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Article

Second Language Teacher Development through CALL Practice: The Emergence of Teachers' Agency

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Abstract

A growing number of studies examining second language (L2) teacher education from the perspective of sociocultural theory, in particular the activity theory framework (Engeström, 1999), show that transformations in teachers' cognition and practice can be fostered through negotiation of sociocultural and cognitive dissonance in their teaching environments.

This case study examines 16 years of cognitive development of two Japanese language teachers practicing computer-assisted language learning (CALL) and the challenges they experienced as a result of the evolution of information and communications technology (ICT). The focus is on the challenges faced by L2 teachers and their responses, and how these challenges relate to the development of teachers' agency as CALL practitioners. Narrative inquiry data for both participants were collected following the Trajectory Equifinality Approach (e.g., Valsiner & Sato, 2006), in which each teacher's life trajectory is visualized to identify critical points based on social affordances and constraints. The critical points were further analyzed and interpreted within and between activity systems.

The data suggests that the teachers became aware of the social nature of the technology through the challenges they encountered when coordinating their own and students' mismatched values attached to ICT. Such a change in perceptions not only impacted their pedagogical usage of the technology but in turn also constituted their agency.

KEYWORDS: ACTIVITY THEORY; AGENCY; CALL (COMPUTER-ASSISTED LANGUAGE LEARNING); TRAJECTORY EQUIFINALITY APPROACH; TEACHER DEVELOPMENT

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Background

Studies examining second language (L2) teacher education from the perspective of sociocultural theory (SCT), specifically those employing the activity theory framework (Engeström, 1999), emphasize the interrelationship between teachers' personal histories and the contextual elements that promote their cognitive development (e.g., Cross, 2010). Changes brought about by these contextual elements, including new tools and technologies, impact on the practice of teaching, as well as on teachers themselves; conversely, new tools and technology are also constantly (re-)shaped in human communities.

A sociocultural approach to Second Language Teacher Education (L2TE)

With the rapid growth of the Vygotskian *sociocultural approach* to teaching and learning (e.g., Lantolf, 2000; Lantolf & Thorne, 2006), which emphasizes the role of social mediation in human activity, second language teacher education (L2TE) has been among the fields greatly impacted by this perspective. L2TE studies taking an SCT view conceive teaching as a socially situated practice (e.g., Johnson, 2009; Johnson & Golombek, 2011) in which teachers are required to reframe and modify their agendas and values according to the needs of particular teaching contexts. Recent studies extending this perspective have investigated teachers' cognitive development through the negotiation of sociohistorical factors emphasizing the role of personal histories and of social factors affecting teachers' cognitive development (e.g., Cross, 2010, Feryok, 2012). In this view, teachers' professional development takes place through the integration of their previous experiences and with contextual factors such as expectations and teachers' beliefs (Alsup, 2006).

One of the significant analytical frameworks adopted to investigate teachers' conceptual development in relation to social, cultural, historical, and institutional elements is *activity theory*, grown out of the sociocultural approach (Engeström, 1987, 1999; Leont'ev, 1978, 1981). Extending Vygotsky's mediational triangle, which illustrates that subject and object are not directly related but instead are connected through cultural mediation (tools and signs), Engeström (1987) suggests a model of collective human activity as represented in Figure 1.

L2TE studies taking a sociocultural approach understand the *teaching activity* to be an activity mediated by a *mediating tool* (*instrument* or *cultural artifact*) and one whose subjects are teachers and students who may have their own perceptions of the goals (*object*), *rules*, and *divisions of labor* of the activity. Thus, some contradictions within and between these elements or between different activity systems will emerge; and these contradictions are the driving force for the transformation of the activity system and its components. For example, transformation may be driven by a teacher who notices contradictory

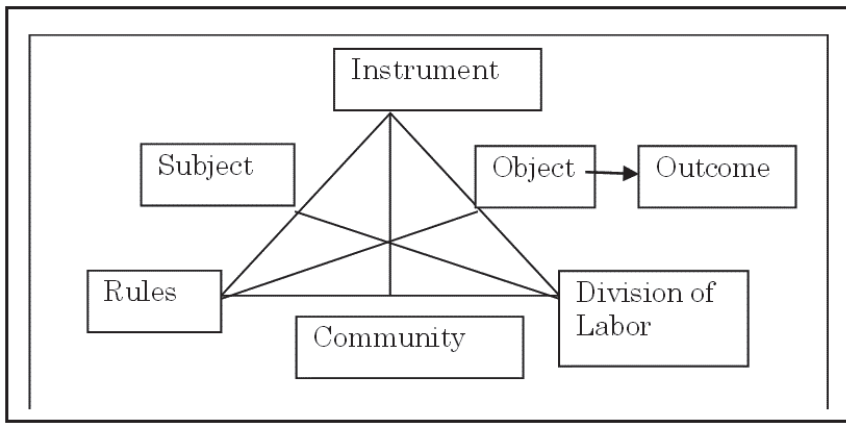

Figure 1: Activity system (originally in Engeström, 1987: 41)

teaching/learning goals between him- or herself and his or her students and who attempts to resolve these contradictions. Engeström (2009b) points out that the objects of a teaching activity may differ between various participants in an educational community, such as teachers, individual students, and the institution itself. Ahn (2011), for example, reports that novice EFL teachers in Korea attempting to develop their students' L2 communicative proficiency face the reality of the national education system, which requires the students to pass a high-stakes English grammar and reading comprehension test. In this case as in others, it is challenging for teachers to coordinate the various potential objects and motives their students may have in learning, within the systems of the school activity. By perceiving teaching practice as a socially emergent human activity, teachers' cognitive transformation in overcoming such conflicting goals can be understood in relation to social elements and other activity systems.

Studies of L2 teacher development from the perspective of activity theory illustrate how cognitive changes in L2 teachers are encouraged by their local teaching environments. However, this approach is inadequate to provide a basis for explaining the individual's active role in their own cognitive transformation (Billett, 2006). To do so, the notion of agency has been employed to explain cognitive development. Ahearn (2001) defines agency as follows. 'Agency refers to the socioculturally mediated capacity to act' (p. 112). Van Lier (2008) sees the concept of agency as being interdependent with social contexts in L2 learning/teaching. A learner/teacher responds to the affordances and constraints of particular social contexts, and the modified conditions that emerge from these affordances/constraints and responses also serve

as a context for his/her next action. As a core feature of agency van Lier designates 'awareness of the responsibility for one's own actions *vis-à-vis* the environment, including affected others' (p. 172). Similarly, within the realm of activity theory, Stetsenko and Arievitch (2004) expand Leont'ev's notion of self (1983) into 'the self as a leading activity', that is, 'as a process of real-life activity that most explicitly positions individuals to meaningfully contribute to the ongoing social collaborative practices in the world' (p. 493). This dual mechanism of the social and the personal has been claimed across various fields, in particular developmental psychology: individuals do not simply reproduce what is available in the immediate context, but rather play an active role in creating new culture.

One of the key aspects of this mutually complementary process of human cognition is the notion of 'active appropriation' (Valsiner, 1998), which suggests that individuals actively construct new choices and are not simply restricted to local environments. This notion may help us understand the cognitive transformation of teachers who face novel circumstances that their training has not covered, such as newly emerging forms of information and communications technology (ICT).

In order to address the individual's role in transforming his or her immediate environment, some studies of L2TE teachers' cognitive development (Cross, 2010; Feryok, 2012) strongly suggest the inclusion of a *ontogenetic* component (i.e., relating to teachers' personal histories and experiences) as well as the *microgenetic* one (the immediate teaching context). For example, Cross's (2010) case study of high school teachers of Japanese in Australia indicates that there may be dissonances between a teacher's personal beliefs as impacted by formal teacher education on the one hand, and national educational policy on the other, and that such dissonances may lead to contradictions in practice. Similarly, recent activity theory scholars suggest consideration of the historical past and future (i.e., the ontogenetic domain) as well as the immediate local context to explain the individual's cognition (Sannino, Daniels, & Gutiérrez, 2009).

