

## An Action Research on Developing Prospective Teachers' Inquiry Skills

Sitkiye Kuter

Faculty of Education, Eastern Mediterranean University, Northern Cyprus  
sitkiye.kuter@emu.edu.tr

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### Abstract

One of the ultimate aims of teacher education programs is to equip prospective teachers with the necessary professional skills and dispositions so that they can build and maintain a philosophy of teaching and learning that is constantly reviewed based on an understanding of research and practices. Developing student teachers' inquiry skills by engaging them in research is one of the indispensable parts of teacher education programs since it provides the basis of their ongoing professional development. The aim of this study is to examine how a process-oriented instructional design helps prospective teachers develop their inquiry skills in educational research methods course. The sample of the study consisted of all forty-two student teachers enrolled in the course in the Faculty of Education. The study adopted action research as a research methodology and gathered data using qualitative data collection instruments. A process research-based inquiry environment was designated to explore the factors influencing the developmental process of student teachers' inquiry skills. The credibility and objectivity of the study was ensured through inquiry audits and data triangulation. The analysis of multiple qualitative data sources provided invaluable findings as regards the factors having impact on student teachers' development of inquiry skills. It was found out that instructional process, collaboration and instructional scaffolding are integral in inquiry-based instruction. These elements were also considered to be influential on the development of student teachers' inquiry skills. The findings of the study revealed certain programmatic implications worthy of consideration.

**Keywords:** inquiry-based instruction; collaboration; scaffolding; instructional design

### 1. Introduction

*The teacher needs to be a researcher because of the nature of professional knowledge. When faith and know-how are put into partnership in educational practice, there is still a need for knowledge; and knowledge is created by research and is provisional (Stenhouse, 1983).*

One of the most noteworthy themes in teacher education agendas has been the emphasis on the conceptualization of pre-service teacher education programs to equip potential teachers with the essential skills and dispositions to be able to make inquiries to develop their own teaching practice and display on-going professional development (Ball & Cohen, 1999) and to help them act as change agents for successful school development (Day, 1999). Utmost importance was placed on teacher education curricula to improve prospective teachers' "intellectual and professional stance of inquiry" to enhance their professional growth in teacher education programs (Ball & Cohen, 1999) and to facilitate their acquisition of the skills to continue to look for answers to difficult problems of teaching and learning processes and the skills to learn from practice besides to learn for practice (Darling-Hammond, 2006). Teachers' construction of knowledge and development, as constructivists believe, is largely influenced and shaped by the interplay between individual and contextual parameters since it is a joint socially constructed meaning making process (Fox, 2001).

#### 1.1 Sociocultural learning theory

Sociocultural learning theory highlights the value of forming a community of learners (Kauchak & Eggen, 2003) and social interactions to assist learning. It also highlights the significance of cognitive, social and motivational factors of development (Woolfolk, Hughes & Walkup, 2008). Vygotsky believed that growth can be realized by observing directly the process of change in which collective dialogues, collaboration, cultural tools and language play central roles (Miller, 2011). In order for the experience to be transformed, one needs to be actively involved in knowledge creation process (Kohonen, 2001) which requires the incorporation of social negotiation and mediation from multiple perspectives and through dialogue (Sanrock, 2001). During co-construction of knowledge, information is made meaningful through

elaborations and the group dynamics, when formed successfully, promote motivation (Kauchak & Eggen, 2003). Also, for meaningful learning to occur, students need, first, a reason for learning; second, to engage in a set of learning activities that can help them achieve their learning goals; and third, proper scaffolding and other aids to help them derive targeted content and skills from their experiences (Lee & Kolodner, 2011, p. 6).

A number of studies in teacher education revealed the value of social interaction and collaboration (Parsons & Stephenson, 2005), the impact of teachers' feedback on pre-service teachers' readiness for teaching (Samaras & Gismondi, 1998), the power of collaboration with peers for teacher development (Warford, 2010), the importance of collaborative teacher education programs (Pugach & Blanton, 2009), teacher growth in a community of learners (Kaartinen, 2009).

