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Making a case for Cultural Historical Activity Theory: Examples of CHAT in practice

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Abstract

This paper argues that Cultural Historical Activity Theory (CHAT) provides a practical framework for theory-based research into Technology Enhanced Learning (TEL). Far from being inaccessible, CHAT provides researchers with the concepts, language and tools to create meaningful and manageable data sets that allow insights into complex social situations such as education. Within the context of a pre-university English language program at a Federal institution in the United Arab Emirates (UAE), the paper describes two recent examples of the author’s research into laptop-mediated English language classrooms using CHAT as the theoretical framework. The paper then goes on to describe a theory-based intervention currently in progress that has grown out of the two examples described. This paper aims to demonstrate that theory and practicality need not be separate. CHAT can be used to guide and design research into not only innovation and best practice in TEL but also the actual day-to-day realities of technology usage in real classroom settings, bringing much-needed criticality to the field. The paper concludes by arguing that CHAT can also provide a framework to drive theory-based interventions via the Change Laboratory. Through CHAT, findings from theory-based research need not remain at a conceptual level but can actually be used to create concrete solutions to problems and actual improved educational practice and policy.

1. Introduction

The wider view in education is one that has seen the introduction of technology to the classroom as both desirable and beneficial (John & Wheeler, 2015; Livingstone, 2012; Scanlon & Issroff, 2005). Research, while recognising challenges, has focussed on the positive impact of classroom technology (Al-Khatib, 2011; Carver, 2016; Hwang & Wu, 2014). In the UAE, studies have also focussed on the positive, particularly in terms of second language learners' writing abilities (Mokhtar, Al Bustami, & Elnimeiri, 2009; Raddawi & Bilikozan, 2018; Tubaishat & Bataineh, 2009), while studies in the USA have also reported benefits in 1:1 laptop initiatives (Grimes & Warschauer, 2008; Park & Warschauer, 2016). Practical implementations have been favoured over theory-driven research, falling prey to what has been described as 'hype and excitement' (Bennett & Oliver, 2011), evident in the UAE during the launch of the iPad initiative in 2012 (Cavanaugh, Hargis, Kamali, & Soto, 2013b; Cavanaugh, Hargis, Munns, & Kamali, 2013a; Hargis, Cavanaugh, Kamali, & Soto, 2014). This state of affairs has cast doubts on the credibility of Technology Enhanced Learning (TEL) as a serious field in terms of academic research. The 'state-of-the-art' has been championed over the 'state-of-the-actual' (Selwyn, 2011).

However, more recently there has been an increase in critical research that problematizes the claims of education technology. Such research no longer risks being labelled as dystopian (Castañeda & Selwyn, 2018). Scholars recognise that this increased criticality needs to be underpinned by strong theoretical frameworks (Jameson, 2019; Passey, 2019) yet many studies make only vague use of or remain wholly bereft of theory (Hew, Lan, Tang, Jia, & Lo, 2019).

This paper aims to address both the need for strong theoretical frameworks and also increased criticality. It argues that a framework to achieve both already exists in Cultural Historical Activity Theory (CHAT). CHAT allows the researcher to move away from a techno-centric perspective and examine instead the complex interrelations of the context where the technology is employed (Murphy & Rodriguez-Manzanares, 2008). Furthermore, CHAT's principle of contradictions allows for critical analysis and identifies opportunities for transformation. The concept of expansive learning can then move abstract ideas to actual concrete practice. This paper will first give a theoretical overview of CHAT. It will then go on to describe the principle of contradictions and the concept of expansive learning. It will then describe two projects that used CHAT as their theoretical framework, and will also describe a third theory-based

intervention currently in process. All three projects have taken place in a pre-university English language course in the United Arab Emirates (UAE).

2. An overview of cultural historical activity theory

Once described as 'the best kept secret in academia' (Engestrom, 1993, p. 64), CHAT is a framework that allows the researcher to consider the entire context in which technology is being used. It has a 'utility for enquiry' (Bligh & Flood, 2017, p. 138) in that it 'provides a language and conceptual toolkit' (Hopwood & Stocks, 2008 in Bligh & Flood, 2017) to describe and analyse 'complex social situations such as education' (Murphy, 2013, p. 45). Rather than focussing solely on the instrument, for example iPads or laptops, or the user (teachers, students etc.), CHAT allows the researcher to consider all the elements or nodes that are working together and also the relationships between them. This is an important strength of CHAT as a research tool. Vygotsky (1986, p. 4) uses the example of a student trying to discover why water extinguishes fire. If the student looks at the elements alone it does not make sense. Hydrogen is flammable, while oxygen sustains fire. The extinguishing qualities of water are lost when you tear the system into components (Virkkunen, 2013, p. 31). Similarly, we cannot truly understand how technology is being used in education by considering isolated elements. Each element, and the complex relationships between them, needs to be considered instead in terms of the whole context. In CHAT, this context is known as the activity system, and complete activity systems are the unit of analysis. A unit could be a team working on a project, it could be a department or an institution. It could be a social practice or even a social system. Whatever its size or scope, the unit can be represented by the activity system in Figure 1.

