and gaps between them should be a powerful method for analyzing and enhancing educational systems.

1.3 Articulating a signature pedagogy: Values, design principles, and design patterns

Shulman (2005) argues that a signature pedagogy has three levels: a *surface structure* – the concrete, operational, and visible acts of teaching and learning; a *deep structure* – the set of assumptions underlying the surface structure about how best to impart knowledge; and an *implicit*

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

structure – the set of ethical and normative beliefs about professional attitudes, values, and dispositions.

Many studies use a mixture of literature reviews, classroom observations, case studies, and ad hoc surveys to identify and present signature pedagogies (cf. Lucas & Hanson, 2016; Thomson *et al*., 2012; and, to an extent, Chick *et al*., 2009). These descriptions are typically simultaneously descriptive and prescriptive, in the sense that they both claim to report on an existing phenomenon and argue for a desired one. This ambiguity appears to diverge from Shulman's original thesis, which was aimed at uncovering the nature of knowledge in a professional domain through the observable ways in which practitioners are trained in this domain. We posit that rather than trying to eliminate this tension, it should be made explicit. We adopt a design science stance, entailing a commitment to go beyond describing the world as it is and consider how it should be and how to make it so (Mor & Winters, 2007). Furthermore, we are seeking a coherent and effective descriptive framework (or language) for signature pedagogies that is structured, flexible, and actionable. To these ends, we have chosen to represent the three levels of a signature pedagogy by mapping them to constructs familiar in the learning sciences and technology-enhanced learning literature, namely values, design principles, and design patterns (Mor *et al*., 2015).

Pedagogical design patterns describe a particular educational challenge, the context in which it arises, and a possible evidenced method of addressing this challenge. They are simultaneously descriptive, as a form of analyzing existing practice, and prescriptive, as a means of promoting effective practice. Design patterns provide an effective format for describing the surface structure of a signature pedagogy. These need to be supplemented with similar forms for describing the corresponding epistemic practices (Warburton & Mor, 2015).

Design principles translate theoretical and empirical findings from the study of teaching and learning into directives, providing designers with clear, evidence-based rules of action. They offer a useful representation for the deep structure and should be justified by reference to the relevant deep epistemic structures. In our framework, these structures are represented as epistemic principles.

The discussion below focuses on the implicit (values) and deep (principles) levels. The exploration of the surface (patterns) level is the objective of future work.

2. Methodology

The present study was conducted in three phases: first, we identified a set of (pedagogical) design principles for TETBLT based on a review of the relevant literature. Second, we validated the initial set of principles by means of a Delphi study. Finally, we inferred the underlying values from the principles and the qualitative comments from the experts who participated in the study.

During the initial phase of the study, we examined seminal work in the field of CALL and psycholinguistic theories of language learning in order to identify a synthesized version of an initial set of 15 pedagogical design principles that might characterize TETBLT programs. These principles were motivated by earlier work in three main areas, namely SLA theories (Doughty & Long, 2003), methodological approaches of foreign language teaching (Kramsch, 2014), and computer-assisted language learning and teaching (Chapelle & Sauro, 2017; Chun *et al*., 2016; González-Lloret & Ortega, 2014). During the initial literature survey, we identified publications that specifically addressed methodological principles of TBLT, CALL, and technology-enhanced language learning and teaching. The main references that came up were Doughty and Long (2003), Chapelle and Sauro (2017), Darvin (2017), Chun *et al*. (2016), González-Lloret and Ortega (2014), Kramsch (2014), Levy and Stockwell (2013), Sauro and Chapelle (2017), Bax (2011), and Thorne (2016).

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

During the second phase, we validated and refined these principles through a two-stage Delphi technique (Hsu & Sandford, 2007). The Delphi method is used as a method of forecasting technological developments by pooling expert estimates (Rescher, 1998). It has been used in a wide variety of domains for forecasting, policy, and consensus analysis. The rationale behind this approach was that a signature pedagogy should balance the ideal approach derived from theory with the pragmatically feasible. The Delphi method is designed to elicit sound practical insights by pooling the knowledge of domain experts. We assembled a panel of experts in CALL (as described in Supplementary Material A: Expert committee selection process) and we sent them an online survey asking them to (1) rate the extent to which each principle contributed to defining the essential elements of a TETBLT program (using a 5-point Likert scale), (2) comment on the principles, and (3) propose additional principles. Based on their responses, and following the process detailed below, we refined the principles and reiterated the expert survey.

The panel included 34 experts and educators in the fields of CALL and CMC. Expertise was determined by compliance with one of the following criteria:

- renowned scholars in the fields of CALL and CMC who were on the boards of the principal CALL journals (*Computer Assisted Language Learning*, *ReCALL*, *CALICO Journal*, *Language Learning & Technology*) or the main academic conferences in the field (WorldCALL, EUROCALL, CALICO)
- authors of seminal papers, handbooks, or state-of-the-art papers in the fields of CALL, CMC, foreign language education, SLA, and computer-meditated TBLT, with citations above the 200 mark according to Google Scholar.

Out of the 34 experts we approached (see Supplementary Material A for more information regarding their profiles), 23 agreed to participate in the study. Their responses to the principles in the first phase obtained agreement (4 or 5 on the scale) averaging 70.7%, ranging from 47.8% to 95.6%.