Feryok's study (2012) examining narrative data from an Armenian teacher of English illustrated how that teacher reacted to educational reforms and social challenges related to the breakup of the Soviet Union and Armenian independence. The teacher's actions against social constraints within the continuum of the activity system in turn reshaped the conditions that prevailed, and in so doing created affordances for her next action. As Feryok's study suggests, L2 teachers' subjectivity, impacted by their previous experiences, plays a crucial role for the emergence of agency. Thus, the study of L2 teacher development should not restrictively focus on immediate experience but needs also to take teachers' prior experience into account.

The Impact of the ICT Revolution on Teachers' Development

Alongside the advent of a post-Vygotskian social view of teaching/learning, L2 teachers over the last 16 years have experienced rapid technological changes. The revolution in ICT has generated new cultural artifacts that mediate virtually all human activities, including teaching practice (Thorne, 2003). Teachers in the middle of their professional careers have been challenged by these developments, especially if they had little preexisting practice to fall back on or no mentors to support them.

In the context of their recent work in activity theory, Sannino *et al*. (2009) state that '[s]ince all activity is mediated, the study of technologies must be embedded in human activities where tools and media are generated, used, and modified' (p. 16). Thus, changes brought about by these new tools and technologies have affected the practice of teaching as well as teachers themselves; and conversely, new tools and technology are also constantly being (re-)shaped in human communities. The examination of L2 teachers' development of agency through and in the context of the ICT revolution may shed light on the active role of agency in the dynamic process of person–environment relations.

In spite of the large-scale effects of the emergence of ICT, few studies to date have addressed L2 teachers' cognitive development in response to the changes brought about by the ICT revolution. One exception is the study by Shelley, Murphy, and White (2013) investigating interview data from six native-speaker teachers of French, German, Spanish, Italian, Dutch, and Mandarin, respectively, whose teaching shifted from face-to-face to distance and blended delivery over time. Shelley *et al*. indicate that similar to the participants' diverse background their cognitive development was also varied and complex. However, what linked them was the emotional aspect of their engagement with new teaching contexts. For example, teachers in distance and/or blended settings felt a lack of support from colleagues, expressed a need for technical skills, and found it difficult to encourage students' regular participation. The decisions that the teachers made following these emotional experiences facilitated their cognitive development.

Another exception is Belz and Müller-Hartmann's self-reflective case study (2003) on their own cognitive development as instructors for a US–German cross-institutional collaborative project. Belz and Müller-Hartmann indicate that teachers' perceptions of online telecollaborative projects are reshaped through the encounter of cultural differences across institutional systems and policies as well as individual teachers' backgrounds and job responsibilities.

The two studies cited above suggest how a particular online teaching practice impacts on teachers' cognitive changes; however, there have been

very few studies focusing on the long-term development of teachers' agency in the context of the recent ICT revolution. Using an activity theory framework, the present study focuses on describing the life trajectory of two teachers who have been pioneers in computer-assisted language learning (CALL). By examining the details of their cognitive change over a longer timeframe than previous studies have done (16 years), the present study explores these teachers' professional development in relation to the challenges that ICT poses.

The research questions are:

1. What kinds of challenges have these L2 teachers faced, and how have they managed these challenges and responded to them?
2. How does the answer to Research Question 1 relate to these teachers' development of agency as CALL practitioners?

The answers to these questions should contribute to CALL teacher education and specifically to the question of how teachers can be better prepared or supported in the digital age. Furthermore, the process of the emergence of agency may provide insights that can be extended to the professional development and provision of support for it across various fields.

Method

Trajectory Equifinality Approach

To understand teachers' development in relation to emergent technology and media embedded in social context, the present study employs a *Trajectory Equifinality Approach* (TEA; e.g., Sato, Hidaka, & Fukuda, 2009), a perspective from cultural psychology that extends Vygotsky's work. To approach the crucial question of how immediate momentary experience is interrelated to the ontogenetic transformation of the individual over a lifetime, TEA suggests the *Three Layers Model of Genesis* (TLMG; Sato, Yasuda, Kanazaki, & Valsiner, 2014). TLMG is based on Valsiner's (2007) attempts to explain the process of *internalization* as viewed by Vygotsky in terms of the way experience at the microgenetic level (i.e., immediate experiences) is selected and taken up by higher mental functions at the ontogenetic (also referred to as macrogenetic) level. Sato *et al.* (2014) suggest we recognize a *mesogenetic* level between the microgenetic and ontogenetic domains, as seen in Figure 2.

Some experiences are reviewed at the mesogenetic level 'where changes are consolidated to be either taken as novelties to the macrogenetic [ontogenetic] level, or become regulators ('promotor signs') of the microgenetic processes' (Sato *et al.*, 2009: 236). Not all events at the lower level directly

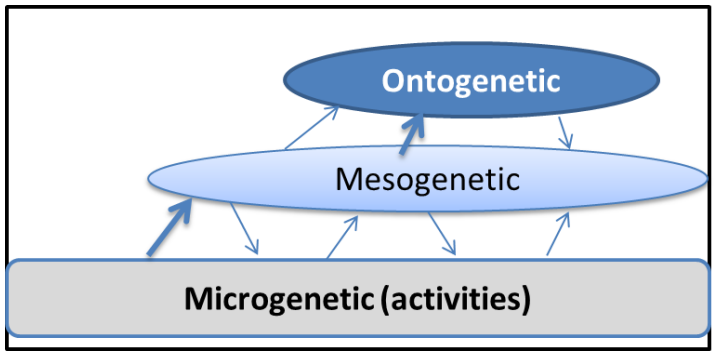

Figure 2: Relation between ontogenesis, mesogenesis, and microgenesis (modified from Sato *et al*., 2014: 6)

impact cognitive changes; rather, a contextually framed notion called the 'promotor sign' (generally derived from social habits, tendencies, and norms) at the mesogenetic level shapes some of the new concepts and drives their integration into the relatively stabilized higher mental structure, which, in turn, guides the individuals' next actions as shown, with some of the arrows going downward from the ontogenetic level (i.e., *externalization*) (Valsiner, 1998; 2007).

To identify events potentially promoting ontogenetic transformation, the *Trajectory Equifinality Model* (TEM; Valsiner & Sato, 2006) visualizes the human trajectory from narrative data and identifies critical events in terms of social constraints/affordances at points potentially promoting cognitive transformation, referred to as *bifurcation points* (BFPs) in one's trajectory, where one makes a decision to move in one direction from among alternatives.

Various qualitative research methods have been used to capture the structure of a research object from an inductive perspective. TEM can be distinguished from other methods such as the grounded theory approach (GTA; Glaser & Strauss, 1967) or renewed Grounded Theory Method (GTM) (Charmaz, 2008) in that it reveals the process of human development embedded in sociohistorical contexts rather than simply categorizing or systematizing the notions that emerge out of the linguistic data (Sato, 2013).

As Zittoun *et al.* (2013) state, TEM responds to 'the theoretical need of contemporary science to maintain two central features in its analytic scheme – time, and (linked to it) the transformation of potentialities into actualities (realization)' (p. 157). To illustrate the trajectories of human beings, TEM uses the notions of the bifurcation point, the *equifinality point* (EFP), and *irreversible time*. Figure 3 is an example.

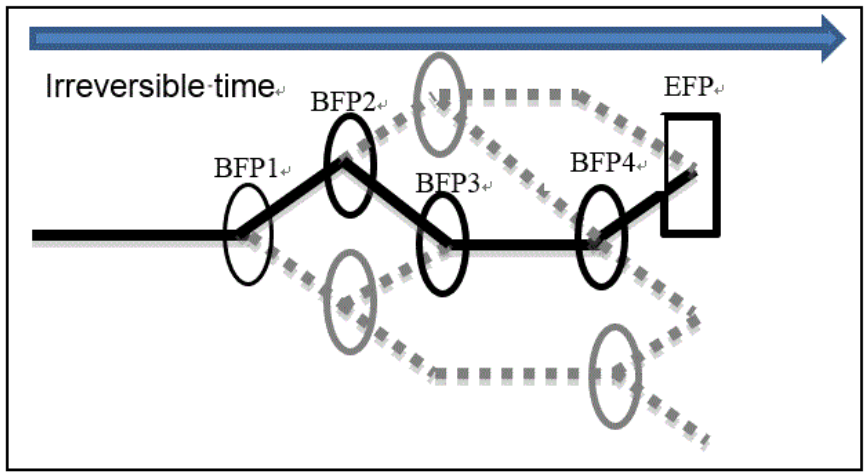

Figure 3: Basic concepts of TEM within irreversible time (originally in Sato *et al.,* 2009)

In the figure, the rectangle represents the EFP, which is what the researchers are ultimately concerned with. One's trajectory can reach the EFP by multiple paths; one chooses (consciously or unconsciously) to move in a given direction at each BFP (represented by the oval shapes), where alternatives are presented. The time arrow is included to remind us that the life trajectory is governed by irreversible time (Bergson, 1910).

