

AN ACTIVITY THEORY PERSPECTIVE ON E-TEACHING IN A VIRTUAL HIGH-SCHOOL CLASSROOM

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ABSTRACT

In the case study reported on in this paper, we identified deviations in the practice of the e-teacher that point to germs of new forms of teaching. Our case was distance education at the high-school level within the province of Newfoundland and Labrador, Canada. Participants were 13 of the 28 e-teachers employed by an organization responsible for the delivery of distance education as well as seven of its management and support personnel. Our theoretical framework was Cultural-Historical Activity Theory (CHAT). Data collection relied on semi-structured interviews conducted primarily online. Data analysis involved identifying contradictions, categorizing them, and, from within the categories, identifying visible manifestations of deviations in the e-teachers' practice leading to innovation. These deviations were clustered and labelled thematically as follows: from controlling to engaging student attention; from e-teacher-preferred tools to student-preferred tools; from e-teacher instruction to independent student learning; from a single e-teacher's voice to multiple students' voices. Use of Activity Theory provided an explanatory lens to appreciate a case of how the introduction of new tools can bring about positive change in teachers' practice.

KEY WORDS

Virtual schooling, Activity Theory, teacher's practice

1. Introduction

The practice of the e-teacher in the distance education, virtual high-school classroom has emerged out of a practice culturally, socially, and historically predefined in face-to-face physical classrooms. The e-teacher therefore brings to the virtual classroom experiences, norms, procedures, activities, beliefs, perceptions, ways of

knowing and behaving that are profoundly and significantly rooted in an established tradition. That tradition includes what Miettinen [1] describes as a historically-dominating approach, which involves memorization and reproduction, lecturing, and teacher-talk with few opportunities for students' spontaneous activity and questions. The tradition includes frame factors such as "curriculum, time and number of pupils, and the classroom as physical space" [1].

For the e-teacher in the virtual high-school classroom, many of the traditional frame factors such as physical space are absent. The e-teacher therefore finds her- or himself in what Kagan [2] refers to as a landscape without bearings where the culturally, socially, and historically defined practice is disturbed or where the traditional script or map no longer serves as an adequate guide. However, this landscape provides an opportunity for new forms of practice to emerge. It also provides an opportunity to transcend the problems associated with traditional practices of teaching and learning in order to uncover "germs of qualitatively new kinds of teaching and learning" [1].

In the case study reported on in this paper, we identify deviations in teachers' practice that point to germs of new forms of teaching in a context of e-teaching in a virtual classroom. Given the newness of the context of the research, our original study was exploratory in nature. Its purpose was to gain insight into the practice of the e-teacher in the high-school classroom from a perspective of Cultural-Historical Activity Theory (CHAT) [3]. CHAT provides a framework well-suited to providing this insight since it respects the "complementarity of the system view and the subject's view" [4]. We analyzed our data using the CHAT principle of contradictions.

Our paper begins with a brief overview of CHAT and the principle of contradictions. We then outline our methods of data collection and analysis and describe the procedures used to identify and report contradictions. We conclude with a discussion of the value of using CHAT and contradictions for providing insight into new forms of teachers' practice. More importantly, we highlight how contradictions may lead to innovation in teaching and learning. We conclude with the limitations and implications of our findings.

2. Theoretical framework

The basic unit of analysis adopted by Activity Theory is the activity system or "object-oriented, collective, and culturally mediated human activity" [4]. An activity system consists of interacting components of subject, object, rules, community, division of labour, outcome, and instruments (tools) [3], [5]. The subject refers to the individual or group whose point of view is considered in the analysis. As Engeström [5] explains, object "refers to the 'raw material' or 'problem space' at which the activity is directed and which is molded [sic] or transformed into outcomes with the help of physical and symbolic, external and internal tools." Community refers to all the participants of an activity system, who share the same object.

The division of labour involves the division of tasks among members of the community as well as the divisions of power and status [6]. The procedures or rules include both explicit and implicit norms (e.g., established and accepted practices) that prescribe actions and interactions within the activity system. Tools can be both material (computer, blackboard) or conceptual (method, model, theory) and undergo continuous change and reconstruction. They mediate the object of activity and enable and empower yet also restrict and limit activity.