Based on the feedback received and the qualitative data gathered from the comments, we derived a refined set of 16 pedagogical principles (see Supplementary Material B for a list of the initial set of principles and the experts' comments after the first round of consultations). This set included examples of some of the most contested principles and incorporated different nuances and perspectives to make some of the principles more inclusive, in addition to further references to the literature to support the principles. The new set of principles incorporated an additional principle based on suggestions from several experts that addressed the transformative role of language learning beyond content knowledge and affecting identities (Darvin, 2017). Some of the comments challenged the fact that some principles showed a bias towards one of the binary notions of certain language acquisition processes (e.g. inductive vs. deductive formulation of language rules, or focus on meaning vs. focus on form). Some other comments disputed the feasibility of some of the principles or provided indications to broaden their theoretical scope. The comments and suggestions from the experts helped us broaden the scope and width of the theory supporting each principle.

The second survey presented the experts with the refined set of principles and referred them to the original set and the comments on it, should they wish to trace our reasoning. We asked them once again to rate their agreement with each principle based on the same 5-point Likert scale and include any comments they deemed appropriate. The next section reports on the results of the second phase of the consultation by first presenting the results of the second survey and discussing the tensions that arose considering the revised set of principles. The discussion will specifically address the principles that posed the most problems for the experts in terms of the essential role they play in a comprehensive TETBLT program.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

3. Results

3.1 Pedagogical design principles

The second questionnaire was answered by 21 out of the 22 experts (one withdrew from the second phase of the project). The principles listed in Table 1 include the modifications suggested by the experts in the second round. During the second round, they obtained an agreement

Table 1. Essential pedagogical principles of TETBLT

Topic	Principles	Agreement	Increase/ decrease
TBLT specific	1. **TBLT.** Use tasks as the predominant base unit of instruction.	67%	↓1.8
Input	†2. **Learning by doing.** Promote learning by doing and using language (often mediated by multimodal artifacts/technology) to produce meaningful outputs.	95%	↑8.3
	†3. **Language use.** Represent and promote language use as a holistic, multimodal entity (including non-verbal communication and symbols), trying not to separate language domains, grammar from lexis.	81%	↑15.7
	†4. **Linguistic complexity.** Balance oversimplification and overcomplexity by elaborating or scaffolding genuine inputs.	81%	↑15.6
	†5. **Input's characteristics.** Provide rich and comprehensible quality input derived from competent language users in a variety of authentic situations, including different language varieties and accents, selected or adjusted to the level of the learners.	86%	↑21.5
Learning processes	6. **Inductive vs. deductive learning.** Encourage inductive learning ("chunks," "formulaic sequences") but allow for deductive focus on form episodes when the context (students, task) and level require it.	67%	↑5.7
	†7. **Meaning vs. form.** Use predominantly meaning-focused communicative tasks but allow focus on form by directing learners' attention to linguistic forms within the context of the task.	76%	↑11.0
	8. **Feedback.** Provide corrective and formative feedback as soon as possible after speech events, without breaking the flow of expression or conversation.	62%	↑14.1
	9. **Clinical teaching.** Assess where learners are in their learning trajectories and adapt instruction accordingly, considering common developmental sequences that psycholinguistic research has established, accommodated for individual learning paths.	57%	↓3.8
	†10. **Immersive environment.** Align the learning environment with the target language to make the learning experience as linguistically immersive[1] as possible according to the level of proficiency of the learners within the given environment, scaffolding when necessary.	82%	↑2.8
	11. **Collaborative learning.** Promote cooperative and collaborative learning while retaining learners' autonomy and respecting their preferences and needs.	67%	↓20.2

(*Continued*)

[1]A virtual environment is where learning takes place: it can be a learning management system, a social network, a virtual campus, or a combination of any of them. By linguistically immersive, we mean that the interface of that setting should be in the target language so that learners learn by being surrounded by as much target language as their proficiency level allows.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Table 1. (*Continued*)

Topic	Principles	Agreement	Increase/ decrease
Learners	12. **Personalization.** Personalize instruction by using technology to adapt to the needs of individual learners, within the constraints and affordances of the learning environment.	62%	↑1
CALL specific	†13. **Techno-pedagogical empowerment.** Technology has different functions in teaching and learning: as a tutoring system, as a mediator for information and resources, and as a communication medium. Given that technology is never neutral,[2] we should enable teachers and learners to critically identify and take ownership of these functions to support learning.	81%	↑7
	14. **Techno-literacy.** Promote students' technological literacy, in the sense of sustaining the balance between fluency and "transparent" (or convivial) use while maintaining a critical stance to assess how the cultures of use affect language learning processes and outcomes.	71%	↓6.8
	†15. **Skills and competences.** Approach the basic modes of communication (reception, production, interaction, and mediation) by embracing critical digital literacies, the new skills for the future work order, including new texts and genres supported by digital technologies.	76%	↓19.4
	16. **Transformative learning.** Foster the development of learners' digital repertoires and competences while embracing the transformative role of language learning from content knowledge, through competences, to shaping students' own identities.	67%	N/A

Note. TETBLT = technology-enhanced task-based language teaching; TBLT = task-based language teaching; CALL = computer-assisted language learning.†Principles that achieved consensus.

