

Enhancing the digital capacity of EFL programs in the age of COVID-19: the ecological perspective in Japanese higher education

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Abstract

Purpose – The COVID-19 pandemic exposed the inability of the Japanese higher education system to adapt to widespread unexpected disruption. The limited metrics available to assess Japanese higher education's response in the wake of the pandemic indicate several areas where the system needs to be strengthened. This paper aims to harness the ecological perspective to explore the procedures by which higher education in Japan can mitigate extant digital shortcomings.

Design/methodology/approach – Leveraging Zhao and Frank's ecological perspective as its theoretical model, this paper proposes practical solutions to remedy deficiencies highlighted by the COVID-19 pandemic rooted in existing literature both within and outside of Japanese higher education research.

Findings – The paper suggests pragmatic ideas to embolden each of the three strata encompassing the educational "ecosystem": institutions, faculty and students. The paper identifies measures for strengthening institutions to become more adaptive and improve leadership capacity. At the faculty level, meanwhile, an increase in professional development opportunities and the bolstering of support systems may function to bridge an intergenerational digital divide. Finally, for students, the authors argue for mobile-assisted language learning in an effort to cultivate stronger learner outcomes, and prescribe how to integrate this method into formal IT platforms.

Originality/value – The current paper is among a select few that use the ecological perspective in the field of educational research in Japan. The authors contend that the model, while effective, offers an incomplete view of education, suggesting that the ecological perspective must be expanded to include students as a distinct species.

Keywords Digital immigrant, Higher education, Rational choice theory, Digital learning, COVID-19, Ecological perspective

Paper type Conceptual paper



Introduction

The outbreak of COVID-19, referred to colloquially as the coronavirus, continues to cause unprecedented disruption to the global order, impacting both the public and private sectors

across a host of disparate industries, including manufacturing, commerce, tourism and education. The sudden emergence of the pandemic globally saw learning networks scramble to cope, with higher education (HE) systems and institutions (HEIs) often turning to digital content delivery as a means of avoiding significant disruptions to learners and scheduling objectives. Despite an increasing global reliance on technological solutions, the current pandemic has nevertheless exposed the unpreparedness of education sectors worldwide to confront such challenges effectively – with this failure conspicuous in the response from Japanese HEIs.

Policies dictating online curricula, content delivery procedures and the eventual restoration of brick-and-mortar access have been left to the discretion of individual institutions, with the Abe Government limiting its guidance at the time of writing to pleas for organizational “flexibility” (Kakuchi, 2020). Yet, it is generally accepted that Japanese learners, educators and HEIs alike often lack the requisite understanding and experience of effective technological practices within the context of education. According to a 2018 survey by the Organisation for Economic Co-operation and Development (OECD), for instance, the proficiency of Japanese learners in computer literacy lagged behind fellow member nations (OECD, 2018), while Clavel (2019) notes levels of comfort and training with regards to educational technologies remains limited amongst Japanese faculty.

Until the recent pandemic, it is apparent that the integration of digital learning systems was of low priority to the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) and, against this background, the anaemic response of the Japanese state to the interplay between an emerging digital frontier and a series of institutional, faculty and learner-dependent considerations may have lasting implications for the future of education locally. These conditions present a need for scholarly exploration, with particular regard to the integration of digitally mediated English as a foreign language (EFL) learning in response to the ongoing health crisis.

While government initiatives have been devised to strengthen digital infrastructure and technology usage within the Japanese education system (MEXT, 2011), preliminary research suggests Japanese students continue to lack a sufficient level of digital literacy so as to make these endeavours a success (Mehran *et al.*, 2017). This may reflect a disconnect between meso-level policy implementation and actual classroom practices in HE generally, and EFL in particular (Aizawa and Rose, 2019). With this context in mind, the authors seek to identify viable strategies for the enrichment of digital EFL practices locally via a detailed examination of the factors impacted by Japan’s COVID-19-induced transition to online content delivery.

Specifically, this analysis takes as its analytical lens Zhao and Frank’s (2003) *ecological perspective*, a holistic framework that takes the environmental ecosystem as a metaphor for the cycle by which digital technologies are adopted, configured and integrated within educational institutions. As noted by Von Lier (2010), “ecology is the study of the relationships among elements in an environment or ecosystem, in particular the interactions among such elements” (p. 4). With this understanding in mind, computer-assisted language learning (CALL) is not merely an approach to language education, but an individual “species” that seeks to thrive within micro-social learning environments and, more broadly, HEI ecosystems. In focusing on the dynamic interactions between CALL and the diverse, sometimes conflicting, species operating within Japanese HEIs, this investigation intends to clarify the relationship between technology and educational practices locally and, where applicable, suggest viable strategies for enhancing Japan’s capacity to deliver digital EFL content.