Contradictions are characteristic of activity systems, to the point that the activity system has been described as a "virtual disturbance- and innovation- producing machine" [7]. Contradictions are "historically accumulating structural tensions within and between activity systems" [8]. They manifest themselves as breakdowns, clashes, disturbances, or deviations from the scripted course of events [9], [10], [6]. Contradictions are important because they contain a potential for transformation of activity. As Kuutti [6] explains, they "generate disturbances and conflicts, but also innovative attempts to change the activity." We think of these attempts as deviations from the script or practice of teaching. By innovation we mean shift, turning point, and object reformulation [11].

3. Method

The case

We conducted a case study to investigate "a contemporary phenomenon within its real-life context" [12]. Our case is distance education at the high-school level within the province of Newfoundland and Labrador, Canada. The Centre for Distance Learning and Innovation (CDLI), created in the year 2000 by the provincial government, oversees high-school distance education. Classes are conducted through a combination of synchronous and asynchronous instruction with the aid of Elluminate Live™ (E-Live) and the learning management system WebCT™ [13].

Participants

Participants were 13 of the 28 e-teachers employed by CDLI as well as seven management and support personnel. The e-teachers represented a variety of subject areas including music, French, the sciences, language arts, mathematics, physics, and chemistry. CDLI e-teachers are not centrally located but teach from offices spread in a variety of geographic locations around the province. All e-teachers were experienced teachers in physical classrooms prior to being hired by CDLI. Some had in excess of 25 years of teaching experience in physical classrooms.

Data collection

Data collection relied on semi-structured interviews [14]. Except for two participants interviewed face-to-face, all other participants were interviewed using E-Live. The version used at the time included two-way audio. This audio-graphic learning environment also includes collaborative tools such as Direct Messaging (DM) and a whiteboard. These tools facilitated interaction between the interviewer and the interviewee using voice and text simultaneously. While the interviewee answered interview questions, the interviewer could use DM for probing. The interviewees could use the whiteboard to display learning resources or illustrate teaching approaches. Interview questions were guided by Activity Theory. The length of each interview was between 90 and 120 minutes. They were recorded using E-Live and subsequently transcribed. All individuals were provided with a copy of their transcript for member checking [15].

Data analysis

Data analysis began with breaking the 300-page text of interview transcripts into units of meaning and assigning codes to the units. We used MAXqda2 software for data management. We subsequently used coding rules or a coding protocol that allowed us to identify and articulate contradictions. From within this data set, we then identified patterns and grouped patterns into categories such as visual cues, time and workload. Within each of these categories of contradictions, we then looked for visible manifestations of deviations in the practice or innovation. These innovations emerging from

contradictions were clustered and labelled thematically. It is these themes that we present in the next section.

4. Findings

We identified four areas or themes. Each of these describes a shift or deviation in the practice as follows: from controlling to engaging student attention; from e-teacher-preferred tools to student-preferred tools; from e-teacher instruction to independent student learning; from a single e-teacher's voice to multiple students' voices. Our qualitative data is presented using as much as possible the actual words of the interviewees.

From controlling to engaging student attention

In the virtual classroom of our case, the centeredness of the physical classroom is replaced by the distributed network of individual 'classrooms' linked together. Students do not sit in rows facing the e-teacher; rather, they sit in front of a computer linked to the other students and the e-teacher. Unlike in the physical classroom, the e-teacher cannot see students. The lack of physical co-presence means that, when they are lecturing, e-teachers cannot know, through visual cues, if students are actually attending, listening, or paying attention. They cannot control, as in the physical classroom, what students are doing because they are not spatially co-present. This situation is reflected in the following comment:

...when you're face-to-face, you can see the students. You know that they are listening to you... You can control that face-to-face because you can actually see that they are on-task or, at least they're not off-task. In here [the virtual classroom] you can't do that.

The contradiction between what e-teachers were used to doing in the physical classroom and what they can do in the virtual classroom provides an opportunity for questioning traditional behaviours. This questioning is evident in the comment that new e-teachers should "really push the interaction in distance to make sure that they [students] are responsive and they are listening" and not "just stand there and teach them." The following anecdote illustrates how one e-teacher responded to the contradiction by altering behaviours and beliefs:

I was delivering material and, of course, thinking that they [students] were in rapt attention on the other end, but they weren't. They were direct messaging or doodling if they had control of the white board or, in some cases, I found out afterwards that they were playing games and listening to headsets in front of the computer... I had to alter my methods somehow or another. So I did. ...over time I began to give students more responsibility for what they're doing...