Figure 1. The activity system (adapted from Engeström, 1987/2015)

Figure 2. The activity system as a node in a network of activity systems (based on Engeström, 1987/2015)

The activity system diagram represents human activity. All human activity is social and has an object with intended outcomes. The relationship between the subject – the individual or group – and their achievement of this object is mediated by instruments or tools. A tool can be physical, for example a hammer. A tool can be a concept or theory. They can also be social others, a more knowledgeable other who possesses knowledge the subject does not that can assist in attainment of the object. The subject is part of a community, and the relationship between the subject and the community is mediated by rules. Meanwhile, the relationship between the community and the object is mediated by the division of labour. Ultimately all the elements, or nodes, of the activity system have influence upon the object of that activity and intended successful outcome.

Let us take the example of a classroom, taking teachers as the subject. The object of the teacher is to teach students, the success of which is often measured by students passing standardised tests. To achieve this object, teachers use tools. They may use devices such as iPads or laptops with eTextbooks and other applications. They use pedagogy and teaching techniques drawn from training and experience and will also use ideas from peers acting as more knowledgeable others. The teachers are not working in isolation, but are part of a community including students, parents and

management. There are rules governing the classroom and school, and expectations in and out of the class over division of labour. All the nodes of the teachers' activity system are related and influence the students' learning, the intended outcome of the activity.

Activity systems themselves do not exist in isolation, but are in fact a node among several interdependent systems. Remaining with the example of a school, the central activity is focussed on student learning. However, there are dependent activity systems for each element of the central system as shown in Figure 2.

The object-activity is actual classroom teaching. The subject-producing activity is teacher training, while instrument-producing activity is the production of teaching materials such as textbooks etc. Rules are produced externally, often by school management, boards of governors and ministries of education. There are also culturally more advanced versions of the central activity. For example, developing nations may look to established education systems and base their own systems on those, drawing ideas to improve their current practice.

Separate systems can also have potentially shared objects. Both teachers and students, for example, partially

share the goal of knowledge creation. This goal is likely shared by management as well, one would hope. This is illustrated in Figure 3.

Figure 3. Potentially shared object

3. The principle of contradictions

If knowledge creation is the intended outcome of education activity systems, then failure and attrition are the unintended outcomes. Unintended outcomes signal the presence of contradictions.

Contradictions are disruptions in the activity system. The introduction of a new tool, for example a classroom device such as tablet computers, can cause a contradiction, as could the introduction of new rules, or changes in community expectations. Activity theory and activity systems analysis enables the identification and labelling of the contradictions, which can in turn enable those experiencing the contradictions to attempt to overcome them.

Systemic contradictions take four forms:

- *Primary contradictions* that occur within one element of the system.
- *Secondary contradictions* that occur between elements of the system.
- *Tertiary contradictions* occurring between systems and the attempt to apply a new model.
- *Quaternary contradictions* between neighbouring activity systems.

(Engeström, 1987/2015 in Bligh & Flood, 2015)

Engeström and Sannino take this further, arguing against the danger that ‘contradiction becomes another fashionable catchword with little theoretical content and analytical

power’ (Engeström & Sannino, 2011, p. 368). They identify four ways in which subjects can experience contradictions, shown in Table 1.

Table 1. Dilemmas, conflicts, critical conflicts and double binds (adapted from Engeström & Sannino, 2011)

dilemmas	An expression or exchange of incompatible evaluations between people or an individual’s discourse, typically reproduced rather than resolved.
conflicts	These take the form of resistance, disagreement, argument and criticism. Resolution typically means compromise or submitting to authority.
critical conflicts	These cannot be resolved by the subject alone, and involve feelings of guilt, inner doubt that are emotionally and morally charged. Resolution often involves emancipation and liberation.
double binds	Subjects facing pressing and equally unacceptable alternatives with seemingly no way out. Resolution requires practical transformation.

