The Professional Identity of Three Innovative Teachers Engaging in Using Technology

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Abstract

This study characterizes the professional identity of three University teachers who have productively engaged in inquiry based classroom practice using knowledge building pedagogy and Knowledge Forum, a collaborative online environment. Grounded theory analysis of teacher interviews, supplemented with field observations, highlights five distinctive features of the teachers' identity: (a) Teachers as professional knowledge builders to explore new visions of teaching for continual improvement of knowledge building; (b) Teachers as co-learners to form symmetrical relationships with students so they can take on the highest level of responsibility; (c) Teachers as problem-solvers and barrier-breakers holding a proactive stance toward the contexts of practice; (d) Teachers as members of a professional community that encourages collaboration, innovation, and continual improvement; and (e) An empowering relationship with the Principal who supports teacher innovation and collaboration.

Keywords: teacher identity; knowledge building;; technology

1. Introduction

Current educational reform requires the ability of teachers to incorporate authentic investigative practices, through which students provide strong explanations and designs to solve authentic problems (Research Council National rescue, 2012). While various professional development resources are initiated to help teachers understand question-based strategies and technologies, knowledge of teaching methods is not enough to be a teacher. education based on sensitive and thoughtful questions (Fairbanks, Duffy, Faircloth, Ye, Levin, Rohr, & Stein, 2010). The complexity of teaching requires teachers to develop adaptive professional knowledge (Bransford, Darling-Hammond, & LePage, 2005) and the ability to engage in wise and collaborative responses to respond responding to the changing needs and evolving thinking of students (Little, Lampert, Graziani, Borko, Clark, & Wong, 2007; Sawyer, 2004). Hence, good teaching based on question and answer can not simply turn into specified techniques, but must emerge from the identity of all teachers (Palmer, 1997). This aspect of instruction gives educators a sense of their independence when dynamically connected with students and their subjects, allowing them to have a clear vision of themselves and what. is important for them to be fulfilled with children (Duffy, 2005), and has the soul and agency to overcome obstacles as they continually seek to respond to students' needs and thoughts (Fairbanks et al. , 2010). The goal of this study is to provide a detailed report of the professional identities of the three elementary teachers who have worked persistently and effectively with the pedagogy and knowledge-building technology, a in the most influential computer-aided collaborative Q&A programs to hone your creative knowledge. among students (Scardamalia & Bereiter, 2006). Our conceptual framework for this research guide consists of two parts, focusing on teacher identity and knowledge building respectively.

1.1 Conceptualizing teacher identity

Teacher identity refers to how teachers identify themselves as teachers, including who they are as experts, and whom they strive and are empowered to be in an interdisciplinary process reflect on their practices and experiences. The teacher's identity is not a static entity; a teacher constantly builds and develops his own sense of reflection through looking at his or her own teaching practice and life, as an example (Palmer, 1997). Who are their teachers (Clandinin & Huber, 2005; Palmer, 1997); A teacher's identity is linked to their particular set of practices (Gee, 2001), such as question-based teaching. In this sense, teacher identity is closely linked to teachers' practice (Enyedy, Goldberg, & Welsh, 2005). Teachers' professional identity arises from their different types of teaching practices in contexts in which they build an overall perspective on themselves in their relationship with students, colleagues, career goals. and teaching background (Beijaard, Meijer, & Verloop, 2004; Dillabough, 1999; Olsen, 2008). In this sense, the identity of a teacher differs from a teacher's specific practical and functional role: their role is tied to specific teaching jobs and skills while the teacher's identity is an entity more personal expression of how one identifies himself as a teacher (Mayer, 1999).

Our concept of identity draws heavily on the work of Gee (2001) and other researchers who highlight some of the key characteristics of teacher identity (Beijaard et al., 2004; Connelly & Clandinin, 2000; Rodgers & Scott, 2008; Sfard & Prusak, 2005). First, teacher identity is an ongoing process in which one interprets and reinterprets himself as a certain type of person and is also recognized as a certain type of person in a particular context. (Gee, 2001). It is not limited to answering the question "Who am I at this moment?", But also includes answering the question: "Who do I want to be?" (Beijaard et al., 2004). Therefore, teachers need to continually explore and reflect on their experience as experts (Antonek, McCormick, & Donato, 1997; Brooke, 1994) and actively seek new ways to identify them. their professional work to approach critical educational issues (Coldron & Smith, 1999). They shape and develop who they are by telling reflective stories of what they strive and do as teachers: "stories to live" is shaped by the past and projected into action their lives and their ongoing work (Connelly & Clandinin, 2000).