## 1.2 Inquiry in teacher education

Education of teachers is a recursive process that depends on inquiry as a stance on the work of teacher education (Cochran-Smith, 2003, p. 21). Inquiry-based instruction is a student-centred pedagogy that uses purposeful extended investigations set in the context of real-life problems as both a means for increasing student capacities and as a feedback loop for increasing teachers' insights into student thought processes (Supovitz, Mayer & Kahle, 2000, p. 332). It is a collaborative process where knowledge is constructed being involved in problem-posing and problem-solving through a process of negotiation within the curriculum (Short, 2009). In literature, 'action research', 'practitioner inquiry' (Hall, 2009), 'teacher inquiry' (Cochran-Smith & Lytle, 1999), 'teacher research' (Cochran-Smith & Lytle, 1999; Berger, Boles & Troen, 2005) are used interchangeably to refer to the research conducted in education by teachers. Stenhouse, in process curriculum, gave emphasis on practitioner inquiry and development through being engaged in systematic inquiry and reflective dialogues (Scott, 2008). Involving prospective teachers in inquiry is critical for several reasons: first, it is an effective way to teach content, increase motivation, and help students develop their analytical thinking skills. It is particularly valuable for giving students practice in defining informational questions, gathering data to solve those questions, and developing their abilities to analyse and evaluate data (Kauchak & Eggen, 2003). Next, cultivating a stance toward inquiry helps potential teachers to be change agents for the future of the society. Promoting teachers' independent learning and involving them in active engagement in inquiry is decisive in reaching this purpose (Joyce & Weil, 1996). Besides, it facilitates strategies of inquiry and the values and attitudes central to an inquiry mind including: process skills, active autonomous learning, logical thinking, verbal expressiveness and so forth (Joyce & Weil, 1996).

A review of literature on inquiry-based instruction displayed a number of empirical research findings on the importance of systematic inquiry (Schulz & Mandzuk, 2005; Van der Linden, Bakx, Ros, Beijgaard & Vermeulen, 2012), providing sufficient inquiry-based learning experiences (Newman et al., 2004), the contribution to professional development (Schulz and Mandzuk, 2005; Pendry and Husbands, 2000), gaining research knowledge and skills (Schulz & Mandzuk, 2005; Sozibilir, 2007; Van der Linden et al., 2012), student teachers' developing understandings of scientific inquiry process (Haefner, 2004; Richardson and Liang, 2008), student teachers' getting motivated to do research (Sozibilir, 2007), involving student teachers in active and student-centred learning (Spronken-Smith, Bullard, Ray, Roberts, & Keiffer, 2008), the necessity of developing more collaborative research projects (Gittlin, Barlow, Burbank, Kauchak, & Stevens, 1999).

The review of literature also showed that a number of studies were conducted on the student teachers studying in the pre-service (Gittlin et al., 1999; Haefner, 2004; Joram, 2007; Newman et al., 2004; Richardson & Liang, 2008; Van der Linden et al., 2012) and elementary (Volkman, Abell & Zgagacz, 2005) and secondary science teacher education programs (Crawford, Zembal-Saul, Munford, & Friedrichsen, 2005) and with the student teachers studying history (Pendry and Husbands, 2000), geography (Spronken-Smith et al., 2008), chemistry and biology (Sozibilir, 2007), and science (Demir & Abell, 2010).

Neither investigation of teacher education programs nor examination of prospective teachers' inquiry skills at the undergraduate level has gained much attention in Northern Cyprus. In this regard, this study is believed to contribute to the existing literature since it aims to examine how senior student teachers in Guidance and Psychological Counselling program develop their research skills in a process-oriented inquiry learning context. The findings of this study could shed light upon the reconsideration and reconceptualization of the existing program regarding its focus on teacher development through inquiry.

## 2. Methodology

The overall agenda of the research design was grounded on the theoretical and methodological norms that substantiate the understanding of the socially constructed nature of reality (Denzin & Lincoln, 2003) through the lenses of participants in actual contexts.

### 2.1 Research design

The study adopted action research as a research methodology. Action research, conducted on curriculum development, teaching strategies and so forth, when 'integrated in initial teacher education programs facilitates continual professional and educational change (Mills, 2003). The whole process throughout the study aimed to uncover the factors influencing the developmental process of student teachers' inquiry skills.

