Empowerment in career science teachers – A mixed methods approach to exploring the professional growth continuum

Teachers and Teaching: Theory and Practice

Mary Hobbs\textsuperscript{a}, Amy Moreland\textsuperscript{a}, Randall Schumacker\textsuperscript{b}, and James Barufaldi\textsuperscript{a}

\textsuperscript{a}Center for Science and Mathematics Education, The University of Texas at Austin, Austin, TX, USA
\textsuperscript{b}Department of Educational Studies in Psychology, Research Methodology and Counseling, The University of Alabama, Tuscaloosa, AL, USA
Empowerment in career science teachers – A mixed methods approach to exploring the professional growth continuum

ABSTRACT

Recent education research has focused on new teachers and why large numbers of teachers have left the profession (Borman & Dowling, 2008; Ingersoll & Smith, 2003). Few studies have targeted experienced teachers in an attempt to identify factors that have contributed to their retention. In the Center for Teaching Quality’s Teacher Working Conditions Toolkit (2006) report, researchers recognized the importance of teacher empowerment and proposed that empowerment can help improve the retention of teachers and ultimately, the success of the students they teach. Since the 1980s, teacher empowerment has been one focus of reform in public schools, yet existing research has failed to give much insight regarding what empowerment means to individual teachers, how these meanings are constructed, what events change these meanings, and whether teachers can retain a sense of empowerment in the context of events and changes that occur within and beyond the school setting. This concurrent, mixed-methods study purposed to identify empowering experiences of career science teachers that have caused them to persist in their careers. Initial qualitative data collection was accomplished through the use of one-on-one interviews in conjunction with the systems dynamics technique of utilizing behavior-over-time (BOT) graphing to capture the experiences of science teachers (N = 52) that have positively or negatively impacted their feelings of empowerment. Based on teacher input, the researchers developed and tested a quantitative survey instrument that collected similar kinds of data in more efficient ways. The resulting survey data (N = 263) was used to identify pivotal experiences that contribute to long-term teacher retention in a much larger sample of teachers who collectively represent varying years of experience along the professional continuum. Our findings indicated that teachers who had participated in a community of learners program where they received 60+ hours of professional development annually had a statistically significant higher average Empowerment Score than teachers who did not (t = 2.138, p = .033). In this analysis, the number of professional development hours did matter. By better understanding the paths that successful teachers have followed, the researchers infer some implications for future professional development programs and policies, such as, the implementation of tiered professional development opportunities for teachers.

Keywords: teachers; teacher development; teacher professional learning; teacher empowerment; teacher retention
Introduction

We used the complex construct of professional empowerment, as identified and defined by Short (1992) - autonomy, self-efficacy, decision-making, status, impact, and professional growth - as a lens to identify pivotal experiences that contribute to long-term teacher retention. We employed a concurrent, mixed-methods study to identify empowering experiences of career science teachers that have caused them to persist in their careers. We investigated what career empowerment meant to individual science teachers, how these meanings were constructed, what events changed these meanings, and whether teachers could retain a sense of empowerment in the context of events and changes that occur within and beyond the school setting.

Qualitative data collection was accomplished through the use of one-on-one interviews in conjunction with the systems dynamics technique of utilizing behavior-over-time (BOT) graphing to capture the experiences that 52 Texas science teachers described as having positively or negatively impacted their feelings of empowerment. We coded and analyzed the qualitative dataset and selected teacher comments to create the Likert-scaled survey items as representative of the range of experiences teachers reported, as bound within the construct of empowerment and the six dimensions.

We developed and tested an online, quantitative survey instrument, the Teacher Empowerment Survey, which collected similar kinds of data, found in the qualitative methods, in more efficient ways. We used the resulting quantitative survey data (N = 263) to identify the pivotal experiences that contribute to long-term teacher retention in a much larger sample of teachers who collectively represent varying years of experience along the teaching continuum.
**Stages of Teacher Development**

There have been a number of efforts to document stages of teacher development using cross-sectional interviews and surveys of teachers at different points in their careers (Fessler & Christensen, 1992; Fessler, 1995; Huberman, 1989). One of the most prominent was Huberman’s (1989) study of teachers’ career stages. After a series of interviews with 160 teachers, Huberman concluded that teachers pass through several phases in their career: a) survival and discovery; b) stabilization; c) experimentation and stock-taking; d) serenity and conservatism; and e) disengagement.

Fessler and Christensen (1992), who documented the interaction between professional career stages and organizational and personal environments, undertook a similar effort. In their model, the teachers’ personal and organizational environment included a number of interactive yet identifiable facets. Movement between and placement within teachers’ career cycle stages were influenced by these factors. The model proposed that a nurturing, supportive and reinforcing environment could assist teachers in pursuing a rewarding, positive career progression. Alternately, an environment that included negative pressures and conflicts could have an adverse effect on a teacher’s career path. Fessler and Christensen (1992) advocated more personalized approaches to professional development.