The different experiences of contradictions can be identified by linguistic clues. Dilemmas are commonly expressed as hedges and hesitations. Conflicts manifest linguistically as disagreement, such as “No” and direct expressions such as “I disagree”. Critical conflicts are signposted by personal, emotional and morally charged accounts, while double binds occur in the form of ‘rhetorical questions indicating a cul-de-sac’ (Engeström & Sannino, 2011, p. 374).

4. Expansive Learning

Once contradictions have been identified, the subjects of an activity system can attempt to resolve them. This takes place through expansive learning. Expansive learning is a bottom up process that takes ideas from the abstract to concrete implementation. This is a cyclical process that moves through seven stages, although the process is not strictly linear and stages can be cycled back to or even dropped during the process. The seven stages are:

1. **Questioning accepted practice and wisdom.** Current accepted practices are rejected.
2. **Analysing the situation.** The group investigates and represents the structure and history of the present situation.

3. **Modelling.** A new model is proposed and potential solutions suggested.
4. **Examining the new model.** The group works with the new model, either in discussion or practice, in order to understand it better.
5. **Implementing the model.** The model is applied practically, becoming more concrete as this progresses.
6. **Reflection and evaluation.** The group evaluates the new practice, critiquing and identifying further modifications.
7. **Consolidation.** The group attempts to embed the new practice in stable form.

(Bligh & Flood, 2015; Engeström, 2016)

Activity systems are in fact in a state of almost constant evolution. As contradictions occur, subjects attempt to overcome them. This leads to the adoption of new tools, new rules and so on, and activity systems evolve. In this sense all activity systems are the offspring of historical systems, a culturally more advanced version of the previous system. The process of expansive learning is commonly applied by researchers through direct intervention known as the Change Laboratory.

I will now go on to describe in detail two projects that took place using CHAT as their theoretical framework, before going on to describe an actual intervention Change Laboratory currently in progress at the time of writing.

5. The context

The projects took place in laptop-mediated English language classrooms at a Federal institution in the United Arab Emirates (UAE). Degree programs in the UAE are largely taught in English, and in order to enter directly to an undergraduate program students need to score the equivalent of an International English Language System (IELTS) band 5.0 on a national English proficiency test, the EmSAT. Students who fail to achieve this can enrol in a one-year pre-sessional English course. All students have laptops, materials are 100% online and delivered through a learning management system. All assessment is online. Although delivery is laptop-mediated, all classes actually take place in a face-to-face environment.

In both projects it is important to recognize that I was very much an insider to the research site as a teacher at the institution in question. There were of course advantages

to this. As an actor situated within the research site I was already immersed in the organization and already possessed a level of understanding that could take an external researcher a prohibitively long time to acquire (Brannick & Coghlan, 2007; Unluer, 2012). While it was necessary to consider possible drawbacks, such as over assumption and role duality, the benefits of established intimacy outweighed the disadvantages.

The institution where the research took place has a long history of incorporating technology in the classroom. Laptops were introduced to the pre-sessional English course in 2010. In 2012, all students and teachers were required to use iPads. With over 14000 people involved across the UAE this was the largest device initiative in the world at the time and was expected to revolutionise teaching and learning (Miles, 2019). In 2017 classes returned to laptops as the classroom device of choice.

Both projects grew out of a concern that despite the heralded benefits of TEL and the enthusiasm of the institution, pass rates were falling and attrition among students was growing year on year. This can be seen in Figure 4.

Figure 4. Pass, attrition and fail rates 2015 - 2018

If the number of students not succeeding – either through failure or through withdrawal is combined, the picture is even bleaker. See Figure 5.

More students, approximately 50%, were failing to succeed than were actually passing. As an education professional this is a situation I cannot accept – I needed to find out why before seeking possible solutions to what is a very real problem for a large number of students condemned to academic failure before even starting a degree program.

Figure 5. Pass and total fail/withdrew rates

6. Project 1: identifying the contradictions in the technology enhanced language classroom

My previous research in the same context had focused solely on the classroom devices (Miles, 2019) or on the teachers (Miles, 2017b). I had become dissatisfied with examining the elements in isolation, and felt that the use of technology in the classroom was being influenced by multiple factors beyond both the devices and teachers themselves. CHAT seemed to provide the answer as it would allow me to consider the context – the activity system itself – as a whole. CHAT also provided the language to describe this whole, and a theoretical underpinning to both the research design and analysis.

