

The Mathematics Enthusiast

Volume 11
Number 1 *Number 1*

Article 7

2-2014

Approaching Professional Learning: what teachers want

Peter Liljedahl

Follow this and additional works at: <https://scholarworks.umt.edu/tme>



Part of the [Mathematics Commons](#)

Let us know how access to this document benefits you.

Recommended Citation

Liljedahl, Peter (2014) "Approaching Professional Learning: what teachers want," *The Mathematics Enthusiast*: Vol. 11 : No. 1 , Article 7.

Available at: <https://scholarworks.umt.edu/tme/vol11/iss1/7>

This Article is brought to you for free and open access by ScholarWorks at University of Montana. It has been accepted for inclusion in The Mathematics Enthusiast by an authorized editor of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

Approaching Professional Learning: What teachers want

Peter Liljedahl¹

Simon Fraser University, Canada

Abstract: *Teachers do not come to professional learning opportunities as blank slates. Instead, they come to these settings with a complex collection of wants and needs. The research presented here takes a closer look at these wants across five different professional learning settings distilling from the data a taxonomy of five categories of wants that teachers may approach professional learning with. The resultant taxonomy, as well as teachers behaviours vis-à-vis this taxonomy indicate that we need to rethink our role as facilitators within these settings as well as the role that single workshops can play in the professional learning of teachers.*

Keywords: Teacher beliefs; Mathematics teacher professional development; Taxonomy of teacher wants

Introduction

Current research on mathematics teachers and the professional development of mathematics teachers can be sorted into three main categories: content, method, and effectiveness. The first of these categories, content, is meant to capture all research pertaining to teachers' knowledge and beliefs including teachers' mathematical content knowledge, both as a discipline (Ball, 2002; Davis & Simmt, 2006) and as a practice (Hill, Ball, & Schilling, 2008). Recently, this research has been dominated by a focus on the mathematical knowledge teachers need for teaching (Ball & Bass, 2000; Ball, Hill, & Bass, 2005; Davis & Simmt, 2006; Hill, Rowan, & Ball, 2005) and how this knowledge can be developed within preservice and inservice teachers. Also included in this category is research on teachers' beliefs about mathematics and the teaching and learning of mathematics and how such beliefs can be changed within the preservice and inservice setting (Liljedahl, 2010a, 2007; Liljedahl, Rolka, Rösken, 2007). Some of the conclusions from this research speaks to the observed discontinuities between teachers' knowledge/beliefs and their practice (Cooney, 1985; Karaagac & Threlfall, 2004; Skott, 2001; Wilson & Cooney, 2002) and, as a result, calls into question the robustness and authenticity of these knowledge/beliefs (Lerman & Zehetmeir, 2008).

The second category, method, is meant to capture the research that focuses on a specific professional development model such as action research (Jasper & Taube, 2004), lesson study (Stigler & Hiebert, 1999), communities of practice (Little & Horm, 2007; McClain & Cobb, 2004; Wenger, 1998), or more generally, collegial discourse about teaching (Lord, 1994). This research is

¹ liljedahl@sfu.ca

"replete with the use of the term inquiry" (Kazemi, 2008, pg. 213) and speaks very strongly of inquiry as one of the central contributors to teachers' professional growth. Also prominent in this research is the centrality of collaboration and collegiality in the professional development of teachers and has even led some researchers to conclude that reform is built by relationships (Middleton, Sawada, Judson, Bloom, & Turley, 2002).

More accurately, reform emerges from relationships. No matter from which discipline your partners hail, no matter what financial or human resources are available, no matter what idiosyncratic barriers your project might face, it is the establishment of a structure of distributed competence, mutual respect, common activities (including deliverables), and personal commitment that puts the process of reform in the hands of the reformers and allows for the identification of transportable elements that can be brokered across partners, sites, and conditions. (ibid., p. 429).

Finally, work classified under effectiveness is meant to capture research that looks at changes in teachers practice as a result of their participation in some form of a professional development program. Ever present in such research, explicitly or implicitly, is the question of the robustness of any such changes (Lerman & Zehetmeir, 2008).