To analyze teachers' development, several sociohistorical domains need consideration. In the cultural-historic domain, the analysis needs to consider the long-term impact of ICT on the teachers' broader contexts. Then, the teachers' personal histories need to be addressed in detail, particularly critical events identified as BFPs that may relate to teachers' cognitive development and influence their life trajectories.

Although TEA is capable of tracing the longitudinal transformation of teachers, determining what encourages teachers' cognitive changes at the micro-level in relation to the social dynamics of teaching practices (i.e., charting what exactly happened at the mesogenetic level) is beyond the scope of the approach. Thus, to understand critical events within the microgenetic context of social and cultural practices, activity theory (e.g., Engeström, 1999) is applied. The examination of *contradictions/tensions* (Engeström, 1999) within and between activity systems based on the analysis of *conflict-based circumstances* (Vygotsky, 1978) is crucial to identify teachers' transformation in the context of the sociohistorical practice of teaching.

Data and analysis

The participants

Data were collected using TEA (as discussed above), in particular with regard to the sampling and interviewing of the participants. First, two Japanese as a foreign language teachers were selected, following the 'Historically Structured Sampling/Invitation' approach (Valsiner & Sato, 2006), as participants with an identical equifinality point (EFP), in this case, 'being a CALL practitioner'. By selecting participants with the same EFP, TEM is able to describe the variation in their life trajectories from a single resting point. Both teachers were in their early 50s and had experienced the rapid growth of ICT in the middle of their teaching careers, becoming interested in and actively involved with CALL from around 1997. Toshi (all names are pseudonyms), a male teacher, was born and raised in Japan but has lived in the United States for about 30 years. He started his teaching career as a graduate assistant at a college in the Midwest around 1984. He enjoys ICT as a hobby and has been acknowledged as a pioneer in online Japanese language learning. For the last 20 years, he has been teaching Japanese at a community college in the US.

Anne, a female teacher, was born and raised in Canada and studied and taught English in Japan in her 20s. She started her teaching career in Canada around 1993. Although Anne is not interested in technology outside work, she has actively contributed to innovative CALL projects since 1997; most are intended to supplement students' independent learning. She teaches Japanese at a major Canadian university.

Data collection

Narrative data were collected through semi-structured interviews by e-mail and Skype. Both participants are fluent in Japanese, and the questions were delivered in Japanese; responses could be in Japanese or English. First, the teachers answered some open-ended questions over e-mail regarding their teaching career in relation to CALL. Then, Skype interviews (72 min for Toshi and 83 min for Anne) were conducted (and later transcribed) to obtain detailed information on the points gathered via e-mail and further develop the discussion. Last, follow-up e-mail interviews were conducted to validate the TEM figures (i.e., the illustrations of the participants' trajectories in Appendix A and B) and modify them according to the participants' perspectives (their 'subject reality', as Pavlenko, 2007 calls it). The combination of asynchronous and synchronous media (text and audio) provided both time for deep reflection by participants (a feature of text mediation, see Feryok, 2008) and opportunities to elicit more information and reach a common understanding between interviewer and interviewee (through Skype).

TEM emphasizes the *trans-view* (Sato, 2012) in interview data; that is, data should reflect the perspectives of both interviewer and interviewee. In order to raise the level of trans-view, first, a rapport should exist to facilitate sharing of personal information between interviewer and interviewee. In this case, the researcher and the two interviewees had known each other for more than five years as colleagues and had previously met in person. To increase intersubjectivity between interviewer and interviewee, a draft TEM figure was presented to each teacher for modification before finalizating the analysis.

The interviews incorporated the so-called 'Life-Line Interview Method' (Schroots & Ten Kate, 1989), which asks interviewees to draw a curving line to express changes in their degree of involvement in the target phenomenon (here, CALL) and to clarify what happened at the curving point, if alternative choice(s) existed besides the one chosen, and if any detrimental or advantageous circumstances applied.

Analysis of the data

To describe the teachers' trajectories using TEM, interview data were analyzed following Yasuda and Sato (2012). First, all e-mail and Skype interview data were segmented into minimum event/meaning units, regardless of topic. Then, segmented data were re-placed along the time axis. Segments that showed the *progress* of behaviors and emotional shifts in achieving the EFP were placed on the upper part of the figure, whereas segments related to *recession* away from the EFP, were on the lower part. Next, starting from left, segments describing similar events/meanings were grouped and labeled, becoming elements of the TEM figure. TEA also suggests that any social constraints and affordances that either promote or prevent one's movement toward EFP be identified. Social constraints, referred to as the *Social Direction* (SD), include social norms, traditions, and pressures that inhibit the way to EFP. In contrast, social affordances, or the *Social Guide* (SG), act as a defensive force against SD and assist one to achieve EFP. The labeled SD and SG data were described with arrows from the top (for SD) and from the bottom (for SG).

After that, timeline events were connected, bifurcation points were identified, and the TEM figure was sent to each teacher for modification and finalization. (Please refer to Appendixes A and B for the TEM figures and Appendixes C and D for the meanings of key-terms in each figure.) Finally, to reveal what promoted each teacher's cognitive development at his/her BFPs on the micro level, any contradictions (Engeström, 1999) emerging within or between elements of the activity systems due to ICT in teaching practice were identified.

Findings

The narrative data of the two CALL teachers show cognitive and social transformations in these teachers' attitudes and practice related to changes and

challenges brought by new technologies. Discussed below are each teacher's trajectory as a CALL practitioner, critical point(s) within it, and the teacher's development of agency as a CALL practitioner.

Toshi's trajectory as a CALL practitioner

Toshi first started using computers in his teaching around 1997 as he developed online drills that provided automatic feedback to the learner. Toshi's interest in new technologies increased with rapid technological developments around the late 1990s, and based on his success in creating online drills he wanted to develop a full Japanese language course for distance learning online. He said he originally had two reasons for developing the online course: to provide learning opportunities for students working fulltime, and to indulge his personal interest in technology: 'This also is a challenge to the technology – how much is possible in the online course with the use of the current technology."

Toshi's trajectory as a CALL practitioner (Figure 4 and details in Appendixes A and C) shows that his growth synchronizes with the development of technologies in general which can be categorized into 'introductory', 'growth', and 'maturity' stages (Haupt, Kloyer, & Lange, 2007). These are reflected in Toshi's trajectory from 'starting point' (introductory stage) to 'struggling period' and 'implementations of new technological tools', (growth stage) and to 'stabilization' (maturity stage).

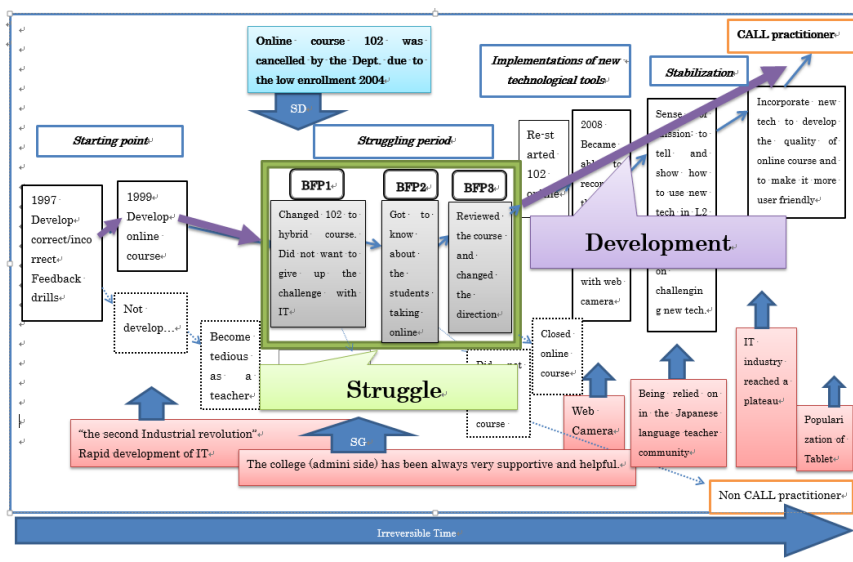

Figure 4: Toshi's trajectory as a CALL practitioner, described with TEM

Toshi's innovative CALL practice meant that he adopted novel technological tools into an online course. He started with text, then audio, and now video-based media, incorporating web-based audio-recordings, digital cameras, tablet computers, and some applications in order to create an interactive e-book. He says that recently technological development has slowed and entered a mature period focused on quality and user-friendliness rather than major innovation.