In this regard, a process research-based inquiry environment was designated. The process first started with an orientation, given by a professional librarian, to familiarize students with online full text databases in English and Turkish. Since the medium of instruction of the course was Turkish and English language proficiency level of the student teachers was low, the librarian gave more emphasis on introducing the online databases in Turkish. Then the whole process continued with the lectures which led student teachers to write their 1<sup>st</sup> progress reports including introduction and literature sections of their papers, 2<sup>nd</sup> progress reports including the revised introduction and literature sections and the new methodology section, 3<sup>rd</sup> progress report including the revised introduction, literature and methodology sections and the new findings section. The process ended with the submissions of the synopsis of an article and the final reports which had been revised upon the previous feedback given by the instructor. All through the program, instructor's scaffolding was provided when student teachers needed.

### 2.2 The study context

The sample of the study consisted of all forty-two senior student teachers in the program taking Scientific Research Methodology course offered by the Department of Educational Sciences at the Faculty of Education. It is a three-hour course offered in Turkish language in the third year in the curriculum. The students taking this course formed their project groups voluntarily. There were six groups formed with five students and one group with six students, one group with four students and one group with two students, respectively. It was the first time that all these students were involved in scientific research.

The course under consideration aims to help student teachers develop a basic understanding of the nature of social science research within education including a thorough consideration of the qualitative and quantitative designs, methods and approaches of study used in research. As a part of the course, they were required to develop the skills required to design and conduct a small scale study using quantitative, qualitative and/or mixed methods.

Within this process, to help student teachers plan and conduct research, the methodology used is as follows: the participants were requested to form their groups that were required to plan and conduct an original mini inquiry on the topic they would agree. Their development and implementation of the research was guided via the weekly conferences held between the group members and the instructor. The major aim of these conferences was to help them reflect on their projects in light of the theories studied in the class.

### 2.3 Data collection and analysis

The study gathered data via students' autobiographical reflective writings and researcher's reflective diary. Throughout the program, participants were supposed to reflect upon their retrospective 'lived experiences' through autobiographies so as to be genuinely aware of their own inner world by connecting it to genuine experiences through inquiry (Jaatinen, 2001). Subjects wrote three autobiographies - one at the beginning, during and one at the end of the program. This would enable the researcher to see the whole inquiry process from student teachers' viewpoints. In each reflective report, subjects reflected upon what they learned or did not learn within the process, the instructional factors that affected their learning, and how these factors affected their learning. A total of 126 reflective reports were collected for the investigation of the issue under examination. The researcher's own reflections on the group performances and their learning helped her/him to see the whole picture from an educationalist lenses.

The qualitative data collected were analysed through content analysis, an approach to the analysis of documents

and texts laying emphasis on creating predetermined categories so as to promote the feasibility of the replication of the study (Bryman, 2001). During data analysis, first, raw data were organized giving numbers to groups (from 1 to 9) and letters (from A to F) to each member in each group. Then, raw data from three sources were organized around predetermined and emerged codes on matrices (Miles & Huberman, 1994). Next, the data processed were confirmed by two inquiry auditors (Lincoln & Guba, 1985). Finally data were verified through data triangulation

## 2.4 Trustworthiness

To ensure the objectivity and credibility of the data generated, the study integrated the phases of organizing the data, generating categories, themes and patterns, coding the data, testing the emergent understandings and searching for alternative (Marshall & Rossman, 1999). Dependability and confirmability of the data was ensured through inquiry audits (Lincoln & Guba, 1985). Triangulating the data helped for the credibility of the findings by uncovering aspects that the data show convergence and divergence (Lincoln & Guba, 1985; Miles & Huberman, 1994).

## 3. Findings

The analysis of multiple qualitative data sources provided invaluable findings as regards the factors facilitating student teachers' development of inquiry skills. The major finding was that the whole instructional process promoted prospective teachers' learning and growth in inquiry. Within the scope of the whole process, the findings displayed that the inquiry-based instructional design had great effect on participants' learning as regard the following aspects.

### 3.1 Students at the heart of learning process

The findings triangulated displayed that, almost all subjects, with two exceptions, were highly satisfied with both the instructional context that aimed to equip them with the essential elements to initiate and implement the research and the process-oriented nature of the instruction. Various aspects were reported influential on the student teachers' growth of inquiry skills.