As powerful and effective as this aforementioned research is, however, it can no longer ignore the growing disquiet that somehow the perspective is all wrong. In fact, it is from this very research that this disquiet emerges. The questions of robustness (Lerman & Zehetmeir, 2008) come from a realization that professional growth is a long term endeavour (Sztajn, 2003) and participation in preservice and inservice programs is brief in comparison. At the same time there is a growing realization that what is actually offered within these programs is often based on facilitators (or administrators or policy makers) perceptions of what teachers need as opposed to actual knowledge of what teachers really want (Ball, 2002). But not much is known about what teachers really want as they approach professional learning opportunities.

The research presented here provides some answers in this regard.

Methodology

As articulated in Liljedahl (2010b), working in a professional development setting I find it difficult to be both a researcher and a facilitator of learning at the same time. As such, I generally adopt a stance of noticing (Mason, 2002). This stance allows me to focus on the priorities of facilitating learning while at the same time allowing myself to be attuned to various phenomena that occur within the setting. It was through this methodology that I began to notice that there was a distinct difference between the groups of teachers that came willingly to the professional development opportunities that I was leading and the teachers that were required, often by their administrators, to attend. This was an obvious observation. Nonetheless, it was as a result of this observation that, I began to attend more specifically to what these differences were. In doing so I began to notice, subtly at first, that the teachers who came willingly came with an a priori set of wants. With this less obvious observation I changed my methods from noticing to more directive research methods. I began to gather data from five different professional learning contexts over a period of two years.

Master's Programs

Teachers in this context are practicing secondary school mathematics teachers who were doing their Master's Degree in Secondary Mathematics Teaching. This is a two year program culminating in either a comprehensive examination or a thesis depending on the desires of the teacher and the nature of the degree that they are seeking. From this group I collected interview data and field notes during two different courses I taught in the program.

Induction Group

This group began as an initiative to support early career teachers (elementary and secondary) as they make the transition from pre-service teachers to in-service teachers. In truth, however, it also attracted more established teachers making it a vertically integrated community of practicing teachers of mathematics. Although this group now meets every second month for the duration of the study we met monthly. From this group I collected interview data, field notes, as well as two years of survey data.

Hillside Middle School

Hillside (pseudonym) is the site of a longitudinal study. For the last five years I have meet with a team of three to six middle school teachers every second Wednesday for an hour prior to the start of the school day. This group began as an administration led focus on assessment of numeracy skills, but after the first year took on a self-directed tone. The teachers in this group lead the focus of the sessions and look to me to provide resources, advice, and anecdotal accounts of how I have seen things work in the many other classrooms I spend time in. For the two year period that constitutes the study presented here I collected field notes and interview data.

District Learning Teams

Very much like the professional learning setting at Hillside, district based learning teams are self-directed. Teachers meet over the course of a year to discuss their classroom based inquiries into teaching. This inquiry runs throughout an entire school year, but the teams themselves only meet four to six times a year. The data for this study comes from three such teams that I facilitated in two different school districts. One of these teams ran during the first year of the study, the other two teams ran in the second year of the study. Like at Hillside my primary role is to provide resources, advice, and insights into their plans and reported classroom outcomes. The data from these teams consisted of field notes, interviews, and survey results.

Workshops

During the two years that I collected data for this study I was also asked to do a number of one-shot workshops. These were workshops designed around a variety of different topics either decided by myself or the people asking me to deliver the workshop. They ranged in time from 1.5 hours to 6 hours with no follow-up sessions. Data, consisting of field notes, comes from six such workshops. Data from two additional workshops consists of field notes and survey results.

Field notes in the aforementioned settings consisted primarily of records of conversations I had with individual teachers during breaks as well as before and after the scheduled sessions. I used these

times to probe more specifically about the origins of questions asked, motivations for attending, querying about what they are getting out of the session, and if there is something else they need or want. This sound very formal and intentional, but in reality, this was all part of natural interactions. In all, I collected notes on over 70 such conversations.

More directed than these natural conversations were the interviews. These were much more formal in nature and provided an opportunity for me to probe further about the conversations we had previously had or the things I had observed during our sessions together. Each interview lasted between 30 and 60 minutes. In all, 36 interviews were conducted over the course of the two years, resulting in 26 hours of audio recordings. These recording were listened to as soon as possible after the interviews and relevant aspects of the recording were flagged for transcription.