Its second characteristic, teacher identity, is shaped by a variety of teaching practice contexts (Beijaard et al., 2004; Rodgers & Scott, 2008). Contexts include larger historical-socio-cultural-social processes that influence teacher identity (Varelas, House, & Wenzel, 2005), personal history that alter beliefs, and Teachers' values, the institution's culture, includes the institution's history and values held by its administrators and other members. Through contemplating their practices and identities, teachers “become more attuned to a sense of self and a deep understanding of how this self-fit into a larger context regarding others.” (Beauchamp & Thomas, 2009, p. 182).

Consequently, teacher identities in relation to sub-identities are reflected in their relationships with peer teachers, students, administrators, and other members of their school community (Beijaard and partner, 2004). Checking on teachers' identity requires understanding how teachers form certain relationships with students, peer teachers, and school management, and positioning themselves toward context such as curriculum, the

school's policy and the actual school environment. Social relationships are very important to identity, because in order to have identity, one must be recognized by others as a specific "type of person" (Gee, 2001). The way teachers identify themselves stems from the nature of the social interaction's teachers have with their peers and others (Dillabough, 1999). In many contexts, a teacher forms many relationships that bring out many aspects of themselves (Gee & Crawford, 1998; Rodgers & Scott, 2008). Teacher identities are co-built "through engaging with others in cultural practice" (Smagorinsky, Cook, Moore, Jackson, & Fry, 2004, p. 21). The identity of teachers affects how they negotiate their roles in relationships with management, curriculum, and students, and these relationships more affect the identity of teachers (Enyedy). et al., 2005). In a study on self-study, Brooke (1994) also found that becoming a teacher involves interacting with other people's perspectives. Conflict between one's own teaching image and colleagues' expectations about what makes a teacher professional can lead to a deep reflection of identity (Volkmann & Anderson, 1998).

The last, vital trait of teacher identities relates to their agency and voice to shape their professional pathway (Rodger & Scott, 2008). The teacher's professional identity develops as a result of negotiating between certain factors, such as the existing social structure and policy, as well as the involvement and cohesion provided by the governing body of the school teachers with educational resources and ideas (Coldron & Smith, 1999). Agencies are empowerment to action (Holland, Lachicotte, Skinner, & Caine, 1998). An agency teacher not only knows how to act in the existing educational world, but also acts and improves the world according to his or her vision. Such agency is the result of teachers recognizing their identities (Beauchamp & Thomas, 2009; Parkinson, 2008) and motivating them to continually strive to discover and form new identities as they go beyond. Current activities in the classroom.

In this study, we investigated the identities of question-based teachers who were involved in building pedagogical and technological knowledge as a school-wide innovation made in more than one form a decade. School-based professional development has been provided to assist students to continually reflect on knowledge-building practices in the classroom as well as what it means for teachers to build knowledge, based on search understand. This study examines how teachers reshape their identities through their long engagement in knowledge-building activities. Consistent with the above concept, we analyze their reflecting stories of what they strive for through their unique set of practices (Gee, 2001), supported by their relationship with birth Members, Colleagues and Principals.

1.2 Teacher identity in inquiry-based, knowledge building communities

With schools increasingly incorporating a problem-centered, inquiry-based pedagogy to develop students' effective knowledge and advanced competencies (e.g., creativity, collaboration, and other competencies of the 21st century), research into teacher learning and development needs to understand the professional identity of teachers who conscientiously perform and maintain demand-based learning in practice their collaborative, question-based learning materials suggest various new roles that teachers take on: designer, moderator, mentor, master of authentic learning processes, and a partner or co-participant in the inquiry process with them or her students, evaluating the student as collaborators while promoting their ownership and representation (Belland, Glazewski, & Richardson, 2008; Brush & Saye, 2000; Crawford, 2000; Hjalmarson & Diefes-Dux, 2008; Hmelo-Silver & Burrows, 2006; Lunn & Solomon, 2000; Mills, 2014; Tabak & Baumgartner, 2004; Zhang & Sun , 2011; Zhang, Hong, Scardamalia, & Morley, 2011). However, existing research on teacher learning to support question-based classroom innovation has primarily focused on teacher knowledge and practice (see Fishman, Davis, & Chan, 2014 for evaluation), with scarce research efforts focused on the professional identity of teachers who are constantly innovating, resilient and efficient in implementing question-based learning (Enyedy et al., 2005). A teacher's identity that is consistent with a question-based pedagogy allows teachers to pursue and persevere in a responsive, responsive teaching approach (Duffy, 2005; Fairbanks et al., 2010) and continuity invent new and more efficient methods (Davis, 2006). Therefore, to better understand teacher identity in supporting question-based pedagogy, current research examines the professional identities of teachers who are deeply engaged in continual classroom innovation by how to use pedagogical knowledge and construction technology (Scardamalia & Bereiter, 2006).