In their mixed-methods research with the Variations in Teachers’ Work, Lives and their Effects on Pupils (VITAE) project, Day, Sammons, Stobart, Kington, and Gu (2007) conducted a large-scale, longitudinal study that explicitly focused on one empowerment dimension, self-efficacy, and how it changed over the course of teachers’ careers. While Fessler and Christensen’s (1992) and Day et al.’s (2007) research is helpful for understanding general patterns of teacher career development, these lines of inquiry could go further to understand
variations in individual teacher’s careers. What remains unclear is why some teachers are able to successfully negotiate hurdles in their personal and organizational environment while other teachers experience the same contextual factors and are not able to navigate their careers in a positive direction (Walsdorf & Lynn, 2003).

In studying empowerment and the six dimensions as identified by Short (1992), Hobbs (2004) reported changes in the way teachers define self-efficacy throughout their careers and noted that a strong sense of autonomy supports teachers through difficult periods. Hobbs (2004) also observed the importance of professional growth opportunities in empowering teachers. We believe these issues matter as we work professionally with teachers to increase their content and pedagogical knowledge while helping them reach a level of empowerment equivalent to Maslow’s (1968) self-actualization – of being all they can be – at every stage of their careers.

**Teacher Empowerment**

What is empowerment and why is useful as a construct to explore the teaching life cycle? Melenyzer (1990) defines empowerment as “the opportunity and confidence to act upon one's ideas and to influence the way one performs in one's profession” (p. 16). Empowerment is most often viewed as a process through which people become powerful enough to engage in, share control of, and influence events and institutions affecting their lives. In part, empowerment requires that people gain the knowledge, skills, and power necessary to influence their lives and the lives of those they care about, as in the professional life cycle of teachers. Lichtenstein, McLaughlin, and Knudsen (1991) distilled the essential kinds of knowledge that empowered teachers possessed into three overlapping areas:

- Knowledge of professional community,
- Knowledge of education policy, and
• Knowledge of subject area.

After a year of examining structural, formal, and institutional-based efforts to empower teachers, the researchers shifted their research to look at knowledge-based reforms. They saw that “knowledge carries its own authority” (Ibid., p. 3).

Maeroff (1988) wrote, “Knowledgeable teachers who act as professionals can improve the education of their students. This is the reason why teachers should be empowered” (p. xiii). If teacher empowerment is vital to effective schools, then it is important to know how it develops and how it can be nurtured. As the educational community attempts to improve schools and better educate students, they must also improve the preparation and the working conditions of teachers. Learning more about teachers and their experiences supports multiple facets of the efforts for school reform.

Short (1992) identified dimensions of empowerment to include professional growth, self-efficacy, autonomy, decision-making, status and impact. Hobbs (2004) original qualitative study identified a pattern with which these dimensions appear. Two models emerged: one that indicated stages of empowerment with the dimensions most relevant that each teacher indicated, and the other an expansion of Short’s (1992) ideas that three of the dimensions fall into the realm of personal empowerment (professional growth, self-efficacy, and status), and three fall into the realm of organizational empowerment (autonomy, decision-making and impact).

*Dimensions of Empowerment*

Hobbs (2004) confirmed the roles and identified the relationships among the six dimensions of empowerment as they evolved in the contexts of teachers’ experiences. The dimensions appeared and matured in an identifiable sequence. Hobbs (2004) proposed that a personal sense of autonomy gave “heart” to the empowerment process, allowing teachers to persist through trying
circumstances, while professional growth experiences fueled the mind. Teachers’ professional growth and/or response to events related to the other four dimensions — decision-making, impact, self-efficacy, and status — were linked to these two.

Figure 1 displays the Hobbs (2004) personal and organizational empowerment model, which parallels two ‘arenas’ occurring along the professional continuum with an order in which the dimensions appear and mature. This model identifies two simultaneous processes of empowerment that develop along a continuum: (1) the personal empowerment process, which includes professional growth, self-efficacy, and status, and (2) the organizational empowerment process, which includes autonomy, decision-making, and impact.