The survey used with the Induction Group, The District Learning Teams, and two of the Workshops consisted of an online survey instrument that was sent to the teachers prior to professional learning session. The survey contained five questions:

Name?

Where are you in your teaching career? Are you in PDP (please specify semester), a TOC (how many years), on a long term TOC placement (for how long), or do you have your own classroom (for how long)?

If relevant - what grades/subjects are you teaching right now?

What do you hope to get out of our next session together? You can ask for understanding of mathematical concepts, teaching strategies, resources, lesson ideas, ideas about classroom management, networking opportunities, specific lesson plans, etc. In essence, you can ask for anything that will help you in your teaching or future teaching. List as many as you want but please be specific.

Please list something from a past session that you found particularly useful.

The last two of these were of obvious relevance to the study. However, as will be seen later on, question two contributed data that became relevant to the analysis.

The field notes, interview transcripts, and survey data were coded and analysed using the principles of analytic induction (Patton, 2002). "[A]nalytic induction, in contrast to grounded theory, begins with an analyst's deduced propositions or theory-derived hypotheses and is a procedure for verifying theories and propositions based on qualitative data" (Taylor and Bogdan, 1984, p. 127 cited in Patton, 2002, p. 454). In this case, the a priori proposition was that teachers come to professional learning settings with their own wants in mind and that these wants are accessible through the methods described above. With a focus on teachers' wants the data was coded using a constant comparative method (Creswell, 2008). What emerged out of this analysis were a set of themes specifically about the wants expressed by teachers as well as a broader set of themes that cut across these wants. In what follows I present these themes in two distinct sections. The first section is a taxonomy of five types of wants. The second section are the themes that cut across this taxonomy.

Results - WANTS

As mentioned, one of the things that emerged out of the aforementioned analysis was a taxonomy of five distinct categories of wants that teachers come to professional learning settings with. To these I add a sixth category. Although not a want per se this sixth theme deals with the resistance with which some teachers engaged in some of the professional developing opportunities. In what follows I present each of these categories in turn, beginning with resistance and following it up with each of the five categories of wants.

Resistance

In the course of the two years of the study I collected data on a number of teachers who were flatly opposed to being part of the professional development setting I was working in. All of this data consisted of observation and conversations and came solely from the workshops and learning team settings. To a person, these teachers were participating in these settings at the bequest of an administrator or a department head. Left up to them, these teachers would choose to not attend. Their want was that they didn't want to be there.

First, these resistant teachers were present and they did participate in the sessions. They engaged in the activities, they asked questions, and they collaborated with others in the room. But this participation was guided by their reluctance at being there. As such, their contribution to the group was often negative, pessimistic, defensive, or challenging in nature. They would say things like "that will never work" and "I already do that". This is not to say that these teachers were the only ones to utter these types of statement, but rather that they only uttered these types of statements. Their questions to me were always challenging in nature with greater demands for evidence, justification, and pragmatism. These challenges were welcomed as they often provided others with an opportunity to engage in the content more critically. The call for pragmatism, in particular, was not unique to resistant teachers, but the goals for making that call were clearly different. When they challenged ideas based on their infeasibility the goal seemed to be to detract from the value of what was being offered; to invalidate it. When non-resistant teachers made the same call it seemed to be motivated by a goal to try to navigate the space between the ideal and the feasible; to find a way to make it happen.

The second reason I include this theme is that these teachers did not always remain resistant. There were several cases in my data where teachers who initially approached the setting with resistance softened their stance over time. In the workshop settings this was marked by a shift in the types and ways in which they asked questions, the ways in which they engaged in activities and interacted with their peers, and in the parting comments and conversations I recorded. In the learning team settings this was marked by the fact that between meetings, these initially resistant teachers, reported back at subsequent sessions about efforts made, and results seen, in their own classrooms.

The third reason for including this theme here is because I want to differentiate between the resistance a teacher may have to an idea in a professional learning setting and the a priori resistance a teacher may approach that setting with. In the former case I am talking about a healthy form of scepticism that, as mentioned, allows teachers to negotiate the space between the ideal and the real, between the theoretical and the practical. The later, however, is a stance that can prevent the uptake of good ideas and helpful suggestions. It can act as a barrier to learning and professional growth.