Background: the context of Japanese education and technology

As noted by Harris and Hofer (2009), the successful integration of technology within learning ecosystems manifests “primarily in curriculum content and content-related

learning processes, and secondarily in savvy use of educational technologies” (p. 99). It should also be recognized, however, that the development and organization of educational technologies take significant influence from the socio-cultural terrain shaping their design. Within the Japanese educational landscape, styles of learning and curricula trail an inescapable logic of test-orientated instruction, with the transition from high school to university secured through a highly structured, rigorous process of *juken jigoku*, or “exam hell.” Consequently, the significance of entrance examinations in determining the respective yield of tertiary education cannot be overstated – with prospective learners vying for admission to brand-name HEIs to enhance their institutional-cultural capital within a highly competitive job market.

This system of credentialism, or “degreeocracy” (Okada, 2001, p. 303), engenders robust academic achievement through the teaching of testable skills, often to the detriment of expressiveness and digital competencies. A 2018 report by the OECD, for instance, found Japanese students to be amongst “the highest performers in PISA across OECD countries” (p. 45). Yet, the same study recorded the number of adults with no information and communications technology (ICT) experience, or who had failed the ICT core assessment, to be 21% – compared to the OECD average of 14.2% (OECD, 2018, p. 45). Indeed, the OECD noted the detrimental impact of the Japanese university entrance examination system on ICT proficiency, creativity and critical thinking.

Given the dominant status of English internationally – and, thus, the utility of the language within the global knowledge economy – Japan’s highly structured “teaching to the test” format extends to EFL instruction. Notwithstanding a push by MEXT in the 1990s for the adoption of contemporary approaches to language instruction (Johnson and Brine, 1999), EFL content in Japan continues to focus on traditionalist pedagogies, including the outmoded audiolingual and grammar-translation methods (Bourques, 2006), with digital technologies broadly omitted from state-mandated language instruction and learning. Accordingly, OECD (2015) statistics measuring technology use during compulsory foreign language learning indicate that Japan is by far the lowest of all participant nations, scoring 2.4% compared to the OECD average of 17.8% (OECD, 2015, p. 52).

Nevertheless, EFL learning environments at the tertiary level are decidedly less structural, with the majority of HEIs more inclined to incorporate learner-centred, communicative approaches and technological innovations within their practice (Bailey, 2004). Such comparatively liberalized methodologies are decidedly at odds with traditional Japanese views towards education and the quasi-militaristic teacher–student dynamic encountered during secondary-level schooling (Sugimoto, 2015). Ordinarily, learners expect a highly structured curriculum, in which they absorb EFL via didactic “chalk and talk” sessions that emphasize rote memorization and reliance on comprehensive teacher direction. In essence, students entering university assume that they will “be told exactly what to do and [...] not to experiment with their own classroom learning” (Johnson and Brine, 1999, p. 254). Given the current integrative philosophy of CALL places strong emphasis on learner-orientated content that promotes agency and real-world language use (Beatty, 2010), the ongoing relationship between compulsory education and structuralism represents a primary determinant in the ongoing failure of Japanese HEIs to adapt to digital language instruction.

Analytical framework: the ecological perspective

The present analysis subscribes to the *ecological perspective* (Zhao and Frank, 2003) as its theoretical lens and subsequently structures each section to adhere to this framework. The ecological perspective likens the HEI to a biological ecosystem, with each stakeholder – from faculty to student – representing a distinct stratum within their respective learning

environment. In this metaphor, which abstractly interprets technology adoption in terms of the ecology of a lake, the school *ecosystem* represents the base level of the hierarchy. It is itself a unit within a broader network of school districts, prefectural education systems and national curricula. Functionally, the school is a dynamic system of interaction that achieves homeostasis, or *internal equilibrium*, through a delicate balancing act incorporating a diverse host of interdependent species and communities, labelled *abiotic* or *biotic*.

While the former refers to the inorganic components of an ecosystem, including “physical setting, location of the computers, grades, and subjects taught” (Zhao and Frank, 2003, p. 812), the latter incorporates organic stakeholders, such as learners, faculty and administrators, populating the school ecosystem. That is not to say that biotic communities alone constitute *species*, however. As with their biological counterparts, school ecosystems exhibit diversity when a variety of species with distinct characteristics and roles interact and modify their surroundings. From this perspective, one may view the utilization of digital tools, including computers, phones, and tablets, as a species. While not “living” in a biological sense, this framework identifies technology use as a species on account of its ability to evolve and, indeed, *invade* ecosystems per the “diverse human needs, experiences, and talents” (Zhao and Frank, 2003, p. 812) dictating its design.