The project was based around the following research question:

RQ1: What contradictions are experienced by English language teachers in a laptop-mediated federal Foundation programme in the UAE?

Activity theory is a framework for qualitative research, and therefore qualitative research methods, in this case focus group and individual interviews, were chosen. The focus groups consisted of three teachers each, and my previously mentioned insider status helped inform the selection of each group. All members had at least 5 years teaching experience in the region, and at least one year in the research site. The focus groups also reflected the diverse multicultural nature of the UAE's teaching population, including members from the UK, USA, Australia, Colombia and Jordan. All members were granted pseudonyms. Two further teachers were chosen for individual interviews in order to broaden the data

collected. The focus groups and individual interviews formed the primary source of data. Member checking of initial results was employed to enhance the trustworthiness of the results.

6.1 Focus group interviews

In order to discover the contradictions it was necessary to create an interview protocol that would examine all the elements of the activity system and also the mediation between them. For this reason I decided to adapt Marken's (2006) six step interview protocol, itself an adaptation of Mwanza's eight-step-model (2002). The original six step protocol can be seen below in Table 2.

Table 2. Marken's interview protocol (Marken, 2006)

What <i>tools</i> do the <i>subject</i> use to achieve their <i>objective</i> and how?
What <i>rules</i> affect the way the subjects achieve their <i>objective</i> and how?
How does the <i>division of labour</i> influence the way the subjects satisfy their <i>objective</i> ?
How does the <i>tools</i> in use affect the way the <i>community</i> achieves the <i>objective</i> ?
What <i>rules</i> affect the way the <i>community</i> satisfies their <i>objective</i> and how?
How does the <i>division of labour</i> affect the way the <i>community</i> achieves the <i>objective</i> ?

The six step protocol as presented in Table 2 had the potential to cause issues due to terminology as the participants may not understand what is meant by the terms in italics. I therefore broke each question down into sub questions in plain language. An example can be seen in Table 3.

The interviews were also artefact mediated. The group members brought their laptops, and opened the learning management system for that teaching week. The group were then prompted to describe how they were using those materials. The discussions quickly became animated, and rather than rigidly stick to the protocol the interviews became semi-structured. However, the six points of the interview protocol were covered by both groups. The interviews were recorded and transcribed verbatim.

Two individual interviews also took place by email. These occurred as an 'interview to the double' (ITTD). Teachers were asked to write a monologue as if instructing a double

Table 3. Actual interview protocol example with prompts

Question
What <i>tools</i> do the <i>subject</i> use to achieve their <i>objective</i> and how?
Why are you teaching the students? What's your purpose?
<i>Is that all? Nothing else?</i>
<i>Look at BB – go through each item under Theme 1.</i>
How would you use....? Talk me through how you would deliver this to students.
Is there anything you would adapt?
Is there anything you wouldn't use / that wouldn't work? Why?
Is there anything missing or anything you would add? What?
Influence of the laptop.
Influence of LMS.

to take their place in the classroom (Lloyd, 2014; Nicolini, 2009).

This is the actual question asked for the ITTD:

Imagine you are going to train a 'double' to take your place tomorrow. It is very important that your colleagues, students and management do NOT detect the double as an imposter, so you must provide them with as much information as possible. The double looks – and sounds – exactly like you.

Now, I want you to imagine you are teaching this double all the things they will need to know to replace you at work tomorrow, specifically in the classroom, without arousing suspicion and being exposed as an imposter.

What will you tell them?

Originally the ITTDs were scheduled to take place orally. However, the participants preferred to write their responses due to time pressures and schedules.

The information from the focus groups and the ITTDs was combined with the aim of representing actual teaching practice, which could then be mapped onto the activity system. This allowed for the identification of contradictions wherever they were occurring, directly as experienced by the teachers themselves in their own words.

6.2 Findings

The transcripts were analysed and linguistic clues highlighted. Consequently it became clear that a number of contradictions were occurring, experienced by the teachers as dilemmas, conflicts, critical conflicts and double binds.

Firstly, there were contradictions in the materials in use and over pedagogy. Students were perceived to lack important computer skills, and issues with efficiency and classroom management meant that many teachers were resorting to paper. There was also discussion over the nature of the course itself. Mobile phones were a major source of classroom conflict, and teachers were questioning the students' expectations and reasons for attending college. Finally, technical issues with the classrooms themselves and with the college open access policy were clearly experienced negatively by those interviewed. The results are summarized in Table 4.

