Teaching and Teacher Education 25 (2009) 507–517

Contents lists available at ScienceDirect

Teaching and Teacher Education

journal homepage: www.elsevier.com/locate/tate

Using activity systems analysis to identify inner contradictions in teacher professional development☆

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ARTICLE INFO

Article history:
Received 27 August 2007
Received in revised form 28 August 2008
Accepted 23 September 2008

Keywords:
Teacher professional development
Activity theory

ABSTRACT

This study took place in the United States and explored teacher perspectives on the situational factors that influence their professional development using Engeström's (Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit Oy) four levels of inner contradictions in activity systems analysis. In this process, we addressed the question: what do teachers perceive as sources of conflicts in their professional development? Semi-structured interviews with participants were the primary data source in this study. By using this analysis method, the findings indicated that teachers perceived that their motivation and goals for participating in professional development were not in alignment with their school district and universities that designed and facilitated professional development activities. This misalignment contributed to various situational challenges that became obstacles for teachers to improve their classroom practices through curricular-based interventions.

In the United States, teacher preparation and qualifications have been identified as being directly related to the effectiveness of classroom teachers (National Center for Education Statistics, 1999). Thus, university researchers and K-12 school personnel have collaborated to ensure quality teacher preparation and professional development programs. However, both universities and schools have experienced challenges in facilitating effective professional development. Despite the fact that educators, policymakers, and researchers are aware of the importance of professional development, current practices inadequately address teacher needs (Borko, 2004). Thus, many traditional school administrators and university faculty-led programs have not been able to facilitate teacher change in classroom practices (Guskey, 1986, 2002; Sykes, 1996).

Researchers have paid little attention to how teacher learning is heavily influenced by the interactions between situational factors in their school (Borko, Davinroy, Bliem, & Cumbo, 2000). For example, in a comprehensive two and-a-half year case study of two veteran third grade teachers, Borko et al. examined the change processes teachers experienced while participating in a university-based partnership professional development program in Colorado for designing and using math and literacy performance assessment tools in their classroom. They describe how the various situational factors of the program were intertwined in facilitating teacher change:

> Collaboration, weekly meetings, and resources were inextricably intertwined to provide a combination of information, support, and accountability that made teachers willing to risk trying out activities that represented fairly substantial departures from their current practice (p. 298).

Additionally, the study reports that the personal factors of the individual teachers, such as beliefs about teaching and personal stages of life, contributed to the teachers' willingness to introduce new practices in their classroom.

In another example that highlights how situational factors influence teacher professional development, the first author was involved in a university partnership-based technology integration program that was in operation from 1999 to 2003 in Indiana. During the five years, the program included 133 teachers and eight rural school districts. While working with teachers in this program, the university staff recognized that, in order to enhance and maximize situational factors to support sustainable teacher change, the program had to include (a) classroom-based curriculum

☆ This project was made possible through the University of Utah, University Research Committee Faculty Research and Creative Grant. A previous version of this article was presented at the annual meeting of the American Educational Research Association Conference at San Francisco.

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doi:10.1016/j.tate.2008.09.014

projects, (b) teacher choice, (c) systematic reflection on practice, (d) opportunities for teachers to share their work with other teachers, and (e) opportunities for teachers to become future technology leaders in their school districts (Ehman, Bonk, & Yamagata-Lynch, 2005).

For future professional development programs to succeed, researchers and practitioners must attend to situational factors that affect the program at both the institutional and individual levels. Newmann, King, and Young (2000) identified some of these factors, which included teacher knowledge, skills, dispositions, school community, program nature, available resources, and school leadership. The demands of standards-based educational reform are another highly relevant situational factor that cannot be ignored because they introduce significant pressure to schools and universities (Delandshere & Petrosky, 2004; Gore, Griffiths, & Ladwig, 2004).

In order to enhance future professional development programs, the goal of this study was to explore methods from a Cultural Historical Activity Theory (CHAT) perspective to identify situational factors that influence teacher professional development, and capture how these factors influence teacher activities. We present the use of activity systems analysis as a descriptive research tool to highlight its potential for meaningful application in teacher education research. In this study, we introduce exploratory methods that can be used at the initial stages of developing future professional development programs. We used Engeström's (1987) activity systems analysis to analyze what teachers perceived as factors that affected their professional development. We then used Engeström's four levels of inner contradiction to document and analyze the challenges teachers found in their activities.

1. CHAT background

In the last two decades, there has been growing interest in pursuing theoretical paradigms that capture complex learning situations. CHAT is one of several theoretical frameworks that became very popular among educational researchers because it conceptualizes individuals and their environment as a holistic unit of analysis. It assumes a non-dualistic ontology and acknowledges the complexities involved in human activity in natural settings. Recently, reputable journals targeted at a wide range of audiences, such as *American Psychologist*, *Educational Psychologist*, *Educational Researcher*, and *Review of Educational Research*, have included articles on CHAT. In many such articles, CHAT has been referred to as social constructivism, sociocultural theory, or activity theory. Through these publications, CHAT is building a reputation as an effective alternative research perspective to traditional learning theories (Roth & Lee, 2007).

Vygotsky (1978, 1986) who is often referred to as a leader in CHAT, claimed that human learning took place in the form of interactions among signs, mediating artifacts/tools, and the individual. He believed that signs were impressions made on individuals from their interaction with tools, and this impression assisted the mediation or the meaning making process of the individual. Signs do not have concrete physical existence in the environment. Instead, signs are the byproduct of the interaction between individuals and the tools that mediate thought processes.

This process has been traditionally identified as the basic structure for mediated action, and is graphically represented as Vygotsky's basic triangle (Cole, 1996; Cole & Engeström, 1993), as in Fig. 1. The subject is the individual or individuals engaged in the mediated action, the mediating artifact/tool includes physical items, social others, and prior knowledge of the subject. The object is the goal of the activity. This triangular representation of mediated action was Vygotsky's attempt to explain human development that did not rely on the dualistic stimulus-response association.