Toshi's challenge (Toshi's critical point)

Toshi's approach to CALL has been forward-looking, adopting new tools as they appeared. He had no serious problems at the early stage; however, he admits to a crisis in his CALL practice after the cancellation of one of his two online courses due to low enrollment around 2004, five years after he had launched them. This became a BFP: instead of giving up on online learning, he reworked the course as a hybrid face-to-face and online course. Through face-to-face interaction with his students he learned that he had misunderstood a crucial characteristic of online learners.

> Then, I realized my assumption about online courses was somewhat wrong. I thought the students who took online courses were all techy. But I could see the students' reactions in the regular face-to-face class of the hybrid course, and found that they were not techy at all. They understood less than 50% of what I said. After realizing this, I added more explanations to the online pages …. (Excerpts are from the Skype interviews, originally in Japanese and translated by the author)

Toshi realized that most of his students took the online course to avoid time and physical constraints involved in commuting to the school, regardless of their skills or interest in technology. As a distance learning instructor, opportunities to interact with his students in person and come to understand their learning characteristics are quite restricted. As he realized his students' low technology knowledge and interest, Toshi also recognized their need for technological assistance, and 'completely revamped the online course with a new assumption of the students' low-level technological skills'. He provided more extensive, step-by-step instructions for using applications and practice pages, and helped students review test formats before online tests.

The transformation of Toshi's CALL practice is illustrated in Figure 5. The thick arrows show that the main contradiction occurred in the tool node: that is, the students' ICT skills and interest did not align with Toshi's. To address this problem, Toshi attempted to reduce the students' responsibility for using technology (shown by the dotted line to 'division of labor') with the new step-by-step design. Also, he no longer expected his students to do online quizzes and exercises independently, and now allowed them to ask technical questions

freely (shown by the dotted line to 'rules'). He used to think students who did not take online quizzes were simply lazy, but then realized that they might be struggling with technological problems. The dropout rate of this course used to be high, but improved following these changes.

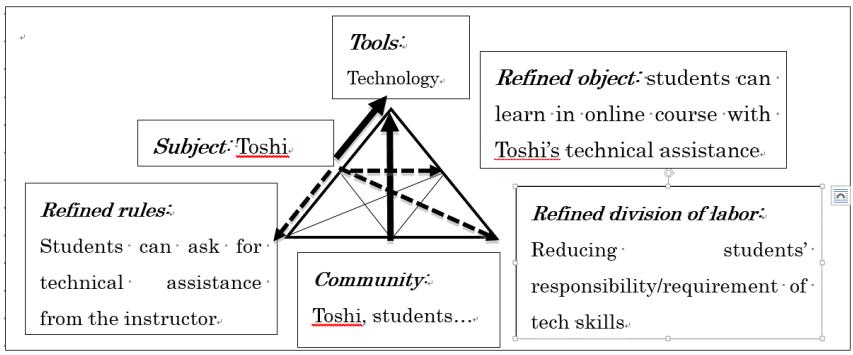

Figure 5: Toshi's refined CALL practice

The reason Toshi changed this online class to a hybrid class (instead of a traditional face-to-face class) was that he 'did not want to give up on the potential of technology'. Toshi's passion for challenging traditional practices by implementing technology in online language courses has driven his continued engagement in CALL practice over the years.

Toshi's development of agency as a CALL practitioner

As a pioneer of CALL who was highly competent in using related technologies, Toshi gradually became aware of his responsibility to assist other L2 teachers struggling with technology in their classrooms. Toshi was nominated by his college for several innovative teaching practice awards and invited to present his online course at several conferences and workshops. He receives e-mails from Japanese teachers worldwide, and has become aware that L2 teachers as well as students often lack the ICT skills needed in present-day society.

> I feel a sense of mission to teach L2 teachers what we can do with the current technology. I am from a scientific field, but most Japanese teachers are from non-science fields, and I feel a sense of mission to share my knowledge with my colleagues. I try to learn new technology so that I can answer the teachers' questions.

Toshi is acknowledged in the professional community for his tech skills and relied on as an expert, and his awareness of his responsibility and role in the teaching community (van Lier, 2008) has grown. Regarding his teaching philosophy, Toshi explains that the teachers' role is to pave the way for the

students so that the students will not go in the wrong direction. This insight underpins the changes he attempted to overcome the problems in his online course.

Anne's life trajectory as a CALL practitioner

A major difference between Anne and Toshi is that Anne is not really interested in new technologies outside her job, making her trajectory and its constraints and affordances quite different from Toshi's. Anne was first introduced to Japanese word-processing when she was a graduate assistant teaching Japanese in the late 1980s. However, she was unenthusiastic and even 'scared of technology': 'I'm really not that fascinated by technology, and don't really want to use it even today for much more than work.'

Anne's lack of interest in technology has shaped her trajectory and agency as a CALL practitioner in ways that distinguish her case from Toshi's. As illustrated in Figure 6 and detailed in Appendixes B and D, Anne's trajectory consists of three periods: 'getting started', 'up and down', and 'the role of new media instruction in higher education'. Unlike Toshi's trajectory, which has been very accommodating to technological development, Anne's life stages as CALL practitioner have been impacted by a broader range of social factors.

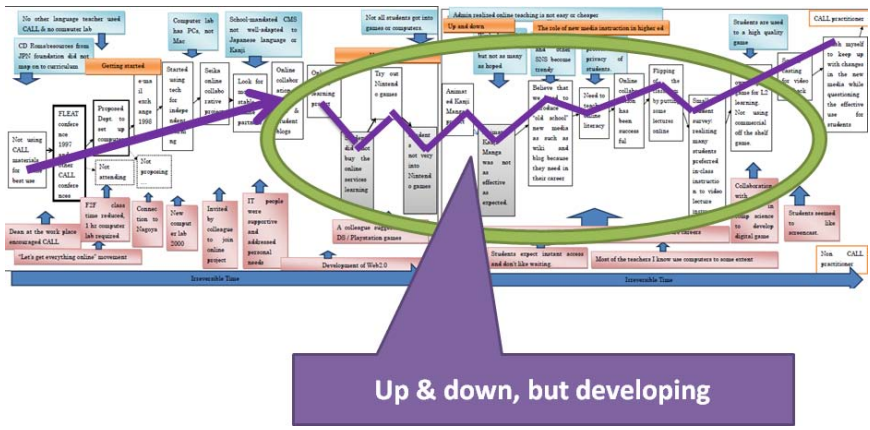

Figure 6: Anne's trajectory as a CALL practitioner, described with TEM

In the 'getting started' stage, despite her low interest in technology, Anne was provided with various social affordances to become involved in CALL in the late 1990s by the 'Let's get everything online' movement (as she calls it). The first college she taught at, in 1993, set up an Apple Mac computer to do Japanese word processing: 'A new dean in the mid-1990s was really into tech stuff himself and encouraged its use.' At the time, CALL was an emerging field,

and few second language education institutions or departments were interested in it. Moreover, the technological applications available were not user friendly, and one needed some technical skills and knowledge to actually apply them. In particular, systems for inputting Japanese characters caused problems, especially on PCs (Macs were more compatible with non-Roman alphabet input at that time) or in certain course management systems common in the late 1990s (e.g., WebCT).

However, Anne overcame these technical difficulties by making use of social affordances, for example by asking for help from IT staff and inviting a CALL professional as a guest speaker for faculty development. Attendance at the FLEAT (Foreign Language Education and Technology) conference and other CALL-related conferences around 1997 was her bifurcation point as a CALL practitioner: 'FLEAT in 1997 was particularly significant for me in terms of getting ideas for e-pals as well as more extensive and better ways to use CALL'. In fact, since then, Anne has started several collaborative online projects connecting her students and Japanese partners in various institutions.