From a Darwinian perspective, the survival and subsequent evolution of a species is dependent on its compatibility and utility within an ecosystem. While a select few technologies will proceed to thrive and generate new variations across successive generations due to their perceived usefulness, those deemed unfit for purpose will ultimately perish. Regardless, all ecosystems involve constant species-to-species interactions, with the most influential species in an ecosystem labelled *keystone*, which functions to “exert some kind of controlling influence over the system” (Zhao and Frank, 2003, p. 811). In considering this interplay, teachers represent a core and established entity, possessing individual needs while also negotiating patterns of intra and inter-species interaction. Through a practice of *reciprocal altruism*, or mutual cooperation, teachers as a keystone species may, conditional to social norms, pressure or assist one another to use CALL.

Drawing on rational choice theory, Zhao and Frank (2003, p. 817) view faculty as “purposeful and rational decision-makers” who, when faced with an invading exotic species, such as forced technological innovation or emergent pedagogical strategies, will make operational decisions born from perceived self-interest – whether that be the well-being of their classroom, the building of social capital through intra-species cooperation, or a shared interest in students (Frank, 2002). Consequently, this interaction represents a dynamic process “wherein the species co-evolve and adapt to each other” (Zhao and Frank, 2003, p. 817), for example by adjusting attitudes towards CALL and by reinterpreting the functions and roles of other species (including technology) over time.

Finally, the ecological perspective identifies external educational innovation as an *exotic species*. The introduction of new technologies holds the potential to disrupt, either positively or negatively, the entire ecosystem. From this perspective, it is not only technology that may be interpreted as an invasive exotic species but also techno-enthusiasts advocating CALL, given their conscious disruption of internal equilibrium. The successful adaptation of an ecosystem to invading technology is dependent on the latter’s characteristics and compatibility with existing species, as well as the interactions produced during attempted homeostasis. Zhao and Frank (2003, p. 813) note several possible outcomes:

- “the invader wins and wipes out the existing species”;
- “both win and survive, in which case some other species may perish or the ecosystem may eventually become dysfunctional because of its limited capacity”;

- “the invader loses and perishes”; and
- “both the invader and the existing species go through a process of variation and selection and acquire new properties”.

Enhancing institutional capacity

Under the ecological perspective, a lack of flexibility within the institutional hierarchy limits the ecosystem’s base stratum to accommodate invasive agents – technology within the context of the present paper. The COVID-19 pandemic has highlighted widespread rigidity within the Japanese HE system, underscoring the need to strengthen institutions’ capacity not only to absorb educational technology but also to prepare for future crises that require versatility. To create vitality within the ecosystem, the present sections offer suggestions to strengthen three key components within the institution:

- (1) improving adaptability;
- (2) fostering competent leadership; and
- (3) strengthening IT proficiency.

Systemic adaptability is necessary if HEIs are to integrate invasive species, or agents, successfully. The university as an institution has been denounced as being “archaic” (Wernick, 2006, p. 558), with these monoliths often criticized for their languid adaptation to emergent realities and threats. The change-aversion exhibited by HEIs is particularly pronounced in the context of Japan, where HE has historically followed a Napoleonic “top-down” model under which HEIs rely largely on public funding (Goodman, 2010; Huang, 2018). This dependency on governmental support also encourages strict adherence to state-mandated HE policies, while deterring institutions from participating in more entrepreneurial practices, in turn making them less innovative and adaptable. Though government policy remains an instrumental part of developing HEIs’ capacity (McRoy and Gibbs, 2009), institutions that proactively engage emerging challenges earlier are likely to be the ones that thrive. This next generation of universities – also referred to as the *new academy* – will be defined by four key principles:

- (1) accepting changes resulting from the Net Generation;
- (2) using technology to create more immersive learning experiences;
- (3) embracing the overlap between culture and technology; and
- (4) adjusting how members of the institution interact (Barone, 2018).

The new academy will accept the changes necessary to teach whom Prensky (2001) terms *digital natives*, or the Net generation, by leveraging technology to facilitate deeper learning. Concurrently, HEIs will acknowledge the intersection of culture and technology, and aim to change the way stakeholders or *species* interact (Barone, 2018). A key component in creating these adaptive *learning organizations* and, in turn, driving information technology (IT), is sound leadership. Effective leadership is instrumental in driving the growth and performance of an organization (Mahdinezhad *et al.*, 2013). Additionally, sound directorship has been identified as a crucial component in developing a learning organization – or one which:

[. . .] will proceed by looking at ways to improve itself, setting up criteria for appraising the effects of changes, creating alternatives, adopting and implementing those that work out well and abandoning those that do not work out well (Bass, 2000, p. 20).