In all, out of the 70 conversations that I made notes on, 10 were with teachers who were, at least originally, resistant to being in the setting. Of these, four changed their stance over the course of the setting. However, my field notes record observations of many more such a priori resistant teachers as well as observed changes in some of them.

Do Not Disturb

This category of wants characterizes those instances where a teacher engages in professional learning because they want to improve their practice, but is reluctant to adopt anything that will require too much change. Ideally, what they want are small self-contained strategies, lessons, activities, or resources that they can either use as a replacement of something they already cleanly insert into their teaching without affecting other aspects of their practice. Such wants were rarely stated outright. Instead, they manifest themselves as overly specific statements of what it is they seek.

"I was hoping to learn a new way to introduce integers".

"I want something to do for the first 10 minutes of class."

"A different way to do review."

All of these are indicative of situations where the teacher is looking to improve one thing about their teaching. The "don't let it affect anything else around it" is implicit in the specificity of the statement. In conversations or in interviews, however, this can sometimes come out more explicitly.

"I'm happy with the rest of my fractions unit. It's just division of fractions that messes me up. I was hoping that you could show me a better way to explain it."

Delving deeper it became clear that in many of the instances where concern over disturbance and tight control over impact was important there was an underlying anxiety, most often around the deconstructing what they have worked hard to build up.

"I've been teaching for seven years now, and I'm really happy with the way things are going. After the last curriculum revision and with us getting a new textbook I have worked really hard to organize all of my lessons and worksheets in math. I don't want to mess with that. So, please don't tell me anything that is going to mess me up. I really just want to know if there is a lesson that I can do using computers that will be fun and that I can just sort of insert into my area unit."

Less often this anxiety is around what they have worked hard to understand.

"When I started teaching I was fine with math. But when I was given a grade seven class this year I sort of panicked about math. Especially the unit on integers. I had never understood it when I was in school and it took me a long time to teach it to myself. So, I don't really want to learn anything new that will rock the boat for me."

In other instances there didn't seem to be an underlying anxiety, but just a pragmatic disposition that small change is good. The teachers with this disposition came to the professional learning settings with a want to learn new things and a willingness to make changes, so long as these were small changes. Although only one teacher spoke directly about this "less is more" disposition there was lots of evidence of it in the way teachers spoke about what they got out of the sessions. For example, in an interview after a session on formative assessment, one teacher told me that she had learned "I am not going to give out zeros anymore". Although important, in relation to the larger conversation of the difference between formative and summative assessment this is a by-product of a shifting assessment philosophy, not a change unto itself. However, when probing further it revealed itself that for this teacher "no zero's is something I can start doing on Monday". This was something that she could cleanly insert into her practice.

Regardless of the motivation, the teachers who wanted to make only small changes know what it they don't know, or don't do well, and want to learn new things to help change them.

Willing to Reorganize

A slight nuance on the previous theme is when teachers want very specific improvements and they are willing to significantly reorganize their teaching and resources to accommodate the necessary changes. Although specific in nature, these wants do not come with limitations. They are stated with an implicit openness to the consequences that the desired improvements may necessitate.

"So, yeah. I'm looking for an improved way to have my students learn how to do problem solving. Right now I do it as a unit in February, but it's not working. I've heard that other teachers do it throughout the whole year and I'm hoping to get some ideas around that."

Further probing of this teacher, as well as the others who made similar statements, revealed that they are not hampered by anxiety around invalidating existing resources or undoing things learned. Like their counterparts in the previous category, however, they know what they don't know or what they don't do well and they want to make changes to improve these things. The difference is the scale at which they are willing to make these changes.

Willing to Rethink

Unlike the previous two categories, the wants that fit into this are much broader in scope and often welcome a complete rethinking of significant portions of a teaching practice.

"I'm pretty open to anything. I mean with respect to differentiated learning."

From the interviews it became clear that for this teacher, as well as for those who expressed similar wants, there exists something in their practice that they want to bolster. In many cases these

teachers are wanting collections of resources that they could then organize and integrate into their teaching.