Nearly all of the student teachers reported how the entire structure of the course, from the very beginning, helped them to develop their inquiry skills gradually with hands-on experiences, in an active, interactive and motivating environment.

Being involved in an active learning process was reported as motivating and encouraging since it helped one student teacher to get new ideas (6D) and another one to get long-lasting ideas (7D). One of the student teachers (1D) also highlighted that he became aware how they had been taught in the wrong way so far and stressed upon how his motivation and learning was promoted through being involved in discovery learning techniques. He said, "We have been generally taught through direct instruction, yet the techniques like brainstorming, question-answer, discussions, group works employed in this course helped us grow better." It is important to stress that one student teacher, at the end of his fourth year, realized that theory, without application, is incomplete and useless.

The course structured with an orientation at the very beginning of the course was considered very beneficial and constructive for the inquiry process student teachers were required to develop by almost half of the student teachers. One student teacher stated how the orientation at the university library promoted her motivation and eliminated her worry in searching databases. Another student teacher (5E) confessed that, notwithstanding her level at the university, she did not know how to search reliable sources on Internet. She also added, "I now know that I am going to graduate by being aware of making and citing quotations". One of the student teachers (4D) also reported, "I learned how to search and use articles from databases and comprehended how to use articles and make a reliable and substantial research". Another student teacher (3A) stressed, "I understood that I was unaware of the researching process so far. My major fault was that, without making preliminary researching on the topic, I used to use unreliable data sources for my reports". She also added that she did not have the habit of reading articles and theses. On the contrary, two student teachers complained about the orientation because, as for them, it did not help them much to search online databases in Turkish. Another two student teachers, reflecting upon their low level of English proficiency, reported their problems in searching articles from online full text databases in English.

Besides, a significant number of student teachers underlined that their inquiry skills developed through the process oriented nature of the course. One student teacher (6A) emphasized that the whole process encouraged her to find accurate and reliable sources during researching which was positive and productive. As a result, she understood that

scientific research worked gradually and in a systematic way. While step by step instructional planning and implementation was reported as having great impact on one student teacher learning (4F), it helped another student teacher (9B) to learn how to work in a disciplined way in the light of the feedback given. One student teacher (3A) stated that doing scientific research was like rings of a chain. Steps are interrelated and you need to follow each of them to learn better.

In addition to these, few student teachers remarked that their growth in researching was promoted due to being involved in higher order thinking processes, as one student teacher (4D) reflected, "we had to be in a state of reflection, questioning and researching. This made us not to embark on ready-made information but to employ self-developing practices through searching and citing articles and writing the report". It was also highlighted that the course encouraged student teachers' questioning skills through researching. One of the essential elements here was the participants' self-involvement throughout the process, which was considered more valuable than studying theory (4E).

### 3.2 *The role of instructional process on student teachers' growth*

Almost all of the participants stressed upon how scared they felt and how difficult they found the course at the very beginning of the course. The factors that minimized their fears and facilitated their learning are as follows.

First, that the course was designed upon progressive reports and step by step submission of assignments was considered invaluable by almost half of the participants. One participant (5B) underlined that there was a very good parallelism between the in-class lectures and the application of the theory through reports all of which contributed their research process and made it concrete. One student teacher (1E) reported how the progressive nature of the course helped her to learn by accumulating the whole from the pieces, while another student teacher (3C) stressed how valuable it was that they were assigned to conduct the project in phases.

Almost half of the subjects reflected on the process nature of the course and they remarked how it facilitated their development in planning and building up their research reports. Nearly half of the student teachers also appraised the impact of progress reports on their growth. One participant (2E) reported, "I see that I am developing in every single report. My mistakes are getting fewer and fewer and I am growing. I had never searched scientific articles and cited from articles and written references."

Furthermore, more than half of the student teachers underlined how the course instructor's exemplifications in lectures helped them to better comprehend the terminology and research process which, as a result, facilitated their researching process. "During lecture, the examples given from real life to elucidate the new terminology made the lectures clear in my mind", as stated by one student teacher (5B). Power point presentation slides were also found having significant impact on students' comprehension of subject matter by more than half of the participants. Regarding the value of the overall instructional process, one of the student teachers (6C) reported, "This course raised my self-awareness. It is really very good for a person to be conscious of his/her ability, interest and gains. After this course, I became aware of how to conduct an inquiry, how to set the research design and decide upon the nature of the study."