The pedagogy of family knowledge building is greater than problem-centered, question-centered learning programs, with particular focus on the design of questions following the processes of target knowledge creation. real (Scardamalia & Bereiter, 2006). In addition to project-based questions that require students to solve predefined problems and tasks, pedagogical methods build knowledge that approaches questions such as how to solve problems progress achieved through acting collective theory: Students identify new and deeper problems as old problems are resolved, promoting sustained progression of collective understanding. Students act as a knowledge-building community to engage in such sustainable inquiry and discussion and together raise the "state of the art" of the collective knowledge of the community of last name (Scardamalia & Bereiter, 2006). They identify deeper issues in understanding, develop and contribute ideas to public spaces, engage in collaborative discussions and testing, and use a variety of resources to promote push their ideas. A networked

knowledge-building environment - Knowledge Forum, formerly known as CSILE (Computer-Aided Intentional Learning Environment) - has been developed to support processes and demonstrations. knowledge building languages (see Scardamalia & Bereiter, 2006). The Knowledge Forum provides a collective knowledge space that gives students' ideas a public, permanent representation. Students contribute diverse ideas to ongoing conversations and work together to advance ideas through constructive criticism, mutual constructive, and progressive problem solving, with challenges. New and deeper knowledge was identified as improved understanding (Bereiter, 2002). Specifically, students record ideas in views (workspaces). These workspaces correspond to their central goals. Students write notes in these views to contribute their ideas, data, and related information using text and graphics. Knowledge forums have support features for knowledge-building discourse that allow students to co-author, elaborate, and annotate. Students can also create reference links with citations to existing notes, as well as add keywords and create notes above to summarize and promote their discussions (Scardamalia, 2004). The Knowledge Forum scaffolds further support both personal contribution and learning as well as collaboration, transferring students to higher-level knowledge processes. Customizable frameworks are designed to support various knowledge processes, such as using the opening sentences "My theory", "I need to understand", "This theory cannot explain "," A Better Theory "and" Put Our Knowledge Together "to support theoretical development (Scardamalia, 2004).

Knowledge building is a dynamic social activity system in which students interact with diverse people and ideas to enhance their collective knowledge. The social and cognitive complexity of this process requires an adaptive, principled approach to classroom design and practice, which differs from the demanding procedural question designs. students and their teachers work on predefined project tasks according to pre-written procedures and timelines (Zhang et al., 2011). Knowledge building in the classroom is guided by a set of 12 knowledge-building principles, including expressive bodies, practical ideas and authentic problems, continuously improving ideas, and collective responsibility towards community knowledge, knowledge-building discourse and the constructive use of authoritative resources (Scardamalia, 2002). Cognitive bodies allow students to set learning goals, initiate and maintain knowledge progress, and engage in higher level knowledge work that is often assigned to teachers. Practical idea principles and valid problems allow students to identify problems stemming from their curiosity and understanding of the world. The principle of continuous improvement of ideas sees ideas always being improvisable, not simply rejected or accepted. The principle of collective responsibility to community knowledge places responsibility for all participants in contributing to community goals and enhancing community knowledge, not just individual learning. The principles of knowledge-building discourse require students to participate in purposeful discourse practices not only for sharing but also for converting and enhancing knowledge. The idea behind the constructive use principle of authoritative resources is to critically access and evaluate sources of information. Students use these resources to support and refine their ideas, not just to find “answers”. The 12 principles and corresponding supports in the Knowledge Forum create affordability for building knowledge in the community.

In a knowledge-building initiative that focuses on the deep curriculum area (s), teachers and their students work together to build inquiry targets based on student progress questions and design knowledge building activities based on principles. Resources and support are provided for teachers to share lesson examples and reflect on the knowledge building process using real-time analytical data on ideas contributions and social interactions. Teachers have used automatic feedback generated by automated tools to facilitate reflection and improve practice. This principles-based approach gives teachers a high level of ownership over classroom practice and innovation, so they can continually refine and refine classroom designs and understanding pedagogy to facilitate increasingly effective knowledge building es for their students (Chan, 2011; Zhang et al., 2011).This study examines the professional identity of a group of teachers from an elementary school who have been working on pedagogical methods and knowledge-building technologies for over a decade. Our previous analysis based on the collection of rich data over eight years has demonstrated the continual improvement of teachers in Q&A practices demonstrated by students' active and collaborative participation in knowledge building (Zhang et al., 2011). Facilitating such sustainable innovation and improvement, teachers have formed professional knowledge-building communities themselves to discuss progress and challenges, co-design and experiment with Classroom designs, reflect on their practices based on collected data and continually deepen their understanding of knowledge building principles. announcement of new possibilities for improvement (Zhang et al., 2011). The purpose of this study is to investigate the professional identities of these teachers in a knowledge-building classroom setting. Our research question arises: What characterizes the professional identity of dedicated and sustainable teachers who use pedagogical methods and knowledge-building technologies ?