"Anything to do with numeracy is good for me."

"I'm looking for new ideas about assessment for differentiated learners."

In some cases, however, these teachers are branching out into new territories and are looking for a comprehensive package of what to do.

"I'm hoping to introduce the use of rubrics into my teaching and want to get the rubrics I should use as well as instruction how to do it."

Either way, these teachers have a rough idea of what it is they want and are willing to rethink their teaching in order to accommodate new ideas. They do not have the anxieties of disrupting already held knowledge or resources that the teachers in the first category did and their wants are broader in scope than the second.

Out With the Old

The wants in the previous category were characterized by a willingness to rethink significant aspects of teaching practice. In the Out With the Old category, the wants are characterized by a rejection of a significant aspects of teaching practice. Teachers with these wants come to professional learning settings unhappy with something in their practice. This unhappiness goes well beyond the awareness that something needs to be improved that was seen in the previous three categories. For these teachers there is nothing to be integrated, there isn't a replacement of some aspect of their teaching to be made. They have already rejected the current paradigm and are now looking for something to fill the void that is left behind.

"My kids can't think for themselves in problem solving. I don't know what I'm doing wrong, but it doesn't matter. I just need to start over with a new plan."

"I can't stand the way group work has been working in my classroom. Or not working is a better description. I have given up with what I've been doing and am looking to learn something completely different."

This is not to say that these wants are coupled with blind acceptance of anything that fits the bill. The teachers who express these wants are often hypercritical of new ideas, usually as a result of their dissatisfaction with something that they have previously changed in their practice.

"I spent a whole year trying to teach and assess each of the processes [communication, connections, mental mathematics and estimation, problem solving, reasoning, technology, and visualization] that are in the curriculum. In the end my students are no better at estimating or communicating, for example, than they were at the beginning of the year. My approach didn't work. I need a new way to think about this."

This is not to say that they are closed minded, but rather that they exert a greater demand on me, as the facilitator, to bridge the theoretical with the pragmatic.

Inquiry

The final category consists of those wants which align with the ideas and ideals of inquiry (Kazemi, 2008). As such, these wants consist, most often, of a general desire to acquire new knowledge and ideas about teaching. The teachers who express these wants are open to any new ideas and often come to professional learning settings without an agenda.

"I'm not really looking for anything in particular. But, I'm eager to hear about some new ideas on assessment."

This is not to say that these wants are flighty and unrefined. The teachers whose wants fall into this category are often methodical in their change, pausing to ask exactly "what is it I am doing" and "if it's working". And if it is working they question "what is it that is telling me it is working". They want evidence of success, but they want it to come from their own classroom.

Results – cutting across the taxonomy

As mentioned earlier, aside from the taxonomy of wants, there were also a set of themes that emerged out of the analysis which can be characterized as cutting across the taxonomy presented above. In what follows I present each of these themes.

Pseudo-Hierarchy

The aforementioned taxonomy of wants seems to form a hierarchy in the way each category requires a slightly greater openness to change than the previous one. But this can be deceptive. Although the teachers in the more longitudinal aspects of the study tended to have wants that became more and more open as the study went on, there were still days later in the study when they would come into the session wanting something as overly specific as a problem to do with the students the next day. There was also evidence in the field notes of individual teachers changing the scope of their wants within a single session. Sometimes this was a broadening of wants to ones that were more open to changes in teaching practice. Other times they regressed to wanting easily insertable resources, especially when the discussions shifted to tricks and best practices.

Two nuances of this theme are worth noting. The first one has to do with novice teachers. Almost without exception, these teachers came to professional learning opportunities with wants that fit into the willing to rethink category. Deeper probing revealed a very good reason for this – these teachers do not have deeply seated practices to disrupt, they have not yet found things about teaching that they wish to reject, and they have not yet routinized aspects of their teaching to the point where they feel comfortable engaging in inquiry. What this leaves is the category of rethinking practice. Except, with their newness to teaching this often became more of a willingness to think about their practice than rethink their practice. Given that I met many teachers whose wants were in the first two categories this means that time in the field can cause a regression regarding openness to change. This was not surprising, but troubling nonetheless.

