# Innovation in Preservice Teacher Preparation: Undergraduate Research in Special Education

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## Abstract

*Teacher preparation programs emphasize the connection between student outcomes in achievement and behavior, but the framework of teachers as researchers is rarely presented as a foundational basis of good instruction. Teachers are aware of the need to consider scores and trends and alter their instruction based on the response of the students to their teaching, but the techniques involved are not explicitly taught as research methods in most preparation programs. The initial purpose of including a research course in the undergraduate program of study was to provide preservice teachers with research skills to enhance their instruction. The long-term goal is to provide the preservice teachers with the tools and techniques whereby they are encouraged to critically reflect on their own assumptions about the role of teachers. Through the implementation of the current research course, which is included in their program of study, students examine ways teachers use single-subject design in the classroom as part of their daily routine in teaching and managing their classroom. Encouraging preservice teachers to learn more research methods not only prepares them for their classrooms, but also serves as an introduction to graduate-level expectations. This essay explores preservice teachers' views on the value of learning research methods as a transformative event in their understanding of what teachers do in the classroom.*

*Keywords:* preservice teachers, undergraduate research, research methods

**Innovation in Preservice Teacher Preparation: Undergraduate Research in Special Education**

It is the intent of university programs to prepare preservice teachers for meaningful careers in education. Teacher preparation in most undergraduate programs has a high concentration of both content literacy and pedagogical instruction (Darling-Hammond, 2016). While knowledge of content is a predictor of successful teaching, and good teaching practice is linked to student outcomes, these two components of what it means to be a teacher will not

predict that the teachers will remain in the classroom. The attrition rate of special education teachers is often linked to the teachers' perception of being overwhelmed by the amount of paperwork that is required by law in assessing and monitoring student progress (Vittek, 2015). Thus, attention to teaching preservice teachers' research methods that can be incorporated into their daily teaching routines, which can then assist in managing this required paperwork and research methods, may be viewed as worthwhile professional competency, instead of viewing data collection as a heinous legal necessity with little connection to their practice. The collection and analysis of student learning and behavioral data are research skills that are often overlooked in teacher preparation, and when these skills are addressed, it is considered part of the documentation piece of reporting and incorporated into a larger skill set directed at the collection of data as a daily occurrence and one that informs one's practice. Data collection and analysis can then be closely linked to selection of curricula, shaping and scaffolding instruction and differentiation of teaching and assessment methods which are all techniques that teachers recognize as necessary competencies. If special education teachers were prepared in such a way as to understand that data collection is an integral part of what it means to be a teacher, then it could have some impact on how teachers view their responsibilities as teachers, and the requirement to collect and analyze data may be less daunting. Transformative learning occurs when the students shift from viewing their role simply as recorders of events into analyzers of data; the transformation of learning is extended when they critically assess their assumptions, reflect upon that data, and exact change in their teaching methods and classroom facilitation. As a result, the authors critique current practice by exploring ways to include activities involving formal research skills preservice teachers can practice within their future classrooms. We believe infusing research methods will increase the likelihood of transformative learning for our preservice teachers and, if used within their future schools, could support developing classrooms that closely monitor student success. Whether or not this transformative content may have any influence on retention rates of induction level teachers, the ability of preservice teachers to recognize the value of learning research skills is perhaps an integral component of supporting teachers as they begin their careers. The transition of preservice teachers' perception of their ability to use research methods to become a better classroom, teachers represent a true transformation in their learning and in their understanding of the teaching field.

**Transformative Learning Theory**

All individuals have their own view of the world and their place in that world. This view has been developed from a variety of sources—their upbringing and influences by parents and others in the formative years, life experiences, cultural beliefs, and educational experiences. In the case of teachers, they have also been consistently exposed to teachers as models throughout their entire life, which influences their perception of the teacher's role within the classroom. However, there are limited opportunities for any student to see or understand the planning and preparation that is required in order to provide instruction and support both in and out of the classroom. For preservice teachers, many have been exposed to the art of teaching prior to beginning a teacher preparation program, but exposure to the reality of instructional responsibility may challenge their initial thoughts of what educators actually do within the classroom. It is during these early preparation experiences that candidates are exposed to the hard work behind becoming an effective educator. Preparation course work should increase their knowledge and deepen their understanding on the groundwork it takes to know the students,

communicate goals and execute plans to achieve outcomes.