2. Method

This case study was carried out as part of a larger research initiative aimed at examining the application of knowledge building as a principle-based innovation in a university for more than a decade. It contributes daily to teacher training, providing internship opportunities for graduate students in educational programs.

For larger research, we analyzed knowledge-building initiatives supported by teachers for over eight years focusing on core science topics as well as communal topics festival. Analysis of students' online essays in the Knowledge Forum reveals an increasing degree of knowledge-enhancing collaboration related to years of teacher experience. Teacher interviews, reflection logging and on-site observations have helped improve teacher efforts and school conditions. Qualitative analysis showed that teachers have been working continuously and collaboratively to improve their practices and deepen their understanding of knowledge-building pedagogy. Through testing new ideas and sharing openly with other teachers, they developed adaptive expertise. The current study reanalyzed interviews with three teachers to understand their professional identity. These teachers are selected because they represent different grade levels, have the most experience in the knowledge-building pedagogy at their school, and are often required to provide advisory support to their respective teachers. Other teachers from international knowledge-building community networks. Teachers include Duong, Thinh and Huong. All teachers are middle-aged and have more than 10 years of teaching experience. Each interview lasted approximately 30 minutes, focusing on how teachers approach and improve their classroom practices to better aid knowledge building. Example interview questions include: How do you see your role as a teacher? What are the three most important qualities you want to develop in your students? What are the main things you do to develop these qualities? What are your three most important innovations in your teaching over the years? How do you see your colleagues / Principals support your efforts to seek innovation in teaching? Identity analysis is mainly based on interviews in which teachers reflect who they are and what they strive for. The analysis is contextualized by observational records of the teacher's classroom activities, systematically analyzed for the larger project.

Interviews are fully transcribed, and then analyzed using a well-established theoretical approach (Strauss & Corbin, 1998). A well-established theoretical approach is suitable for the subject of this study because, although the professional identity of the teacher has been studied in identity-based literature, teachers based on the sentence. Ask a high level of innovation that has never been tested for this purpose. We also argue that incorporating existing ideas from the literature about what constitutes teacher identity not only does not "compromise methodological purity" (Dunne, 2011, p. 113), but also "can actually enhance rigor" (p. 113). Literature review provides a clear rationale for the research and a specific research approach (Coyne & Cowley, 2006; McGhee, Marland, & Atkinson, 2007). Second, it is very useful in contextualizing research (McCann & Clark, 2003), providing the researcher with a goal (Urquhart, 2007) and knowing how the phenomenon has been studied (Denzin, 2002; McMenamin, 2006). Third, it is very useful in developing 'sensitive concepts' (Coffey & Atkinson, 1996; McCann & Clark, 2003) and promotes' clarity in thinking about concepts and the ability to develop theory" (Henwood & Pidgeon, 2006, p. 350).

Following a well-established theoretical analysis process, the author first reads the interview transcripts over and over again, and at the same time creates open-source code that reflects the specific characteristics of the teacher's identity. These codes are then categorized into major topics that include sub-topics to capture the outstanding characteristics of teachers' professional identities relative to their knowledge-building practices. The creation of topics informed by teacher identity and knowledge building as our double conceptual framework and by the characteristics of teacher identity were reviewed at the beginning of this article while opening up possible new facets of teacher identity in the knowledge-building contexts. After that, the two authors reviewed the open-source code and the original and sub-topics together and discussed any disagreements. For example, some raw code such as the classroom as a community of researchers, teachers as a true fellow student, and trust in students developed into the following sub-subject: "Teachers with private How to be a learner: Maintain a student-based requirement through a symmetric teacher - student interaction in which the teacher is not intellectual authority but co-student. This sub-topic then became a core aspect of the following topic: "Teachers as classmates: Form a symmetrical relationship with the student so that they can assume the highest responsibility in learning and improving knowledge."

In valid theoretical analysis, the level of consensus among researchers is less important than "the content of the disagreements and the insights the discussion can provide for refining coding frameworks". (Barbour, 2001). In addition, we have adopted a reflective approach to analysis to ensure reliability and validity (Barry, Britten, Barber, Bradley and Stevenson, 1999). Schwandt (1997) determined that the reflectivity was twofold. The first aspect involves being part of the context, context and phenomenon being studied. The second is "[a] the process of self-reflection of one's prejudices, theoretical tendencies, preferences, etc." (page 135). We

used the reflex ability "to direct us outward to gain extended understanding" (Barry, Britten, Barber, Bradley, & Stevenson, 1999, p. 30). We reflect not only by recording reflexes and recording analytical decisions in memos, but also by reflecting on every decision we make (Mason, 1996). In addition, as a group, we engage the group's reflexes, ensuring that there is a dialogue between our personal reflexes and our team reflexes (Barry et al., 1999). In the process of negotiating our ideas, we have developed a dialectic to improve our thinking. That is, by sharing and negotiating our thoughts and differences, we think through our positions and justify them, and if an argument cannot be justified then it is clearly weak (Barry et al., 1999). Subjects and subtopics were then further refined and confirmed through contacting and comparing topics, checking data against topics, and categorizing identified topics with data. data from teacher journals and field observations. Refined themes and subtopics built in Results.