(4 or 5 on the Likert scale) averaging 74% ($SD = 10$), ranging from 57% to 95%. The experts showed an acceptable percentage of agreement (above the average, which was 75%) on half of the principles, specifically with Principles 2, 3, 4, 5, 7, 10, 13, and 15. Although the agreement increased for most principles (10) during this second round, as can be observed in Table 1, not all of them reached the 75% threshold. In only five instances did the agreement level decrease during the second round in the case of Principles 1, 9, and 14, and quite significantly (by 20 points) in the case of Principles 11 and 15. The data set and working documents for the entire process are available at https://tbtell.iucc.ac.il/ and in the Supplementary Material B: Versions 1 and 2 of the principles. The feedback and discrepancies among experts and the distribution of values for the most contested principles during the second phase of the Delphi study will be further discussed in the discussion section.

Most of the concerns raised by the experts on the comments included after each principle are related to the feasibility of the practical application of the principles, which does not undermine the principles themselves. The difficulties rely, in most cases, on several other underlying considerations one would need to consider in the design of technology-enhanced language teaching programs. These may include the level of proficiency of the learners or the variety of individual and instructional conditions that potentially constrain language learning and teaching. In the discussion section, we will detail the tensions and problems that were brought up by the specific comments on the principles that failed to reach sufficient agreement and provide an explanation of the possible reasons for the lack of agreement.

[2]There is a misconception that technology is "neutral" in the sense that it is merely a container or a vehicle that does not impact what happens within it. However, no technology is neutral (Ocando Finol, 2019): technologies are designed by people, with specific purposes in mind, to be used within specific contexts.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

3.2 Corresponding epistemic principles

As detailed previously, we argue that any signature pedagogy reflects an implicit target signature epistemology, and consequently the pedagogical principles reflect the implicit epistemic principles. Table 2 lists the set of proposed epistemic principles corresponding to the pedagogical design principles presented in Table 1. Together, they encapsulate the deep level of the signature pedagogy. These are systematically derived from each principle by (a) switching their formulation from behavioristic to propositional statements and (b) relating the pedagogical principle to epistemic principles backed up by theoretical studies/work in the fields of SLA, foreign language education, and CALL. In other words, our process begins in the literature, synthesizes and consolidates key outcomes in the form of design principles, refines and validates those by consulting experts in a structured Delphi process, deduces epistemic principles from the resulting design principles and confirms these by referring back to the literature. Even though some of the pedagogical principles failed to reach a significant level of agreement, we decided to derive epistemic principles for each one of them given that the disagreements were mostly related to the applicability or feasibility of incorporating the principles into existing language teaching programs, rather than with the essential propositions of the principles themselves.

4. Analysis of the results and discussion of the findings

In this section, we will detail the feedback and comments obtained from the experts on the second round of the consultation, considering the second version of the pedagogical principles listed in the previous section. We will proceed to discuss the tensions raised by the experts and focus on the principles that were problematized or where consensus was not reached.

Consensus was achieved with half of the principles (2, 3, 4, 5, 7, 10, 13, 15) listed earlier. However, Principle 15 (skills and competences) exhibited a significant drop in consensus from the first to the second phase. The principle reached 96% agreement in its first formulation, which contained a general indication about the need to broaden the scope of the linguistic skills to be developed to include new literacies, genres, and skills. This dropped to 76% agreement in its second formulation where we introduced a slight change in terminology when referring to the basic skills, which changed from "basic skills" to "basic modes of communication," and included intercultural mediation as an additional skill. The authors of a number of recent articles (Chun *et al*., 2016; Darvin, 2017; Sauro & Chapelle, 2017) stress the importance of developing these skills and competences by integrating them into current language learning practices, and indeed the experts did not include substantial criticisms about this principle in the second round. However, and given that they marked the principle down, we think the principle did not benefit from the reformulation in its second version.

In the next two sections, we will group the principles according to the types of comments they elicited and discuss the experts' feedback in each case.

4.1 Principles difficult to implement

Most of the experts consulted agreed with the essence or content of Principles 8, 9, 11, and 12, and the lack of consensus derived mostly from the difficulties they anticipated in implementing them.

Even though the experts did not reach a consensus regarding Principle 8 (62% agreement), they all agreed on the need to provide some type of feedback. However, concerns were raised regarding the feasibility of providing feedback to learners in a timely manner in a CALL setting without interrupting the natural flow of conversation. Principle 9 addressed the issue of adapting teaching to individual learning paths in accordance with established psycholinguistic developmental sequences, also known as clinical teaching (Grossman, Hammerness & McDonald, 2009). In this case, again, the experts agreed with the essence of the principle, but expressed their doubts about

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Table 2. Epistemic principles of TETBLT