Taylor (2000) reviewed literature on transformative learning and discovered six themes related to the essential characteristics of transformative learning and how to promote it. They include: (a) promoting ownership by the group along with individual agency, (b) providing shared experiences, (c) developing an understanding of personal and social influences, (d) delivering values-rich content within coursework, (e) recognizing the relationship between critical reflection and affective learning, and (f) understanding that time is needed to change one's way of thinking. Similarly, Kasworm and Bowles (2012) noted that higher education settings provide ample opportunities for challenging students' frames of reference. They indicated that innovative higher education programs that engage in transformative learning "challenge student perspectives, promote critical thinking and creativity, integrate knowledge across disciplines, create community-university collaboration, develop inclusive communities of diverse learners, and enhance connections among student and faculty" (p. 396).

Colleges and schools of education may be particularly well-positioned to transform preservice teachers' frames of reference, or worldview. Initially, the preservice teachers' frame of reference may be made up of their own educational journey, and as such, they may have limited exposure to diverse students or challenging settings. In some cases, this worldview can become "set," and an individual can have difficulty changing because their worldview becomes habits of mind—broad, habitual ways of thinking and acting. However, teachers enter classrooms that are increasingly diverse, and as a result, they cannot afford to have set ways of thinking or assumptions about students. In fact, "developing more reliable beliefs about the world, exploring and validating their dependability, and making decisions based on an informed basis is central to the adult learning process" (Taylor, 2000). The process of becoming a teacher, both outwardly and inwardly, means that many students' beliefs of what it takes to be a teacher and what it takes to become a teacher (their "worldview") may be radically different from the reality of the process.

Developing these beliefs in an informed way is supported by transformative learning theory. This theory "explains how adult learners make sense or meaning of their experiences, how social and other structures influence the way they construe that experience, and how the dynamics involved in modifying meanings undergo changes when learners find them to be dysfunctional" (Mezirow, 1991, p. xii). According to Mezirow (2000), there are distinct steps that make up transformative learning: (a) a disorienting dilemma, (b) self-examination, (c) critical assessment of assumptions, (d) recognizing that one's discontent and the process of transformation is shared, (e) exploration of options for new roles, relationships, and actions, (f) planning a course of action, (g) acquiring knowledge and skills for implementing one's plans, (h) provisional trying of new roles, and (i) reintegration into one's life on the basis of conditions dictated by the new perspective. The first step in transformative learning, the "disorienting dilemma," is often experienced by induction teachers when they are faced with the expectations to teach all the students in their classroom, many with vastly different learning needs than those that the induction teacher may have experienced. In the best cases, this will lead to the next step, "self-examination," when they consider the strengths and weaknesses of their own abilities to address the knowledge, skills and dispositions of the educational field. It is the intention of our teacher preparation program to provide this transformative learning prior to the student being a teacher of record, so that the process of facing a disorienting dilemma and choosing to self-examine will be a practice that the teacher already engages in with some measure of competence.

Mezirow's next distinct step in transformative learning involves, in large part, using critical reflection as a way to change existing worldviews, frames of reference, and habits of mind (Mezirow, 1991). Reflection has been a significant part of teacher education for decades, supported by educators such as Dewey, Kolb, and Schon. However, reflection in teacher education often occurs in a vacuum; preservice teachers have little real practical experience on which to base their reflection. Embedding a research course in the undergraduate special education teacher preparation program seeks to provide this critical reflection as students experience life as a teacher. This introduction to data collection, and the companion reflection as the analysis of the data is completed, can be viewed as a necessary "teacher skill" which may promote transformative learning as students experience the connections within making data-informed decisions to enhance their practice.

Transformation learning occurs in the program described in this study in which undergraduate students are asked to conduct research in field placements. In this program, the faculty engaged in "an approach to teaching based on promoting change, where educators challenge learners to critically question and assess the integrity of their deeply-held assumptions about how they relate to the world around them" (Mezirow & Taylor, 2010, p. xi). Teachers in the field undertake research skills in their daily practice through both formative and summative assessment. Certainly, many preservice teachers come into their preparation program having some idea of the necessity of assessment as well as the need to understand the outcomes of assessments, but few recognize that what teachers do nearly every day is, in all regards, significant data collection and analysis. As such, it is our intent to help them understand their role as a researcher.