6.3 Reflection

Using CHAT meant that this research project had strong theoretical underpinnings from the beginning. The research design was driven by CHAT, using an interview protocol designed specifically to explore each node of the activity system and the mediations between them. CHAT also allowed for the analysis to share these underpinnings, providing a conceptual framework and language to label the findings in terms of type of contradiction and further how these were experienced by the teachers.

However, there are some shortcomings. Firstly, the study focused solely on one activity system and did not include neighbouring systems that partially share the object. A more in depth study would have to include the students and management of the institution. The results identified quaternary contradictions between both systems and that of the teachers, but only the teachers' voices were heard. Secondly, with hindsight it would be better to take a more systematic approach to identifying the linguistic clues signalling contradictions. Engeström & Sannino (2011), for example, used a computer program to first identify and then classify contradictions during discursive analysis. This would lead to a certain quantification, but would also strengthen the argument. Finally, given the limited scope of the project possible solutions to the contradictions identified are not discussed. There is an opportunity here to make concrete changes through expansive learning. This will be returned to later.

Table 4. Contradictions experienced (Miles, 2018a)

Contradiction	Type	Experienced as
Teachers are not using common materials	Secondary between subject and tools	Dilemma
Teachers disagree over the teaching of vocabulary	Primary, tools	Dilemma
Students have poor keyboarding skills	Secondary, tools and object	Conflict
Students are off task when using laptops, watching videos instead etc.	Secondary, rules and tools	Conflict
Teachers try to be developmental, management sees the course as purely remedial	Quaternary, between management and teachers' shared object	Conflict
Students are distracted by mobile phones	Secondary, tools and rules	Critical conflict
Teachers want independent learners, but realise the need for teacher-centred learning.	Secondary, subject and division of labour	Critical conflict
Teachers do not think students actually know why they are at college.	Quaternary, between students' and teachers' shared objective	Critical conflict
Smart technology in classrooms turns off computers and lights mid-lesson	Quaternary, between management and teachers' concerning tools	Double bind
Open access policy means some students are simply never going to succeed	Secondary, community and object	Double bind

7. Project 2: collaborative learning in the laptop-mediated English language classroom

This project took place in the same context, and also grew out of my concerns over student failure and attrition. The focus of this project shifted from a general focus on how laptops were being used to a focus on actual language teaching and learning. Since the 1970s, language learning has loosely followed Communicative Language Teaching (CLT). Language learning is not 'a process of mechanical habit formation' (Richards, 2005, p. 4). Instead learning is inductive, not deductive. It is communicative, with emphasis on interaction, collaborative creation of meaning and opportunities to experiment with the language. Activities are designed to foster communication and thereby increase language learning. These activities include group work and information gap activities carried out in pairs. These types of activities still form the backbone of most ELT course books and teacher training to this day. Consequently, most if not all the language teachers in the institution would subscribe to CLT, but what was actually happening in the classroom? How were the approach of teachers and the activities employed affecting the students' learning? Classroom observations had suggested that group and pair work was not commonly being implemented. Could this be having a negative effect on language learning? Two research ques-

tions were formulated:

RQ1: How is collaborative learning taking place in the laptop-mediated English language classroom?

RQ2: What are the contradictions preventing effective collaboration that may be leading to unintended outcomes of poor learning and student failure?

CHAT was chosen once again as the theoretical framework, informing the design of the research and the conceptual language to analyse and frame the results.

This project used classroom observations and individual email interviews as the primary data sources.

7.1 Stage 1: observations

Five 50-minute classroom observations were arranged with the sample of teachers. Again the sample aimed to represent the diverse teaching population of the UAE, including teachers from the UK, USA, Lebanon and KSA. Classes also consisted of students who had failed and were repeating the course as well as those who had been successful in previous courses. During the observation, running field notes and three 'snapshots' of student activity were taken. In order to

Table 5. Engagement scale

Engagement	Description	Collaboration	Description
3	Student is fully engaged and participating in the activity.	a	Student is collaborating with partner or group members, actively completing task together.
2	Student is partially engaged in the activity and may be distracted.	b	Student is occasionally collaborating, for example on some areas of difficulty, but frequently working alone.
1	Student is not engaged with the activity. Exercise is on screen but no activity is taking place.	c	Student is working alone.

record the snapshot I devised a simple scale that rated each student on a) engagement and b) collaboration. A student fully engaged but working alone would rate as 3c, while a fully engaged student collaborating with their peers would rate a 3a. The scale can be seen in Table 5.