The second point worth noting is the fact that although I can, at this point, sit back and challenge the evidence regarding the hierarchical nature of the taxonomy of wants, the data indicates that as a facilitator I was constantly trying to upsell teachers on their wants. That is, I was always trying to create more openness and broaden the scope of what it is they wanted out of their work with me. This was especially true of the teachers who came with wants in the first two categories. And, many teachers did expand their wants as a result of these efforts. There was even evidence in the data my efforts to, and success at, shifting the wants of resistant teachers; although to a much lesser extent than those teachers who came willingly. Although not the focus of this article, this is an important point in that it shows the potential effectiveness of a facilitator in fostering changes. But it also speaks to the fact that teachers who come willingly to professional learning settings are already engaged in thinking about change and, as such, are predisposed to changing.

Engagement

Something that emerged very clearly from the data was that the wants that teachers had coming into a professional learning setting affected the way in which they engaged in the session. These types of engagements can be seen as fitting into three categories.

First, the teachers who wanted to make minimal change tended to manage to extract things from single sessions that spoke of small change. An example of this was presented above in the way one teacher took away from a wide sweeping session on the differences between formative assessment and summative assessment only the one small, and easy to implement, strategy of not "giving out zeros". Other such examples include "having students tell the story of how they solved a problem" as the only tangible thing that came out of a session on improving students' communication skills in mathematics, or "not telling students if their answer is correct" out of a session on problem solving. These examples, almost all coming out workshop settings, are solid evidence that a teacher who is committed to making small change will find ways to make small change, even in the face of complex and broad topics. However, as mentioned above, in the more longitudinal settings of the District Learning Teams or among the teachers at Hillside there was a general trend towards more openness.

The second category pertains to those teachers who approached these professional learning settings already open to change. Unhampered by the need to restrict their changes these teachers were more willing to take on ideas that went beyond the scope of the wants that they came into the professional learning settings with.

"So, I wanted to understand why our district is saying that we can't use zeros anymore. I was willing to make changes around this in both testing and homework if I could figure out what to do instead. Now I realize that what I really need to do is change the way I collect information about my students' performance. I need to get away from the collection of points and focus more on the collection of data."

They were also more willing to walk away from professional learning settings with commitments to make change in areas other than what they came in with.

"I originally wanted to work on numeracy skills, but now I realize that I also need to work on my students' group work and communication abilities."

This was true irrespective of the nature of the professional learning setting. This willingness to take on broader or different ideas than they initially came in with was seen even across very short single workshops. Unlike the teachers who wanted small change, these teachers' openness to change is not limited to what they know they don't know, but extends to what they didn't know they didn't know.

The final category pertains to those teachers who were resistant to participating in the first place. Although there are a few rare exceptions, for the most part these teachers were unaffected by the ideas presented in workshops. Their resistance to being present extended to their resistance to new ideas. But as mentioned, they were still present and they did participate. However, their contribution to the group was often negative, pessimistic, defensive, or challenging in nature. Having said that, the two teachers who were required to be part of a District Learning Team did change over time and both started coming to the sessions with expressed wants that broadened in openness with time.

Autonomy

A final theme that emerged from the analysis pertains to the autonomy of teachers. As mentioned early on in the article the impetus for the research presented here grew out of the obvious difference between teachers who want to be present and those who do not. This speaks greatly to the autonomy I saw exercised not only in the participation on professional learning settings, but also in the way in which the teachers participated. The teachers were free to take up new ideas, or not. They were free to broaden their thinking on new ideas, or not. What drove this freedom was their autonomy as teachers and as learners. Although I presented new things to them they got to decide what they would do with them. They could reject them, they could think about them, or they could act on them.

Among the teachers who I had repeated interactions with, this autonomy extended beyond the professional learning settings and into their teaching. They were free to implement change, or not. They were free to try out new ideas, or not. And again, they exercised this autonomy.