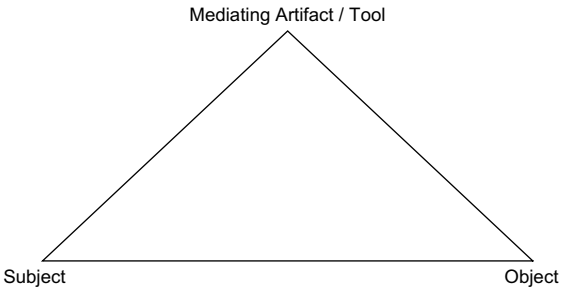

Fig. 1. Vygotsky's basic mediation triangle adapted from Cole (1996).

2. Understanding and using activity systems analysis

Activity systems analysis is based on Vygotsky's work on mediated action (Barab, Evans, & Baek, 2003; Cole, 1996; Cole & Engeström, 1993). This method of analysis became well known after Engeström's (1987) original conception and the wide circulation of his work through publications of Cole and Engeström (1993) and Engeström (1993). Since then, Western researchers have applied activity theory to (a) summarize organizational change (Barab, Schatz, & Scheckler, 2004; Engeström, 1993), (b) identify guidelines for designing Constructivist Learning Environments (Jonassen & Rohrer-Murphy, 1999), (c) identify contradictions and tensions that shape developments in educational settings (Barab, Barnet, Yamagata-Lynch, Squire, & Keating, 2002), (d) demonstrate historical developments in organizational learning (Yamagata-Lynch, 2003), and (e) evaluate and improve K-12 school and university partnership relations (Yamagata-Lynch & Smaldino, 2007).

The elements of activity systems, as shown in Fig. 2, include subject, tool, object, rules, community, division of labor, and outcomes and each element represents specific, transactional aspects of human activity. Subjects are participants in an activity, motivated toward a purpose or attainment of the object. The object can be the goal of an activity, the subject's motives for participating in an activity, and the material products that subjects gain through an activity. Tools are socially shared cognitive and/or material resources that subjects can use to attain the object. Informal or formal rules regulate the subject's participation while engaging in an activity. The community is the group or organization to which subjects belong. The division of labor is the shared participation responsibilities in the activity determined by the community. Finally, the outcome is the consequences that the subject faces because of his/her actions driven by the object. These outcomes can encourage or hinder the subject's participation in future activities.

Engeström (1996, 2001) describes three distinct approaches to activity theory and refers to them as three generations of activity

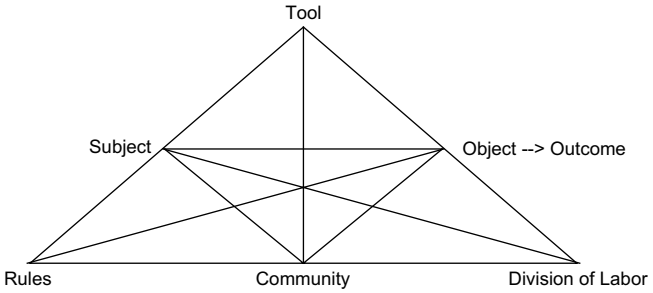

Fig. 2. Activity system model adapted from Engeström (1987).

theory. He refers to Vygotsky's mediated action triangle as the first generation activity theory that allowed researchers to conceptualize human activity as an integrated unit of analysis capturing individuals interacting with the environment while making meaning of the world (Center for Activity Theory and Developmental Work Research, 2004). The second generation was inspired by Leontiev's (1978) work, which emphasized the collective nature of human activity. Engeström (1987) demonstrated this analysis method through the graphical expression shown in Fig. 2. Engeström (1996, 2001) further developed the analytical scope of activity systems analysis by introducing the third generation activity theory within the context of Developmental Work Research (DWR), in which researchers often take a participatory and interventionist role. In third generation activity theory, shown in Fig. 3, the minimum unit of analysis is joint activities. This analysis method attempts to understand the interactions among joint activities and their outcomes to resolve tensions that are brought upon by the joint activities.

In Fig. 3, there are two interacting activities initiated by different subjects (subject 1 and subject 2). The two activities are bound by the shared object (object 3) in the two activities. The relationship between the two activities can trigger a chain reaction of mediated actions within the individual activities. These chain reactions from the joint activities can lead to inner contradictions for the individual activity and the joint activity.

Many studies in the United States using activity systems analysis have primarily focused on the descriptive nature of second generation activity theory, and used activity systems analysis as a supplementary tool in qualitative research. Additionally, third generation activity theory is still in its developmental stage among North American researchers. Although this study was not designed as a participatory and interventionist study, we explore the use of third generation activity theory by using activity systems analysis as a tool for examining the intersection of activities shared between teachers and professional development coordinators such as school districts and universities. We provide recommendations for how future research in teacher education can take advantage of the interventionist nature of third generation activity theory.

2.1. Engeström's four levels of inner contradictions

One of Engeström's (1987) original motivations for developing the activity systems model was to allow researchers to identify the inner contradictions that impose tensions on participants' work settings and help them change the nature of an activity to overcome those tensions. When analyzing the various sources of tension, Engeström identified four levels of inner contradictions, described in Table 1. Inner contradictions can be observed by researchers when they identify an activity that is central to their study and is affected by other related activities (Engeström, 1987, 1993). This assumes that human activities do not exist in vacuum, and it emphasizes how a relationship between joint activities can bring imbalances to one of the activities with the potential for instigating a change process (Center for Activity Theory and Developmental Work Research, 2004).

Primary contradictions occur when activity participants encounter more than one value system attached to an element within an activity that brings about conflict. For example, according to Supovitz and Turner (2000) professional development programs that are sustained and intensive have greater value for professional development coordinators for moving the school reform agenda forward. On the other hand, it may have minimal appeal to teachers because teachers see more value in one-day workshops or curriculum development-based quick fixes to their local classroom issues. In these situations, school districts, universities, and classroom teachers all share a common object for improving classroom practice, but they do not share the same values that define what type of professional development programs are most effective for achieving this common goal. This brings difficult situations to school districts and universities because teachers are more likely to choose not to be involved in sustained and intensive programs that are more likely to meet long-range institutional goals.

