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What is implied when researchers claim to use a theory?

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ABSTRACT
The focus of this article is on the use of theories and on what we imply when we in research claim to use a theory. In this article, diverse uses of one theory will be illustrated with reference to 10 different studies. The aim is not to evaluate or judge how the theory is used in these studies, but to discuss how the diverse uses of one and the same theory may infer very different things in research. Questions are raised about what happens with the hierarchy and the coherence of an argument and what conclusions can be drawn when only some parts of a theory are used.

Introduction

What do we in research imply when we claim to use a theory? The aim of this article is to illustrate how a single theory can be used in very different ways in research and to discuss what such differences may imply[*]. The theory to be used as an example is Wenger's (1998) social theory of learning. Since Wenger published his book *Communities of Practice: Learning, Meaning, and Identity* in 1998, the notion of communities of practice has become common in educational research. However, the main issue in the article is not Wenger's theory in particular. Instead, his theory will be used to illustrate how one and the same theory can be used very differently in research. The content of the article will therefore be of interest not only to researchers using this particular theory but (hopefully) also to researchers using other theories.

Although Lave and Wenger introduced the notion of communities of practice in 1991, in this article we will focus only on research referring to Wenger's 1998 book. In that book he writes that his aim is to present a conceptual framework where learning is placed 'in the context of our lived experience of participation in the world' (1998, 3). In this article we will not present Wenger's theory beyond that, in order to avoid imposing our own interpretations of which are the main concepts in his theory. Instead, the theory will be presented based on how it is used in different studies.

The notion of communities of practice has been investigated and discussed before, for example by Kanes and Lerman (2008). They investigated similarities and differences in how the notion is used by Lave and Wenger (1991) and by Wenger (1998), respectively. In this investigation of the use of Wenger's theory, our aim is not to evaluate or judge either Wenger's theory or how it is used in the studies presented. Instead, our aim is to illustrate and discuss how the use of one and the same theory may imply different things and to discuss implications of such plurality.

According to Radford (2008), a theoretical approach contains three interrelated components: *basic principles*, *methodology* and *research questions.* In this article we will organize the comparisons of how Wenger's theory is used based on those three components. In his article, Radford focuses on these interrelated components when networking different theories within one single study. In contrast, in this article we will use the interrelated components to organize the comparison of how one single theory is used in different studies.

Selection of reviewed studies

Since both authors of this article are from the field of mathematics education, we limited our focus to studies on mathematics teaching or learning and/or mathematics teachers' professional development. However, the use of Wenger's theory is not limited to either this subject area or to education. It is widely used within many fields and actually stems from business research. We will address potential consequences from limiting the selection of articles to the field of mathematics education in the end of the article.

The search for articles was made in 19 databases, using the search words *communities of practice, mathematic** and/or *teach**; the search was limited to peer-reviewed journals or books. From this selection, consisting of more than 8000 articles, we limited the search to *communities of practice* and *mathematic** and/or *Wenger*; although that reduced the number of articles, there were still too many in some of the databases. We then removed 'or' *teach**. Thereafter we were able to browse through all the titles and keywords to find a selection of research articles using *communities of practice*. This selection is not at all comprehensive; however, the purpose in the article is not to generalize but to illustrate how a single theory is used in very different ways in research.

Our initial interest in studies using Wenger's theory was not to carry out this review but to investigate whether groups (communities of practice) or individuals (identity) or both were foregrounded in studies using his theory. While investigating this, we observed that communities of practice were sometimes considered as pre-existing and sometimes being designed within the research. Due to space limitations, this article cannot present all the research we have read; instead, we present research that, together, illustrates those differences mentioned above. The following 10 studies will be used as illustrations in the article: Bohl and Van Zoest (2003), Corbin, McNamara, and Williams (2003), Cuddapah and Clayton (2011), Cwikla (2007), Franke and Kazemi (2001), Goos and Bennison (2008), Graven (2004), Hodges and Cady (2013), Pratt and Back (2009) and Siemon (2009). Based on these articles it will be further explored what it might imply to use Wenger's theory in research.