Critical to the success of leaders at the helm of such organizations will be their ability to adopt a transformational leadership style (Bass, 2000). Transformational leadership has been exalted as the dominant paradigm in education over the past several decades (Black, 2015). As opposed to transactional leadership, which subscribes to a hierarchical, management-oriented approach, transformational leadership aims to inspire and motivate organization members. This is achieved by creating a shared vision, heeding individual differences between organizational members, and by stimulating members vis-a-vis their inclusion within decision-making and delegation processes (Argia and Ismail, 2013).

Studies on the efficacy of transformational leadership within the context of education have drawn correlations between the application of this leadership paradigm and a diverse array of performance indicators including teacher's job satisfaction (Bogler, 2001), the quality of learning outcomes (Argia and Ismail, 2013; Mahdinezhad *et al.*, 2013) and institutions' ability to innovate (Mirci and Hensley, 2010). Future educational leaders may embolden their institutions by being "democratic in their relations with teachers and students but also know when they must accept their responsibilities to take charge" (Bass, 2000, p. 37). However, this leadership approach conflicts strongly with the rigid hierarchies that permeate Japanese society and, by extension, HE. These hierarchies emerged from the collectivist orientation of Japanese society, rooted in a long history of Confucian influence (Hooker, 2003; Steers *et al.*, 2009). Though effective leadership was once envisioned as a set of qualities inherent within gifted individuals – thereby bringing into question the likelihood of the Japanese HE system's ability to rapidly cultivate skills among its present leadership – contemporary leadership theory research acknowledges that these characteristics *can* be learned (Amanchukwu *et al.*, 2015). Thus, bolstering leadership capability to oversee the growth of the institutional stratum within the Japanese HE system will require targeted training and leadership skill development.

Successful implementation of transformational leadership practices has, in fact, proven beneficial within other industries in Japan (Fukushige and Spicer, 2007; Gandolfi, 2012; House *et al.*, 2002). To actualize such leadership approaches, Prewitt (2003) argues that organizations must first create a shared vision agreed on by both leadership and staff. This will then parlay into leaderships instituting six action principles:

- (1) the creation of continuous learning opportunities;
- (2) the promotion of dialogue and inquiry;
- (3) encouraging collaboration and team learning;
- (4) establishing systems to capture and share learning;
- (5) empowering people towards the collective vision; and
- (6) connecting the organization to its environment (Noble, 2007).

The aforementioned emphasis on shared learning and empowerment will help facilitate the rapid integration of IT necessary to deliver content flexibly in the digital age. Among the many IT tools available to institutions to engage learners online, perhaps none is more important than the Learning Management System (LMS).

The role of LMSs in mitigating the fallout from the COVID-19 crisis cannot be understated. Without these systems, institutions would have had no means of delivering course content to students securely from a distance. The pandemic ensured face-to-face delivery was nearly impossible, particularly after clusters of infected students emerged at several Japanese HEIs (Asahi Shinbun, 2020). While 99% of American universities have adopted some form of LMS, with both faculty and students praising its ability to elevate learning (Dahlstrom *et al.*, 2014), Japanese universities still lag behind in this regard

(Vasilache, 2017). This slow-adopter approach likely aggravated a difficult situation; the failure of institutional stakeholders to accommodate this *invasive species* was poisonous to the system as a whole. Indecision and a lack of preparedness at both the governmental and institutional level resulted in a rather sporadic, even chaotic approach to online teaching within Japanese HEIs. This problem was likely exacerbated by a general lack of technological proficiency among the Japanese populace (OECD, 2018), which highlights the urgency with which institutions need to develop both their own and their students' ability to use digital tools. Even after enhancing leadership capacity through training, institutions need concrete methods for the systemic integration of ICT.