As illustrated in Anne's TEM figure, her involvement in CALL increased sharply in the late 1990s and early 2000s. Unlike Toshi, Anne has managed technological constraints by making full use of available social affordances. 'I went to a fair number of CALL conferences, and usually got ideas from some other [context] not related to the Japanese language, and I took them and brought them back and found someone in IT or whatever to see if we could do the same kind of thing in Japanese. The people in IT are very supportive.'

However, in the late 2000s, Anne entered an 'up and down' stage where she implemented several CALL projects that turned out not to be as useful for her students as she had expected. Overall, she characterized her interest in CALL as follows:

> It flows in waves, as I get enthusiastic about a new application, use it, and then deal with the aspects that don't work or I don't like about it. But generally the trajectory is constantly moving forward, as I don't intend to stop trying new things with CALL, and slightly upward, as I learn from my mistakes and gain more experience.

Overall, as Anne became involved in a variety of CALL projects and practices, she gradually learned about the value of ICT for her students and the aspects that interest them, which has further assisted her development as a CALL practitioner more recently.

Anne's challenges (Anne's critical period)

Unlike Toshi, Anne's 'critical point' was not a particular event, but a series of up and down movements occurring in conjunction with CALL projects in the

middle stage of her CALL trajectory. Thus, it is better understood as a 'critical period' in which she struggled to figure out how to incorporate CALL in her Japanese classes.

For example, some of Anne's younger colleagues suggested that she buy Nintendo DS or PlayStation games in Japanese for pedagogical usage. However, she found that these commercial products were not effective for educational purposes because they were made for native speakers of Japanese and required a high level of Japanese literacy to play. Similarly, her attempts to implement 'flipped learning' (e.g., Pearson & The Flipped Learning Network, 2013) by providing online lecture videos and an animated Kanji Manga project made her realize that not all students are interested in the new media.

> not all kids are interested in games or computers, right? We just sort of assume they are, but they aren't. Some of them are not into technology as we think they are. What I have tried has been useful for some students. I keep looking for things that will be useful for all the students, that will be really great for everyone. Maybe that's impossible …. I just keep adding new stuff to my repertoire and looking around, hopefully finding different tools and using new technology to customize the curriculum according to what I think is best for my students.

Although Anne has been involved in various CALL projects, she has maintained a critical perspective on their value. She states:

> I'm aware that I am not able, because of financial constraints, my own shortcomings, and various other reasons, to fully exploit the potential of CALL, and this is frustrating. I therefore often question its value in the way that I use it. Does it contribute to the students' learning process? Is there a significant difference [compared to not using CALL]?

Unlike Toshi, Anne calls herself a 'follower, not a pioneer' in CALL, because she does not have strong technological skills. However, she is highly conscious of the social affordances and role of technology in her students' learning, and uses surveys to assess their opinions of each project rather than simply trying out a new technology without considering the implications. Through accumulated reflections on her CALL practices, Anne has discovered some differences between the technologies preferred in society in general and those preferred in Japanese classes; these are discussed below.

Anne's Development of Agency as a CALL Practitioner

Anne's professional identity as a CALL practitioner has been transformed with the development of ICT itself and of its social role over the last 16 years. This has greatly impacted on the social constraints and affordances of her CALL practice.

Until around 2000, Anne struggled to create a technologically ready environment to practice CALL because she had little technological background or personal interest in technology or new media. She went to a series of CALL conferences to get ideas for CALL practice and actively sought technological and financial assistance to do so from her colleagues and institution. As indicated in Appendix B, most of the social constraints and affordances in her 'getting started' period were technology related.

However, such technological problems were alleviated as the technology developed and became more capable of accommodating non-'techy' students, providing more varied and flexible approaches for different types of users. As technological difficulties receded, the responses of Anne's students to the new practices became the most critical aspect of her CALL practice. Through the series of CALL projects she instigated, she became aware of the differences between her students and society in general in terms of technology preferences. Her objective after the 'getting started' stage shifted from simply incorporating new technologies to ensuring that CALL actually aided students' learning.

Anne gradually became aware of her responsibility to address these gaps in preferred technology usage. One of the most salient was that popular technological applications (e.g., videogames) may not be useful for L2 learners, as mentioned above; another was the gap between her students' ICT skills/interest and the skills Anne felt they would need in their future careers.

> I also think it's increasingly important to introduce and encourage students to use applications they might not be familiar with, so I do try to incorporate some of the basic ones like blogging and wikis, which are different from Facebook or Snapchat or whatever most students are into now. (In my experience, the first time most students use a wiki or blog is in my class. At the beginning I took for granted that students would know how to work with these tools, but soon realized that specific instructions are required.) Trendy social media obviously has its place in their lives, but blogs and wikis and more 'old-school' new media might eventually have more significance and relevance in their personal lives and careers….

At present, Anne sees part of her role as introducing types of tools that students will need in their future careers. Through her series of CALL projects, Anne recognized the gaps that exist in values and beliefs around technology between the different subjects of a teaching activity (i.e., the students and teachers) and across social domains (e.g., between students and society in general). Her awareness of her responsibility as a CALL practitioner has promoted a transformation in her professional identity from 'introducer' of ICT to 'mediator' between these different values and beliefs.

Discussion

Our narrative data from two teachers who have experienced the last 16 years of the ICT revolution as CALL practitioners suggest both commonalities and differences in the challenges they faced and their responses. Both teachers encountered dissonances in the value(s) attached to ICT and skills, both between themselves and their students and also across social communities more broadly. For instance, the large gap in the level of technological skill and interest between them and their students raised the teachers' awareness that they needed to modify their values and reconsider their expectations towards ICT. As Tarone and Allwright (2005) point out, divergences between teachers' and students' beliefs are one of the most salient and immediate factors promoting change of teachers' beliefs.

As they and their students negotiated values and expectations related to ICT, Toshi and Anne recognized their mediating mission: to respond to tensions between communities caused by the emergence of new technology. Toshi felt obligated to fill the gap in technological skills between the teachers' community and the advanced ICT community, while Anne attempted to mediate differences between the ICT her students like and those they will need in their future work environments. Progress in Toshi and Anne's self-awareness as mediators initially occurred within the classroom but expanded across communities, a notable development in the emergence of strong agency on the part of these teachers.

These findings suggest an interesting relationship between ICT as a mediating artifact and teachers as subjects, a continuum that exists in their teaching activity as well as in the expanded interacting activity systems. Teachers need to improve the effectiveness of ICT use in their teaching by negotiating differences in the values around ICT held by themselves, their students, and the broader society where the students will be engaged in the future.

In their early period of ICT engagement, both teachers interviewed here got involved with CALL for their own reasons: curiosity and desire to do something new (Toshi) and the department head's encouragement (Anne). However, through their struggles to negotiate beliefs around technology and around the rapid growth of social attitudes around its value, the teachers became aware of tensions in these 'mediating artifacts' across the social domains of teaching activity (e.g., differences in ICT skills; in teachers' needs and students' needs; across related communities, such as the advanced ICT community to which Toshi belongs and the L2 teachers' community; and in college students' society and the society the students will enter in their future career). In this way, each teacher developed a sense of mission as a 'CALLer' through their struggles and experiences. As the teachers recognized the social nature of these technologies, they tacitly accepted the need to negotiate the

meaning of technology in their teaching contexts so as to innovate their practice and move forward as CALL practitioners.

Thus, how these teachers perceived ICT and incorporated it in their teaching practice, what experiences of CALL practice they had had, and how they interpreted the consequences differentiated their cognitive transformation. Such perceptions impact on both the teacher's role as CALL practitioner and his/her immediate social environment in turn. Toshi expects to use ICT as an innovative tool for online distance learning and sees his 'CALL mission' as providing technological assistance for his students and colleagues to address the gap in skills and knowledge. Anne, in contrast, initially focused on the technological affordances of ICT, but gradually acknowledged the importance of the social nature as a series of innovative CALL practices she implemented did not effectively satisfy her students' needs. With this realization, she finds that one of her roles as a teacher is to select and introduce useful IT tools to her students to help them survive in the digital age.