This autonomy is obvious and it didn't take reams of data and deep analysis to see it. What the data and the analysis showed, however, was that the teachers exercised their autonomy in ways that redefined my role as a facilitator of professional learning. Although I was behaving as though I was driving the agenda of professional learning the reality is that at every stage the teachers had their own agenda, that they pursued this agenda, and that they used me as a resource in this pursuit. This is not to say that I did not have influence or that I was not able to change agendas, but rather than at every stage the teachers exercised the ultimate control; they could choose to learn or they could choose not to, they could choose to agree, or they could choose not to. The strongest evidence of this is what brought these teachers to the sessions, sometimes repeatedly. Each time they had a goal for attending—a want they needed satisfied—and they saw me as a resource likely to satisfy this need.

Conclusions

Much can be taken from the results presented above. The most obvious is that teachers come to professional learning settings with a variety of wants and needs. The results indicate that these wants can be organized into a taxonomy with pseudo-hierarchical properties. More importantly, however, is what the results say about teacher autonomy and the role that workshops play in the professional growth of teachers.

It is a long held belief that single workshops are an ineffective means of creating professional growth (Ball, 2002). Although the data indicates that this was generally true for teachers who are either resistant to change or are only willing to make small changes, the results also indicate that this was not at all true for teachers whose wants coming into the session were more open to change. In settings where participation was voluntary this accounted for the large majority of teachers. These teachers were quite willing to not only broaden their thinking on what they wanted out of the session, but were also willing to take up entirely new ideas. These results nuances the way we should view the effectiveness of workshops in facilitating teacher change.

Teacher autonomy, too, is something that needs to be taken into greater consideration. Coupled with the taxonomy of wants the results of this study feeds into a new paradigm in which the professional growth of teachers is seen as natural (Leikin, 2006; Liljedahl, 2010b; Perrin-Glorian, DeBlois, & Robert, 2008; Sztajn, 2003) and teachers are seen as agents in their own professional learning (Ball, 2002). Teachers do not approach their professional learning as blank slates. They come to it with a complex collection of wants and needs and use professional development opportunities as resources to satisfy those wants and needs. Recognition of this has an impact on how we view our role as facilitator in these settings. Working from the perspective of a resource we need to be much more attuned to what it is that teachers want, even if that awareness of the taxonomy of what they could want.

References

Ball, D. L. (2002). What do we believe about teacher learning and how can we learn with and from our beliefs? In D. S. Mewborn, P. Sztajn, D. Y. White, H. G. Wiegel, R. L. Bryant, & K. Nooney (eds.) Proceedings of the 24th International Conference for Psychology of Mathematics Education – North American Chapter. Athens, Georgia.

Ball, D. L., & Bass, H. (2000). Interweaving content and pedagogy in teaching and learning to teach: Knowing and using mathematics. In J. Boaler (Ed.), Multiple perspectives on the teaching and learning of mathematics (pp. 83-104). Westport, CT: Ablex.

Ball, D. L., Hill, H.C, & Bass, H. (2005). Knowing mathematics for teaching: Who knows mathematics well enough to teach third grade, and how can we decide? *American Educator*, 2005(Fall), 14-46.