### 3.3 *The impact of instructional scaffolding on student teachers' growth*

One of the key findings was that a great majority of the subjects underlined how collaborative dialogues they were involved during the inquiry building process boosted their joint decision making in finalizing the projects. The central attention was on peer and teacher scaffolding.

#### 3.3.1 *Peer scaffolding*

During the program, intragroup dynamics were deemed to have both positive and negative impact on learning. The first point considered critical was peer feedback. While working collaboratively helped two student teachers (5C and 9B) to learn from their mistakes, which enhanced their motivation and successful completion of their work, it helped another student teacher (9B) to be aware of the importance of listening and showing respect to others. The value of group dynamics was highlighted by these participants since sharing the same or diverse views both nurtured the quality of the output they produced. Another subject (2E) stated that when each person in a group has different attitudes, beliefs and views, joint work is enriched.

Next, group cohesion was remarked as one of the aspects that influenced arriving at decisions. Almost all of the participants stressed upon the fact that they had unity among group members, which facilitated their planning and

conduction of the project. One of the student teachers (7B) reported that as a group they learned how each member contributed to the whole project. She also reflected on the value of taking responsibility since all group members inevitably contributed to each other's development in group work. One participant (5B) underlined how vital it was to move towards the target as a united group. However, it is noteworthy to underline that one fourth of the subjects complained about the irresponsible group members who inhibited building up their projects. It is also meaningful to indicate that while some student teachers underlined their happiness in forming their groups with the members they chose, nearly half of the subjects raised their problems as to the group size.

A great number of the student teachers reflected on the importance of personal and shared responsibility of the members in fulfilling the projects. One participant (5C) stated, "I believe that when our group members have self-responsibility, our team work will yield successful results. If all responsibility is laid upon one person and others dodge their responsibility, a chaos may be created." Therefore, the contribution that members make during working on an inquiry project was reported critical. Some participants attributed the success of their works to all group members' awareness of their responsibility during the inquiry. One of the student teachers (6D) touched upon how shared responsibility within the group had impact on her growth. On the contrary, some participants reflected upon how difficult people in groups gave lessons to others. One participant (3C) highlighted, "Collaboration is not confined to only projects at schools; it is lifetime. Therefore, despite the people that you cannot get along well in groups, they teach us how to reconcile diverse ideas and cope with difficult people within groups." The number of members in each group was considered having impact on the work produced. Especially it was highlighted by some groups that the more members in the group, the more problems emerge when gathering for the project. One of the student teachers (6B) complained about the difficulties they encountered to find common meeting time for all members to meet.

What is more, while nearly half of the participants stressed that peer collaboration increased their interest and motivation in planning and finalizing their project, a few of them reported that, working collaboratively, they developed responsibility. "That we did everything related to our project together with my peers boosted my motivation", was highlighted by one of the student teachers (5B). She added that learning is inhibited when you are not motivated.

### 3.3.2 Teacher scaffolding

Teacher scaffolding was underlined as a key feature promoting students' awareness as regards their own strengths and weaknesses in writing an inquiry report by a significant number of students. The value of teacher feedback was also underlined by one participant (4F), "I don't believe that such a project can be completed without teacher feedback." Another participant (6C) reported, "instead of copying and pasting, through teacher support, I learnt how to quote and cite from articles. During this process, I became aware of the fact that I was not aware of how to search and cite literature" Another participant (5D) highlighted, "it was not an easy process. We didn't proceed effortlessly. Without teacher feedback, I would complete it without being aware of what I was expected to learn. I just got the logic of inquiry." While one student teacher (4F) underlined the value of teacher written and spoken feedback, another student teacher emphasized,

"We all know the function of feedback on the quality of the output. I have heard it for years and written it in my assignments. But I really tasted how it feels like in this project. Apparently I learned that it is the raw material of learning. Teacher provides feedback, students use it and learning becomes permanent." (8B)

Almost all of the students wrote highly concerning the feedback they received from the teacher throughout the whole research building process. Nearly half of the student teachers regarded teacher scaffolding as a self-motivating factor within the research process, while a number of participants highlighted that they consolidated what they learned through teacher feedback. As one (9D) stated, "The teacher feedback is vital. I learned what my mistakes were, what I was supposed to revise, what route I should follow during my project."