Research questions

We will start the comparison by investigating the kinds of research questions being addressed in the 10 selected studies. According to Radford (2008), a research question must be in line with the basic principles of all involved theories when networking. Based on this, the research questions in the studies compared in this article ought to be very similar since they are all using the same theory.

Almost all of the studies compared in this article mention something about the social turn in research or/and something about social theories in general. For example:

> The field of mathematics education has shown increased interest in sociocultural views of teaching and learning […]. (Hodges and Cady 2013, 299)

> Lerman (2001) argues that sociocultural theories offer more useful conceptual tools for understanding teachers' learning as increasing participation in the practices of a professional community. Mathematics education researchers are beginning to apply Wenger's (1998) social theory of learning, and in particular the notion of learning in communities of practice, to investigate teacher learning in professional development programmes that promote innovative practice. (Goos and Bennison 2008, 41)

All of the studies emphasize the social context as the central issue to be focused on, and not as something in the background only to be accounted for. For example:

> […] we are increasingly understanding these communities and the multitude of entailments they encompass as the necessary targets of, rather than as a supplementary resource to, our research. (Bohl and Van Zoest 2003, 339)

Thus, the emphasis on the social context is common for all the studies. The research question/questions are not made explicit in all of the studies but there is a coherent theme in the research questions or objective mentioned in the studies, for example:

How teachers accommodate to the process of change and the group dynamics encountered within school structure. (Cwikla 2007, 554)

How a cohort can be a valuable recourse of new teacher support, particularly in areas where novices, who are being prepared largely through alternative routes, start their careers in some of the most challenging teaching assignments. (Cuddapah and Clayton 2011, 62)

[…] describe and explain teacher learning that occurs within a mathematics senior-phase in-service program that was stimulated by curriculum change. (Graven 2004, 177)

The quotes above are from studies illustrating the initial differences we found in studies using Wenger's theory; groups foregrounded (Cuddapah and Clayton 2011; Cwikla 2007), individuals foregrounded (Graven 2004), designed communities of practice (Cuddapah and Clayton 2011) and pre-existing communities of practice (Cwikla 2007; Graven 2004). The quotes are examples of how the studies reviewed in this article, despite different starting points and different wordings, have the common focus on processes of teacher learning, teacher development and/or teacher change, or as expressed by Bohl and Van Zoest, on understanding 'how, why, and what teachers learn' (2003, 339). This coherent theme is applied to teachers at different stages of their working lives.

The studies by Siemon (2009) and Goos and Bennison (2008) are about teacher education. Siemon (2009) focuses on a special community-based approach to teacher education for a special target group of a local minority population. Goos and Bennison (2008) examine the intersection between completing teacher education and starting as a novice teacher, describing how a community of practice focused on becoming teachers of secondary school mathematics emerged during a pre-service teacher education programme and was sustained after students graduated and began their first year of full-time teaching in schools.

The studies by Cuddapah and Clayton (2011) and Bohl and Van Zoest (2003) focus on novice teachers. However, they write that their results also largely apply to experienced teachers. The common theme in these two studies concerns how and why novice teachers are or are not influence by their social environment.

The studies by Franke and Kazemi (2001), Graven (2004), Cwikla (2007), Hodges and Cady (2013) and Corbin, McNamara, and Williams (2003) focus on experienced teachers undergoing some kind of change. Graven (2004) describes teacher learning that occurs within a mathematics senior-phase in-service programme that was stimulated by a curriculum change. Cwikla (2007) investigates how teachers accommodate the process of change and the group dynamics encountered within a school structure. Hodges and Cady (2013) investigate the emergence of a community of practice among middle grades mathematics teachers who participated in a two-year blended-format professional development programme. Corbin, McNamara, and Williams (2003) investigate how teachers with special training working as coordinators implement new teaching strategies in schools.

Regardless of their focus, whether on teacher education, or on novice or experienced teachers, several of the studies investigate the implementation and effects of some kind of organized development initiative. The researchers are more or less involved in these implementations. Some have developed and implemented the interventions they are studying and others study interventions developed and implemented by others. This will be further elaborated later in the article.