It has been stated that the convergence of technology and pedagogy often “collides with the process, structure, governance, power relationships, and cultural values of the traditional campus” (Barone, 2018, n.p.). One promising means of addressing this friction is the *diffusion of innovations model* (DIM; Rogers et al., 2005). The DIM outlines how “innovations, defined as ideas or practices that are perceived as new, are spread” (Rogers et al., 2005, p. 3). By identifying and targeting a heterogeneous group of *early adopters* within the HE ecosystem, the theory postulates that diffusion of a given innovation (or invasive species) will be accelerated, as this group acts as a catalyst to promote adoption and use across the wider system. This group of early adopters must be given the proper training and support necessary, as at present, these two resources are lacking (Iwasaki et al., 2011). An effective means of promoting sound usage of the LMS and potentially other IT tools within the institution that has been elevated in the literature are professional development programs targeting faculty administered through the LMS (Barone, 2018; Parker, 2011). This approach simultaneously strengthens faculty understanding of the system, while simultaneously exposing this keystone species to the technical and theoretical knowledge necessary to successfully facilitate an online or blended environment. Leadership must be at the helm of implementing such change, as the literature strongly advocates for the necessity of sound leaders in overseeing systemic change in the HE ecosystem.

Emboldening faculty

While institutional reform is critical, any measures brought forward to embolden the use of LMSs will be fruitless unless instructors are willing to implement ICT. Within the present context, this intangible obstacle is what Ertmer (2005, p. 27) terms a “second-order barrier”: that, if the language teacher perceives little value in technology-enhanced education, they will be unwilling to adopt it. Other technology barriers include beliefs about the role of the teacher and the perception of classroom control (Sherman and Howard, 2012). This section will examine the nature of this cognitive barrier and suggest potential solutions for overcoming it.

Recall that teachers form what Zhao and Frank (2003) regard as *keystone species*, those dictating the flow of the school ecosystem; *invading species*, meanwhile, manifest per the technology use promoted by techno-enthusiasts. One way of exemplifying this dichotomy is to position teachers in terms of their familiarity with technology and how it conflicts with their own learning legacies due to generational distance. Prensky (2001) classifies learners and teachers into *digital natives* – those growing up with and therefore accustomed to technology; and *digital immigrants* – (ordinarily) teachers unfamiliar with, but perhaps attempting to use technology in the classroom. We can view digital immigrants' ineffectiveness with educational technology as an inability to evolve within the ecosystem, which ultimately results in their extinction; or, more pertinently, that these digital immigrants will come to be *replaced* by digital natives.

There are criticisms that Prensky somewhat oversimplifies a complex issue (Bayne and Ross, 2011) and that actual data to support the position is lacking (Bennett *et al.*, 2008). Furthermore, given the age of Prensky's thesis, any generational division has come to be less distinct, as digital natives would have progressed to become techno-enthusiast teachers themselves. It would also suggest that younger practitioners are always proponents of technology. Certainly, a shortcoming in self-efficacy with regards to technology has been shown to correlate strongly with teaching experience. Klassen and Chiu (2010) describe a dramatic fall in confidence following 19 years of teaching experience, for instance. Nevertheless, practitioner age does not represent the singular source of this discrepancy, with Klassen and Chiu (2010) noting stress, classroom management skills, and learner aptitude as further attributing factors. Moreover, teachers with student-centred beliefs "tended to enact student-centred curricula despite technological, administrative, or assessment barriers" (Ertmer *et al.*, 2012). Thus, teacher beliefs are crucial in determining whether external educational innovations can be successfully implemented.

This organically leads to a discussion of the role of digital native teachers. As new technologies and their advocates are considered invading species, we must also consider their compatibility within the ecosystem as a barrier. Technological competence or advocacy is not a guarantee of successful implementation and can paradoxically pose a hindrance. Indeed, the deterministic *techno-positivist* ideology – a compulsive enthusiasm among teachers regarding e-learning can, in fact, serve to derail these efforts. Key issues include CALL being euphorically interpreted as a "saviour with redemptive power" (Njenga and Fourie, 2010, p. 202), or that the effectiveness of the approach is "given" or "automatically generated" (Ortega and Zyzik, 2008, p. 334), despite numerous examples of CALL initiatives failing due to factors as varied as participation structures (Reeder *et al.*, 2004) and culturally normalized institutional parameters (Belz, 2002). Yet, the digital immigrant concern that CALL may come to replace human interaction as the primary learning medium in HE is also fallacious on account of the crucial role of teacher feedback and face-to-face interaction, particularly during foreign language acquisition (Johnson and Brine, 1999).

Another key factor affecting teachers' beliefs is brick-and-mortar classrooms affording teachers a sense of authority, while, in the digital space, the *locus* of control is heavily diminished. Although learner autonomy via digital interaction has gradually gained traction among practitioners, many educators lament the inability to direct student learning in such situations, as teachers "[...] in technology-mediated environments may not align with principles of learner-centredness" (Reinders and White, 2016, p. 146). The perpetual and consistent nature of an online LMS, or even email, enables a situation whereby students are not only exposed to EFL content to a hitherto unprecedented degree, but expect immediate responses from teachers regardless of day or time (Shiobara, 2018). Teachers become stressed, and their work-life balance inevitably becomes muddled. The classically interpreted identity of the teacher becomes eroded, and technology, inevitably, bemoaned.