Secondary contradictions occur when activity participants encounter a new aspect of an activity, and the process for assimilating this new aspect into their daily activity brings about conflict. For example, in the first author's previous work it was found that when teachers volunteer to be involved in professional development programs, the expectations and requirements for work-related activities change (Yamagata-Lynch, 2003). Teachers become responsible for meeting professional development expectations and requirements at the same time while managing daily work-related expectations at school. Professional development program activities that are demanding of teacher time potentially become a burden on them for completing daily work-related activities. Consequently, teachers face difficulties assimilating the new rules and division of labor brought upon by the professional development program into their daily routine.

Tertiary contradictions occur when activity participants face conflicting situations by adopting what is believed to be a newly advanced method for achieving the object. For example, a school district may identify a student achievement problem in math after analyzing the results from their fourth grade state standardized test scores. The district evaluates various solutions to the problem, and decides to implement a district-wide prescribed math program with new texts and teaching materials. Teachers are then required to attend training on this math curriculum package and implement the program in their fourth grade classrooms. The implementation of the new math program may take a minimum of 60-min of daily teaching time in the classroom, and require teachers to rearrange their lessons on other subject areas. In these types of mandated curricular program changes, teachers may not easily find connections between the new program and their everyday practices in the classroom. This may encourage teachers to resent the program while they are required to change their math teaching methods, and lead to situations suggested in Little (1989) where professional development programs do not necessarily address school district needs and classroom teacher needs at the same time.

Quaternary contradictions occur when activity participants encounter changes to their activity that result in conflicts with adjacent activities. For example, the teachers in the previous example may find it very difficult to adjust their teaching of other

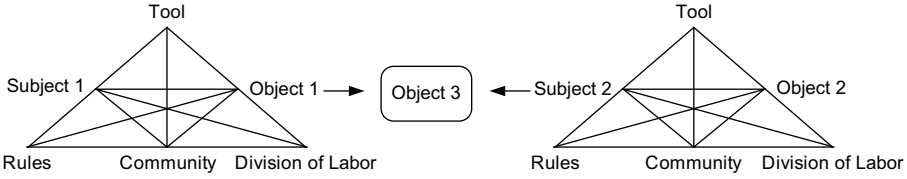

Fig. 3. Interacting activity systems in third generation activity theory adapted from Engeström (1996).

Table 1
Engeström's (1987) four levels of inner contradictions in activity systems.

Contradiction level	Engeström's definition
Level 1	
Primary Contradiction	When activity participants encounter more than one value systems attached to an element within an activity that brings about conflict.
Level 2	
Secondary Contradiction	When activity participants encounter a new element of an activity, and the process for assimilating the new element into the activity brings about conflict.
Level 3	
Tertiary Contradiction	When activity participants face conflicting situations by adopting what is believed to be a newly advanced method for achieving the object.
Level 4	
Quaternary Contradiction	When activity participants encounter changes to an activity that result in creating conflicts with adjacent activities.

subject areas so that the new 60-min math curriculum package fit into their daily routine. Some teachers may have been accustomed to implementing interdisciplinary lessons where they blended math and science activities. However, once the math curriculum is set to a school district-wide package, teachers no longer have the time to engage students in interdisciplinary lessons; therefore, teachers will have to develop new strategies for teaching science.

3. Methodology

3.1. Research question

We used Engeström's (1987) model to organize the findings from this study into activity system units, and map out the sources of systemic tensions involved in those activities. Through this analysis, we intended to identify what teachers perceive as sources of conflicts in their professional development. Much of this analysis involved using activity systems as a descriptive tool for identifying and modeling the complexities involved in teacher professional development in single activity system units. Then we used the single activity systems to analyze how joint activities in teacher professional development among teachers, school districts, and universities affect individual teacher professional development activities. The specific research questions we addressed were (a) what do teachers perceive as situational factors that bring inner contradictions in their professional development? (b) How are the inner contradictions related to one another? (c) How do inner contradictions influence teacher professional development?

3.2. Research participants

This study took place in a suburban area near Salt Lake City, Utah. We interviewed teachers and school administrators from a suburban school district that was beginning a partnership with a large university during the 2002–2003 school year. The district is made up of 81 schools: 56 elementary, 15 middle, and 10 high schools. About 20% of the students in the district are economically disadvantaged (below the statewide average of about 31%), with about 16% of students on free or reduced price lunch programs. Six percent of the students were classified as Limited English Proficient, close to the state average. The district's students were made up of largely white children (about 91%; statewide is about 84%). Approximately 6% of the students were Hispanic, just below the state average.

The participants in this study included male and female elementary and junior high school teachers and administrators. The teachers were the primary participants and the administrators were secondary participants of this qualitative investigation. There were seven participants in the initial interviews. These participants consisted of two principals, one district professional development coordinator, and four teachers. Four of the above participants volunteered for the follow-up interviews. These participants consisted of one principal and three teachers. All participants voluntarily chose to participate in this study.

3.3. Data collection

Data collection followed naturalistic inquiry methods (Lincoln & Guba, 1985), using interviews as the primary data source. Document analyses provided a secondary data source, which included partnership literature from the university, professional development brochures from the school district, and any classroom or professional development materials that participants provided during the interviews. These data sets provided background information regarding the school district.

3.4. Data analysis

3.4.1. Thematic analysis

We began data analysis with the constant comparative method (Strauss & Corbin, 1998). The goal of this analysis was to report on thematic findings represented in the participants' interviews that identified how participants perceived that professional development brought benefit to their work, and how participants perceived that professional development affected their work. We used this analysis as a starting point to identify the various levels of contradictions that teachers perceived they encountered when they participate in professional development.

We identified initial thematic codes using NVivo 5.0 a qualitative research software. We began this process with the two researchers independently coding transcripts of interviews and available district and university documents. Then we discussed how we coded each transcript and came to an agreement of each code. We then merged our codes and provided definitions of all relevant codes, eliminating redundancies. Once we identified the initial set of codes, we recoded the interview transcripts. We then identified overarching themes in the transcripts relevant to the research question. The actual act of writing the results section affected the way we concluded to the final themes; therefore, we went back to Nvivo to ensure our coding and thematic findings were consistent throughout.