Topic	Principles
TBLT specific	1. **TBLT.** Learners acquire language through purposeful activity (tasks) (Ellis, 2003: 279; González-Lloret & Ortega, 2014).
	†2. **Learning by doing.** Learning is most effective when the learner is actively using language to produce meaningful outputs (Van den Branden, 2006).
Input	†3. **Language use.** Mastery of language requires a holistic comprehension, connecting multiple modalities, language domains, grammar, and lexis (Skehan, 2009; Yang, Kuo, Eslami & Moody, 2021), but also learners to use both the language and the technology creatively (González-Lloret & Ortega, 2014).
	†4. **Linguistic complexity.** Learning is optimal in the "zone of proximal development" (Aljaafreh & Lantolf, 1994), or the "flow region" (Csikszentmihalyi, 1991), where learners encounter genuine inputs, scaffolded to their ability.
	†5. **Input's characteristics.** Learners need to engage with different types of rich and authentic inputs (Gilmore, 2007) enabled and amplified by technology (Chapelle, 2009).
Learning processes	6. **Inductive vs. deductive learning.** Learners have the capacity to extract language patterns and rules when presented with enough data (Lantolf & Thorne, 2006). The rules learners deduce are tacit, and thus they require explicit instruction to formalize and articulate them, and gain access to some less transparent rules and parameters (Chamot & Kupper, 1989).
	†7. **Meaning vs. form.** Language learning is situated in a social and cultural context. Learners notice and negotiate meaning within a context while attending to the linguistic features that cause communication dissonance (Swain & Lapkin, 2013).
	8. **Feedback.** Learning is driven by feedback. Timely corrective feedback has at least a facilitative role in the acquisition of certain linguistic features (Arroyo & Yilmaz, 2018). Other (formative) types of feedback complement the former to scaffold the learning process (Hyland & Hyland, 2019).
	9. **Clinical teaching.** Learning is a dynamic individual journey within canonical psycholinguistic developmental sequences (Doughty & Long, 2003). Thus, to be effective, instruction needs to monitor individual progression along such paths and respond to them (Wang, Tseng & Liao, 2009).
	†10. **Immersive environment.** A linguistically rich but level-appropriate and flexible (virtual) environment fosters meaningful and situated learning experiences (Duff & Polio, 1990).
	11. **Collaborative learning.** Learning has a strong social component. In particular, language has a dominant social function, and thus is learned naturally through social interaction and collaboration. Such interactions engender engagement and provide meaningful experiences and context for learning while developing crucial skills, attitudes, and abilities (Ellis, 2003: 276).
Learners	12. **Personalization.** Learning also has a significant individual dimension, and learners respond best when tasks and feedback are optimized according to their needs and preferences. The use of adequate and easily available technology can enable and assist adaptive learning and personalized instruction (Petersen & Markiewicz, 2008).
CALL specific	†13. **Techno-pedagogical empowerment.** Learning is most effective when learners experience ownership of their learning environment and processes. This includes a critical mastery of the techno-pedagogical devices for different teaching and learning functions. Learning to critically identify, assess, and make informed use (González-Lloret & Ortega, 2014) of these functions becomes part of the learning process (Warschauer, 2002).
	14. **Techno-literacy.** The ability to succeed in using technology seamlessly and transparently entails the risk of making other aspects that affect language learning processes and outcomes opaque (Ayres, 2002).
	†15. **Skills and competences.** The ability to communicate multimodally using digital technologies is a skill that needs to be fostered and approached critically in the language classroom (Sauro & Chapelle, 2017).

(*Continued*)

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Table 2. (*Continued*)

Topic	Principles
	16. **Transformative learning.** Learning a new language empowers individuals in a way that transcends content knowledge and competences, and contributes to shaping students' own identities (Darvin, 2017).

Note. TETBLT = technology-enhanced task-based language teaching; TBLT = task-based language teaching; CALL = computer-assisted language learning.†Principles that achieved consensus.

the possibility of implementing it in a given learning context. This would require language instructors and curriculum and course designers to understand how to deal with and circumvent issues such as heterogeneous learner cohorts or large groups of learners. There are developments in intelligent tutoring systems that allow for sophisticated interactions, including feedback moves (Ferreira, Moore & Mellish, 2007; Swartz & Yazdani, 2012; Sweidan, Abu Laban, Alnaimat & Darabkh, 2021). Research in intelligent CALL (iCALL), which combines artificial intelligence, computational linguistics, natural language processing, and machine-aided translation in order to provide feedback and scaffold language learning in diverse learning environments (CMC, both form-focused and meaning-focused instruction) and adapting to different learners (Khemaja & Taamallah, 2016), has been yielding promising results for decades (Schulze & Heift, 2013). Numerous empirical studies have assessed the effectiveness of these tools and artifacts, but the fact that these have been mostly tested for specific language domains in specific languages makes their implementation in other (online) settings or languages challenging. The issue of the impracticality of implementing the pedagogical principle came up once again in the experts' remarks about Principle 12, which tackled the personalization of instruction based on learners' needs. We originally thought that illustrating the principle with examples of personalization based on the affordances brought by virtual learning environments could contribute to increasing the feasibility of the principle in the eyes of the experts. Nonetheless, the principle remained well below the threshold with a 62% agreement. Arguably, these results point to a gap between research results and practical feasibility in common contexts, and should serve as a challenge to the research community to derive pedagogical recommendations from their research and make these accessible and available to practitioners.