![Figure 1. Personal and organizational empowerment model.](image)

While Hobbs (2004) found that some teachers relied heavily on a sense of intrinsic empowerment (autonomy) to make personal choices that transcended changes they made in their professional lives, other researchers characterized autonomy as situated within the arena of
organizational empowerment – dependent on changes in the school environment (Klecker and Loadman, 1996; Short, 1992). Professional growth, however, falls within the realm of personal empowerment. Teachers can choose to grow professionally. Even so, the importance of a teacher’s social context and organizational support on teacher learning should not be underplayed. In their work entitled *Organizing Schools for Improvement: Lessons from Chicago*, Bryk, Sebring, Allensworth, Luppescu, and Easton (2010) found that an essential driver of school improvement can be found within the organizational level, and that ‘individual initiatives’ seldom work in isolation.

Considering the importance numerous researchers have placed on professional growth as a dimension of empowerment, the dimension deserves careful study. According to Maeroff (1988), making teachers more knowledgeable is a vital part of empowerment because people who are misinformed or ill-informed are certainly not likely to perform as responsible professionals. Part of the reason why teachers have not exerted more authority is because they are not sufficiently equipped to do so.

We find it significant that professional growth is under the control of the individual teacher, and we believe this information can be useful for self-empowerment by teachers as well as for maximizing the beneficial effects of professional development by providers. We find that many professional development providers, even those who work with teachers over long periods of time, are not aware of where individual teachers are situated along the professional continuum. Nor are they aware that those teachers may in fact, be seeking both a learning community that provides access to specific science content and contact with scientists and science educators.
Purpose
If reform efforts are to be successful in schools, educational researchers must improve their ability to maintain quality individuals in the classroom. The ultimate purpose of this study is to lend some insight into the field of teacher research by probing into impacting experiences and events that career teachers recall from their professional lives. We also looked for patterns in those events that may help us better understand career stages and career-long professional development needs.

Research Questions
To better understand those pivotal events that have impacted the lives of career science teachers, the study addressed the following inquiries:

1. What are the impacting experiences that contribute to science teachers’ overall sense of empowerment? In other words, what are the observable outcomes of those abstract, professional empowerment qualities in career science teachers?

2. To what extent are there common patterns, or not, in science teachers’ experiences of empowerment over the professional life cycle.

Mixed-Research Design
In order to identify the career stages and the experiences teachers have found most empowering during those stages, the study used a novel research protocol. Qualitative data collection was accomplished through the use of one-on-one interviews (Clandinin & Connelly, 2000) in conjunction with the Systems Dynamics’ (Anderson & Johnson, 1997; Senge, 1999) technique of utilizing behavior-over-time (BOT) graphs. While the need exists to collect more data by listening to teachers’ stories via a methodology such as narrative inquiry, the time required for
interviews limits the number of participants and thus threatens the applicability of the data. Using a mixed-methods design over the course of four years, the researchers used both qualitative and quantitative approaches to gather additional data concerning science teachers’ perceptions and experiences via an online Teacher Empowerment Survey instrument.

**Data Sources**

Fifty-two K-12 science teachers were selected for the study based on demographics, recommendations by science educators and administrators, and longevity in the classroom. The sample represented diverse teachers having seven to thirty-eight years’ science teaching experience, from rural, urban, and suburban schools across Texas. A sample of those same fifty-two teachers met in three regional focus groups comprised of ten teachers per group to discuss the stories revealed through the BOT graphing and interview processes. Those teachers identified the pivotal experiences described during data collection and assisted in the early development of an instrument.

A smaller random sample of the participant teachers completed an early print-based version of the survey instrument and then, via feedback forms, compared their level of satisfaction with both qualitative and quantitative data collection processes for identification of impacting experiences. Using a non-randomized, purposeful sampling methodology, the researchers administered the pilot survey instrument online to a larger sample of teachers - representing all experience levels of K-12 science teachers statewide – and analyzed the results.

**Qualitative Data and Analyses**

The 52 case study teachers graphed their highs and lows of empowerment as they described in detail those pivotal events that caused them to feel empowered (or un-empowered) over the
course of their careers (Figure 2). Parallel graphs were then constructed for each of the six dimensions of empowerment.

![Figure 2. Sample behavior-over-time (BOT) graph.](image)

The researchers categorized teacher experiences, identified patterns, and examined the data for congruence with the growth of empowerment model developed by Hobbs (2004) during a previous study (Figure 3). This model shows empowerment as a cyclical process encompassing three phases of empowerment.
Figure 3. Phases of Empowerment model, design adapted from Senge et al.'s (1999) *The Dance of Change*. 
The Three Phases of Empowerment