## Benefits of Undergraduate Research in Teacher Education for Transformative Learning

Our program examined the empirical basis for including a research experience within the program of study in order to ensure that the skills that the preservice teachers would gain would aid in supporting them in their own classrooms. The opportunity to conduct research while in a teacher preparation program is beneficial to special educators because it promotes the refinement of both their teaching and service skills and can serve to broaden their knowledge of their related disciplines, which is essential to special educators who oftentimes work with a variety of general educators with content specialties across disciplines (Lassonde, 2008; Levy, Thomas, Drago & Rex, 2013). Undergraduate research encourages leadership and collaboration, promotes logical analysis, and enhances students' written and oral communication skills (Ishiyama, 2002). These skills are an integral part of what it means to be a teacher. An undergraduate research experience provides an ideal context for prospective educators to demonstrate required practices of innovative and inquiry-based teaching and learning, familiarity and competence in evidence-based interventions, and reflective teaching (DeVore & Munk, 2015). Considering these benefits, undergraduate research provides prospective educators and educational specialists with the skills necessary to transform schools into centers of innovative teaching, learning and scholarly activity and creative activity. They become thoughtful, purposeful professional educators who become leaders in their educational institutions, units, schools and communities. Conducting research as an undergraduate for many students is, by nature, a transformative learning experience. Our goal in providing research methods is to prepare the preservice teachers in their undergraduate program the opportunity to learn research methods in preparation for a research experience that is embedded later in their program.

As faculty, we were committed to include undergraduate research in our teacher preparation, and to that end, the College of Education created avenues to establish an innovative outlet to connect research methods within the initial certification special education program. Through a collaborative effort between the research and special education professors, we created a new course to serve as an introduction in research methods. In addition to the teaching and research faculty, administrative support was also present, in the person of the associate dean for research. This support by the associate dean was in line with current research that indicates that once the administrators in education units (deans, department chairs, program coordinators), are informed about the benefits of undergraduate research, they are more likely to negotiate with their academic departments for innovative ways in which to sponsor interdisciplinary undergraduate research (Brakke, Crowe, & Karukstis, 2009; Murray, Naimoli, Kagan, & Snider, 2004).

## Teacher as Researcher

In the very nature of their role as a classroom leader, teachers become informal researchers. Many days teachers enter their classroom with a new activity to try and a new strategy to engage students. Consistently testing attempts and seeking differences in student achievement and or behavior, teachers' classrooms become an incubator for learning experiments. For new teachers, their daily routine is persistently creating new ideas, techniques and skills to further sharpen their skill as a teacher and give better instruction to their students. However, much of the literature overlooks teachers discussing their development in researching their experiences. Teacher preparation courses share little on research methods that undergird teacher practice in documenting ways to monitor student progress through a formal approach of gathering research data.

Current research on beginning teachers developing formal research skills has been documented as self-study research (Bullock, 2009; Loughlin, Hamilton, Laboskey, & Russell, 2004; Marin, 2014), and also teacher as researcher in an international context (Brantley & Crocco, 2010; Kosnik, 2005). An important result of this work is the increase of teacher practices that involve critical self-examination and reflection to examine change within their classrooms. Teacher as researcher is part of the action research paradigm that calls for the practitioner to actively study their own practice to measure change within their students and growth within their teaching skills and/or knowledge (Hollingsworth, 1995). When teachers include formal research methods to their practice, they increase their professional role to include a systematic, self-reflective, intentional inquiry into aspects of classroom practice. Towards that end, teachers carefully review their teaching duties, they engage in constructing critical questions based on perceived local problems, collect and interpret data, and write up their findings in a report with the interest of improving their practice (Kane, 2007). The teachers are key players within the research process and it can take up to a few weeks or several years to complete pending on the problem under investigation.

By infusing action research methods within the preservice teacher course work, these college students are exposed to ways they can increase their professional judgement by using evidence. Top-down policies and past schooling experiences help to shape the prior knowledge of preservice teachers and what they envision are the possibilities of classroom teaching (Beuhl & Beck, 2014). However, we propose that using action research methods sheds light on how teachers make evidence-based decisions to lead their classrooms. Involving students within the research process earlier and more often can support their development in asking critical

questions and adapting to evidence as they encounter it (Hatch, Eiler-White, & Faigenbaum, 2005).

This process is situated within transformative learning by suggesting that preservice teachers now have the concepts to investigate what works relative to their current classrooms instead of relying on previous experience in that grade or what the previous teacher of that content has shared with them. They can explore other activities or methods and test the results on which techniques works best for their students. Additionally, they have the skills to write up the differences observed within the classroom and disseminate to others in reports or presentations.

## Description of Research Course

This course is an undergraduate introductory course in educational research. Students enrolled in the course are special education majors and approximately 20 students enroll in the course as a cohort. Research designs, methods, and applications of research specific to investigations in special education practice are explored. The course includes essentials in evaluating a literature review and key issues in data collection using qualitative and quantitative approaches. Students investigate the development of instruments for measuring student progress and applying intervention, understanding variable relationships, and descriptive studies. They develop the capacity to frame research questions, determine appropriate research designs, collect necessary data, interpret results, and develop awareness of the range of alternative instructional and behavior approaches.