Another principle (11), which addressed collaborative learning, showed a great loss of consensus among experts from the first to the second round. We assumed that in a TBLT approach, learner collaboration could be almost taken for granted. However, after the first round, the experts raised concerns about the role of learners' autonomy (in the sense of self-regulated and self-directed learning; Andrade & Bunker, 2009) and individual preferences and needs. Therefore, we proceeded to soften the statement and add nuances that would make the principle more inclusive. The original statement "Promote cooperative and collaborative learning" was complemented by adding "while retaining learners' autonomy and respecting their preferences and needs," but it went down from 87% agreement to 67%, possibly due to the fact that rephrasing the principle changed its meaning and focus. The first version of the principle focused on the idea that collaborative and cooperative learning fosters more significant learning and promotes learners' autonomy (Edwards, Holguín-Barrera, Ortiz & Pérez, 2019). However, the second version included the importance of learners' preferences and needs, which resulted in the experts pointing out the difficulties in implementing this principle even though collaborative learning has been extensively researched in CALL settings (Kukulska-Hulme & Shield, 2008) and there are numerous accounts of its applicability in several empirical studies (Kessler & Bikowski, 2010; Kessler, Bikowski & Boggs, 2012). Possibly, the caveat we added alerted the experts to the challenge of implementing this principle.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

4.2 Principles indicative of different opinions

Principle 1, which addressed the need to use tasks as the base unit of instruction, failed to appeal as an essential principle among the experts consulted, reaching 70% agreement during the first round but decreasing to 67% on the second round. We initially thought this pedagogical principle would not be questioned, given that it constitutes the pedagogical essence of a technology-enhanced *task-based* language teaching program. However, the experts considered that tasks had to be used alongside other types of units of instruction – such as texts – and only when appropriate.

The difference between deductive and inductive reasoning when inferring language rules stated in Principle 6 also failed to reach enough consensus (67%) among the experts. In their comments, they disapproved of the fact that the two processes were presented in opposition and raised concerns about possible obstacles. Among others, they brought up the students' cognitive abilities or the nature of the target language (lexical vs. grammatical languages).

Principle 14, which underscored the importance of keeping a critical stance towards the use of technology for language learning and using technology taking into account the relationship established between learners, tools' affordances, and learning environments (Ocando Finol, 2019), obtained 78% agreement during the first round, dropping to 71% in the second round. Unfortunately, we did not manage to obtain sufficient comments that could help us understand the shortcomings of this principle other than the fact that the experts did not deem it crucial.

Finally, Principle 16, which highlights the importance of the development of learners' digital repertoires and competences while embracing the transformative role of language learning in shaping learners' identities, was added on the second round based on the feedback and suggestions from the experts. It was intended to capture the transformative power that learning a language can have for the learners at the identity level, in contexts that are also trying to foster learners' digital repertoires and competences. The principle, which reached 67% agreement, was challenged and considered too institution- and learner-dependent. Additionally, the need for teachers to have a role in developing learners' identities was contested, even though this last aspect was not explicitly stated in the formulation of the principle.

In summary, eight of the principles we identified (2, 3, 4, 5, 7, 10, 13, 15) obtained a clear consensus, and should be considered as sound advice for practitioners, grounded in research and practice. Another four (8, 9, 11, 12) received ambivalent responses due to concerns regarding the feasibility of their implementation. These principles highlight potent directions for research and development. The remaining principles (1, 6, 14, 16) indicate areas where the experts' opinions diverged, and further debate is required.

5. Conclusions

This paper presented a step towards articulating a signature pedagogy for TETBLT. It involved reaching a consensus among experts in the field of CALL about pedagogical practices and distilling epistemic principles from them, which include underlying assumptions about the way knowledge is constructed, assessed, and transferred in the field. This was not without its challenges. Bringing together several approaches to language education and linguistics, such as interactionist SLA and sociocultural and socio-constructivist approaches, proves to be an arduous task and requires compromising and being inclusive when theories offer sometimes contradictory premises. However, we believe that the fields of language acquisition and language pedagogies advance by evolving together and supporting one another, linking theories and empirical studies that support or refute them. Any advance in either pedagogical approaches or language acquisition builds upon existing theories and pedagogies. In our current study, we tried to be as inclusive as possible because we firmly believe that to put together epistemic principles, we needed to consult experts who follow different approaches to solve the same issues.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Several authors (Chapelle, 2014; Colpaert, 2020; Zuengler & Miller, 2006) have advocated for researchers in the field of CALL to adopt an open epistemological stance, which might help advance our understanding of TBLT in CALL environments. We believe that taking an integrative theoretical and epistemological stance can be of help in identifying the affordances of educational technologies for TETBLT. Identifying these affordances is important for instructors and learning designers but also for those conducting research to assess the potential learning outcomes of a given learning activity.

The principles that gained the highest support addressed learning by doing, advocating language use, dealing with linguistic complexity while providing rich and varied but comprehensible input, promoting meaning-focused communicative tasks in an immersive learning environment, taking a critical stance towards technology, and broadening the scope of traditional linguistic skills and competences to include those supported by digital technologies. However, the principles promoting the use of tasks, encouraging inductive learning, advocating timely feedback, supporting adaptive and personalized learning, fostering collaborative learning, promoting techno-literacy, and addressing the transformative role of language learning at the identity level did not reach enough consensus among the experts.