The Hobbs (2004) empowerment model conceptualized the teachers’ experiences and their perceived growth in empowerment. The sequence of phases became the primary organizer, with the contexts drawn from the teachers’ stories. The dimensions identified in the literature served as the secondary means of organization. This technique was revealing due to the strong presence of teacher voice. The model depicts empowerment as a growth process with three phases of development: The Initiating Empowerment Phase, The Growth of Empowerment Phase, and the Sustaining Empowerment Phase. While the dimensions of empowerment can and do appear at any time during a teacher’s career, there was a relatively consistent pattern as to the order of events the teachers described. Therefore, one could infer the sequence in which the dimensions emerged and evolved. The dimensions became increasingly complex and sophisticated and reached maturity during the third phase, as reflected in the following table.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Years Teaching Experience</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Initiating Empowerment | 1-3                       | • Lack of preparation for entering the classroom and concurrent lack of awareness of professional development opportunities  
• Early experiences with decision-making  
• Increasing confidence that accompanied student success |
| Growth of Empowerment     | 4-8                       | • Growing awareness of professional development  
• Increasing self-efficacy through student success  
• Challenging contexts — both teaching and personal  
• Maturing sense of autonomy through involvement in decision-making |
| Sustaining Empowerment     | 9+                        | • Appreciating lifelong learning  
• Redefining self-efficacy  
• Valuing relationships with peers  
• Impacting education through group involvement |

Table 1. The Phases of Empowerment.
For the 52 teachers in this study, as well as with the teachers involved in the previous pilot study (Hobbs, 2004), the initiating phase lasted approximately three years. Teachers during this phase are classroom focused, trying to survive (Huberman, 1993) while building feelings of self efficacy (Day, et.al., 2007). The subsequent five years were periods of growth supported by professional development opportunities and, despite personal challenges and difficult teaching situations, resulted in an overall increase in empowerment. Huberman (1993) designates this phase as career stabilization. Hobbs (2004) found this to be a time when many teachers were selected for campus committees or other roles in their campus community.

By the ninth or tenth year, some of the teachers were struggling to sustain their sense of empowerment, whereas others had found collegial relationships within or outside the school that promoted their sense of empowerment. Researchers note this as a time of leveling off, a crossroads (Day, et.al, 2007), reassessment (Huberman, 1993) and a period of frustration/stability (Fessler & Christenson, 1992) as they attempted to sustain their empowerment (Hobbs, 2004). Although qualitative data collection lends invaluable richness and depth to the stories of teachers, the technique was laborious and required a large commitment of time. Hence, we developed a survey instrument that collected similar data that could be analyzed using mixed-methods approaches.

Quantitative Data and Analyses

Based on the qualitative analyses of the 52 teacher interviews, in congruence with the Hobbs’ (2004) Empowerment Model, and in meetings with the regional focus groups, the researchers developed a pilot instrument that collected similar kinds of data in more efficient ways: the online Teacher Empowerment Survey.
Relying on patterns discerned from the qualitative data-collecting techniques, the researchers selected teacher quotes that were representative of the majority of the 52 case study teachers’ comments about empowerment and its 6 dimensions. The quotes were ordered according to when they appeared in the teacher stories, and those quotations subsequently became Likert-scaled items on the *Teacher Empowerment Survey*. Demographic data collected from the survey respondents also allowed the researchers to ascertain patterns found in those responses. The mixed-methods study design permitted the researchers to formulate quantitative survey items from the qualitative data while confirming analyses of the qualitative data via the quantitative survey results.

*Empowerment Score Interpretation*

In this study, a linear continuous variable was created (Empowerment) that met homogeneity of variance, skewness, kurtosis, missing data, and outlier assumptions. To create an *Empowerment Score* via a Rasch Rating Scale for the overall *N* = 263 respondents, we used seven Likert-based (ordinal-scaled) items, which centered on the overall construct of ‘empowerment’ and its six dimensions. These seven items were scored from: 1 (= Not At All) to 5 (= A Great Deal). A zero value was assigned to “Don’t Know” responses. The Rasch Rating Scale program converted the ordinal-scaled responses into linear response measures. The Rasch logits were then transformed using a permissible linear transformation into a scaled score: *Empowerment Score* = mean + (standard deviation * logit).

Additionally, this specific scaled score was computed to range from 0 (low) to 100 (high) to permit educational personnel to easily interpret the *Empowerment Scores*. Scores in the range of 0 to 34 indicated low self-empowerment; scores from 35 to 60 indicated average self-
empowerment; and scores from 61 to 100 indicated high self-empowerment. Demographic variables were used to statistically analyze whether mean differences existed in the Empowerment Scores. Frequency tabulations for each demographic variable were presented along with a descriptive statistic for the dependent variable, Empowerment Score.

**Results and Discussion**

The Empowerment Scores had an internal consistency reliability coefficient of .99. The Empowerment Score distribution indicated different levels of teacher empowerment in our study, although statistically significant mean differences were not found between most levels of the demographic variables. Table 2 depicts the score range, quartile, and frequency of teachers for the overall Empowerment Scores.