The course contains several learning activities that center on data collection and data-driven decision making. Towards that end, students learn that data collection and analysis of the data is a more sophisticated way of understanding problems and concerns in the classroom versus just simple documentation of occurrences. A survey of student interest was used in this project to gather data; however, the researchers explored several sources to understand how transformative learning occurred within the instructional content of the course. The purpose of the survey was to provide an interest inventory of how the students in three sequential cohorts viewed particular instructional devices used within the course of the class (i.e., quizzes, lectures, projects) as well as their relative interest in the content of the class itself. It was intended to provide the instructor (second author) with information regarding the clarity and transferability of instruction more so than the end-of-course evaluations that were administered by the university.

## Methods and Results

Students completed a 10-item pre/post survey on their interest in research methods and course activities. Item analysis results were determined for each cohort individually (2016, 2017, and 2018), to measure differences within each group. When comparing the mean item scores, cohorts' scores revealed an overall increased familiarity with the research process between the pre-course surveys and post-course surveys. Additionally, students who presented research at various conferences were contacted about their experience as a presenter and how helpful it was to their practice as a teacher.

In general, the survey was useful to the instructor to gauge student interest in course activities. Many of the items were developed to gather additional data on the course format and to gain a deeper understanding of students' attitudes on course projects. Items on the survey requested a self-report on their attitudes of importance in studying research methods, understanding the process of scientific research, and their abilities to identify procedures commonly used in qualitative or quantitative research methods. By moving beyond the students' attitudes of the projects, the researchers wanted to investigate if the survey would also be useful in sharing insights on transformative learning of the course material.

Several observations were made in comparing the pre/post data in each group. However, very little could truly provide sufficient evidence of transformative learning as the survey was not designed specifically for that purpose. However, we did observe differences in students' interest and attitude mean scores to an item specifically on teacher skills, indicating their personal level of importance of the course to foster a better understanding of using data to improve teaching practices. Specifically, in the 2018 cohort of 21 students, reported mean scores were as follows: (4.38 pretest and 5.42 posttest, with a STD of 1.25). The increased difference on this item we propose there exist some transformative learning experiences that will impact their skills as a teacher and developing researcher.

While transformative learning was not directly associated with the survey, several other observations were made of students' progress throughout the course and during presentations that were related to transformative learning and provide some evidence of change in students' habit of the mind. In connection to the tenets by Kasworm and Bowles (2012), we offer activities within the course and its connection to the survey where we can assume transformative learning was achieved.

Transformative learning was demonstrated through many of the course activities, as evidenced through Kasworm and Bowles' six tenets. In regard to the first tenet, "Challenging student perspectives and assumptions," we reference Mezirow's (2000) description of a "disorienting dilemma," in which students attempt to solve problems using abstract reasoning. In one specific course task, students were asked to consider which research approach is more precise—qualitative or quantitative? After reading and in-class debate, we discussed the differences in Likert-scale measure anchor items and how people view these differently. Consider common terms to indicate frequency such as Never, Rarely, Sometimes, Often and Always. We examined the varied meanings for each term for each person within the classroom, how exact then can we assume in gathering the attitudes of a population when people vary on the meaning of terms even for the term NEVER. Over the course of teaching this class, there were several students that indicated the possibility of NEVER happening 3 times; however, they would still respond by using NEVER on a survey. Visualizing the differences among their classmates gives the students another frame of reference to consider as they continue to read other research articles and review different surveys. While the survey did not test transformative learning, we use the evidence to suggest there was change in student thinking related to the nature of research as suggested in Table 1.

Regarding the second tenet, "Promoting critical thinking and creativity," our students spent time analyzing hypothetical qualitative and quantitative data sets as well as creating display charts and graphs for these data sets. While the class serves as an introduction to research approaches, we spend a third of the course on analysis techniques that K-12 teachers find useful for disseminating data to their team, grade level, and principal. Also, we explore analysis techniques to track student progress on alternative assessments beyond K-12 test scores. Creating

data charts for individual K-12 students, grade levels, and schools can be tedious and rigorous, yet, requires undergraduate students to organize material and think critically of the best approaches to display the data. The connection to the survey is one particular item that directly explores level of importance; the analysis projects are as a learning activity.