It was also necessary to record some students as 'off-task' (OT) as they were not engaging with the lesson, teacher or device in any meaningful way. An example snapshot can be seen in Figure 6.

Figure 6. Observation snapshot

From the snapshot we can see that the majority of students were engaged, but working alone at 8:06. At 8:30 this had improved, and just under half the students were engaged and collaborating, although the majority were still not working with anybody else and were engaging solely with their laptop.

7.2 Stage 2: interviews

Following the observations, teachers were interviewed

via email. Constraints of time due to heavy teaching schedules and project deadlines prevented face-to-face interviews. The interview protocol was again based on Marken's (2006) adaptation of Mwanza's eight-step-model (2002) used in the previous project. An example of an actual question is below in Table 6.

Table 6. Interview protocol

How does the division of labour influence the way the subjects satisfy their objective?

When students are working together, what's your role in the classroom? What about the students? Is it always the same? What governs this? Is it static or fluid?

The interview results were collated and analysed. An obvious advantage of email interviews is that there is no need for transcription.

7.3 Findings

Results were presented separately, with the observation findings presented in terms of the engagement and collaboration scale (Table 5 and Figure 6) and the interview results presented in terms of contradictions.

In the observations, while collaboration was found to be taking place it was not taking place with 100% success. In some cases students were collaborating informally, for example helping each other in class activities such as online quizzes. In other cases students were given formal instructions to work in pairs, but many continued to work alone. In one observation, students were asked to share computers, one device between 2 (1:2) but they ignored this instruction and the teacher did not enforce it. In short, it was clear that even when group or pair collaboration was specifically

instructed students either did not want to or did not know how to work in this fashion. Furthermore, teachers did not enforce or insist on the collaboration. Device usage in all observations was one student per device (1:1), and when collaboration occurred students did so face to face rather than via laptops. It was clear that despite coming from a background in CLT teachers were rarely employing group or pair work activities.

Four contradictions were identified, listed in Table 7.

Table 7. Contradictions

Contradiction	Type
Classroom rules of collaboration are not explicit or enforced	Primary, rules
Student, teacher and management expectations over collaboration are in contrast	Primary, community
Laptops are solely deployed 1:1, no efforts to share screens or try different deployment patterns	Secondary, subject and tools
Students do not understand the rules of working together or acceptable classroom behaviour	Quaternary between the teachers and students' activity systems

This led to the conclusion that if effective collaboration and CLT were to take place a two-pronged approach was needed. Teachers needed to be drawn out of complacency and challenged to bring communicative pedagogy back to their classrooms. At the same time, students needed to be actively trained how to collaborate and work effectively in groups.

7.4 Reflection

Again, CHAT provided a strong conceptual framework to underpin both the design and analysis of the research. However, an immediate flaw is obvious. CHAT only guided the interview stage of the project, and did not guide the design of the observation stage in the same way. Perhaps a stronger tie to the theory would have led to better findings and better connection between the two data sets. Also, at the interview analysis contradictions were only identified by type. How teachers were experiencing those contradictions – dilemmas, conflicts, critical conflicts and double binds – was not considered. Again, stronger findings could have resulted from taking a more robust approach and a more systematic

analysis of the language, using for example computer software.

The findings of both projects have highlighted contradictions that need to be addressed if teaching and learning, and subsequently pass rates and retention, are to be improved. The shared theory of CHAT links both projects and feeds directly into the third, a Change Laboratory.

8. Project 3: a Change Laboratory

It is one thing to identify the contradictions, but something else entirely to not only seek but apply solutions to the problem. There was no simple solution. The previous research in the context pointed to the need for improved collective teaching practice, rather than isolated individual efforts. A solution would be complicated, involving many different components and actors, and required a systematic approach and collective effort if these very real issues were to be addressed. Once again, this could be addressed through CHAT and more specifically through the Change Laboratory.

The Change Laboratory is a formative intervention for the development of work activities by actual practitioners in collaboration with a researcher-interventionist (Virkkunen, 2013). Students in the research context are experiencing failure multiple times, and the individual teacher can do little to address this. However, this project intended to employ a collective effort utilising the toolkit of the Change Laboratory with the aim of creating a new model of teaching English in the laptop-mediated language classroom. Ultimately the aim is improved language learning and student success.

The Change Laboratory is a direct intervention to promote expansive learning. It gives direct, transformative collaborative agency to the participants, in this case the teachers, giving them ‘the ability to question, analyse and shape their own practice’ (Englund, 2018, p. 193).