Whether studying organized development initiatives or informal activities related to teacher development, one common theme in the studies is the enhancement of students' learning of mathematics. Even though the focus is on the teachers, the aim is to improve teachers' ability to teach students mathematics. Siemon (2009), for example, considers how teachers in a minority population can enhance their ability to teach mathematics to students within that population. The implementation of new teaching strategies investigated by Corbin, McNamara, and Williams (2003) was developed to increase students' learning of mathematics.

Only one of the studies, Pratt and Back's (2009), focuses on students directly. The focus is on what virtual learning environments might offer learners and how people's (teenagers' in particular) engagement with a subject is affected by the medium through which that engagement takes place.

To summarize, the studies reviewed in this article indicate a common focus on processes of teacher learning, teacher development and/or teacher change in the research questions used. In the next section we will move on to compare methodological issues.

Methodology

According to Radford (2008), the methodologies must also be in line with the basic principles of all involved theories when networking and our next comparison will focus on methodological issues. All reviewed studies are longitudinal studies, many of them conducted over several years. This may be a result of our selection of studies as they focuses on processes of teacher learning, teacher development and/or teacher change. However, retrospectively we have not found any opposites to longitudinal studies.

Our initial interest to investigate whether groups (communities of practice) or individuals (identity) or both are foregrounded in the studies as well as the question whether communities of practice are viewed as pre-existing or if they are designed within the studies are methodological issues why they will be elaborated further in this section.

The first half of Wenger's 1998 book focuses on communities of practice while the second half focuses on identity. Thus it is possible to foreground groups (communities of practice) or individuals (identity) or both. Wenger explains that this is not a 'change of topic but rather a shift in focus within the same general topic' (1998, 145). Since the theory is very broad and yet detailed, it is not surprising that either groups (communities of practice) or individuals are foregrounded in the studies. Franke and Kazemi's (2001) study is an exception, however, and an example of 'both' since they analyse both the interaction within a community of practice and the identity development of individual participants.

In the studies by Cwikla (2007), Cuddapah and Clayton (2011), Goos and Bennison (2008), Hodges and Cady (2013) and Siemon (2009), groups of teachers are in the foreground and individuals are in the background or are not mentioned as individuals at all. In contrast, Bohl and Van Zoest (2003), Corbin, McNamara, and Williams (2003), Graven (2004) and Pratt and Back (2009) foreground the individuals, trying to understand how they are influenced by the different communities of practice in which they participate.

As mentioned, all of the studies focus on some kind of change or development and, as also mentioned; the researchers are more or less involved in the interventions bringing about these changes. Some researchers have developed and implemented the interventions they are studying while others study natural events or interventions developed and implemented by others.

Natural events or interventions developed and implemented by others are in focus in the studies by Bohl and Van Zoest (2003), Corbin, McNamara, and Williams (2003), Cwikla (2007), Graven (2004), Pratt and Back (2009) and Siemon (2009). In these studies communities of practice are treated as pre-existing, developed before the study began and without the influence of the researchers. However, these studies vary in how they identify the communities of practice as such; only Siemon (2009) explains how the communities of practice have been identified as such using Wenger's concepts. In the other five studies, it is not explained how the researchers have identified the communities of practice as such. Bohl and Van Zoest (2003) analyse how different communities of practice in which novice teachers participate influence their mathematics teaching. They give an empirical example of one novice teacher, in relation to whom they discuss differences in the role of novice teachers in different communities of practice, but they do not present how they identified these as communities of practice, nor do they explain how they identified the novice teacher's membership in these communities. Graven (2004) considers an in-service programme as a community of practice, but it is not explained how this community of practice has been identified as such. This is also the case in the studies of Corbin, McNamara, and Williams (2003) and Cwikla (2007), who investigate the implementation of a national numeracy strategy. Pratt and Back (2009) deal with the issue of giving ground for pre-existing communities of practice by writing:

> Whilst others might wish to argue about whether there is 'really' a community there, our perspective is to ask a different question: if we imagine this network of people and artefacts as a community, what does this tell us about the nature of people's interaction with the situation? (2009, s. 116)