3. Results

3.1 Teachers as professional knowledge builders to explore new visions of teaching: Viewing teaching as ever improvable to open new possibilities for student knowledge building and development

As an important aspect of who they are and meaningful to achieve, teacher comments in interviews show that they are professional knowledge builders who are committed to vision exploration innovations in instruction to open up new possibilities for building and developing students' knowledge.

First, the clue teachers consider themselves teachers for the comprehensive development of children and lifelong learning, not just to cover the curriculum. Specifically, they are committed to developing important qualities beyond the curriculum content, such as curiosity, intellectual thinking skills, creative problem solving, and social interest association, collective responsibility and open spirit. They emphasize that these qualities are critical to student development and more essential for students to participate in effective knowledge building.

Developing curiosity is one of the most important qualities that make them who they are as a young educator. Duong realizes the limitations of the curriculum in stimulating the student's natural curiosity, promoting learning; therefore, in her classes, she especially encourages students to ask deeper and deeper questions and to engage in curiosity. Similarly, Thinh mention the importance of discovering questions posed by students and their interest. Specifically, they make it clear that this teaching style, contextualized and relevant to student's lives, tailored to the needs and curiosity of the student, leads to active participation and in-depth exploration, that is the essence of inquiry. As Thinh says, she wants to arouse "a love of learning so that when they go to school, they don't see work at school just for learning, but that it's important to their lives." At the same time, Thinh emphasizes that this teaching attitude has been a part of who she has always been: "I really tried to stick to it in the public school system, but to come back here and see everyone sharing I am right back on how students learn best, practice developmentally appropriate. "

According to the teachers, curiosity as a principle stimulates the desire to learn deeply about something, very important in problem solving and nurturing an inquisitive mind. Teaching problem-solving also starts early.

Developing independence in thinking is another important part teachers want to achieve. Huong mentions developing independence and openness in thinking early in the education of student: “I want them to know that they can act independently; they don't have to have a teacher there, guide them the whole way and let them know what's right or wrong ”.

In line with a commitment to promoting interest, curiosity, and independent thinking among students, teachers focus their role on creating a community of knowledge builders who share the responsibility of learning. can. Teachers emphasize collective responsibility that allows students to continue to move forward in the pursuit of common knowledge and hold accountable to each other without teacher intervention at all times.

To explore and achieve their vision of teaching, teachers embark on a sustainable and reflective journey to discover and build new knowledge about their careers. During interviews, teachers commented that they continually rediscover what it means to be a knowledge-building teacher. Their understanding of knowledge-building pedagogy has evolved over time. In the process, they are all learners. Duong made this important belief in rethinking, refinement and improvement: “But five years from now, we can go back and say: 'I didn't know I was speaking then. What, and this is like building knowledge! 'So there is continuous improvement. Just like ideas are improvisable, the knowledge-building process is immutable .... You keep going deeper into what this means ... None of us are who learned. We are all learners. Cadence added: “I never tried to think it really worked, I would do the same thing again. I'm always looking for ways to improve my training ”.

Teachers' comments on the new advances they have made in their classrooms demonstrate an open, adaptive teaching approach through which new classroom arrangements, processes, and technologies are linked. flexible and integrated testing and adjustment procedures to serve and reinforce knowledge building and understanding. What these teachers have learned and gone through in the process reinforces their identity as

knowledge builders. She expressed her thoughts on the matter, "… because we have the software, the questions are there and they will be answered. "

Reflecting on her experiments in the classroom, Duong commented on the changes she made to develop dynamic collaborative structures to build knowledge for over three years. She started out with small fixed group collaboration during the first year, developed into collaboration in interactive groups, and ultimately as an opportunity-based collaboration among students based on an emergency need without fixed subgroups. Analysis of online lectures shows that the increased connection and productivity among her students is a result of these changes (see Zhang, Scardamalia, Reeve, & Messina, 2009; Zhang & Messina, 2010). Duongs has also changed the way conversations are organized in the classroom; rather than scheduling it in advance, she decided to let the conversations go naturally. Likewise, her use of technology in the classroom has shifted from a teacher-led task to trusting children and allowing them to decide if an idea or question is relevant and important to discuss, online or in person or not. As all teachers emphasize, the continuous efforts to improve and innovate teaching are an important characteristic of who they are. As new teaching concepts and strategies continue to develop, teachers redefine their relationships with students in the classroom.