In Japan, technology faces a steeper challenge given normalized teacher perceptions of technology are decidedly conservative (Vasilache, 2017). Indeed, classrooms in Japan are frequently teacher-centred (Nishino and Watanabe, 2008; Sugimoto, 2015), and thus directly at odds with the constructivist and student-centred philosophies influencing contemporary CALL practice. One study related to Japanese teachers' perceptions on technology found that only 31% of practitioners viewed computers as effective devices for motivation, only 20% recognized the Internet as a valuable tool, while roughly a third thought computers were resources rather than education tools (Joshi *et al.*, 2010). The results contrast sharply with teachers from the USA, who had significantly more positive beliefs towards technology

in the classroom. Institutional reforms highlighted above are vital, but dismantling ideological resistance from digital native and immigrant teachers alike will be key. As such, emboldening faculty will require a multi-prong approach.

Professional development and training

A vital predictor of success in classroom adoption can be measured by the degree and quality of training received by the language teacher. [Lee and Lee \(2014\)](#) suggest introducing pre-service teachers to technology with structured courses, which was shown to amplify self-efficacy and consequently improved technology integration. Particularly crucial is that pre-service teachers receive adequate training. This can be through workshops, designing technology-using projects with in-service teachers, and planning forthcoming curricula that use ICT as a core component. [Johnson et al. \(2012\)](#) suggest “boot camps” in which teachers learn to deliver online classes. Specifically, three-day summer workshops focusing on planning and evaluating digital content delivery. These sessions were reportedly successful not merely in teaching *how*, or the practical applications of technology, but strengthening teacher understanding as to *why* digital technologies have emerged as compelling mediational tools – thereby functioning to combat outdated or “traditionalist” beliefs.

Time commitment

An obvious, but perhaps more difficult, requirement is providing teachers time to both acclimatize to new technologies, as well as integrate them within their classroom methodologies. Essentially, changing institutional cultures that dictate teachers’ adoption of new initiatives requires a balanced blend of management, collegiality and hard work over a prolonged period ([Brown, 2012](#)). Teachers must be willing to commit to a “risk-taking attitude”, in other words, taking time to make mistakes and be able to learn from them, with an openness to the change ([Vannatta and Nancy, 2014](#), p. 261). Time is a valuable commodity for teachers, and finding it represents a balancing act requiring self-discipline on top of mandated institutional guidance. However, with improved time management skills through a willingness to learn within a traditional work schedule, teachers will build confidence and be able to challenge their established technological beliefs.

Ongoing support

Naturally, institutional support is crucial to adoption; however, this must include continuous assistance from peers and IT specialists ([Chen, 2009](#)), for instance, in the form of teacher-to-teacher guidance, as consistent with [Zhao and Frank’s \(2003\)](#) rationalist interpretation of *reciprocal altruism*. Indeed, keystone species may revert to traditional EFL pedagogies if gaps in knowledge, equipment reliability, or software problems become ongoing issues. Returning to the notion of LMS integration, [Iwasaki et al. \(2011\)](#) remark that learning platforms must incorporate several key functions to support teachers. Chiefly, they must allow for the straightforward assessment of learning through, for example, quizzes, student team creation and the variable nature of learner interaction. Feedback, from both students and teachers will embolden online learning systems, although overbearing criticisms may hinder progress ([Moser, 2007](#)). In this way, the provision of support for teachers to attempt risk taking and experimentation, while simultaneously emphasising the positive impact of CALL to students, will be highly motivating ([Ertmer and Ottenbreit-Leftwich, 2010](#)). This can be achieved through seminars and meetings that involve teachers when forming key decisions regarding CALL strategy. Ultimately, once a language teacher is aware of the multitude of advantages technology provides, they are more likely to adopt it, evolve, and, ultimately, overcome second-order barriers.

Fostering learner proficiency

While the scale of Zhao and Frank's (2003) analytical lens is broad, there remains a glaring omission from its ecological scope: *learners*. Indeed, the exclusion of what is, perhaps, *the* essential stakeholder within this unified framework is perplexing. While students are broadly categorized as biotic “components” of educational ecosystems (Zhao and Frank, 2003, p. 812), the authors fail to recognize the potential for learners to “evolve” into a distinct species. Consequently, the present investigation classifies students in terms of *mutualism*, or the interactions between multiple species that produce a net benefit. As described by Kato and Kawakita (2017, p. 5), the “ecosystem is a network of innumerable mutual interactions” and, given the interplay between teacher and student represents the foundation on which the school ecosystem is maintained, we interpret mutualism as central to co-evolution between species.