The experiences of another e-teacher provide further illustration of how the contradiction manifested itself and how it resulted in an opportunity to allow more active forms of student participation and interaction:

...one thing that I had to come to grips with really quickly was [that] I needed to change. I needed to have a way to make sure that they [students] were attentive and the only way to do that is interaction. If you just teach and don't allow them to answer questions or interact or have some tool privileges in this environment they can just either fall asleep or go on to something else or be doing something else while you are teaching them.

From e-teacher-preferred tools to student-preferred tools

In the virtual classrooms in our case study, the everyday tools do not support multi-sensory communication. A large proportion of interaction is text-based and few of the interactions are visual. The synchronous environment of E-Live affords interactions by voice through two-way audio as well as through text-based Direct Messaging (DM). The e-teachers are most used to voice as a means of communicating to students. This is the form of communication that has been used traditionally in classrooms. However, as one study participant noted: "...in most instances, the students are much more comfortable doing the messaging... as opposed to actually speaking to the teachers." This contradiction between students' and e-teachers' tool preferences leads to envisaging new possibilities for the practice as illustrated in the following comment:

...outside of the formal environment, there's a whole room of technological applications that the students use... that perhaps could be incorporated more effectively into the instructional environment. If we were using instant messaging as a teaching tool, we'd bridge very quickly to what's comfortable and safe for the students, safe in that sense that they know it well... and feel comfortable inside it.

The following example illustrates how, for one e-teacher, the contradiction leads him to focus on the object of activity from a more student-centred perspective:

...you have to look at direct messaging and instant messaging in terms of how students feel about it. How are they most comfortable with communicating?... it's their global environment.... As teachers, we need to take ourselves to where our students are and not force our students to come to where we are.

From e-teacher instruction to independent student learning

In the virtual classrooms of our study, the daily time schedule differs from the typical physical classroom. In each course, approximately 60% of contact and

interaction is synchronous (in real time in E-Live) versus 40% asynchronous. During the latter, students work independently on e-teacher facilitated and directed work. During this time, they can contact the e-teacher in E-Live but there are no whole-group classes scheduled. This difference between what has been the practice in physical classrooms and what has become the norm in the virtual classroom leads to the emergence of contradictions. For example, as one e-teacher noted, she is used to being able to directly monitor students but, in reality, “it’s extremely difficult... to be able to determine what students are doing in their offline or asynchronous class.” The following comment provides evidence of how new ways of looking at the e-teachers’ and students’ roles emerge out of contradictions between the need for asynchronous versus synchronous classroom time:

We are finding, for example, that students are less willing to perform asynchronous activities simply because they prefer synchronous but that doesn’t make it a good thing. Many kinds of learning are best done not synchronously because in many cases the teacher may, for example, end up dominating the proceedings in synchronous, while we wish them to be asynchronous because we want the student to have a very lively input here.

Some voices from the virtual classroom of our study identified a contradiction between the time needed for certain types of activities and what was available or possible as follows: “...we lack the seatwork and group meeting techniques if we’re only going to be online [synchronously] six times. I just don’t have the time to do them.” This contradiction also leads to new ways of thinking about the role of classroom time and how it can be used differently, as the following comment illustrates: “In an asynchronous environment, I can see many opportunities to provide students individual... opportunities... to heighten their awareness or deepen their understanding, deepen their exposure to topics.” A similar perspective is articulated in this comment: “I can stretch the time.... and I can build in reflective thinking opportunities that are maybe a few minutes, they could be hours, they can be days...” As in the preceding comments, the following perspective points to ways of reformulating the object of e-teacher’s activity from something that is dependent on e-teacher presence to more independent uses of students’ time:

You have to stretch yourself to see where you can bring extra time into the child’s learning experience beyond that which is scheduled.... You can build independent learning activities that have to take place outside of the class time that can be very positive, and I don’t mean homework to complete what you didn’t get done, I mean those very proactive engaged learning experiences.