We used a relatively low-resource and straightforward procedure to generate a set of pedagogical design principles and corresponding epistemic principles and underlying pedagogical values for TETBLT. Together, these form a significant step in the articulation of a signature pedagogy and corresponding signature epistemology for this domain. The pedagogical design principles that obtained consensus appear to be robust, and we are confident that they can serve as a useful resource for both novice and expert practitioners in the field. The other set of principles that we derived from the literature but failed to reach consensus on highlights important tensions between theory and practice; the theory presents scientific consensus, whereas the experts consulted here present a more pragmatic consensus, which we believe has an intrinsic value.

In order to complete a comprehensive and coherent articulation of the signature pedagogy, we will need to engage a larger cohort of practitioners and identify practices that implement the principles we have defined. This can be done using various "pattern mining" techniques, such as pattern workshops (Warburton & Mor, 2015), pattern mining (Kohls & Uttecht, 2009), or surveys. These observations set the plan for our future work.

Supplementary material. To view supplementary material referred to in this article, please visit https://doi.org/10.1017/S0958344022000118

Ethical statement and competing interests. The current research complies with the ethical regulations of research work by which volunteer participants could withdraw from the study at any point in time and that their identifying data would be kept anonymous. The authors declare no competing interests.

References

Aljaafreh, A. & Lantolf, J. P. (1994) Negative feedback as regulation and second language learning in the zone of proximal development. *The Modern Language Journal*, 78(4): 465–483. https://doi.org/10.1111/j.1540-4781.1994.tb02064.x

Andrade, M. S. & Bunker, E. L. (2009) A model for self-regulated distance language learning. *Distance Education*, 30(1): 47–61. https://doi.org/10.1080/01587910902845956

Arroyo, D. C. & Yilmaz, Y. (2018) An open for replication study: The role of feedback timing in synchronous computer-mediated communication. *Language Learning*, 68(4): 942–972. https://doi.org/10.1111/lang.12300

Atkinson, D. (2002) Toward a sociocognitive approach to second language acquisition. *The Modern Language Journal*, 86(4): 525–545. https://doi.org/10.1111/1540-4781.00159

Ayres, R. (2002) Learner attitudes towards the use of CALL. *Computer Assisted Language Learning*, 15(3): 241–249. https://doi.org/10.1076/call.15.3.241.8189

Bax, S. (2011) Normalisation revisited: The effective use of technology in language education. *International Journal of Computer-Assisted Language Learning and Teaching*, 1(2): 1–15. https://doi.org/10.4018/ijcallt.2011040101

Chamot, A. U. & Kupper, L. (1989) Learning strategies in foreign language instruction. *Foreign Language Annals*, 22(1): 13–22. https://doi.org/10.1111/j.1944-9720.1989.tb03138.x

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Chapelle, C. A. (2003) *English language learning and technology: Lectures on applied linguistics in the age of information and communication technology* (Vol. 7). Amsterdam: John Benjamins. https://doi.org/10.1075/lllt.7

Chapelle, C. A. (2009) The relationship between second language acquisition theory and computer-assisted language learning. *The Modern Language Journal*, 93(s1): 741–753. https://doi.org/10.1111/j.1540-4781.2009.00970.x

Chapelle, C. A. (2014) Technology-mediated TBLT and the evolving role of the innovator. In González-Lloret, M. & Ortega, L. (eds.), *Technology-mediated TBLT: Researching technology and tasks* (Vol. 6). Amsterdam: John Benjamins, 323–334.

Chapelle, C. A. & Sauro, S. (eds.) (2017) *The handbook of technology and second language teaching and learning*. Hoboken: John Wiley & Sons. https://doi.org/10.1002/9781118914069

Chick, N. L., Haynie, A., & Gurung, R. A. R. (2009) From generic to signature pedagogies: Teaching disciplinary understandings. In Gurung, R. A. R., Chick, N. L. & Haynie, A. (eds.), *Exploring signature pedagogies: Approaches to teaching disciplinary habits of mind*. Sterling: Stylus Publishing, 1–16.

Chun, D., Kern, R. & Smith, B. (2016) Technology in language use, language teaching, and language learning. *The Modern Language Journal*, 100(S1): 64–80. https://doi.org/10.1111/modl.12302

Cobb, P., & Gravemeijer, K. (2008) Experimenting to support and understand learning processes. In Kelly, A. E., Lesh, R. A. & Baek, J. Y. (eds.), *Handbook of design research methods in education: Innovation in science, technology, engineering, and mathematics learning and teaching*. New York: Routledge, 68–95.

Colpaert, J. (2020) Editorial position paper: How virtual is your research? *Computer Assisted Language Learning*, 33(7): 653–664. https://doi.org/10.1080/09588221.2020.1824059

Csikszentmihalyi, M. (1991) *Flow: The psychology of optimal experience*. New York: Harper Perennial.

Darvin, R. (2017) Language, ideology, and critical digital literacy. In Thorne, S. & May, S. (eds.), *Language, education and technology: Encyclopedia of language and education*. Cham: Springer, 17–30. https://doi.org/10.1007/978-3-319-02237-6_35

Doughty, C. J. & Long, M. H. (2003) Optimal psycholinguistic environments for distance foreign language learning. *Language Learning & Technology*, 7(3): 50–80.