It is also crucial to note that these teachers' responsibility as CALL practitioners has emerged not from a single experience of CALL practice but rather as the accumulated outcome of active interactions with teaching contexts over 16 years. Both teachers' cognition has been shaped not simply by a single incident, but also by their subjectivity generated through premediated experiences (pertinent events occurring earlier) (Billet, 2006). Toshi recognized his students' low technological skills not during the online course, but after its cancellation, during the hybrid course. Similarly, Anne noticed her students' needs regarding ICT only as a result of the accumulation of a series of CALL activities. Each teacher's mission emerged through the various activities where teachers started to associate with each other, interpret their experiences, and build certain motives to re-shape and carry out activities (Leont'ev, 1983).

Each teacher's cognitive transformation was achieved differently at the ontogenetic level, influenced by their (micro) experiences and the (meso) frames through which they viewed those experiences. These teachers' different responses to new technology recall the notion of active appropriation (Valsiner, 1998): they do not simply reproduce practice and are not simply constrained by immediate social experience but rather adapt to novel circumstances. Toshi and Anne had critical times when they could have given up employing new technology, but they chose instead to refine and remake their pedagogical usage of it in context to redefine their teaching practice.

Unlike previous studies, this one has investigated teachers' development as CALL practitioners using a socially embedded analysis method. By examining transformations in practice using new technology and attitudes toward it within an activity system as well as in relation to personal trajectories, the present study illustrates the transformation in the teachers' practice as a process of emergence of agency.

In a recent revision of activity theory, Engeström (2009a) suggests that the emergence of agency be analyzed in terms of the notions of 'need, object and motive' (Leont'ev, 1978) and of contradictions in them. Similarly, teachers' awareness of the tensions in their teaching practice is crucial in enacting their agency. Through involvement with CALL, teachers become aware not simply of new styles of teaching and learning with ICT but also of contradictions in the values surrounding new technology between and across teaching communities. Negotiations take place in view of the different expectations of the technology that are maintained by teachers and students, and communities related to the students' future careers urge the teachers to maintain a sense of mission as mediators.

As always with case studies, the responses of these two teachers and their implications are unique to their particular contexts and are non-generalizable. Nevertheless, the data seem to illustrate that ICT is social and to show that the way the technology is perceived by the community (or communities) each teacher is located in impact on how they mediate and adapt it to their teaching practice. Also, the fact that the teachers who were the focus of the present study are both in socioeconomically stable positions (tenured or on a tenure track at an early age) and have 'legitimacy of access to practice' (Wenger, 1998; Tsui, 2007) in their professional communities (as full-time faculty members) affects the number and type of options available to them. If these teachers were in more marginalized positions (Varghese, Morgan, Johnston, & Johnston 2005), their support or recognition by the community as innovative teachers would likely be restricted and the development of their agency might have been more complicated.

Implications for L2TE

By shedding light on socially salient changes related to new technology and media, the present study addresses the social mediatedness of the transformation in L2 teachers' practice and the attitudes that relate to this transformation. The findings suggest that what promotes teachers' transformation in accord with social change is not only the change itself but also how it is perceived and reflected in practice in ways that reflect the differences within and across communities. Like ICT, other socially mediated human activities (e.g., language ideologies, national language and education policies; Cross, 2010) are also crucial aspects of L2 teaching practice that teachers may need to negotiate.

The current approach to CALL in L2TE programs, conferences and workshops has focused on introducing new technological skills and innovative practices. However, as Garrett (2009) notes in her review of technology in L2 learning, shifting views of the technological potential of these tools – from assisting teachers' instruction to supporting students' learning – are becoming

apparent. This change is reflected in Toshi's and Anne's data discussed here. At the beginning of their CALL careers, both teachers expected ICT to powerfully affect their teaching, but only through critical incidents did they realize the need to consider the contextual aspect of ICT and tailor programming to students' needs and expectations of new technology.

To implement ICT in teaching practice, the teacher needs to analyze and understand the context as well as the current technological options. As concepts of language competency vary among linguists and L2 teachers (e.g., a focus on 'language form' vs. 'language function and use') and influence their teaching approaches, how a teacher perceives a technology impacts on how he or she incorporates it, and may also compromise the teacher's agency in turn. Thus, it may be crucial for in-service teachers to reflect critically on their CALL practice and for pre-service teachers to acknowledge their varied potential trajectories regarding CALL and to become aware of the contextual nature of L2 learning technologies.

Methodological Implications

TEA has only recently been applied from cultural psychology to L2 learning and L2 teacher education, and the present study may thus play a pioneer role in introducing the approach. The present findings suggest some advantageous aspects of TEA for the analysis of narrative inquiry into teachers' sociocognitive development. One is that TEA can identify social constraints and affordances at specific points in time and thus illustrate how these points in one's life are influenced at various levels by social moves and choices about which way to move.

The other beneficial aspect of TEA is that by tracing the life trajectory with a timeline, TEA shows how teachers' actions and perceptions shift: not suddenly, but as a result of the accumulated outcomes of experiences. As mentioned above, in order to capture cognitive transformation due to the collected consequences of interaction between teachers and their teaching contexts, the traditional method exploring immediate experience may not be adequate to capture how previous experience impacts on later experience as change emerges over time. From this perspective, incorporation of TEA into an activity theory framework can enrich our understanding of how teachers' practice and cognition transform over time and how they are the result of the relevant prior experiences.

Thus, we see that TEA is capable of identifying the critical points which may have an impact on change at the ontogenetic level. However, the relationship between the microgenetic and ontogenetic level, as embodied in processes at the mesogenetic level, had not been theoretically explained in previous research. To address this issue, the present study incorporated activity theory

to broaden the scope of interpretation by identifying what actually promotes or requires one's transformation at a critical point or in response to a critical event. In the present case, by identifying contradictions and tensions within teaching practice that correspond to the emergence of ICT, the data have clarified which aspects of these changes actually foster cognitive transformation in teachers. With the addition of a strong account of the relationship between the individual and social agency as depicted in the local activity system, TEA may become even more capable of precisely addressing cognitive transformation across one's lifespan.

TEA may also be profitably applied to reflective practice in L2TE. A number of studies focusing on teachers' cognition from an SCT perspective address the role of reflection (e.g., Farrell, 2007; Freeman, 1996; Singh & Richards, 2006), but one recent study (Miller, 2009) further proposes a need for 'critical socio-cultural reflection' that considers the role of not simply personal but also institutional and social aspects in shaping one's experience. Teachers' professional trajectories can be visualized with TEA on the basis of their discourse with peers or mentors, helping them reflect and understand how their teaching and learning beliefs have been (re-)formed over their lives under the guiding and promoting influence of social and contextual factors.

Conclusion

This study shows how a newly emergent cultural artifact (ICT) influenced the development of teachers' agency through their recognition of their own new role in relation to technology as that role emerged: namely, the role of a mediator responsible to fill the gaps in value around and knowledge of new technologies across communities.

What is striking across the different trajectories of the CALL teachers considered here and their social responsibilities as reflected in those trajectories is that the teachers' perceptions of the affordances of ICT not only shape their pedagogical use of it, but also, in turn, differentiate their mediating roles in their local communities. This finding suggests the crucial nature of the interdependent relationship between the individual and social agency. The teachers in the present study have not simply been obeying social constraints and affordances: they actively understand the meaning of new technologies each in their own way and adapt their practices to their immediate environments; and in the process, they develop an articulated picture of their role as a CALL teacher in society.

By tracing the development of these two teachers along with technological and social developments in ICT over the last 16 years, this study reaffirms that communication and learning tools are not static but constantly modified and context dependent in nature, and that practicing CALL teachers

who have noticed these characteristics of them actively seek corresponding actions. The data further suggest that this realization and the related conceptual development not only take place on a broad level and in a socioculturally driven way, but gradually emerge through accumulated experiences, experiments, and reflections in the face of micro-level contradictions within one's teaching practice, and therefore may not be captured adequately in a simple concept building analysis. Although critical thinking skills like these have been less emphasized in CALL teacher education compared to the introduction of eye-catching high-tech applications, the development of such skills will play a crucial role in supporting teachers' development in the digital age. Future studies should be conducted to investigate teachers' transformations in relation to various types of social, cultural, and historical change, over a lifetime, in order to fully reveal the process of the emergence of teachers' agency, enriching our understanding of the development of L2 teachers and teachers in general.