From a single e-teacher’s voice to multiple students’ voices

Unlike in the physical classroom, students in the virtual classrooms of our study had access to tools that allowed them to behave differently than they would in a face-to-face classroom. In the virtual classroom, they can reply on Direct Messaging (DM) to carry on public and private conversation with their peers or e-teacher during class time at the same time as the e-teacher is teaching and talking. However, this possibility creates dilemmas and contradictions for e-teachers. They must decide whether to allow these conversations or how they should manage them. In the following anecdote one e-teacher describes her experience of how the tool of DM allowed new types of conversations and communication in the classroom:

...what surprised me was that, as I’m teaching, students would actually be making comments,... or making jokes... If you were in a face-to-face classroom and you’ve got 30 kids there, you’ve got to maintain some control over your classroom. The students have been brought up to not talk in class unless they have a question to ask or they have to put up their hand. The amount of text chatter that was actually going on surprised me because it was almost like they were talking in class only it was quiet talk because it was text chat.

These new types of conversations can nonetheless be distracting for e-teachers and pose difficulties with multi-tasking. The latter prompted one e-teacher to react with: “...I’m not an octopus.” In spite of the difficulties associated with students’ use of this tool during classroom time, as one e-teacher explained, it is not simply a matter of denying them use of the tool: “You can say to the students, ‘Nobody is allowed to type in the direct messaging while the class is going on,’ but that’s going to limit the amount of interaction they are going to do.” A similar comment provides evidence of a shift towards new forms of conversation in the classroom where more than just the e-teacher’s voice is heard:

... students are chatting since they’re talking back and forth... and in fact I encourage it, because in that sense, it brings them that much closer together as an actual class, it takes away some of the distance that’s between them.

5. Discussion

The four themes presented above illustrate the contradictions as well as the possibilities that emerge when a practice that is culturally, socially, and historically predefined in face-to-face physical classrooms moves into a virtual classroom. In our case, the lack of physical co-presence forced a reconsideration of ways of behaving and communicating that are traditionally and historically entrenched in the practice. Likewise, the affordances of the new tools make possible ways of interacting and

communicating unlike those of the physical classroom. As the examples above illustrate, the contradictions faced in the new environment provide opportunities to rethink behaviours and beliefs.

The behaviours and beliefs relate to how instructional time should be used, how or whether students' attention should or can be 'controlled,' or how the channels of classroom communication should be managed and how e-teachers and students manage classroom tools. The historically-dominating approach described by Miettinen (1999), which involves memorization and reproduction, lecturing and teacher-talk, underwent scrutiny and transformation in the context of the practice of the e-teachers in our study.

In these virtual classrooms, we found germs of new forms of the practice emerging from the questioning and from attempts to resolve or come to terms with the contradictions faced. In this regard, the activity system of the e-teachers reflected what Russell (2002) referred to as a "virtual disturbance- and innovation-producing machine" (p. 71). The innovations provide the opportunity to move beyond the teacher-dominated or teacher-centred form of the practice to one in which roles and responsibilities are conceptualized so that the student is placed at the centre. In the activity system of the e-teachers in our study, our findings suggest that there is a shifting of the object of teaching from a practice that is teacher-centred to one that is more learner-centred.

6. Conclusion

In this paper, we relied on a CHAT framework to identify deviations in the script in the practice of e-teachers. Use of this framework allowed us to recognize in our data the interrelatedness of complex contradictions, on one hand, and possibilities for innovation, on the other. Activity Theory provided us with tools to help us understand how technology can bring about reform in teaching and learning. In our context, the contradictions faced by teachers in the transition from the physical to the virtual classroom, particularly in relation to the use of new tools, provided an opportunity to reconsider and transform teaching practice.

Our study is limited or bounded by its focus on only one case. Additionally, within this case, and in relation to Activity Theory, we chose as subject the e-teacher. Had we adopted the student as subject, our findings may have been very different. The study relied on interviews and did not include other data collection methods such as observations. Our findings come from a study of e-teaching conducted at the secondary level. We do not know if similar findings might emerge in a context of e-teaching at the post-secondary level where students are older. Future studies might explore if similar findings

would be replicated at other levels in other contexts and with a different Activity Theory subject.

In terms of implications for practice, our findings suggest that e-teachers have to develop new approaches, strategies, techniques, behaviours, and beliefs in order to function effectively in a virtual classroom such as the one in our study where many of the traditional frame factors are no longer present. Our findings suggest that pre- and in-service e-teachers may benefit from opportunities to identify contradictions in their practice and to evaluate how they might use them as opportunities for professional growth and for innovation in practice. Our findings may be of interest to those administering virtual learning in terms of informing discussions related to decisions and policies about provision and use of teaching and learning tools and about balancing use of asynchronous and synchronous instructional time.

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