4. Thematic analysis of teacher perceived value of professional development

Data from our thematic analysis of participant interviews suggest that teachers in the study valued professional development as a resource for (a) initiating momentum for change in classroom practices, (b) collaborating with other teachers, (c) contributing to district initiatives, and (d) providing job security and monetary reward. When a workshop or a university course/degree program did not provide them with the above opportunities teachers were more likely to perceive that they were participating in the program for "seat time" to earn points for their certification renewal rather than adding value to their work. Therefore, teachers were motivated to participate in professional development activities to improve their teaching and to maintain certification requirements.

4.1. Professional development that initiates change

Study participants viewed professional development as a resource for bringing momentum to improve their teaching practices. Zach, a middle school teacher commented, "Professional

development helps me in learning more about my profession…. It lets me…change a few things…. If I stay in a rut, I feel the kids aren't learning what they should be" (Zach, teacher interview, June 11, 2002). Zach and other participants felt that some of the professional development events they attend were excellent resources for identifying strategies to revise their teaching methods to meet student needs. Teacher participants also appreciated professional development that encouraged them to change their practice by providing them with ready-to-use teaching materials or the time to develop new materials. For example, Paul, a middle school teacher, commented how he appreciated district-level science professional development programs facilitated by teachers sharing lesson plans.

Ken, an elementary school principal, reported that his teachers were very enthusiastic about curriculum-focused professional development events even when they cut into teacher personal time, and even when the presenters did not have K-12 education background. For example, Ken spoke about when he contracted inservice sessions with book authors and illustrators from the business sector to work with his teachers and students on writing and pre-writing skills. He reported that his teachers were very receptive to the authors and illustrators because writing and pre-writing were areas of weaknesses in student test scores, and the inservice sessions focused on developing strategies to improve teaching methods.

Teacher participants and principals reported that professional development events that focused on concrete classroom-based curricular issues without expecting teachers to completely change their practice provided them with the most momentum to improve classroom practices. Teachers did not necessarily expect professional development activities to initiate a total overhaul of their teaching. They found the most value in professional development that helped them fine-tune their teaching. For example, Susan, an elementary school teacher, observed, "The thing I like about professional development is it gives us a new view on old things…" (Susan, teacher interview, May 28, 2002).

Unfortunately, not all professional development events focus on concrete classroom-based curricular issues. Ken pointed out that when his school district organized mandated professional development events, teachers often came back with mixed results. Susan who worked at Ken's school commented how it was most frustrating when she attended a district-mandated inservice program on balanced literacy for several required hours and it did not fit her classroom situation.

Teachers agreed that professional development activities designed by school districts or by universities for a wide range of audiences were more likely to be not curricular focused. Instead, these professional development activities focused on abstract general pedagogical principles that teachers needed to find opportunities to adapt to their classroom and infuse into their practice. In these events, teachers found it very difficult to identify concrete teaching strategies that they could bring back to their classrooms.

4.2. Professional development that supports teacher collaboration

Teachers reported that they appreciated professional development programs that allowed them to collaborate with colleagues. For example, at both the elementary and middle school in which this study took place, the principals organized a yearlong local professional development program that encouraged teachers to share ideas for changing classroom practices. Ken, the elementary school principal, replaced the weekly 40-min morning faculty meeting with teacher professional development time. Teachers came to the meeting having read a short article, prepared for group discussion and reflection on the weekly topic. The articles were at times selected by teachers from news sources such as *Newsweek* or from the *The Master Teacher* training pamphlet set that Ken acquired for the school (for more information visit http://www.masterteacher.com/). Mark, a teacher at Ken's school, reported that he uses ideas from *The Master Teacher* readings and incorporated them into classroom activities.

Similarly, Jack, the middle school principal, organized book chats that met throughout the year. Ten to twenty teachers read a selected book for the purpose of engaging in a dialogue about the book's central themes and classroom implications. Selected titles included *Reviving Ophelia: Saving the Selves of Adolescent Girls, The Right to Learn: A Blueprint for Creating Schools that Work*, and *Multiple Intelligences: The Theory in Practice*. Jack felt that inservice workshops often do not give teachers the opportunity to share their ideas, and in many cases teachers forget about the workshop content once they walk out the door. Jack believed that book chats in contrast provided opportunities for teachers to dialogue about broad pedagogical principles introduced in a book, and adapt those principles to local issues to find curricular-based implications.

Paul identified both formal and informal collaboration with colleagues as an essential form of professional development. He defined collaboration as "being able to just share ideas" with other teachers regarding the curriculum and students (Paul, Teacher Interview, March 27, 2003). Paul referred to the three-year new teacher-mentoring program as a formal district-level professional development that encouraged teacher collaboration. Paul was a mentor himself for two teachers in the building. He additionally discussed that it is important for him to have opportunities to share ideas with colleagues during informal meetings such as lunchtime.

4.3. Professional development that contributes to state and district initiatives

Teachers in this study felt that professional development that helped them contribute to district initiatives was valuable to their career. These initiatives included contributing to state agencies for creating materials that their school district can later use, and obtaining professional certifications that helped their school district to comply with federal regulations. Teachers developed a sense of pride when they knew that their participation in professional development programs contributed to the overall initiatives of their school district.

For example, Paul was selected to write test questions for the new state science exam based on the new core curriculum. He was honored to be selected as one of the test authors. He also viewed this experience as a boost for his professional development because he was given the time to collaborate with other teachers to examine the new core curriculum in depth. He remarked that this was the most valuable professional development experience for the school year "because I'm not a real good writer…. [Writing the test questions] would challenge me out of my comfort area. You know we put our kids in that situation all the time" (Paul, Teacher Interview, May 22, 2002).

Zach obtained an ESL endorsement through a university program supported by the school district. The school district was not in compliance with federal regulations requiring teachers of minority students to have ESL credentials. Zach obtained his endorsement by attending university courses one night a week for two years. The school district supported him by paying his tuition and providing him with a stipend. This program was very taxing on Zach's time, but he enjoyed participating in it because he was rewarded properly and was able to contribute to the district goal for meeting the federal regulations.

4.4. Professional development that provides job security and salary increase

Teachers in this study reported that professional development helped to achieve necessary promotions and salary increases.