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References

Ahearn, M. L. (2001). Language and agency. *Annual Review of Anthropology*, 30, 109–137. http://dx.doi.org/10.1146/annurev.anthro.30.1.109

Ahn, K. (2011). Learning to teach under curricular reform: The practicum experience in South Korea. In K. E. Johnson & P. R. Golombek (Eds), *Research on Second Language Teacher Education: A Sociocultural Perspective on Professional Development,* 239–253. New York: Routledge.

Alsup, J. (2006). *Teacher Identity Discourses: Negotiating Personal and Professional Spaces*. Mahwah, NJ: Lawrence Erlbaum Associates.

Belz, J. A., & Müller-Hartmann, A. (2003). Teachers as intercultural learners: Negotiating German–American telecollaboration along the institutional fault line. *The Modern Language Journal*, 87 (1), 71–89. http://dx.doi.org/10.1111/1540-4781.00179

Bergson, H. (1910). *Time and Free Will: An Essay on the Immediate Data of Consciousness* (F. L. Pogson, Trans.). London: George Allen and Unwin.

Billett, S. (2006). Relational interdependence between social and individual agency in work and working life. *Mind, Culture, and Activity,* 13 (1), 53-69. http://dx.doi.org/10.1207/s15327884mca1301_5

Charmaz, K. (2008). Constructionism and the grounded theory. In J. A. Holstein & J. F. Gubrium (Eds), *Handbook of Constructionist Research,* 397–412. New York: The Guilford Press.

Cross, R. (2010). Language teaching as sociocultural activity: Rethinking language teacher practice. *The Modern Language Journal*, 94 (3), 434–452. http://dx.doi.org/10.1111/j.1540-4781.2010.01058.x

Engeström, Y. (1987). *Learning by Expanding: An Activity-theoretical Approach to Developmental Research*. Helsinki: Orienta-Knosultit. Retrieved 15 March 2014, from <http://lchc.ucsd.edu/mca/Paper/Engestrom/expanding/toc.htm>

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R.-L. Punamaki-Gitai (Eds), *Perspectives on Activity Theory: Learning in Doing,* 19–38. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511812774.003

Engeström, Y. (2009a). The future of activity theory: A rough draft. In Sannino, A., Daniels, H., & Gutierrez, K. (Eds), *Learning and Expanding with Activity Theory,* 303–328. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/cbo9780511809989.020

Engeström, Y. (2009b). From learning environments and implementation to activity systems and expansive learning. *An International Journal of Human Activity Theory,* 2, 17–33.

Farrell, T. (2007). *Reflective Language Teaching: From Research to Practice*. London: Continuum.

Feryok, A. (2008). An Armenian English language teacher's practical theory of communicative language teaching. *System*, 36 (2), 227–240. http://dx.doi.org/10.1016/j.system.2007.09.004

Feryok, A. (2012). Activity theory and language teacher agency. *The Modern Language Journal*, 96 (1), 95–107. http://dx.doi.org/10.1111/j.1540-4781.2012.01279.x

Freeman, D. (1996). The 'unstudied problem': Research on teacher learning in language teaching. In D. Freeman & J. Richards (Eds), *Teacher Learning in Language Teaching,* 351–378. Cambridge: Cambridge University Press.

Garrett, N. (2009). Computer-assisted language learning trends and issues revisited: Integrating innovation. *The Modern Language Journal*, 93, 719–740. http://dx.doi.org/10.1111/j.1540-4781.2009.00969.x

Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicago, IL: Aldine Publishing Company.

Haupt, R., Kloyer, M., & Lange, M. (2007). Patent indicators for the technology life cycle development. *Research Policy* 36 (3), 387–398. http://dx.doi.org/10.1016/j.respol.2006.12.004

Johnson, K. E. (2009). *Second Language Teacher Education: A Sociocultural Perspective*. New York: Routledge.

Johnson, K. E., & Golombek, P. R. (Eds.). (2011). *Research on Second Language Teacher Education: A Sociocultural Perspective on Professional Development*. New York: Routledge.

Lantolf, J. P. (Ed.). (2000). *Sociocultural Theory and Second Language Learning.* Oxford: Oxford University Press.

Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural Theory and the Genesis of Second Language Development.* Oxford: Oxford University Press.

Leont'ev, A. N. (1978). *Activity, Consciousness, and Personality*. Englewood Cliffs, NJ: Prentice Hall.

Leont'ev, A. N. (1981). The problem of activity in psychology. In J. V. Wertsch (Ed. & Trans.), *The Concept of Activity in Soviet Psychology,* 37–71. New York: M. E. Sharpe.

Leont'ev, A. N. (1983 [1975]). Activity, consciousness, personality. In *Selected Psychological Works* (V. Davydov, V. Zinchenko, A. A. Leontiev, & A. Petrovskij, Eds.); Vol. 2, 94–231. Moscow: Pedagogika.

Miller, J. M. (2009). Teacher identity. In A. Burns & J. C. Richards (Eds), *The Cambridge Guide to Second Language Teacher Education,* 172–181. Cambridge: Cambridge University Press.

Pearson & The Flipped Learning Network (2013). *Flipped Learning Professional Development*. Retrieved from http://www.pearsonschool.com/flippedlearning

Pavlenko, A. (2007). Autobiographic narratives as data in applied linguistics. *Applied Linguistics*, 28 (2), 163–188. http://dx.doi.org/10.1093/applin/amm008

Sannino, A., Daniels, H., & Gutiérrez, K. (Eds). (2009). *Learning and Expanding with Activity Theory*. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511809989

Sato, T. (2013). Shitsu-teki kenkyu to human computer interaction no yutaka na setten to mirai e mukete [Towards the enriched point of contact and future between the qualitative research and human computer interaction]. *The Human Interface*, 15, 303–308.

Sato, T., Hidaka, T., & Fukuda, M. (2009). Depicting the dynamics of living the life: The trajectory equifinality model. In J. Valsiner, P. Molenaar, M. Lyra, & N. Chaudhary (Eds), *Dynamic Process Methodology in the Social and Developmental Sciences,* 217–240. New York: Springer. http://dx.doi.org/10.1007/978-0-387-95922-1_10

Sato, T., Yasuda, Y., Kanazaki, M., & Valsiner, J. (2014). From describing to reconstructing life trajectories: How the TEA (Trajectory Equifinality Approach) explicates content-dependent human phenomena. In Wagoner, B. Chaudhary, N & Hviid, P. (Eds), *Cultural Psychology and its Future: Complementarity in a New Key*. Charlotte, NC: Information Age.

Schroots, J. J. F., & Ten Kate, C. A. (1989). Metaphors, aging and the life-line interview method. In D. Unruh & G. Livings (Eds), *Current Perspectives on Aging and the Life Cycle: Vol. 3, Personal History Through the Life Course,* 281–298. London: JAI Press.

Shelley, M., Murphy, L., & White, C. J. (2013). Language teacher development in a narrative frame: The transition from classroom to distance and blended settings. *System*, *41*, 560–574. http://dx.doi.org/10.1016/j.system.2013.06.002

Singh, G., & Richards, J. (2006). Teaching and learning in the language teacher education course room: A critical sociocultural perspective. *RELC Journal*, 37 (2), 149–175. http://dx.doi.org/10.1177/0033688206067426

Stetsenko, A., & Arievitch, I. M. (2004). The self in cultural-historical activity theory. *Theory & Psychology*, 14 (4), 475–503. http://dx.doi.org/10.1177/0959354304044921

Tasker, T. (2011). Teacher learning through lesson study: An activity theoretical approach toward professional development in the Czech Republic. In K. E. Johnson & P. R. Golombek (Eds), *Research on Second Language Teacher Education,* 204–221. New York: Routledge.

Thorne, S. L. (2003). Artifacts and cultures-of-use in intercultural communication. *Language Learning & Technology*, 7 (2), 38–67.

Tsui, A. B. M. (2007). Complexities of identity formation: A narrative inquiry of an EFL teacher. *TESOL Quarterly*, 41 (4), 657–680.

Valsiner, J. (1998). *The Guided Mind: A Sociogenetic Approach to Personality.* Cambridge: Harvard University Press.

Valsiner, J. (2007). *Culture in Minds and Societies*. New Delhi: Sage.