<table>
<thead>
<tr>
<th>Empowerment Score Range</th>
<th>Quartile</th>
<th>Frequency of Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: 0 to 34</td>
<td>25th</td>
<td>76</td>
</tr>
<tr>
<td>Average: 35 to 60</td>
<td>50th</td>
<td>121</td>
</tr>
<tr>
<td>High: 61 to 100</td>
<td>75th</td>
<td>66</td>
</tr>
</tbody>
</table>

Mean = 46.13  
Std. Dev. = 18.50  
N = 263

Table 2. Empowerment Score range, quartile, and frequency of teachers.

We employed a concurrent mixed methodology, in that we converged or triangulated both forms of data “in order to provide a comprehensive analysis of the research problem” (Creswell,
2003, p. 16). The importance of belonging to a community of learners was a statistically significant finding in the data. Non-significant findings, yet interesting trends as supported by the qualitative narratives, did emerge to explain the slight differences in the following demographic variables: years teaching experience, grade level taught, school context, and certification type.

**Professional Community of Learners**

Teachers who had participated in a community of learners program where they received 60 or more hours of professional development annually had a statistically significant higher average Empowerment Score than teachers who did not ($t = 2.138$, $p = .033$). The notion of ‘lifelong learning’ within a community, including administrators, science teachers, and the larger community of scientists and science educators, is an essential component for sustaining a sense of professional empowerment. Table 3 displays the mean differences between teachers who had or had not participated in a professional community of learners.

<table>
<thead>
<tr>
<th>60+ hours Professional Development?</th>
<th>$N$</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>171</td>
<td>48.31</td>
<td>19.111</td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>42.99</td>
<td>15.404</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Development $t$-value</th>
<th>$dF$</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.138</td>
<td>245</td>
<td>0.033</td>
<td>5.323</td>
</tr>
</tbody>
</table>

Table 3. Mean differences between teachers’ professional learning community involvement.
For example, many of the interviewed teachers told stories emphasizing the importance of collegial relationships, particularly as experienced teachers. Kathy described her relationship with a fellow fourth grade teacher as follows:

The two of us just hit it off and I could go way off the graph. This point in my life from here to my fifteenth year of teaching was probably the high point of my career. We wrote curriculum together, we could finish each other’s sentences, we were that close. She was my alter ego practically. I was the dreamer and would say, ‘We can do this and this and this’. And she would say, ‘No, we can’t do that but let’s see if we can work on this.’

For Kathy, empowerment was dependent on the relationships with individuals who shared her ability and energy level under the leadership of a principal who understood their needs. She also noted the following:

You have to have a smart leader. Somebody who is intelligent but who understands people and has empathy and who understands that different personalities work better together. You can’t just put people together because you have to have a warm body in that spot. You have to have somebody that listens when you have a concern or you want to try something new. Our principal was so visionary....She knew how to put people together....She knew her faculty. She cared about us.

Kathy perceived that her empowerment stemmed from collaborative relationships on her campus. Nancy and others, meanwhile, described the importance of working relationships with scientists and other professionals outside their schools. Nancy spoke at length about her work at NASA in the summers and how she went there to “get her fix” that allowed her to continue teaching year after year. Nancy realized, and verbalized, her need for professional relationships outside the school. Most experienced, and self-professed empowered, teachers that we interviewed had formed such relationships, and those ranged from a statewide officer with a teacher union to a part time consultant for a nationally recognized science curriculum provider. The opportunities for leadership offered by these relationships provided a sense of professionalism that was an empowering addition to the role of teacher.
Some teachers reported membership in communities of learners outside their schools. Stuessy et al. (2009) stated that education researchers investigating the benefits of professional learning communities (PLCs) have indicated some success in solving issues of teacher retention. Studies targeting schools that have restructured the concept of PLCs find professional cultures that build on the strengths of teachers at all stages in their careers. Such professional cultures foster leadership and ownership among teachers of all experience levels, maximize the unique contributions that all teachers bring to the professional culture, and minimize attention to novice teachers’ deficiencies.

Conversation and dialogue about expert practice occurs within the PLC environment, amongst teachers with all levels of experience, including beginning teachers who make unique contributions from their perspectives. The PLC would also support and recognize veteran teachers who reside on the other end of the career scale, as contributors of expert knowledge and as science leaders in the school and district. Goals are shared regarding the development and revision of a science program that increases the effectiveness of its science teachers and the learning of its students. Veterans who mentor, model, practice self-reflection, and share the role of experts in an integrated professional culture can also learn from novice teachers in a supportive atmosphere centered on learning from one another to improve practice.