According to Megan, the professional development coordinator, and Susan, the state teacher licensing system required teachers to earn one hundred points per year in professional development activities. The professional development events that the state office accepted for license renewal included (a) college/university courses and/or state approved inservice (18 points per 1 semester credit); (b) workshops, symposia, conferences, district courses, or staff development (1 point per clock hour); (c) service in professional activities in an educational institution (1 point per clock hour); (d) service in a leadership role in a professional organization (maximum of 10 points per year); (e) education research and innovation; (f) other professional development activities; and (g) substituting (State Educator License Renewal Brochure, issued May 10, 2000). Additionally the school district applied the points teachers earned for license renewal toward advancement and salary increase requirements.

Although job security was one of the driving forces in the selection of professional development events, teachers also weighed how much time and money each event was going to cost them. Teachers had to pay a minimum of $15 registration fee for most professional development events offered by the school district. There were some district-mandated events that teachers were paid to attend, but this was very rare. Often, district organized professional development took place during weekends, after school hours on weekdays, and over the summer, cutting into teacher personal time. University courses were far more expensive than district events, and many took place on weeknights on university campuses, following the long hours that teachers work at school. Some teachers commented that it was just too expensive to attend university courses and it took up too much of their personal time.

5. Activity systems analysis

5.1. Identifying activities that influence teacher professional development

The activity systems analysis resulted in identifying two activity systems that described the situational factors and guided our interpretations of the inner contradictions in participant teacher professional development activities. The activities consisted of one initiated by teachers as the subject and another initiated by school districts and universities as the subject. Although school districts and universities are artifacts that in the traditional sense of activity systems analysis do not initiate activity and thus are not ordinarily categorized as a subject, in this study as an organizational unit both school districts and universities took a prominent role in teacher perception of their work and professional development activities. Teachers perceived that school districts and universities engaged in activities related to teacher professional development at the institutional level with collective objects. Therefore, teachers referred to their school districts and universities as institutions that indeed initiated activities that influenced, or in a CHAT term oriented, teacher activities. Figs. 4 and 5 illustrate the graphic summary of these activities based on Engeström's (1987) model.

In Fig. 4, the subject is teachers who chose to participate in professional development activities. These teachers chose to participate in these activities because of the following objects: bringing curricular-based change in practice, engaging in teacher collaboration, contributing to district initiatives, and ensuring individual job security. The tool that helped these teachers included time, money, relevant classroom materials, colleagues, and school principals.

The rule that determined how teachers participate in professional development activities included state licensing, renewal requirements and university requirements when teachers were enrolled in university courses. The community members that supported teachers were school district and university professional development staff. The division of labor was new responsibilities teachers found in professional development activities, for example, creating test questions, creating new lesson materials, and fulfilling reading assignments for university courses or for local book chats.

The outcomes of teacher participation in professional development activities included both positive and negative results. As positive outcomes, teachers found that they were contributing to district needs, continually renewing their practice, and completing university degree programs. At the same time, there were teachers who reported that they experienced frustrations from professional development programs that did not meet their classroom-based curricular needs.

Fig. 5 represents what both the primary and secondary participants of this study perceived and reported as the role that school districts and universities take in professional development. The subject in Fig. 5 is school districts or universities that facilitated professional development programs. Study participants perceived that these institutions provided programs to them so that they attain the objects of meeting state teacher certification and accreditation requirements; secure highly qualified teachers in the school district; and raise K-12 student test scores. The tools that school districts and universities used to develop professional development programs and degree programs were money and student test score results.

The rules that guided the school district's and university's decisions regarding professional development included state licensing and renewal requirements and institutional accreditation requirements. These elements in the rule component defined the division of labor in professional development programs. The community that supported this work included state agencies, teacher unions, accreditation organizations, and teacher education researchers. The outcomes that the school district and universities found in professional development were securing state funding and maintaining institutional accreditation status.

5.2. Identifying the shared object in teacher professional development

Fig. 6 shows the teacher professional development activity from Fig. 4 and university and school district teacher professional development activity from Fig. 5. Object 1 in this figure is the teachers' object from Fig. 4 and Object 2 is the school district and university object from Fig. 5. The intersection of Object 1 and Object 2 represents the shared object improving teaching and learning practices.

In our analysis, we found that a joint activity does not guarantee that the efforts for meeting the shared object are organized and coordinated. For example, this was very clear when Susan shared her experience in mandated school district professional development events that did not necessarily meet her classroom needs. While the school district found the need for all of their teachers to become proficient in balanced literacy to meet their student needs, this was not appropriately communicated to individual teachers. Susan, therefore, found the program to be a misuse of her time because she perceived that she was not involved in literacy education. As illustrated in this example, the uncoordinated efforts for attaining the shared object brought inner contradictions that systemically affected teacher professional development.

6. Analyzing inner contradictions: identifying how inner contradictions relate to one another and influence teacher professional development

By examining Figs 4, 5, and 6, we found that teachers' object for participating in professional development and what teachers

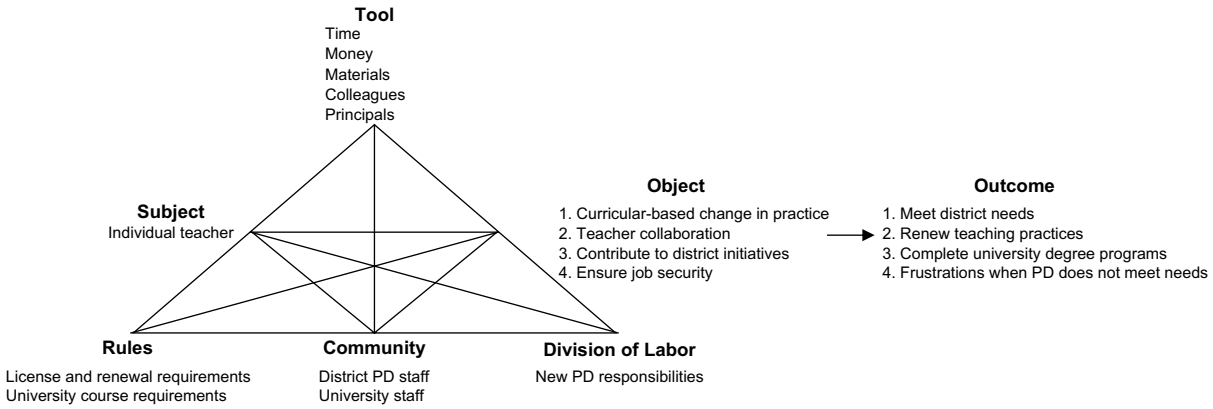

Fig. 4. Teacher professional development activity system.