As animals biotically pollinate the flowering plant, so too does the educator fertilize the mind of the learner. If, as is theorized by Zhao and Frank (2003, p. 813), a sequence of reciprocal altruisms drive keystone species; it follows that the “fundamentally selfish” behaviour of educators functions in concert with the harmony of their micro-ecosystem classroom, and the development of the species contained within – thus, a *net benefit* is realized. Considering the quasi-militaristic structure of Japanese education (Sugimoto, 2015, p. 131), it is self-evident that the mutualistic interactions between teacher and learner exert significant influence over a student's proficiencies in digital learning. As noted by Beatty (2010), structuralist educational philosophies are decidedly incompatible with the current integrative direction of CALL. Yet, given the prevalence of teacher-centred practice within Japan, learners “are taught English almost exclusively using a grammar-based approach that emphasizes accuracy” (Hammond, 2007, p. 43), often to the exclusion of digitally mediated pedagogies.

As observed previously, OECD studies (2015, 2018) illustrate the normalization of “digital immigrant” (Prensky, 2001, p. 1) practices locally, with Japan recording the lowest percentage amongst participant nations with regards to the self-perceived capacity of faculty to integrate technologies within the classroom (OECD, 2018). The prevalence of second-order cognitive barriers (Ertemer, 2005) amongst Japanese educators is consistent with findings from Ford and Botha (2010). They describe a lack of ICT literacy and infrastructure, an inability to use technology, and structural forms of instruction as the primary factors impacting the unsuccessful integration of educational technologies. The conditions impacting the usage of CALL by Japanese learners thereby manifest per the socio-educative position of practitioners locally, with the invasion of technology as an exotic species holding the potential to cause significant disruption to internal equilibrium.

Consequently, until second-order barriers amongst Japanese faculty are addressed per the recommendations detailed previously, digital instruction must function through a delicate balancing act. It is imperative that educators and learners alike acclimatize gradually to the digital systems in play and, in the instance of the latter, not be cognitively overloaded during their efforts to advance technological and linguistic proficiencies contemporaneously. One possible solution is the utilization of dedicated EFL applications or computer-mediated communication (CMC) via mobile-assisted language learning (MALL) technologies, including smartphones and tablets. The creative use of mobile tech outside of Japanese classrooms is well-documented (McCarty *et al.*, 2017; Takahashi, 2010) and, given the social dependence of students on smartphones during adolescence, Takahashi (2014) notes that it is often easier for learners to complete work using mobile technology as opposed to personal computers.

Indeed, despite its status as a relatively nascent branch of CALL, there remains a growing body of inquiry connecting mobile devices to effective, learner-focused foreign language curricula. Stockwell (2016, p. 296), for instance, notes that “recent research has started to take advantage of the affordances associated with mobile devices rather than trying to simply replicate computer-based activities”. Nah *et al.* (2008), for example, used the sociocultural-orientated *interaction hypothesis* as a means of developing collaborative English language learning amongst Korean university students via a custom LMS. In encouraging participants to use MALL outside of regular class hours, the authors note that learners took more responsibility for the time and location of study sessions, while the collaborative nature of the CMC-based approach helped them to view assigned activities more positively – thereby representing a *student-centred* approach.

Byrne and Diem (2014, p. 6) also describe a preference amongst Japanese learners for “mobile versions of language dictionaries, translators as well as mobile flashcards and games for vocabulary acquisition” due to their flexibility, convenience and ease-of-use. Faculty can enhance MALL practice further by “keeping in mind student preferences for social contact, audio, video, and short texts” (McCarty *et al.*, 2017, p. 13) when structuring content. Mobile technologies functioning in unison with LMS, such as Moodle, and/or CMC services, including Zoom and Microsoft Teams, offer flexibility with regard to the access, integration and cultivation of interest-driven personal learning environments. In this context, one may recognize MALL as allied with *connected learning* ecologies, in which learners’ personal interests, relationships and achievements integrate holistically within an openly networked, peer-supported learning ecosystem. Again, these factors constitute a student-centred philosophy, and while this approach necessitates a certain amount of learner responsibility in lieu of direct teacher control, Howlett and Waemusa (2018) have shown that digital immigrant practitioners are willing to use MALL if provided with institutional support.