3.2 Teachers as co-learners: Forming symmetrical relationships with students so they can take on the highest level of responsibility for learning and knowledge advancement

The lead teachers identified themselves as co-learners, honoring students as members of the research team to build collective knowledge.

Identifying yourself as a student leads to a more symmetrical relationship with the student. They honor students as team members who have the power and ability to propose goals and topics for research, construct and evaluate theory, design experiments, and form assemblies. Duong emphasizes this point with enthusiasm: "Imagine if a child feels that in the first place they can add things by connecting things in an interesting way. They can add a new perspective, a new theory. "The teachers believe that student can take on senior responsibility in the classroom to come up with deeper questions and ideas. They impart this confidence to their students in activities and encourage them to ask questions that guide and deepen their collective inquiry.

The symmetrical relationship with students is reflected in students-driven, open-ended discourse in the classroom and on Knowledge Forum, which are not pre-scripted by the teacher but co-improvised by all community members—with the teacher as one of them. The teachers comment on the importance of respecting diverse ideas. They model their respect of student ideas in the classroom and further create a community that respects diverse voices from all members. The diverse ideas are treated as the driving force to deepen classroom discussions. Cadence underscores her openness to follow students' deepening questions and ideas and let them explore these questions for sustained inquiry and discourse.

In addition to their trust in the student's agency and their ability to come up with questions and ideas for in-depth understanding, teachers also encourage students to take on the high-level responsibilities often carried out by teachers in classrooms traditional learning. These include providing input to high-level decisions about what to study, through what activities, who will do what, when and where online discussion spaces should be structured and utilized how all teachers emphasize that it is important to encourage children to bring up specific issues for discussion rather than sticking to teacher-set topics and schedules. The example from Duong's class is particularly prominent. At first, he simply planned and scheduled knowledge-building talks - a structure co-developed by teachers to facilitate interactive discussions focus on driving ideas beyond information sharing (see Zhang et al., 2011). She then hung the bags in the classroom to encourage students to take notes when they had important issues or knowledge to address. Through these and other changes, her classroom knowledge-building talks have become much more spontaneous and organic, with continually improving ideas. During our classroom observations, we have captured many metacognitive discourses embedded in ongoing classroom conversations, focusing on issues such as: Are we making progress? are not? What are the areas that need further research? What kind of information should be recorded in the Knowledge Forum? Student input to these questions leads to general decisions about how communities should focus and refine their knowledge-building work in the next stage.

The focal point teachers see the Knowledge Forum as the driving force behind the transfer of high-level responsibility to students. For example, Thinh values using the Knowledge Platform to support sustainable discourse and continues to make student questions and processes visible for reflection. The software provides a space where "questions exist there and they will be answered." She expressed that before using the Knowledge Forum, it is difficult to find out which questions have been answered. With the Knowledge Forum scaffolding, marking questions using "I need to understand" and theories using "My Theory" and "A Better Theory", both teachers and students of they can track progress in addressing progression questions and find areas for further contribution, assisting collective decision-making on directions and deeper action.

3.3 Teachers as problem-solvers and barrier-breakers: Holding a proactive stance toward the contexts of practice to address challenges, constraints, and barriers for continual improvement

Developing innovative methods tailored to their teaching vision requires teachers to face and address a range of context-created challenges and barriers, such as time limits and class schedules, subject limitations, age difference and technology breakdown. Instead of being defeated by challenges and barriers, teachers become active problem solvers and breakers.

In the face of various challenges, teachers developed adaptive strategies to make knowledge building feasible and effective across student and classroom age groups, and they said about these efforts as part of who they are. As they strive to engage students of all ages in building knowledge, they need to develop adaptive ways to address the challenges of developmental differences.

In terms of technology reliability, teachers also need to learn to solve various technical problems on their own (e.g., Internet connection, forgotten passwords) due to a lack of full-time tech support specialists. They see this challenge as an opportunity to model student how to solve problems and create alternatives when technology isn't working. Duong emphasizes her persistent and proactive approach to solving problems with a "healthy stomach". She said: “It puts you in a role where you have to be always happy with technology and that's a lot of work.”

3.4 Teachers as members of a professional community that encourages collaboration, innovation, and continual improvement: Building collaborative relationships with colleagues to share, discuss, design, and reflect on innovative classroom practices

The creative collaboration of teachers with colleagues and treating them not just as teachers but as researchers is another major aspect of who they are as professionals.