Instead of studying natural events, Cuddapah and Clayton (2011), Goos and Bennison (2008), Hodges and Cady (2013) and Franke and Kazemi (2001) carry out interventions and, at the same time, study these interventions. In these four studies, communities of practice are designed by the researcher(s) in relation to the interventions. Cuddapah and Clayton (2011) design a community of practice by arranging physical sessions with a group of novice teachers. They use Wenger's theories to analyse the development of the group as a community of practice and its function as a resource to support new teachers. In their analysis they present how the 'community was observed throughout and between the data' (2011, 72). As such, the group of novice teachers being a community of practice was both a precondition and a result of their analysis. Similarly, Franke and Kazemi (2001) design communities of practice with mathematics teachers with the purpose of providing them with opportunities to learn about mathematics teaching and learning. However, Franke and Kazemi do not describe why or how the group of teachers is a community of practice. Goos and Bennison (2008) discuss the issue of pre-existing versus designed communities of practice as they design a web-based community of practice within teacher education. Although, they design the external frames for the community of practice, their interest in the study is in whether or not the web-based community develops into a community of practice. As such, they design a community, but it is its emergence as a community of practice they investigate in their study. Both Goos and Bennison (2008) and Hodges and Cady (2013) investigate the development of communities of practice within a professional mathematics teacher's development initiative where a web-based tool is used to 'foster the development of communities of practice' (Hodges and Cady 2013, 302). The study by Hodges and Cady (2013) is a continuation of the study by Goos and Bennison (2008) and the designed communities of practice in both studies are web-based.

To summarize, sometimes groups (communities of practice) are foregrounded and other times individuals (identity) or both are foregrounded in the studies. Sometimes communities of practice are viewed as pre-existing and sometimes they are designed within the studies. Sometimes communities of practice are based on notions from Wenger and sometimes they are defined as communities of practice without further explanation. Accordingly, while the research questions were quite similar among the investigated studies, the methodological comparison of the studies makes visible several quite different uses of Wenger's theory.

Finally, in this section we want to briefly mention the methods used to collect empirical material in the studies. Bohl and Van Zoest (2003) write that '[t]o illustrate the way in which we have found the ideas of modes of participation and regimes of accountability useful in the interpretation of our data, we offer a case scenario from our recent research' (341). *Modes of participation* and *regimes of accountability* are notions from Wenger's theory. However, after this they do not write anything about the character of the empirical material used to reinforce the case scenario. The other studies describe the use of a wide range of observations (participating–non-participating, video and/or field notes), interviews, e-mail with questions and questionnaires. However, the choices of methods are not motivated by the use of Wenger's theory. Quite the opposite Graven (2004) motivates the use of Wenger's theory based on the empirical material already collected through interviews as 'it became evident that teachers themselves saw their learning as a process of developing new identities' (181). All studies except Cuddapah and Clayton's (2011) use two or more of the methods mentioned above. Cuddapah and Clayton however write that '[t]he theoretical framework was brought to bear later in the analysis, so it did not shape how data were collected' (2011, 66). This implies that they would have collected other and/or more empirical material if they had known that they would come to use Wenger's theory. Thus, there seems to be a common line that the use of Wenger's theory presupposes a wide range of empirical material

on both what the respondents say and what they do, even if this is not made explicit in the articles. This seems to allow for a wide range of methods when collecting the empirical material in the studies.

Basic principles

This final comparison will focus on which parts of Wenger's theory are mainly used. These parts can be considered as the basic principles in the studies.

A similarity shared by the studies reviewed in this article is that they use only selected concepts from Wenger's theory. Therefore the basic principles of the studies are not the same even though they refer to the same theory.

In some of the studies, the researchers mention that they have selected only some of Wenger's concepts. For example, Bohl and Van Zoest (2003) write that they will use two of Wenger's notions, *modes of participation* (their term for what Wenger refers to as *modes of belonging*) and *regimes of accountability*. They mention that communities of practice develop through mutual engagement, joint enterprise and shared repertoire (concepts from Wenger), but in their analysis they only use the two selected concepts. Others do not mention that they only will use some of Wenger's concepts, so readers may think that they are seeing all of Wenger's theory applied in the study.