The outcome of restructuring such a PLC is professional growth and retention of science teachers at all career stages. Retained science teachers familiar with the school culture can sustain the PLC’s efforts to build positive support structures for all teachers in the teacher professional continuum. These include novice teachers and experienced teachers alike who find themselves navigating the quickly changing, highly complex terrain of high school science teaching. Texas and the nation could benefit from case studies of schools developing, testing,
and revising PLCs that adopt professional practices and policies that retain and sustain high school science teachers (Stuessy et al., 2009).

**Years of Teaching Experience**

Although the mean *Empowerment Score* from the 263 survey results indicated a positive trend from 38.19 to 48.87 across the teaching experience groups, the \( F = 2.138 \) and \( p = .096 \) indicated there was no statistically significant mean difference between the years of teaching groups at the .05 level of significance. Table 4 displays the mean differences among teaching experience levels including the one-way ANOVA test.

<table>
<thead>
<tr>
<th>Years Teaching</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3 Years</td>
<td>21</td>
<td>38.19</td>
<td>12.906</td>
<td>13</td>
<td>55</td>
</tr>
<tr>
<td>4 to 8 Years</td>
<td>73</td>
<td>44.60</td>
<td>17.926</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>9 to 15 Years</td>
<td>82</td>
<td>46.61</td>
<td>19.098</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>16+ Years</td>
<td>87</td>
<td>48.87</td>
<td>19.138</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>46.13</td>
<td>18.504</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>dF</th>
<th>Mean Square</th>
<th>( F )</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2167.766</td>
<td>3</td>
<td>722.589</td>
<td>2.138</td>
<td>0.096</td>
</tr>
<tr>
<td>Within Groups</td>
<td>87535.839</td>
<td>259</td>
<td>337.976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>89703.605</td>
<td>262</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Mean differences among years of teaching experience.

From a quantitative perspective, these results were not statistically significant. Yet, the underlying trends of empowerment from low to high made sense in the qualitative analyses. Years of teaching experience parallel years of life experience. The teachers in this study
recognized that their changing personal situations influenced their opportunities for involvement in professional growth experiences. For example, Donna recalled that early in her career she had to make personal choices that precluded her taking advantage of all the professional development opportunities that might have helped her deal with challenging instructional situations. During much of her career, Donna’s family responsibilities had placed heavy demands on her time, and, as a result, she was unable to participate in professional development activities as needed or desired.

However, at the time of the interview, personal responsibilities were taking less time and Donna concluded that, “I feel like any opportunity that comes along that I’m free to do that - to attend what I feel like will help me and my students.” She recognized her sense of autonomy and sense of responsibility in making such choices. She concluded that, “It has totally been my decision to go and do what I think will help me to be a better teacher.” For the more experienced teachers, diminishing family responsibilities frequently afforded additional time for professional growth opportunities.

*Grade Level Taught*

The researchers observed a difference in the grade level focus of the teachers interviewed. High school teachers tended to talk more about the subject or subjects they taught. Elementary teachers often told enjoyable stories about individual students, particularly telling stories of having seen those students as adults and feeling that they made a difference in these young peoples’ lives. A sense of the importance of developing the “whole child” was interwoven in their interviews. Of the three groups, middle school teachers were the most likely to discuss pedagogical issues of curriculum planning and writing and assessment.
A visual inspection of the survey results suggested that Pre-K to elementary teachers had higher *Empowerment Scores* than secondary teachers, implying the trend that empowerment decreases as grade level increases. However, this trend was not statistically significant ($F = 2.047, p = .131$). Table 5 displays the mean differences among grade levels including the one-way ANOVA test.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK to Elementary</td>
<td>157</td>
<td>47.96</td>
<td>17.865</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Middle School</td>
<td>41</td>
<td>43.80</td>
<td>21.871</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>High School</td>
<td>62</td>
<td>42.87</td>
<td>17.718</td>
<td>4</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>46.09</td>
<td>18.586</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Sum of Squares</th>
<th>$dF$</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1402.871</td>
<td>2</td>
<td>701.435</td>
<td>2.047</td>
<td>0.131</td>
</tr>
<tr>
<td>Within Groups</td>
<td>88070.095</td>
<td>257</td>
<td>342.685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>89472.965</td>
<td>259</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Mean differences among grade levels taught.

**School Context**

While the researchers found good and bad teaching situations in rural, urban and suburban school settings, differences in the overall contexts were evident in talking to the case study teachers. Teachers in rural settings frequently teach multiple grade levels or courses, have to drive farther for professional development and learning opportunities, and may reveal some sense of being ‘trapped’ by the limited job opportunities in their community. As one teacher said, “I was teaching 7th, 8th, 9th, 10th, and 11th [grade]. I was teaching all of it. That was overwhelming to say the least.” And another, in describing her professional choices, said, “As far as choosing a
place to teach, that's been limited because we're pretty much here to stay. My husband's job [is here], and he's from here. He doesn't want to move. But I'd be willing to go anywhere.”