Teachers see themselves and their teaching as part of the professional community of teachers they work with. As Thinh said, "... people here are very interested in teaching and improving it." Furthermore, all teachers emphasized that the formation of such a professional team is very important to innovate and improve their teaching. Duong remarked: "It creates an environment where you say something and even just by talking about it, you are improving your understanding." Huong adds, “Anytime I have an idea, a question and I want to connect with another class or another teacher, you most likely have people willing to go ahead and do it. "

Furthermore, deliver professional-oriented presentations at weekly knowledge-building meetings, assist them collaborate on problem solving and form new ideas, shape them as experts. At the meetings, they exchange classroom design, insights and challenges, ask questions, and continually develop better understanding and strategies for building deeper and more effective knowledge. They also emphasized that this community, which strives for excellence in teaching, is open to sharing both success and success, failure. Such freedom and boldness in talking about both successes and failures stems from the teachers' shared belief that taking risks is inevitable when experimenting with new approaches that lead to improvement. Good practice of teaching. In this community, as Thinh emphasizes, “There is no pretense that things are going well. People raise their problems and admit when things don't go well. "

These teachers also identify themselves as both teachers and researchers and emphasize that their own hands-on research, as well as working with other researchers, is an important component of teaching. teach well, promote innovation, refinement and change. Duong further explains this important relationship between teaching and research, "The researcher part provides information for teaching and the teaching informs the researchers part about me." Thinh sums up, “For me, research really goes hand in hand with teaching… good teachers constantly reflect on their teaching and think about how to improve it… It's just a natural part of it of good teaching.”

3.5 An empowering relationship with the Principal: Perceiving the Principal as both a leader and a professional colleague who supports teacher innovation and collaboration for continual improvement

Lead teachers build supportive relationships with the Principal in terms of expertise instead of administrative orientation. Through weekly knowledge-building meetings and informal continuous interactions, teachers share with the Principal and other colleagues about their teaching expertise, ideas and design, understand learn about your student's development and needs as well as a vision of innovative teaching methods. Principals engage in professional dialogue and provide input. Cadence commented on this share, “If you have an idea, you present it to her [Principal] and it makes sense to her, she will support you. She may question it and ask you to think of it in a slightly more valuable way, but she will really support it. "Thinh emphasizes that she receives the support from the Principal to maintain her innovative methods," said: "She's a great leader and that allows me to teach the way I want to teach, renews and reflects my practice.” Duong expressed the essence of this relationship, “We are so empowered. We are supported a lot, but with that is a huge responsibility ”.

4. Discussion

The current research seeks to shed light on the professional identities of the three teachers who have worked consistently and effectively with their pedagogy and knowledge-building technologies. While existing literature on teachers in question-based environments focuses on investigating teacher practices and strategies to facilitate collaborative learning. Teacher knowledge, beliefs and goals (see Fishman et al., 2014 for consideration), this study is primarily intended to examine the new professional identities of teachers engaged in classroom innovation for many years. Our interview data captures their narrative stories about what they do and what they mean as teachers (Connelly & Clandinin, 2000). As document review shows, teachers are constantly building and refining their reflective sense of self through a review of their teaching practice (Antonek, McCormick, & Donato, 1997; Brooke, 1994; Palmer, 1997). Through their long involvement in pedagogy and knowledge-building technology, as a set of special practices (Gee, 2001), the lead teachers in this study developed Develop new insights into who they are and what it means to be an investigation-based knowledge teacher. Specifically, the analysis highlights five particularly important aspects of teacher identity relevant to the broader real world context (Beauchamp & Thomas, 2009) that relate to students, their peers, and their Principals.

First, in addition to regular instructional practitioners, teachers are specialist knowledge builders who explore new teaching visions and abilities and test new teaching designs, and adapt to continuous improvement. They see the building of pedagogical and technological knowledge as support to their vision. Since there is no classroom process to achieve these advanced learning outcomes, teachers must work as specialist knowledge builders to develop and improve specific designs based on principles of building knowledge. During this experience (Gee, 2001), they are empowered to engage in continuous reinterpretation and reinterpretation (Beijaard et al., 2004) of their being knowledge building teachers. They are acutely aware that as teachers they are constantly changing because they have a strong sense that they need to be educators to help children participate in knowledge building effective. This thinking allows teachers to develop an adaptive approach that shows themselves a willingness and openness to change existing classroom processes and arrangements, and test new and innovative strategies, including new ways to use technology. Their identities are specialist knowledge builders who are vision-oriented, relevant and supported by their knowledge-building practices that require dynamism and adaptability in high level in class work. Teachers reflect who they are and what they do in a knowledge-building pedagogical context, which in itself requires teachers to build knowledge of their pedagogy and to develop it.