Valsiner, J., & Sato, T. (2006). Historically Structured Sampling (HSS): How can psychology's methodology became tuned in to the reality of the historical nature of cultural psychology? In J. Straub, D. Weidemann, C. Kolbl, & B. Zielke (Eds), *Pursuit of Meaning. Advances in Cultural and Cross-cultural Psychology,* 215–251. Bielefeld: Transkript. http://dx.doi.org/10.14361/9783839402344-010

van Lier, L. (2008). Agency in the classroom. In J. P. Lantolf & M. E. Poehner (Eds), *Sociocultural Theory and the Teaching of Second Languages,* 163–186. London: Equinox.

Varghese, M., Morgan, B., Johnston, B., & Johnson, K. A. (2005). Theorizing language teacher identity: Three perspectives and beyond. *Journal of Language, Identity, & Education*, 4 (1), 21–44. http://dx.doi.org/10.1207/s15327701jlie0401_2

Vygotsky, L. S. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed. & Trans.), *The Concept of Activity in Soviet Psychology,* 144–188. New York: M. E. Sharpe.

Vygotsky, L. S., & Luria, A. R. (1993). *Studies on the History of Behavior: Ape, Primitive, and Child* (V. I. Golod & J. E. Knox, Trans.). Hillsdale, NJ: Erlbaum.

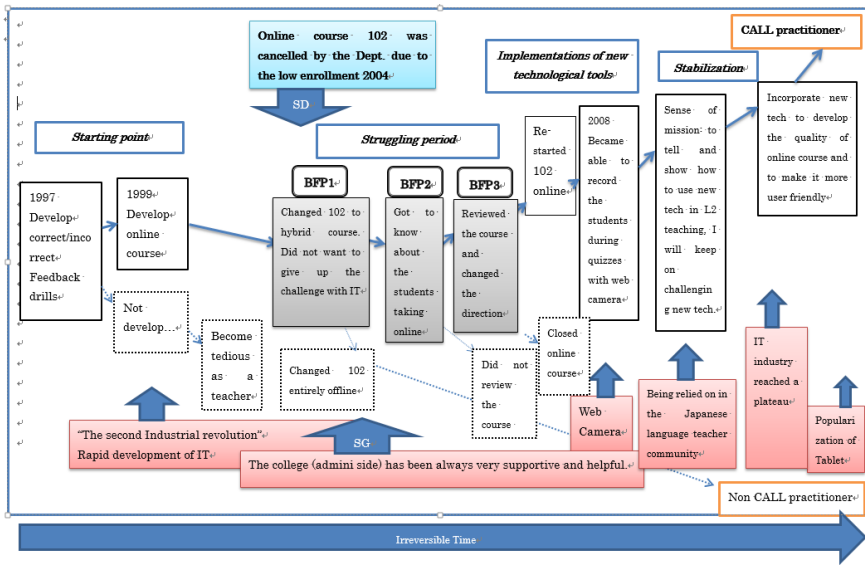
Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identities*. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511803932

Yasuda, Y., & Sato, T. (2012). *TEM de wakaru jinsei no keiro: Shitsu-teki kenkyu no shin tenkai* [Understanding life trajectory with trajectory equifinality model: A new perspective in qualitative research]. Tokyo: Seisho Shobo.

Zittoun, T., Valsiner, J., Vedeler, D., Salgado, J., Gonçalves, M. M., & Ferring, D. (2013). *Human Development in the Life Course: Melodies of Living*. Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9781139019804

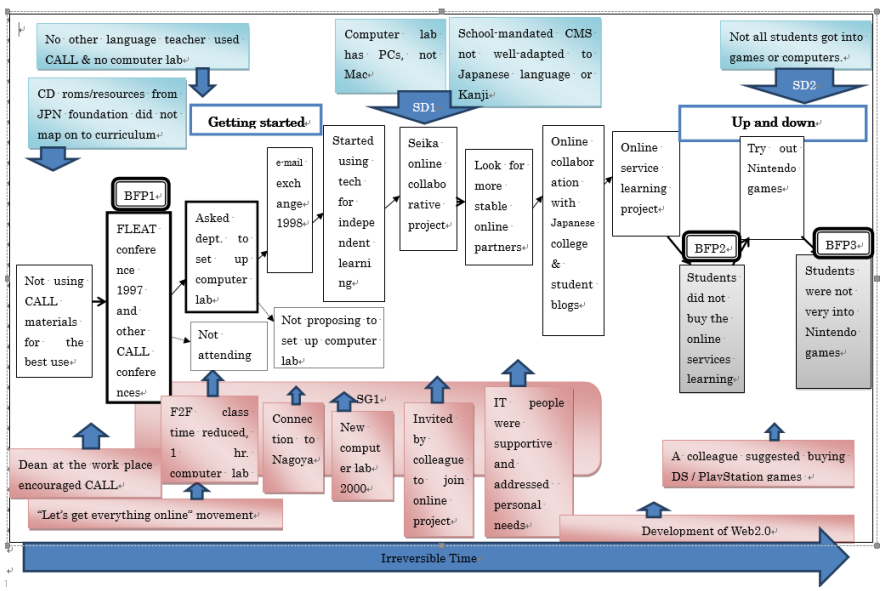
Appendix A

Toshi's trajectory as a CALL practitioner, described with TEM in detail

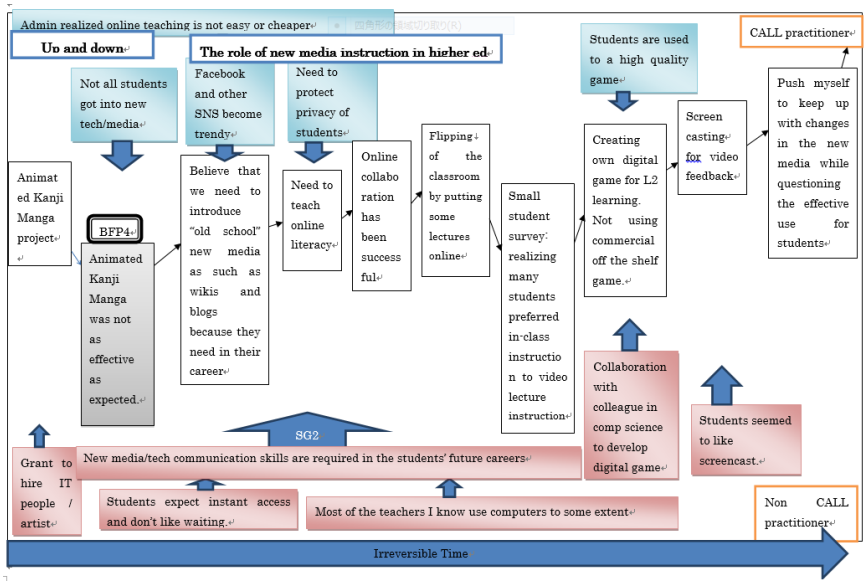


Appendix B

Anne's trajectory as a CALL practitioner, described with TEM in detail (first half)



Anne's trajectory as a CALL practitioner, described with TEM in detail (second half)



Appendix C

Summary of key-terms in Toshi's TEM

Key-terms in TEM	*In Toshi's TEM*
EFP (Equifinality Point)	Being a CALL practitioner
P-EFP (Polarized Equifinality Point)	Not being a CALL practitioner
BFP (Bifurcation point)	BFP1: Changed online course to hybrid course BFP2: Recognized the students' low level of tech interest and skill BFP3: Revised the online course
VT (Value Transformation)	Realized the gap in tech skills and expectations between himself and his students
SD (Social Direction)/ SG (Social Guide)	SD: Online course cancelled due to low enrollment SG: College administration was very supportive and helpful

Appendix D

Summary of key-terms in Anne's TEM

Key-terms in TEM	*In Anne's TEM*
EFP (Equifinality Point)	Being a CALL practitioner
P-EFP (Polarized Equifinality Point)	Not being a CALL practitioner
BFP (Bifurcation point)	BFP1: Attendance at FLEAT conference BFP2-4: Students were not interested in the CALL practices Anne developed
VT (Value Transformation)	Realized teacher needs to carefully select the appropriate ICT tool for students
SD (Social Direction)/ SG (Social Guide)	SD1: Tools were not well adapted to Japanese language SG1: Tech support and faculty collaboration SD2: Not all students were interested in tech stuff SG2: Tech skills are becoming not optional, but mandatory in society