As a teacher in a rural community, Cheryl was leaving the classroom to become a mentor with a government-funded program to support teachers. Cheryl explained:

I’m not leaving because I’m unhappy. I mean, if I was going to stay in the classroom, this is where I’d stay. This is a great school, great kids, with a great administration. I wouldn’t want to teach anywhere else. And money is not why I changed jobs, even though it will be more. I think if the money had been equal - if they’d said, ‘Okay, we’ll pay you ten thousand more dollars,’ - I would still change. I just don’t think you can be an effective teacher if you’re not satisfied yourself.

Cheryl was dissatisfied with the opportunities for personal and professional growth available to her in her small school district. What if there had been more opportunities for professional development, or autonomy, or decision-making? What if she had been raised in status or she felt like she had more impact? Would she have stayed?

The survey results indicated that the Empowerment Scores for the rural school districts were on average 5.5 points lower than the urban and suburban school districts. However, the mean differences were not statistically significant ($F = 2.29, p = .10$) at the .05 level of significance. Table 6 displays the mean differences among school context types including the one-way ANOVA test.
In spite of the negatives reported about urban schools, there were benefits to living and working in large cities. As one teacher reported, “I was a teacher intern at the Medical Center [in the summer] and got to actually work with transgenic mice and stuff like that. That was absolutely marvelous. It gives you a new vibrancy and urgency, and renewal of why you're doing this. Those things are always marvelous.”

Some, however, from all three geographic groups, took a holistic approach to thinking about autonomy. They considered, in connection with the BOT graph, their ability to make long-range career choices. Many talked about family situations that influenced their decision to transfer to another school or to decline professional development opportunities. Some, like Janet, talked about leaving teaching to work at a fast food restaurant instead. She insisted she had the personal autonomy to leave anytime she wanted. Overall, they felt very much “in control” and capable of making major decisions that would impact them both personally and professionally.

Table 6. Mean differences among school context types.

<table>
<thead>
<tr>
<th>School District Type</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>57</td>
<td>41.56</td>
<td>19.353</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>Urban</td>
<td>109</td>
<td>47.01</td>
<td>19.111</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Suburban</td>
<td>97</td>
<td>47.82</td>
<td>16.996</td>
<td>4</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>46.13</td>
<td>18.504</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>One-way ANOVA of Empowerment Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>School District Type</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>Between Groups</td>
</tr>
<tr>
<td>Within Groups</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 6. Mean differences among school context types.
As a result, some teachers drew their autonomy BOT graphs straight across the page. These teachers have always felt in control, or as Beth said, “Nobody’s in control of me, but me.”

**Certification Type**

While the survey instrument captured data on teachers who had gone through alternative certification programs, this was not the case for the teachers in the face-to-face interviews. Those teachers, who met the interview criteria for having taught twelve or more years, obtained their teaching credentials before alternative certification became an option. The fastest growth in alternative certification has occurred primarily since the year 2000 (National Center for Alternative Certification).

Analysis of survey data did not show a statistical difference between the traditional vs. alternative certification groups ($t = 1.07, p = .285$). An independent t-test was computed and a visual inspection of the survey results suggested that traditionally certified teachers, on average, tended to have higher Empowerment Scores (46.98 versus 44.38). Table 7 displays the mean differences between levels of certification including the one-way ANOVA test.

<table>
<thead>
<tr>
<th>Certification Level</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>175</td>
<td>46.98</td>
<td>19.312</td>
</tr>
<tr>
<td>Alternative</td>
<td>87</td>
<td>44.38</td>
<td>16.847</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certification Level</th>
<th>$dF$</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.07</td>
<td>260</td>
<td>0.285</td>
<td>2.604</td>
</tr>
</tbody>
</table>

Table 7. Mean differences between certification levels.
Conclusion and Implications

We framed the research within the following inquiries: What are the impacting experiences that contribute to science teachers’ overall sense of empowerment? In other words, what are the observable outcomes of those abstract, professional empowerment qualities in career science teachers? And, to what extent are there common patterns (or not) in science teachers’ experiences of empowerment over the professional life cycle?

We hypothesized that the collection of quantitative data would reveal clearer patterns in the experiences of those teachers who had self-identified themselves as empowered. What we found instead were statistically non-significant trends that made sense when interpreted using the qualitative data but lacked the depth of context and detail as found in individual teacher stories. Empowerment is a ‘complex construct’ (as noted by Short (1992)), and those factors that contribute to long term teacher success and retention are similarly complex, due in part to the volatile nature of empowerment itself.