A related aspect of teacher identities is related to how they position themselves in relation to the challenges and difficult contexts of their work (Beijaard et al., 2004, Gee, 2001; Rodgers & Scott, 2008; Varelas et al., 2005). The document argues that teachers often find obstacles and constraints on context that prevent them from innovating and changing. The teachers in this study actively identified and solve challenges instead of avoiding them. They identify themselves as problem solvers and barrier breakers, who continually develop adaptive strategies to make knowledge building feasible and effective. They proactively approach obstacles so they can solve problems with their peers and students, turn them into ideas and opportunities for innovation, and implement and enhance ideas, stay awake in a new condition. Such an active stance is an important part of a teacher's identity, allowing them to deal with dilemmas and make decisions to maintain student-centered learning (see also, Enyedy et al., 2005).

Another important characteristic of the professional identity that lead teachers exhibit is reflected in their social relationships with others (Beijaard et al., 2004; Gee, 2001; Sfard & Prusak , 2005). Through forming relationships with students, fellow teachers, and administrators, teachers have created many identities (Gee,

2001), or aspects of themselves (Rodgers & Scott , 2008), is related to "their activities in society" (Gee, 2001, p. 99). First, the teacher's relationship with the student constitutes their identity. Their understanding of themselves as a certain kind of expert is deeply relevant to students (Beauchamp & Thomas, 2009) and forms certain types of relationships with them. Different from traditional authority roles, they identify themselves as co-learners of their students in a knowledge-builder community. This results in a symmetrical relationship with the student, in which the student assumes the most important role in continuous knowledge building. This relationship is consistent with how teachers approach classroom discussions in both live and online environments through the Knowledge Forum, not a teacher-planned conversation, but a conversation. Student-driven, spontaneous, and co-improvised conversation driven by authentic student questions and ideas. Such symmetrical relationships have been demonstrated to some extent in the study of learners-oriented teachers; however, this symmetry is not always maintained (Enyedy et al., 2005) or is random (Crawford, 2000; Tabak & Baumgartner, 2004).

Yet another essential attribute of a teacher's identity is deeply tied to the type of relationship they form with other teachers and with their Principals. Their sense of a professional community, as teachers show in their reflection stories, fundamentally reinforces their bold vision of innovative and adventurous teaching (Cohen, 1989). In collaborative groups, devoted to understanding and improving teaching, teachers also demonstrate a hybrid identity (Bereiter, 2002) by describing them as not only teachers but also research researchers. their own practice, in collaboration with other teachers and researchers, to continually improve their understanding and pedagogical strategies. The increasingly effective knowledge-building practice results from this multidimensional identity, which includes co-developing better understanding and design of classroom practice methods, supporting each other in solving problems. Solve problems and take risks, share successes and failures based on formal and informal data collection, while at the same time challenge one another in an atmosphere of mutual respect and sharing.

Assisting them in exploring and improving classroom practices to facilitate knowledge-building, teachers further develop a democratic and professional-oriented relationship with their Principals. The foundation for this relationship is a mutual understanding that continuous innovation and experimentation are needed to improve education, and teaching needs to go hand in hand with research. These teachers see the Principal as a dedicated leader to the school and an educator who can always share opinions and expertise and participate in professional conversation. with the teacher. This type of relationship leads teachers to find themselves empowered to pursue teaching according to their vision, take risks to experiment with innovative approaches, and collaborate and share with Principal as well as other colleagues about the advancements and challenges. This democratic relationship with the Principal and its direct connection to the way teachers perceive and identify themselves has never been demonstrated in a document about teacher identity.

These different aspects of the teacher's identity seem to be deeply interconnected, depicting a consistent image of the teacher's self in the context of a question-based, knowledge-building classroom. The identities of teachers are vision-driven professional knowledge builders who continually improve classroom practice supported by their roles as problem solvers and disruptors break down barriers to address contextual challenges and difficulties as well as their relationships with students, colleagues, and the Principal. They build together identity through engagement with students, colleagues, and their Principals in transformative cultural practices (Smagorinky et al., 2004), which focuses on collaborative knowledge building. By collaborating with their students in building knowledge and reflecting on those experiences, they are noticed and impressed by the students' profound ideas and positive thinking, this even further. reinforce their belief in students 'potential and agency, and help teachers visualize new possibilities for further engaging students' responsibility through improved classroom designs. Through ongoing dialogue at weekly meetings focused on knowledge-building progress, strategies and challenges, teachers support and acknowledge each other as constructivists. Knowledge, problem solver, and co-learners. These identities are further reinforced by a democratic relationship with the Principal, who fosters a school culture that supports sustainable innovation (Zhang et al., 2011). With these key characteristics about who they are and what they strive for, teachers can be persistent and productive in implementing and improving knowledge-building methods and solving challenges formula varies continuously. At the time of this study, teachers were still looking for effective ways to perform knowledge building in mathematics, based on a set of tried and tested strategies.

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