Graven uses the concepts of *practice, meaning, identity* and *community* to describe and explain teacher learning. These four concepts are, according to Wenger, 'interconnected and mutually defining' (2004, 5). Graven also mentions Lave and Wenger's (1991) concepts of *co-participation* and *participation*, but these are not used in her analysis. Even though Graven describes communities of practice in her study, the 'three dimensions' (2004, 72) that according to Wenger are the source of a community of practice, *mutual engagement, joint enterprise* and *shared repertoire*, are not used. However, Graven instead wants to add *confidence* as a supplement to *practice, meaning, identity* and *community*.

Cuddapah and Clayton (2011), like Graven (2004), initially refer to Lave and Wenger (1991) but to the concept of *legitimate peripheral participation*. They discuss this concept as one that can be used when analysing novice teachers as newcomers in teaching. However, as all novice teachers in their study are members of a new community of practice designed by the researchers, they instead, like Graven (2004), use *practice, meaning, identity* and *community* when coding their empirical material. They briefly mention the concepts of *mutual engagement, joint enterprise* and *shared repertoire,* but they do not use them in their analysis.

Those three concepts, *mutual engagement, joint enterprise* and *shared repertoire*, are used by Goos and Bennison (2008), Hodges and Cady (2013) and Siemon (2009). As shown previously, these three studies have communities of practice in the foreground. Goos and Bennison (2008) use the three concepts when they analyse the emergence of their designed web-based community of practice. To investigate mutual engagement, they count the number of interactions in the web-based tool. By analysing the content in these interactions they also investigate the joint enterprise and the shared repertoire that develops. Siemon (2009) uses the three concepts by making lists of what it is in the different communities of practice identified in the study that indicates joint enterprise, mutual engagement and a shared repertoire. Consequently, in her study communities of practice are pre-existing, but she defines them in terms of these three concepts. Three communities of practice are acknowledged this way. Hodges and Cady (2013) use the three concepts in the same way, but their approach is somewhat different. They use the concepts in order to identify and/or examine the development of communities of practice in a designed web-based tool. In their analysis they look for evidence of joint enterprise, mutual engagement and a shared set of ways of interacting in order to see if a community of practice has been developed. As such, the concepts of *mutual engagement, joint enterprise* and *shared repertoire* are used to identify both designed (Goos and Bennison 2008; Hodges and Cady 2013) and pre-existing (Siemon 2009) communities of practice.

In addition to mutual engagement, joint enterprise and a shared repertoire, Siemon (2009) also uses Wenger's concept of *negotiation of shared meaning* when referring to a space where the participants in the different communities of practice can meet. This space is used both as a place to negotiate meaning and as a research tool to 'explore the processes involved in building community capital' (2009, 226). Furthermore, Siemon uses the concept of *boundary objects* when defining Probe Tasks as a boundary object in the negotiation described above (a Probe Task is described in the paper as a specifically chosen or designed task to support indigenous teacher assistants as they teach key aspects of number). Cwikla (2007) also uses the concept of *boundary objects*. In her investigation of the evolution of a middle school mathematics faculty, she uses this concept together with the concept of *brokers*, which is also from Wenger. She mentions communities of practice, but she does not define them. When using the concept of brokers, she refers to Wenger's definition, stating, 'a broker can serve as a conduit for communication and translation between communities of practice' (2007, 558). Corbin, McNamara, and Williams (2003) also use the concept of *brokering* when investigating numeracy coordinators in an implementation of a national numeracy strategy. The concept is used to theorize tensions in the work of the coordinators. Corbin, McNamara, and Williams (2003) find signs of brokering in their analysis by using three more of Wenger's concepts: the *modes of belonging: engagement*, *alignment* and *imagination*. Pratt and Back (2009) also use the concepts of *engagement, alignment* and *imagination* in their analysis. They also use Lave and Wenger's (1991) concepts of *legitimate peripheral participant* and *peripheral and central participation* to describe a person's participation, and changes in participation, in two different communities of practice.