8.1 The Research Design

Expansive learning is a seven-stage process, and this helped guide the research design. Firstly, I used my insider to knowledge to form two groups with three participants each. I repeated the focus group interviews based on Marken’s (2006) interview protocol in order to ensure that data was recent and relevant. I also carried out an online survey on three groups of students. Where possible, it is important to include the voices of neighbouring, related

activity systems, and the student survey was intended to achieve this. Unfortunately the student results were not particularly helpful as answers tended to be guided by what students thought their teachers wanted to hear. For example, almost no students admitted to misusing laptops in class, or for attending college for any other reason than to study. The focus groups, however, provided further recent evidence of clear contradictions that supported and added depth to those previously identified.

For the actual Change Laboratory, I formed a group of eight participants, consisting of a representative sample of the teaching population. All participants are educated to Masters level, have more than 5 years teaching experience in context, and represent a wide range of nationalities including the UK, USA, Saudi Arabia and Pakistan.

The Change Laboratory has a clear sequence based on the seven stages of expansive learning. Eight 2-hour meetings were scheduled, two weeks apart. The plan was for one meeting for each stage, with an eighth meeting for consolidation if needed. Each meeting was recorded and transcribed, and then analysed in order to plan the subsequent meeting – there is no set outcome with the Change Laboratory, and although the researcher can guide the actual path taken is beaten by the participants.

The meetings followed a clear sequence:

Meeting 1: Questioning and rejecting the current practice. *Data from the focus groups showing the contradictions, plus data demonstrating falling pass rates and increased attrition was presented and discussed.*

Meeting 2: Analysing the situation. *Using a timeline the group discussed issues that had arisen over the previous 10 years of teaching in the institution, such as the introduction of new tools, rules and objects.*

Meeting 3: Continued analysis. *The group continued to discuss current and past issues and their impact on the classroom. Embryonic solutions began to be suggested.*

Meeting 4: Modelling. *The group discussed specific solutions to the problems identified and agreed to put them into practice.*

Meeting 5: Examining the new model. *The group discussed new practices that were working, what they had been trying out and what they were still facing issues with.*

Meeting 6: Implementing the model. *The group continued to discuss the new models they were implementing into their classroom practice, focussing particularly on ways to best teach language skills and functions in laptop-mediated classrooms.*

Meeting 7: Reflection and evaluation. *The group evaluated the new model and made it a more concrete set of statements.*

Meeting 8: Consolidation. *Here the final model appeared in stable form ready to be embedded as new practice.*

8.2 Preliminary findings

The data is still under analysis, and will be presented in a later paper. However, the initial analysis suggests that the focus on classroom technology in recent years, especially since the introduction of iPads in 2012, has caused teachers to move away from communicative pedagogy in favour of interactive material and applications delivered to individuals on personal devices. Students have been working in isolation rather than collaboratively, and teachers have over-focussed on implementing technology to the detriment of actual good classroom language teaching. Participants have rediscovered their pre-technology teaching skills and are now adapting these to fit into the realities of the laptop-mediated classroom. Classroom technology is not going to go away, and the model in development is not a Luddite reversion to paper that completely decries classroom technology. Rather new deployments are advised, moving away when necessary from 1:1 device distribution. Interactive materials, furthermore, may not actually be benefitting students if overused – students simply click until they get the right answer rather than actually apply language skills. The humble PDF can prevent this. Finally, while there is a place for interactivity and gamification, but it needs to be used strategically. For the participants, it has been a positive experience, as can be seen from the quote below:

Teacher 8: I feel I've got back to where I was when I first came here. I've got my confidence back in the classroom.

Once solidified, this new model will be presented to a wider group of peers, as well as the course management, and feedback will subsequently be sought from the students themselves.

8.3 Reflection

I began the research determined to stick rigidly to the design of the Change Laboratory but quickly recognised the

Table 8. The Change Laboratory surfaces (adapted from Virkkunen, 2013)

	MODEL/VISION	IDEAS/TOOLS	MIRROR
F U T U R E	7. Visioning the future structure of the activity system in which the current contradictions would be overcome.	8. Modelling the new tools and ways of working necessary for realising the vision. Designing the first experiments with the new tools and new ways of working.	9. Follow up data about the feasibility of the new tools and ways of working as well as about needs for their further development.
P R E S E N T	6. modelling the most important changes taken place in the elements of the activity system as well as historically evolved inner contradictions the changes have created within the activity system.	2. Shared concerns, identified problem areas. Ideas for further analysis. Solution ideas.	1. Samples of problem situations in the practitioners daily work with the object of the joint activity
P A S T	5. Modelling the central features of the past structure of the activity. Analysing the nature of the current phase of the transformation of the activity.	4. Identification of periods and turning points in the development of the activity.	3. Data concerning important historical changes in the activity system.