Duff, P. A. & Polio, C. G. (1990) How much foreign language is there in the foreign language classroom? *The Modern Language Journal*, 74(2): 154–166. https://doi.org/10.1111/j.1540-4781.1990.tb02561.x

Edwards, R., Holguín-Barrera, M. D., Ortiz, A. C. & Pérez, M. (2019) Promoting EFL learner autonomy in a teacher-centered culture through video-sharing and collaborating in online forums. *Latin American Journal of Content & Language Integrated Learning*, 12(1): 99–127. https://doi.org/10.5294/laclil.2019.12.1.5

Ellis, R. (2003) *Task-based language learning and teaching*. Oxford: Oxford University Press.

Ferreira, A., Moore, J. D. & Mellish, C. (2007) A study of feedback strategies in foreign language classrooms and tutorials with implications for intelligent computer-assisted language learning systems. *International Journal of Artificial Intelligence in Education*, 17(4): 389–422.

Foster, P. & Ohta, A. S. (2005) Negotiation for meaning and peer assistance in second language classrooms. *Applied Linguistics*, 26(3): 402–430. https://doi.org/10.1093/applin/ami014

Gilmore, A. (2007) Authentic materials and authenticity in foreign language learning. *Language Teaching*, 40(2): 97–118. https://doi.org/10.1017/S0261444807004144

González-Lloret, M. (2007) Implementing task-based language teaching on the web. In Van den Branden, K., Van Gorp, K. & Verhelst, M. (eds.), *Tasks in action: Task-based language education from a classroom-based perspective*. Newcastle: Cambridge Scholars Publishing, 265–284.

González-Lloret, M. & Ortega, L. (eds.) (2014) *Technology-mediated TBLT: Researching technology and tasks* (Vol. 6). Amsterdam: John Benjamins. https://doi.org/10.1075/tblt.6

Grossman, P., Hammerness, K. & McDonald, M. (2009) Redefining teaching, re-imagining teacher education. *Teachers and Teaching*, 15(2): 273–289. https://doi.org/10.1080/13540600902875340

Hofer, B. K. (2001) Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, 13(4): 353–383. https://doi.org/10.1023/A:1011965830686

Hsu, C.-C., & Sandford, B. A. (2007) The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*, 12: 1–8.

Hyland, K., & Hyland, F. (eds.) (2019) *Feedback in second language writing: Contexts and issues* (2nd ed.). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108635547

Jarvis, H. & Krashen, S. (2014) Is CALL obsolete? Language acquisition and language learning revisited in a digital age. *TESL-EJ*, 17(4): 1–6.

Kelly, G. J. & Licona, P. (2018) Epistemic practices and science education. In Matthews, M. R. (ed.), *History, philosophy and science teaching: New perspectives*. Cham: Springer, 139–165. https://doi.org/10.1007/978-3-319-62616-1_5

Kessler, G. & Bikowski, D. (2010) Developing collaborative autonomous learning abilities in computer mediated language learning: Attention to meaning among students in wiki space. *Computer Assisted Language Learning*, 23(1): 41–58. https://doi.org/10.1080/09588220903467335

Kessler, G., Bikowski, D. & Boggs, J. (2012) Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology*, 16(1): 91–109.