As mentioned, Franke and Kazemi (2001) analyse both the interaction in one community of practice and the identity development of individual participants. However, they do this without explicitly using any of Wenger's concepts. The artefacts they mention are not identified explicitly as artefacts used by Wenger but as used in sociocultural theories in general. They also mention *identity* and *negotiation of meaning*, both of which are thoroughly elaborated by Wenger, but they do not refer explicitly to how the concepts are used by Wenger. Thus Franke and Kazemi refer to, and use, Wenger's social theory of learning, but not explicitly or solely; rather, they present it as part of a general sociocultural view of learning.

Overall, several of Wenger's concepts are used in the studies presented in this paper, including practice, meaning, identity, community, mutual engagement, joint enterprise, shared repertoire, modes of belonging, engagement, alignment, imagination, brokering, negotiation of meaning, boundary objects, regimes of accountability, co-participation and participation. However, seldom are more than three or four concepts used in the same study. Since the theory is broad yet detailed, it is not surprising that researchers focus on and use only parts of it. However, few of the studies draw attention to the fact that they are using only some concepts from Wenger's theory. Neither do they discuss the eventual consequences of not using the theory in its entirety. Hence, anyone reading only one of the studies may easily believe that the whole of Wenger's theory is used.

Discussion

As seen, Wenger's social theory of learning is used in different ways in different studies. Wenger (1998) terms his work a 'conceptual framework' (e.g. 5), a 'social theory of learning' (e.g. 4) and/or a 'perspective' (e.g. 3). According to Eisenhart (1991), there are three kinds of research frameworks: theoretical, practical and conceptual. Eisenhart distinguishes these as theoretical frameworks based on formal logic, practical frameworks based on practitioner knowledge and conceptual frameworks based on justification. Somehow Wenger's social theory of learning comprises all three of these features. According to Niss (2007), theories are stable, coherent and consistent systems of concepts that are organized and linked in hierarchal networks. Those criteria apply to the content of Wenger's book. However, when researchers use only some of Wenger's concepts the criteria are no longer met. Furthermore, Niss writes that one purpose of theories 'is to provide *a structured set of lenses* through which aspects or parts of the world can be approached, observed, studied, analysed or interpreted'

(2007, 100). Similarly, Radford (2008) emphasizes that the hierarchy of the basic principles in the theories must be taken into consideration when networking between theories. Just because one element is present and described in similar ways in two theories, it may not have the same theoretical meaning because its hierarchical place varies in the theories. What then happens with the hierarchy and the coherence when only some parts of a theory are used? Further, what conclusions, based on Wenger's theory, can be made if only some of his concepts are used?

The diverse uses of Wenger's social theory of learning presented in this article show that the *structured set of lenses* used in these studies differ substantially. Even though the research questions were similar in the investigated studies, the methodology and the basic principles differed. One reason for this can be that the use of Wenger's social theory might have had different emphasis depending on the research framework used – that is, theoretical, practical or conceptual (Eisenhart (1991).

In this article Wenger's theory has been used as an example of the diverse uses of a theory. Similar diversities most likely can be found in relation to several other theories. But, who is to decide if a theory is used as intended by the originator? Who can decide which of the articles in this review that uses Wenger's theory as intended? Probably this can only be made by the originator while all we others make interpretations. These interpretations regard both how a theory can be used (for example if all notions or only some can be chosen), what the notions involved imply as well as which empirical material the theory can be applied to. Depending on our own interpretations regarding these issues we will find others' interpretations more or less sound. The overall discussion in this article can be broadened to one about which conclusions can be made, based on a theory, if only some parts of the theory are used, and if the parts used are used differently. How far can a theory be stretched (if considered to be coherent) before actually becoming another theory? We do not claim to have an answer to this question, but we do want to stress the importance of researchers being transparent, making visible not only which parts of a theory they are using but also which parts they are not using. Furthermore, researchers need to reflect and make implicit possible implications in their studies when they use only parts of theories.

Finally, are the findings presented in this article a consequence of the selection of articles to review? Is the diverse use of Wenger's theory specific for the field of mathematics education? Would the same, new or no disparities be found if a similar review were made in another subject filed? This is still to be investigated. What we have illustrated in this article is that even within one subject field, and within studies of common interest in processes of teacher learning, teacher development and/or teacher change, using the 'same' theory may imply very different things.