- Cooney, T. (1985). A beginning teacher's view of problem solving. *Journal for Research in Mathematics Education*, 16(5), pp. 324-336.
- Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). New Jersey: Pearson Education, Inc.
- Davis, B., & Simmt, E. (2006). Mathematics-for-teaching: An ongoing investigation of the mathematics that teachers (need to) know. *Educational Studies in Mathematics*, 61(3), 293-319.
- Hill, H., Ball, D. L., & Schilling, S. (2008). Unpacking "pedagogical content knowledge": Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, 39 (4), 372-400.
- Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal*, 42(2), 371-406.
- Jasper, B. & Taube, S. (2004). Action research of elementary teachers' problem-solving skills before and after focused professional development. *Teacher Education and Practice*, 17(3), 299-310.
- Karaagac, K. & Threlfall, J. (2004). The tension between teacher beliefs and teacher practice: The impact of the work setting. *Proceedings of 28th Annual Conference for the Psychology of Mathematics Education*, vol. 3, 137-144.
- Kazemi, E. (2008). School development as a means of improving mathematics teaching and learning: Towards multidirectional analysis of learning across contexts. In K. Krainer & T. Wood (eds.), *Participants in Mathematics Teacher Education* (pp. 209-230). Rotterdam, NL: Sense Publishers.
- Leikin, R. (2006). Learning by teaching: The case of Sieve of Eratosthenes and one elementary school teacher. In R. Zazkis & S. Campbell (Eds.), *Number Theory in Mathematics Education: Perspectives and Prospects*. (pp. 115-140). Mahwah, NJ: Erlbaum.
- Lerman, S., & Zehetmeir, S. (2008). Face-to-face communities and networks of practicing mathematics teachers: Studies on their professional growth. In K. Krainer & T. Wood (eds.), *Participants in Mathematics Teacher Education* (pp. 133-153). Rotterdam, NL: Sense Publishers.
- Liljedahl, P. (2010a). Changing beliefs as changing perspective. In *Proceedings of the 6th Congress of the European Society for Research in Mathematics Education*. Lyon, France.
- Liljedahl, P. (2010b). Noticing rapid and profound mathematics teacher change. *Journal of Mathematics Teacher Education*, 13(5), 411-423.
- Liljedahl, P. (2007). Reification: Explicating teachers' tacit knowledge and beliefs. *Proceedings of the 13th international conference on Mathematical Views (MAVI)*. Gävle, Sweden.
- Liljedahl, P., Rolka, K., Rösken, B. (2007). Affecting affect: The re-education of preservice teachers' beliefs about mathematics and mathematics learning and teaching. In M. Strutchens & W. Martin (eds.) *69th NCTM Yearbook – The Learning of Mathematics* (pp. 319-330). National Council of Teachers of Mathematics: Reston, VA.

- Little, J. W., & Horn, I. S. (2007). 'Normalizing' problems of practice: Converging routine conversation into a resource for learning in professional communities. In L. Stoll & K. S. Louis (eds.), *Professional Learning Communities: Divergence, Depth, and Dilemmas* (pp. 79-92). Berkshire, UK: Open University Press.
- Lord, B. (1994). Teachers' professional development: Critical collegueship and the roles of professional communities. In N. Cobb (ed.), *The Future of Education: Perspectives on National Standards in America* (pp. 175-204). New York, NY: The College Board.
- Mason, J. (2002). *Researching Your Own Practice: The Discipline of Noticing*. New York, NY: Routledge.
- McClain, K. & Cobb, P. (2004). The critical role of institutional context in teacher development. *Proceedings of 28th Annual Conference for the Psychology of Mathematics Education*, vol. 3, 281-288.
- Middleton, J. A., Sawada, D., Judson, E., Bloom, I., & Turley, J. (2002). Relationships build reform: Treating classroom research as emergent systems. In L. D. English (ed.), *Handbook of International Research in Mathematics Education* (pp. 409-431). Mahwah, NJ: Lawrence Erlbaum Associates.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage.
- Perrin-Glorian, M.-J., DeBlois, L., Robert, A., (2008). Individual practising mathematics teachers: Studies on their professional growth. In K. Krainer & T. Wood (eds.), *Participants in Mathematics Teacher Education* (pp. 35-59). Rotterdam, NL: Sense Publishers.
- Skott, J. (2001). The emerging practices of novice teachers: The roles of his school mathematics images. *Journal of Mathematics Teacher Education*, 4(1), 3-28.
- Stigler, J., & Hiebert, J. (1999). *The Teaching Gap. Best Ideas from the World's Teachers for Improving Education in the Classroom*. New York, NY: The Free Press.
- Sztajn, P. (2003). Adapting reform ideas in different mathematics classrooms: Beliefs beyond mathematics. *Journal of Mathematics Teacher Education*, 6(1), 53-75.
- Taylor, S. J., & Bogdan, R. (1984). *Introduction to qualitative research methods: The search for meanings*. New York: John Wiley & Sons.
- Wallas, G. (1926). *The Art of Thought*. New York, NY: Harcourt Brace.
- Wenger, E. (1998). *Communities of Practice*. New York, NY: Cambridge University Press.
- Wilson, S. & Cooney, T. (2002). Mathematics teacher change and development: The role of beliefs. In G. Leder, E. Pehkonen, & G. Törner (Eds.), *Beliefs: A Hidden Variable in Mathematics Education* (pp. 127-148). Boston, MA: Kluwer Academic Publishing.