perceived as the school district's and university's object for facilitating professional development are not aligned with each other. This indicates that teachers in this study believed that they had very different objects for participating in professional development compared to school districts and universities that facilitate them. While this finding may not be a surprise, the use of activity systems analysis provided some clue to why the joint professional development activities between teachers and professional development coordinators were uncoordinated. Teachers looked for specific content-based curricular improvement as one of the main reasons to participate in professional development. On the other hand, teachers perceived that school districts and universities were interested in general interventions for entire grade levels, subject areas, or schools that addressed student achievement problems.

Teachers perceive that school districts and universities were often in positions to enforce the rule and division of labor of professional development in the form of policy decisions spelled out by state agencies and accreditation organizations. Teachers felt that these rules and division of labor did not necessarily allow professional development programs to focus on specific curricular-based classroom interventions even though that was what teachers found as one of the most valuable object. Teachers perceived that school districts could not dismiss these rules and division of labor because they played a large role in determining the state funding and resources allocation.

Inevitably, the uncoordinated shared objects in the joint professional development activity created several inner contradictions. These contradictions included disagreements about (a) benefits that teachers gained from professional development programs, (b) overwhelming responsibilities and expectations teachers were required to juggle in sustained and intensive professional development programs, (c) new approaches to teaching that did not fit into classroom practices, and (d) ripple effects from changing pedagogical practices in one area of teaching that fed into other areas. Table 2 summarizes these disagreements according to Engeström's four levels of inner contradictions.

The inner contradictions, spawned from the joint activity, brought several tensions to teacher professional development. Fig. 7 shows Fig. 4 with the tensions that teachers perceived while participating in professional development. These tensions include (a) continuing professional development with competing value systems, (b) continuing professional development while juggling multiple regulations and requirements, (c) continuing professional development after undesirable outcomes, and (d) adjusting overall instructional practices in the classroom while accommodating new approaches to teaching.

6.1. Tension A1 and A2: continuing professional development with competing value systems

The misalignment perceived by teachers in the values attached to professional development among teachers, school districts, and universities affected teacher professional development. Tensions A1 and A2 in Fig. 7 between the tool and object and the rule and object represents the influences of this misalignment and is a result from the primary contradiction of this study. Both tensions introduced difficulties to teachers who wanted to infuse curricular-based innovations to their teaching.

The mere observation that teachers, school districts, and universities are engaging in a joint professional development

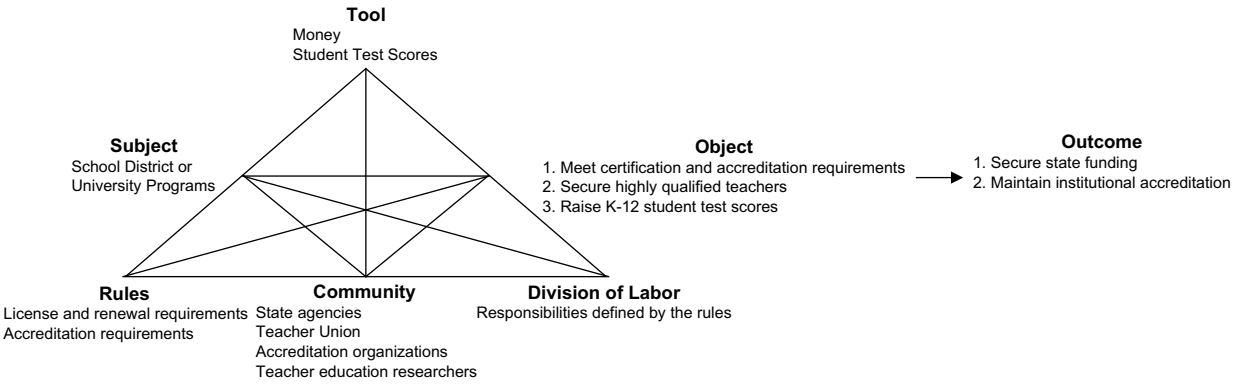

Fig. 5. School district and university professional development activity system.

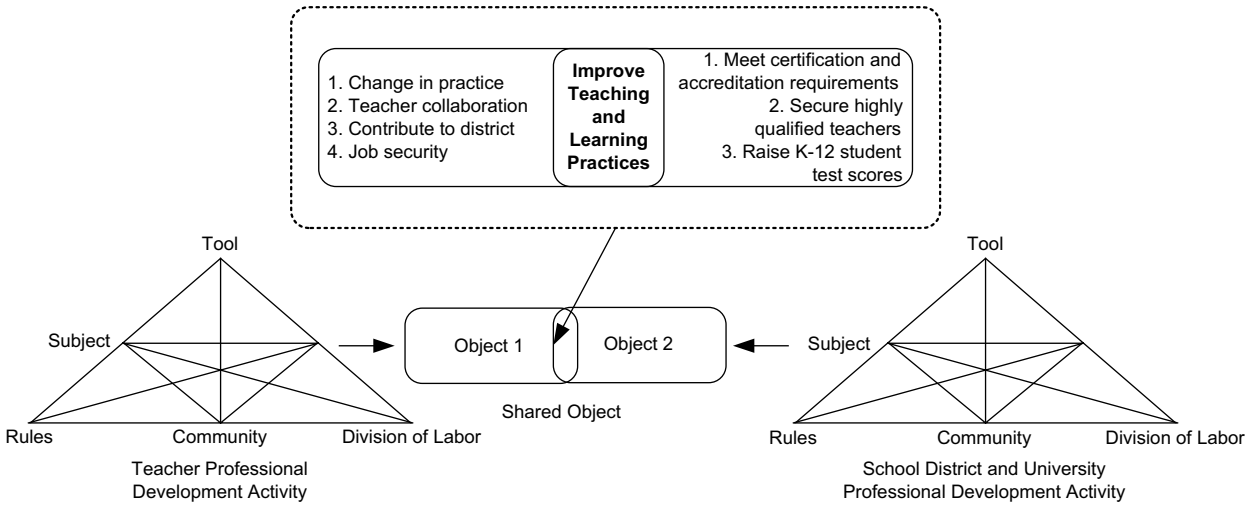

Fig. 6. Joint professional development activities.