Disclosure statement

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Notes

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References

Bohl, J. V., and L. R. Van Zoest. 2003. "The Value of Wenger's Concepts of Modes of Participation and Regimes of Accountability in Understanding Teacher Learning." In *Proceeding of the 27th International Group for the Psychology of Mathematics Education Conference*, edited by N. A. Pateman, B. J. Dougherty, and J. T. Zilliox, 339–346. Honolulu: International Group for the Psychology of Mathematics Education.

Corbin, B., O. McNamara, and J. Williams. 2003. "Numeracy Coordinators: 'Brokering' Change Within and Between Communities of Practice?" *British Journal of Educational Studies* 51 (4): 344–368. http://www.jstor.org/stable/1555912.

Cuddapah, J. L., and C. D. Clayton. 2011. "Using Wenger's Communities of Practice to Explore a New Teacher Cohort." *Journal of Teacher Education* 62 (1): 62–75. doi:10.1177/0022487110377507.

Cwikla, J. 2007. "The Trials of a Poor Middle School Trying to Catch Up in Mathematics: Teachers' Multiple Communities of Practice and the Boundary Encounters." *Education and Urban Society* 39 (4): 554–583. doi:10.1177/0013124507302464.

Eisenhart, M. A. 1991. "Conceptual Frameworks for Research Circa 1991: Ideas from a Cultural Anthropologist; Implications for Mathematics Education Researchers." In *Proceedings of the 13th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education Conference*, edited by R. G. Underhill, 202–219. Blacksburg: International Group for the Psychology of Mathematics Education.

Franke, M. L., and E. Kazemi. 2001. "Teaching as Learning Within a Community of Practice." In *Beyond Classical Pedagogy: Teaching Elementary School Mathematics*, edited by T. Wood, B. Scott Nelson, and J. Warfield, 47–74. Mahwah: Lawrence Erlbaum Associates.

Goos, M. E., and A. Bennison. 2008. "Developing a Communal Identity as Beginning Teachers of Mathematics: Emergence of an Online Community of Practice." *Journal of Mathematics Teacher Education* 11 (1): 41–60. doi:10.1007/s10857-007-9061-9.

Graven, M. 2004. "Investigating Mathematics Teacher Learning within an In-service Community of Practice: The Centrality of Confidence." *Educational Studies in Mathematics* 57 (2): 177–211. http://www.jstor.org.proxy.lnu.se/stable/4150270.

Hodges, T. E., and J. Cady. 2013. "Blended-Format Professional Development and the Emergence of Communities of Practice." *Mathematics Education Research Journal* 25 (2): 299–316. doi:10.1007/s13394-012-0065-0.

Kanes, C., and S. Lerman. 2008. "Analysing Concepts of Community of Practice." In *New Directions for Situated Cognition in Mathematics Education*, edited by A. Watson, and P. Winbourne, 303–328. New York: Springer.

Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Lerman, S. 2001. "A Review of Research Perspectives on Mathematics Teacher Education." In *Making Sense of Mathematics Teacher Education*, edited by F. Lin, and T. J. Cooney, 33–52. Dordrecht: Kluwer Academic Publishers.

Niss, M. 2007. "The Concept and Role of Theory in Mathematics Education." In *Relating Practice and Research in Mathematics Education. Proceedings of Norma 05*, edited by C. Bergsten, B. Grevholm, H. Måsøval, and F. Rønning, 97–110. Trondheim: Tapir.

Pratt, N., and J. Back. 2009. "Spaces to Discuss Mathematics: Communities of Practice on an Online Discussion Board." *Research in Mathematics Education* 11 (2): 115–130. doi:10.1080/14794800903063323.

Radford, L. 2008. "Connecting Theories in Mathematics Education: Challenges and Possibilities." *ZDM The International Journal on Mathematics Education* 40 (2): 317–327. doi:10.1007/s11858-008-0090-3.

Siemon, D. E. 2009. "Developing Mathematics Knowledge Keepers: Issues at the Intersection of Communities of Practice." *Eurasia Journal of Mathematics, Science & Technology Education* 5 (3): 221–234. http://www.ejmste.com.proxy.lnu.se/v5n3/EURASIA_v5n3_DSiemon.pdf.

Wenger, E. 1998. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.