**Table 1** *Student Interest in Learning More About the Nature of Research Pre and Post-Survey*

| Year | N | Mean Scores | Standard Deviation | df | p-value |
|------|---|-------------|--------------------|----|---------|
| 2016 | | | | | .461 |
| Pre-Survey | 19 | 4.95 | 1.35 | 18 | |
| Post-Survey | 19 | 5.26 | 1.97 | 18 | |
| 2017 | | | | | .025 |
| Pre-Survey | 21 | 5.50 | 1.34 | 20 | |
| Post-Survey | 14 | 4.21 | 1.05 | 13 | |
| 2018 | | | | | .231 |
| Pre-Survey | 23 | 5.52 | 1.44 | 22 | |
| Post-Survey | 21 | 4.81 | 1.66 | 20 | |

*Note. The p-value reflects individual t-tests drawing from each individual year.*

For the next two tenets, "Integrating knowledge across the disciplines" and "Engaging in community-university partnerships and collaboration," we provide several examples that weave these items seamlessly together. One of the more obvious activities is students' involvement with action research studies from our recent graduate students. Students are required to offer a reflection on action research studies from our previous Education Specialist (EdS) students who completed action research studies as a requirement for their degree. The studies range in topic on issues related to reading, math, science, and social studies at different levels. The undergraduate student gains practical knowledge from current teachers' attempts to conduct classroom research. It also reaches into the community and university partnerships through the school context that are also described and considered a major part included in their reflective writing. For the last two tenets, "Developing supportive and inclusive community of diverse learners," and "Enhancing connections between and among students and teachers" (Kasworm & Bowles, 2012), we provide the example of students' weekly goals, discussion posts, and in-class group activities to build our learning community. Each week, the students set a goal for submitting assignments under a pseudonym they create at the beginning of the semester. The professor is not aware of the identity of the students but gives feedback on the shared Google form for each student who completes his or her weekly goal. This goal sheet is a motivator for students to state when they start and finish weekly assignments. Discussion posts and in-class activities also offer students opportunities to share opinions and collaborate on assignments. These activities reflect transformative learning by encouraging students to process information and make connections with others. The students must personalize, process, and connect or consolidate their ideas to create projects for in-class assignments, such as creating a survey activity. Students randomly draw a topic from a hat and must work together to create a survey for the other class members to complete. There are several limitations to completing the assignment, such as time, effective

survey design rules and number of survey items. This is an intense activity, but one we have come to appreciate in building our classroom learning community. Changes in students' attitude on the importance of common procedures used in quantitative and qualitative research methods provide us some evidence of transformative learning. Cohort 2018 students self-reported a greater importance placed upon their ability to identify procedures commonly used in qualitative and quantitative research methods at the conclusion of the course. Table 2 illustrates a significant difference ($p<.005$) in students' opinions.

**Table 2** *2018 Cohort Importance on the Ability to Identify Procedures Used in Research*

|  | N | Mean | Standard Deviation | Df | p-value |
|---|---|---|---|---|---|
| Pre-Survey | 23 | 1.58 | 0.69 | 22 | .002 |
| Post-Survey | 21 | 3.16 | 0.76 | 20 |  |

While there were several limitations to the survey that prevent us from making any generalizations from these initial results (i.e. small size, reliability of instrument, etc.), we did find it useful to question students about their experience and restructure the materials in the course to address specific needs. As we increased our engagement with previous research on transformative learning the authors attempted to examine if undergraduates were transforming in their learning within the research methods course. While the data collected here does not overwhelmingly support transformative learning, we did observe student change and development within the activities. Our next steps are to include more qualitative data in our sample after students complete the course and prepare for conference. For example, we include here one student's statement shared after her presentation at a state level research conference.

Chelsea, a senior education major stated, *"I would not have done any presentations without the research course. I think that without this course I would not have even thought about doing research or about research being possible in education. I also do not think that I would have known how to go about creating an abstract or presentation had I not have completed the research course or had professors that knew more about research to lean on and ask for help."*

To capture the depth of student transformational change we may need to add more qualitative approaches to gather the details illustrating the connection of the course to student change.

## Conclusion

A powerful result of transformative learning experiences is that once someone's understanding has been transformed, it is impossible for them to revert to their old perspective. Teachers cannot come into the classroom each time thinking, "This is how I teach." Every time they are given something new, they need to critically assess their assumptions and approach—that is where the transformative learning occurs.

"Transformative learning causes an individual to "come to a new understanding of something that causes a fundamental reordering of the paradigmatic assumptions she holds and leads her to live in a fundamentally different way…Transformative learning and education entail a fundamental reordering of social relations and practices" (Brookfield, 2003, p. 142).

While our intention was to provide preservice teachers with more tools to support them in the classroom, what we found was that embedding the research course within their teacher preparation had the additional benefit of changing how they viewed their role as teacher. By expanding this perspective of the preservice teachers and enhancing their critical thinking, they were able to explore the classroom through the lens of a researcher. Using action research methods may be a serious consideration to transform learning the art of teaching our preservice teachers.

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