Melenyzer defined empowerment as “the opportunity and confidence to act upon one's ideas and to influence the way one performs in one's profession” (p. 16). One pattern recognized in the teacher stories is the importance of a balance between opportunity and confidence, and a significant change in one can cause immediate feelings of declining empowerment (i.e., an opportunity presented that is outside the perceived feelings of efficacy of the teacher; or the opposite, a denied opportunity where the teacher is confident he or she can succeed). Capturing feelings of empowerment in real time (via the Teacher Empowerment Survey) is capturing today’s feelings based on most recent events and may not be as informative overall as the more laborious methodology of recording the entirety of career experiences and tracking patterns in those experiences. According to David,
Opportunity and confidence. That’s the key. Confidence to act on one’s ideas and to influence the way one performs in one’s profession. My confidence is so great after all these years of experience that I am going to make the opportunity. I’m not going to wait for someone else to say, ‘Would you like to do this today?’ I’m going to seize the opportunity.

By better understanding the paths that successful teachers have followed, the researchers can infer some implications for professional development programs and policies for the future. Results of this study support the implementation of tiered professional development opportunities for teachers. We found trends in the data that supported the differences in the developmental and empowerment needs of teachers in Phase 1, Phase 2, and Phase 3. Yet, most school systems take a one-size-fits-all approach to offering growth opportunities to its professional staff. During the first three years of employment, Phase 1 teachers should be supported as they learn the logistics of being a classroom teacher. Teachers in this study reported that peer assistance facilitated this process. However, this assistance was often incidental and not always available when needed.

Professional development during Phase 2 should assist teachers in becoming more effective in designing and delivering instruction that meets the needs of their particular student population. This study indicated that teachers in this phase have concerns about their self-efficacy, or instructional effectiveness in terms of student achievement. Professional development should capitalize on this concern. Research suggests that Phase 2 teachers should be encouraged to sample a variety of professional development offerings and pursue individual interests and needs.

Furthermore, teachers in this phase were becoming increasingly involved in leadership activities and roles. These leadership roles enhanced their sense of empowerment as their voices were being heard and their actions were benefiting their colleagues and students. Overall, data in
this study indicate the importance of administrators providing opportunities for teachers to become involved in meaningful leadership activities.

During Phase 3, the teachers in this study recognized the importance of lifelong learning and noted a strong need for collaboration with other professionals who were functioning at their level of competence. Some also sought new professional challenges. However, the data showed a leveling off in their growth in empowerment. School districts should be flexible in allowing these Phase 3 teachers to forego some of the standard offerings and attend, instead, workshops and conferences that meet their individual interests and needs.

Teachers must be afforded opportunities to engage with colleagues in and outside their campuses. Fullan (1993) claimed that opportunities for teachers to work together as ‘kindred spirits’ who were involved collegially would form a critical mass of empowered teachers with the capacity to renew schools on a continual basis. Of course, in doing so, they would be sustaining and renewing their sense of empowerment. These veteran teachers who describe themselves as lifelong learners and seekers of peer relationships begin identifying themselves as “educators” rather than “teachers” (Hobbs, 2004). Thus, subtle shifts in the way we as professional development providers work with teachers can significantly increase our effectiveness in helping teachers continue to grow professionally.

If teacher empowerment is to become a means of improving schools, then teachers must be supported throughout the process of reaching a self-actualized level of empowerment – of being all that they can be. Only a few of the teachers interviewed for this study had reached that level, and some of them were leaving the system due to lack of opportunities for further professional growth. The availability of such activities that are designed to increase their
instructional capacity and provide opportunities for sustained collaborative interaction with other teachers would enhance the probability of their retention.

**Limitations and Further Research**

We believe the survey technique holds promise for increasing our understanding of teachers and how to best support them, however, the *Teacher Empowerment Survey* clearly needs refinement and the modified instrument needs to be administered to a much larger teacher sample. We would also encourage the implementation of a longitudinal study that would follow a cohort of teachers through their first decade of teaching, tracking their professional growth and even offering a more comprehensive and aligned series of professional development opportunities than the random ‘menu’ most teachers currently receive. The research found a statistically significant relationship between teacher empowerment and belonging to a learning community that involved 60+ contact hours. Hence, we are interested in the potential for professional learning communities as a conduit for professional development, but we need to know more about the learning communities teachers report as beneficial.

**Acknowledgments**

This research was based upon *Project Instrument Development (I.D.): Instrument Development for Exploring the Professional Growth Continuum*, which was funded by the National Science Foundation’s Teacher Professional Continuum (TPC) program grant #0554468. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of NSF.
References