Within a connected ecosystem, the interplay between EFL and online collaboration provides a link between linguistic progress and “the support of friends, caring adults, and/or expert communities” (Kumpulainen and Sefton-Green, 2014, p. 10). The interconnected nature of CMC provides an active conduit for discussion and multi-sourced language generation (Schamroth Abrams, 2014), while also softening the hierarchical structures typically associated with brick-and-mortar learning environments. Considering MALL facilitates persistent access to EFL materials, a learner may, for example, collaborate with peers via easily monitored HEI LMS or CMC services. In this instance, reinforcing or corrective feedback may be received in an informal, humanistic space, thereby interlacing the cognitive and affective domains while simultaneously enhancing a linguistic community of practice.

Nevertheless, any formal attempt to facilitate and measure digitally mediated linguistic progress should consider the challenges associated with the approach. While teacher-monitored peer-to-peer interaction is ideally suited to communicative learning, it can be challenging to reconcile the measurement of individual language improvement with collaborative practices. Issues of plagiarism may arise when assessed content is discussed online, where the distinction between support and collaboration may become blurred. Yet, as Gordon (2014, p. 18) notes, “legislating and penalizing such behaviours ignores the trend towards shared knowledge and social media”. Thus, the educator must provide effective routes of assessment that account for the impact of collaborative ecosystems. Potential solutions include a reduction in “traditional” coursework designs in favour of online assessment methods, such as portfolios, Wiki entries, video uploads or collective book reports, which allow for explicit auditing of individual learner contributions.

While collaborative, asynchronous education represents a potential disruption to ecological homeostasis, MALL offers a solution to tech species invasion that reflects not only the preference amongst Japanese learners for mobile technologies but also, given the normalized, cross-generational status of smartphones as “indispensable tools for daily life” (McCarty *et al.*, 2017, p. 24), the delicacy of second-order cognitive barriers amongst educators. As the population of “digital native” learners increases, so too does the requirement for technological learning interventions. It thus follows that keystone species adapt their technical and pedagogical practices to meet these educational imperatives and the diverse learning modes of their students. While no simple task, increased utilization of MALL as a collaborative space for learners to process and discuss EFL content allows keystone educators to adapt not only to technology as an invasive exotic species but also an increasingly dynamic form of *digital native* learner-species, also.

Directions for future research

This position paper leveraged the ecological perspective to offer a holistic view of deficiencies in the Japanese HE system at three strata: the institution, the faculty and the student. At the time of writing, research on the impact of COVID-19 on HE was scant and the pandemic’s long-term implications within and beyond HE were largely still unknown. Future research might leverage the theoretical framework we have proposed, which included students as a vital component in an ecological framework. This research may, for example, adopt the framework offered here to analyse the preparedness of the Japanese HE system to address other unanticipated disasters once the full scale of COVID-19 is known. Furthermore, although the inquiry highlighted existing impediments at disparate levels of the HE ecosystem, there appears to be a dearth of studies examining the interconnectivity of policy implementation at the macro, meso and micro-level. One recent study identified a disconnect between meso-level policy and micro-level pedagogy (Aizawa and Rose, 2019); however, more research is required to develop a more complete picture of this issue.

Conclusion

The present study examined Japanese HE’s readiness to address the COVID-19 pandemic and its associated challenges through the lens of the ecological perspective. In doing so, the authors identified deficiencies technology poses as an invasive species within the three strata of the Japanese HE ecosystem – the institutions themselves, faculty and students – with aims to offer solutions rooted in the literature. At the institutional level, it was suggested Japanese HEIs become more malleable to face unanticipated challenges, to cultivate more competent leadership and to bolster IT proficiency, both tangibly and pedagogically. To improve faculty capacity to facilitate effective online learning, it was suggested that more professional development opportunities be enacted, that faculty be afforded more time to focus on integrating technology into their classrooms, and that IT support systems be improved to ensure teachers do not deviate from more sound, blended-learning practices. Finally, at the student level, it is suggested educators gradually integrate educational technologies in HE classes, recognizing and engaging Japanese students’ predisposition to MALL-centred applications, integrating MALL learning into formalized institutional IT structures, and using these to create collaborative online learning environments. Using these measures will assist in ensuring the ecohealth of the Japanese HE ecosystem going forward.

While the dust has yet to settle on the COVID-19 pandemic and its future ramifications are unknown, this paper aims to provide antecedent propositions as to how HEIs in Japan can rise to meet the challenges of the virus, as well as other disruptive events that the system

may encounter in the future. As cases continue to rise nationally at the time of writing, Japanese HEIs will likely have to be proactive in addressing shortcomings within the system as they prepare to continue online course delivery. Educators should view the recommendations above as just that suggestions, which need to be tailored and adapted to fit within their given educational context.

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