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Khemaja, M. & Taamallah, A. (2016) Towards situation driven mobile tutoring system for learning languages and communication skills: Application to users with specific needs. *Journal of Educational Technology & Society*, 19(1): 113–128.
Kohls, C. & Uttecht, J.-G. (2009) Lessons learnt in mining and writing design patterns for educational interactive graphics. *Computers in Human Behavior*, 25(5): 1040–1055. https://doi.org/10.1016/j.chb.2009.01.004
Korsvold, A.-K. & Rüschoff, B. (1997) *New technologies in language learning and teaching*. Strasbourg: Council of Europe.
Kramsch, C. (2014) Teaching foreign languages in an era of globalization: Introduction. *The Modern Language Journal*, 98(1): 296–311. https://doi.org/10.1111/j.1540-4781.2014.12057.x
Kukulska-Hulme, A. & Shield, L. (2008) An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *ReCALL*, 20(3): 271–289. https://doi.org/10.1017/S0958344008000335
Lantolf, J. P. & Thorne, S. L. (2006) *Sociocultural theory and the genesis of second language development*. Oxford: Oxford University Press.
Levy, M. & Stockwell, G. (2013) *CALL dimensions: Options and issues in computer-assisted language learning*. New York: Routledge. https://doi.org/10.4324/9780203708200
Lucas, B. & Hanson, J. (2016) Thinking like an engineer: Using engineering habits of mind and signature pedagogies to redesign engineering education. *International Journal of Engineering Pedagogy*, 6(2): 4–13. https://doi.org/10.3991/ijep.v6i2.5366
Mor, Y., Cook, J., Santos, P., Treasure-Jones, T., Elferink, R., Holley, D. & Griffin, J. (2015) Patterns of practice and design: Towards an agile methodology for educational design research. In Conole, G., Klobučar, T., Rensing, C., Konert, J. & Lavoué, É. (eds.), *Design for teaching and learning in a networked world: EC-TEL 2015: Lecture notes in computer science* (Vol. 9307). Cham: Springer, 605–608. https://doi.org/10.1007/978-3-319-24258-3_69
Mor, Y. & Winters, N. (2007) Design approaches in technology-enhanced learning. *Interactive Learning Environments*, 15(1): 61–75. https://doi.org/10.1080/10494820601044236
Ocando Finol, M. (2019) Past the anthropocentric: Sociocognitive perspectives for tech-mediated language learning. *Annual Review of Applied Linguistics*, 39: 146–151. https://doi.org/10.1017/S0267190519000114
Ortega, L. (2007) Meaningful L2 practice in foreign language classrooms: A cognitive-interactionist SLA perspective. In DeKeyser, R. (ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology*. Cambridge: Cambridge University Press, 180–207. https://doi.org/10.1017/CBO9780511667275.011
Petersen, S. A. & Markiewicz, J.-K. (2008) PALLAS: Personalised language learning on mobile devices. In *The Fifth IEEE International Conference on Wireless, Mobile, and Ubiquitous Technologies in Education (WMUTE 2008)*. Los Alamitos: IEEE Computer Society Press, 52–59. https://doi.org/10.1109/WMUTE.2008.17
Rescher, N. (1998) *Predicting the future: An introduction to the theory of forecasting*. Albany: State University of New York Press.
Sauro, S. & Chapelle, C. A. (2017) Toward langua-technocultural competence. In Chapelle, C. A. & Sauro, S. (eds.), *The handbook of technology and second language teaching and learning*. Hoboken: John Wiley & Sons, 459–472. https://doi.org/10.1002/9781118914069.ch30
Schulze, M. & Heift, T. (2013) Intelligent CALL. In Thomas, M., Reinders, H. & Warschauer, M. (eds.), *Contemporary computer-assisted language learning*. London: Bloomsbury Academic, 249–265.
Shulman, L. S. (2005) Signature pedagogies in the professions. *Daedalus*, 134(3): 52–59. https://doi.org/10.1162/0011526054622015
Skehan, P. (2009) Modelling second language performance: Integrating complexity, accuracy, fluency, and lexis. *Applied Linguistics*, 30(4): 510–532. https://doi.org/10.1093/applin/amp047
Swain, M. & Lapkin, S. (1998) Interaction and second language learning: Two adolescent French immersion students working together. *The Modern Language Journal*, 82(3): 320–337. https://doi.org/10.1111/j.1540-4781.1998.tb01209.x
Swain, M. & Lapkin, S. (2013) Focus on form through collaborative dialogue: Exploring task effects. In Bygate, M., Skehan, P. & Swain, M. (eds.), *Researching pedagogic tasks: Second language learning, teaching and testing*. Abingdon: Routledge, 98–118.
Swartz, M. L. & Yazdani, M. (eds.) (2012) *Intelligent tutoring systems for foreign language learning: The bridge to international communication* (Vol. 80). Berlin: Springer Science & Business Media.
Sweidan, S. Z., Abu Laban, S. S., Alnaimat, N. A. & Darabkh, K. A. (2021) SIAAA-C: A student interactive assistant android application with chatbot during COVID-19 pandemic. *Computer Applications in Engineering Education*, 29(6): 1718–1742. https://doi.org/10.1002/cae.22419
Thomson, P., Hall, C., Jones, K. & Sefton-Green, J. (2012) *The signature pedagogies project: Final report*. Newcastle: Creativity Culture & Education.
Thorne, S. L. (2016) Cultures-of-use and morphologies of communicative action. *Language Learning & Technology*, 20(2): 185–191.
Van den Branden, K. (ed.) (2006) *Task-based language education: From theory to practice*. Stuttgart: Ernst Klett Sprachen. https://doi.org/10.1017/CBO9780511667282
Wang, Y., Tseng, M.-H. & Liao, H.-C. (2009) Data mining for adaptive learning sequence in English language instruction. *Expert Systems with Applications*, 36(4): 7681–7686. https://doi.org/10.1016/j.eswa.2008.09.008

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press

Warburton, S. & Mor, Y. (2015) A set of patterns for the structured design of MOOCs. *Open Learning: The Journal of Open, Distance and e-Learning*, 30(3): 206–220. https://doi.org/10.1080/02680513.2015.1100070

Warschauer, M. (2002) A developmental perspective on technology in language education. *TESOL Quarterly*, 36(3): 453–475. https://doi.org/10.2307/3588421

Yang, X., Kuo, L.-J., Eslami, Z. R. & Moody, S. M. (2021) Theoretical trends of research on technology and L2 vocabulary learning: A systematic review. *Journal of Computers in Education*, 8(4): 465–483. https://doi.org/10.1007/s40692-021-00187-8

Zuengler, J. & Miller, E. R. (2006) Cognitive and sociocultural perspectives: Two parallel SLA worlds? *TESOL Quarterly*, 40(1): 35–58. https://doi.org/10.2307/40264510

About the authors

Laia Canals is a lecturer at the Centre for Modern Languages at the Universitat Oberta de Catalunya. Her research addresses technology-enhanced task-based language learning, development of L2 through interaction in collaborative tasks in CMC settings, the development of intercultural communicative competence, digital skills, and online language teacher education.

Yishay Mor consults businesses, NGOs, and educational institutions on the design, development, assimilation, and dissemination of educational innovations. He is a senior consultant with Meital.

Author ORCiD. Laia Canals, http://orcid.org/0000-0002-9605-012X
Author ORCiD. Yishay Mor, https://orcid.org/0000-0001-8079-8443

https://doi.org/10.1017/S0958344022000118 Published online by Cambridge University Press