activity does not imply that the subjects/participants involved in the activities can see that they are participating in this joint activity on a daily basis. As indicated in many of our teachers' comments, they perceive that they are engaging in professional development at the individual level. They attend professional development primarily for themselves and their students' benefit. For example, Zach shared with us how he participated in professional development because he wanted change in his teaching practices to better meet student needs. This demonstrates a lack of acknowledgement for viewing improving K-12 education and preparing highly qualified teachers as a joint process shared among teachers, school districts, and universities.

Teachers in this study worked with very limited resources in terms of time, money, and curricular resources on a daily basis. This was also true when teachers participated in professional development activities. Without a joint awareness of the joint activity, teachers perceived that when school districts or universities provided monetary and human resources for professional development programs they were funneled to programs that would help meet state license and renewal requirements and institutional accreditation requirements. Therefore, teachers in this study struggled to make the most out of their situation by attending events that school districts and universities rewarded them to gain job security even when they felt that these activities did not help them develop curricular focused classroom interventions.

Table 2
Four levels of inner contradictions observed in this study.

Contradiction level	Observations from this Study
Level 1 Primary Contradiction	Individual teachers, school districts and universities do not share a common value system on how to spend time and money on professional development activities.
Level 2 Secondary Contradiction	School districts and universities do not account for new responsibilities introduced to teachers from sustained and intensive professional development programs that bring hardship to meet other daily teaching responsibilities.
Level 3 Tertiary Contradiction	New methods for teaching introduced in professional development programs do not necessarily fit into teachers' daily classroom practices.
Level 4 Quaternary Contradiction	One area of change to teachers' daily classroom practice interacts with other activities in the classroom and necessitates more change.

6.2. Tension B: continuing professional development while juggling regulations and requirements

Participants from this study had to adhere to regulations and requirements that were associated with maintaining their jobs and fulfilling professional development course expectations. This brought difficulties to teacher professional development activities and is represented as a circular tension in Fig. 7 as Tension B in the rule component. This tension was a result from the secondary contradiction of this study, and is circular because the elements within the rule component competed against one another. Tension B introduced further complications to teachers' already limited time for developing new teaching methods and materials that would help student learning.

Similar to findings from the first author's previous work, teachers in this study had to meet multiple sources of job-related expectations while participating in professional development activities (Yamagata-Lynch, 2003). This created conflicting situations and complicated teachers' work lives. For example, when teachers reported that they participated in semester long university courses, course activities were based on the university calendar and did not reflect the K-12 school calendar. Therefore, teachers felt that there were times during the year that they found it very difficult to maneuver the workload associated with the course while surviving the demanding expectations at their schools. This tension also bring to light how school districts and universities are engaged in activities that involve them meeting state and accreditation requirements while they are participating in joint professional development activities. While the details of state and accreditation requirements are beyond the scope of this study, this tension establishes how schools and universities take part in other activities that affect teachers engaging in professional development, even when the activity is shared with subjects who are not necessarily teachers.

6.3. Tension C: continuing professional development after mixed outcomes

Several teachers in this study reported that they had been in too many required professional development events that did not

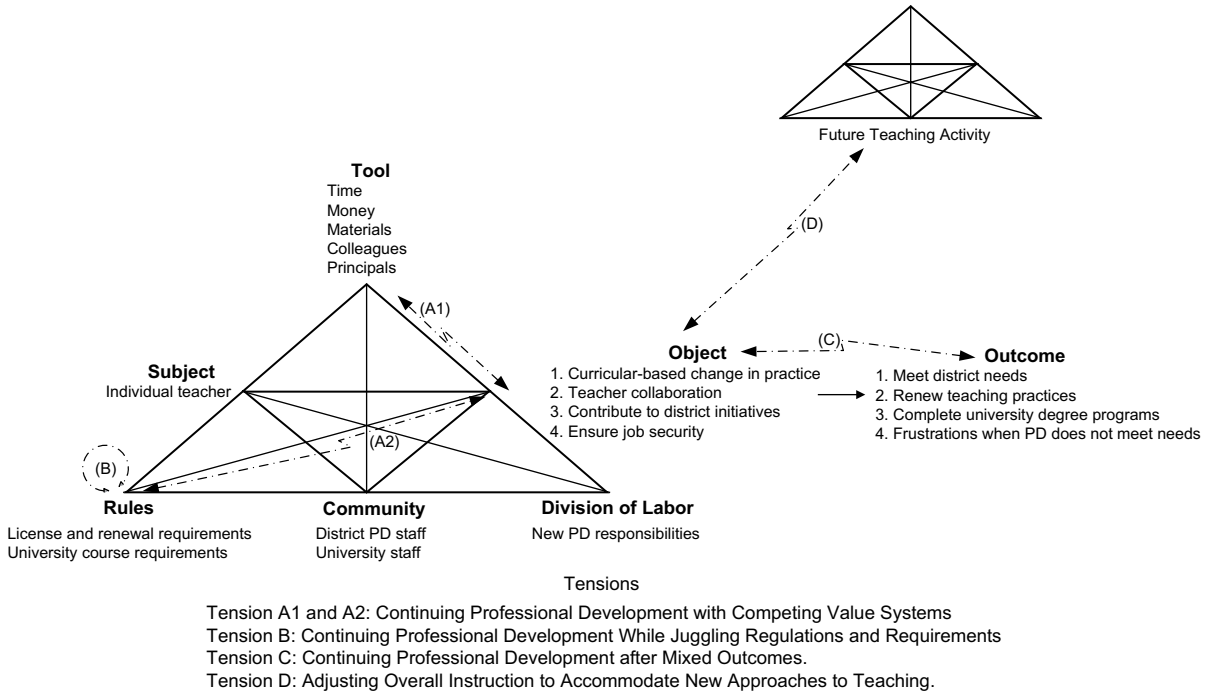

Fig. 7. Tensions in Teacher professional development activity system.

necessarily meet their immediate curricular-based needs. Teachers expressed frustrations when they were expected to improve their teaching after participating in professional development activities that did not address instructional issues in their classroom. Tension C in Fig. 7 between the object and the outcome represents this teacher frustration, and resulted from the tertiary contradiction. This tension made some teachers very leery of attending school district or university-based professional development activities that they knew were not going to assist them develop classroom-based interventions.