need to adapt. The classic Change Laboratory has clear roles for each participant. For example, one member needs to lead the discussion, another acts as scribe and takes minutes, and so on. For the first meetings I insisted upon this. However, I found that assigning a scribe meant that person did not participate in the discussion. Furthermore, the participants did not return to the minutes at any point in subsequent meetings, so I abandoned this aspect. It was more effective to provide a summary of the previous meeting at the start of the next session. I also found it more effective to direct the discussion myself as researcher-interventionist.

The participants also struggled with the theory at times. I recorded and planned the sessions based on mirror surfaces (Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996; Virkkunen, 2013), an example of which can be seen in Table 8.

However, this proved confusing for the participants. On the other hand, it provided a useful guide for the design of each meeting for myself as researcher, but I decided it was unnecessary for the group members to understand or follow it.

The participants also struggled to understand CHAT and the activity system triangle initially. However, I persevered and by the third meeting they were familiar with the layout and concept although the language of CHAT did not manifest in their discussions. This is not a limitation. As researcher I was able to use CHAT to analyse the discussions and present the results, thereby guiding the following meetings.

The Change Laboratory has clear benefits for the researcher. Firstly it provides a strong theoretical underpinning with its basis in CHAT. Secondly, it has a clear structure based around expansive learning that guides the process from beginning to end.

It should be noted that undertaking a Change Laboratory is not for the faint hearted, both researcher and participant. There is a considerable time investment for the participant, both in terms of attending the meetings and experimenting with and implementing the new model. This is even more true for the researcher. Meetings need to be transcribed and analysed in time to plan for the next session. The two-week window I gave for this seemed large at the planning stage, but was tiny in actual practice.

Overall, however, this iteration of the Change Laboratory has been a positive experience for all concerned. It remains to be seen whether the new model proposed will provide a solution to the falling pass rates and rising attrition, and the results will need to be seen over the longer terms if the success of the experiment is to be judged. However, solutions have been proposed, modelled and are currently in practice. All participants are positive of the eventual outcome.

9. Discussion and conclusion: the case for CHAT

Like any theory, CHAT is not without its critics. Some argue that the framework is inadequate for investigating human culture and psychology (Toomela, 2000 & 2008b in

Yamagata-Lynch, 2010). Others cite arguments that CHAT is too difficult to learn and not worth the effort to do so (Nardi, 1996 in Yamagata-Lynch, 2010). Yet CHAT remains a popular theory. In addition to the three projects presented here in recent years CHAT has underpinned research into mathematical modelling and science education (Chao et al., 2017; Erduran, 2018; Galleguillos & de Carvalho Borba, 2018; Hernandez-Martinez & Vos, 2018), and higher education (Englund, Olofsson, & Price, 2018; Kaatrakoski, Littlejohn, & Hood, 2017). It has been used to investigate mobile tool use (Paskevicius & Knaack, 2018) as well as English language teaching and learning (Montoro, 2016; Rind, 2016). CHAT remains a theory with versatility and ‘applicability to a wide variety of settings, contexts and approaches’ (Murphy & Rodriguez-Manzanares, 2008, p. 453).

The three projects presented here form good examples of how CHAT can be applied at all stages of the research process, and this applicability demonstrates the practical strengths of CHAT. Firstly, CHAT provides a ready language and toolkit for the design of the research. Interview protocols can be designed that investigate each element of the activity system, and the relationships between them. Marken’s interview protocol (2006) and Mwanza’s eight-step model (2002) are examples of this that can easily be adapted, as here, for any context. Secondly, CHAT can also guide the analysis and presentation of results. It facilitates the making sense of ‘complex real-world data sets in a manageable and meaningful manner (Yamagata-Lynch, 2010, p. 5). CHAT provides the researcher with the language to do so via the four types of contradiction, and fine tunes this further through the different ways these contradictions can be experienced from dilemma to double bind, using linguistic clues for identification. Finally, CHAT not only identifies contradictions but provides a framework for change. Expansive learning can take abstract ideas to the level of concrete practice and policy, creating actual real-world solutions to actual real-world problems. For researchers seeking the criticality and theoretical underpinning to drive robust research into the field of technology enhanced learning, Engeström’s (1993) best kept secret is the answer.

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