As a result, teachers were in a situation where they had to continue attending mandatory professional development events even when the outcomes did not meet their needs. Teachers believed that these activities met requirements for the school district and university institutional framework even though their personal needs were not met. For example, within a 15-week university course Zack felt that there were some topics in the course irrelevant for his ESL endorsement. These topics seemed to him as unnecessary embellishments that allowed the university to offer the course in three-credit-hour form. This finding is in agreement with Little's (1989) report that many school districts and universities find it challenging to satisfy both teacher and institutional needs through professional development programs. This tension shows how the joint activity in Fig. 6 is not necessarily visible to teachers and how the activities that school districts and universities must participate are related to state accreditation requirements that affect teacher activities.

6.4. Tension D: adjusting overall instruction to accommodate new approaches to teaching

When teachers reported that they had participated in professional development programs that introduced them to new teaching methods, which involved more than a minor replacement of one curricular activity with another, it required them to adjust their overall teaching methods. Tension D in Fig. 7 between the object of teacher professional development activity and future teaching activity represents this tension. This tension resulted from the quaternary contradiction.

Tension D had interesting implications where some teachers refused to change any part of their teaching if it required a complete overhaul, and some teachers decided to apply best practices into more than one area of their teaching. For example, when Susan attended the district-mandated balanced literacy program she decided that the method did not fit into her teaching style and, therefore, she dismissed the entire method. On the other hand, Zach who obtained an ESL endorsement from a university program recognized that many of the principles he learned in his courses were general best teaching practices that he chose to implement in his classroom for non-ESL students as well.

We found that many teachers when given the choice, engaged in an analysis to identify professional development activities that exposed them to curricular interventions that were easier to assimilate into their teaching. Several teachers favored activities that provided them with quick instructional interventions rather than interventions that required them to change large portions of their teaching. This is not a surprising finding because it is very similar to Supovitz and Turner's (2000), report that teachers prefer to engage in short term professional development activities in their own interest areas.

7. Implications

Teachers in this study found that they do not share a common object with school districts and universities that organize and facilitate their professional development activities. Teachers focused on improving curricular-based activities, while they perceived that school districts and universities aimed to attain objects related to licensing, accreditation, teacher quality, and student test scores. When teachers perceived that their professional development experiences were driven by institutional objects, it became very difficult for them to engage in meaningful activities because the situational factors at their schools were arranged to support institutional professional development objects and not necessarily teacher professional development objects.

On the other hand, we did find a joint object that teachers shared with school districts and universities for improving K-12 education and preparing qualified teachers. Our participants

perceived the joint activity to be more of a tug-of-war rather than a shared effort for a common object. Teachers in this study tried to get the most out of the professional development in which they participated by avoiding involvement in this conflict.

As a result, teachers in this study found challenges in effectively infusing what they learned. The institutional requirements that they have to meet for maintaining their licensing status or earning promotion often did not provide them curricular-based professional development opportunities. The rules and regulations that teachers found imposed on them by school districts and universities were what teachers reported to get in the way for implementing changes in their classroom practices.

7.1. Future possibilities for using activity systems analysis in teacher education research

For future professional development efforts to succeed, the tug-of-war between teachers and professional development coordinators must be addressed. One method to minimize this struggle is for teachers, school districts administrators, and universities faculty to acknowledge that they are participating in a joint activity. This requires engagement in a discussion to identify what the joint professional development activity is and how the activity affects the individual teacher activity and institution school/university activities. Activity systems analysis can take a role in this process to help researchers and practitioners identify joint activities and what specific aspects need to be changed or monitored to minimize tensions that impede the progress of individual and institutional professional development activities.

For example, the first author conducted a different study (Yamagata-Lynch & Smaldino, 2007) that was designed as an interventionist project to engage K-12 school personnel and university staff and faculty in discussions to identify joint objects in their partnership. Prior to this study, partnership members had identified communication problems between the school and university personnel that led to difficulties in meeting joint goals. The activity systems analysis model was used with the participants as a focal point in group discussion sessions. The use of the activity systems model helped participants maintain a targeted discussion for identifying the joint partnership activity, individual activity, and institutional activity. Through ongoing processes that spanned over a year, the author identified joint objects and solutions to communication issues that had been difficult to overcome in the past.

In future wide scale institutional studies that are participatory and interventionist it may be beneficial for researchers and practitioners to identify multiple objects and motives in both individual and collective activities surrounding teacher professional development to map out the potential situational hazards that need to be addressed. In this study, we only presented the dominant teacher perspective and the institutional activity based on what teachers described of the school district and university activity. In future studies, it would be interesting to identify and compare if there are any differences in what teachers report about their professional development activity depending on their years of experience and other contextual factors such as location of their school.

Additionally, it will be essential to collect and compare personal descriptions of what is involved in teacher professional development activity from individual teachers, school district administrators, and university faculty. Researchers then ought to contrast the described activity with observations of what is actually practiced. This will help identify dissonance between what is perceived and practiced, and reveal what is considered to be involved in professional development activities among the key players who are subjects in the joint activity.

The findings from the activity systems analysis can be presented to study participants to generate ideas for how to improve the community practice of teacher professional development. This can help study participants to establish policies and procedures that will help overcome and prevent systemic tensions that inhibit teachers from infusing what they learn from professional development into their classroom practices. However, there needs to be a constant reassessment of the joint activity to examine whether there are any new tensions that arise from changes that occur to the joint activity over time.

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