## 4. Discussions and Recommendations

Professional development of teachers has been one of the most significant agendas for teacher education (Ball & Cohen, 1999). Schools have given substantial emphasis on assisting teacher-initiated research as a way of professional development (Little, 1999). In this regard, this study attempted to scrutinize how a process-oriented instructional design influenced prospective teachers' inquiry skills within an action research agenda.

The overall findings exhibited that the instructional and learning processes, collaboration, guidance, and instructional scaffolding had prominent role on student teachers' development of inquiry skills. Incorporating student

teachers in a learner-centred environment where they would be cognitively and socially active and interactive was considered one of the foundational elements of instructional design in promoting student teachers' research skills. Students can greatly benefit from inquiry based learning. When they are active in the learning process, they can have improved understanding, more enjoyable learning, a greater sense of achievement and improved preparation for lifelong learning (Spronken-Smith et al., 2008). The orientation helped most of the student teachers develop their skills in reaching scholarly articles from online full text databases in Turkish. However, due to student teachers' low level of English proficiency, most of them could not benefit from the online databases in English. Research becomes invaluable when it is linked to both theory and practice (Gitlin et al., 1999). With regard to the instructional process, the process-oriented nature of the course contributed to the participants' growth of inquiry skills and, within this process, the instructor giving exemplifications from real life supported the student teachers' development. Finally, the student teachers' collaborative dialogues with their peers and instructor supported their growth in inquiry. In line with this finding, Parsons and Stephenson (2005) highlight the importance of collaboration. Assisted learning is critical to scaffold learning (Woolfolk et al., 2008). Feedback as the dialogue between individuals for correction may lead to internalized self-regulation (Samaras & Gismondi, 1998). While intragroup dynamics, group cohesion and personal and shared responsibility were considered as the elements critical for promoting student teachers' inquiry skills, interest and motivation for research, teacher scaffolding was regarded as indispensable within the inquiry-based instructional process. For development, besides co participation, cooperative learning and joint discovery of knowledge (John-Steiner & Mahn, 1996), sociocultural theory highlights the significance of cognitive, social and motivational factors for development (Woolfolk et al., 2008). The role of the teacher can be conceptualized as that of facilitator of student learning through dialogue and collaboration (Kaartinen, 2009, p. 613). The teacher educator could keep track of the progress of the group, especially on their elaboration and decision making processes (Dobber et al., 2012).

In conclusion, in light of findings, it could be said that 'unless professional development and pre-service teacher development programs include learning and practicing the appropriate scaffolding strategies, then implementation of inquiry is unlikely to succeed' (Volkman et al., 2005, p. 867). The findings revealed that a process-oriented inquiry based instruction enhanced the professional development of student teachers' inquiry skills. Due to the nature of action research, this study was only limited to the development of inquiry skills of the senior student teachers in Guidance and Psychological Counselling program. In this respect, researchers and curriculum designers should be encouraged to conduct subsequent empirical studies to explore how process oriented instructional design enhances student teachers' development of inquiry skills by involving other student teachers in other disciplines and incorporating multiple data collection instruments. Such research agenda can provide valuable insights into the contribution of this process-oriented instructional design on student teachers' development of inquiry skills and its shortcomings.

## References

- Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Towards a practice-based theory of professional education. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession* (pp. 376-411). San Francisco: Jossey-Bass Inc.
- Berger, J. G., Boles, K. C., & Troen, V. (2005). Teacher research and school change: Paradoxes, problems, and possibilities. *Teaching and Teacher Education*, 21(1), 93-105.
- Bryman, A. (2001). *Social research methods*. USA: Oxford University Press.
- Cochran-Smith, M. (2003). Learning and unlearning: The education of teacher educators. *Teaching and Teacher Education*, 19(1), 5-28.
- Cochran-Smith, M., & Lytle, S. (1999). The teacher research movement: A decade later. *Educational Researcher*, 28(7), 15-25.
- Crawford, B. A., Zembal-Saul, C., Munford, D., & Friedrichsen, P. (2005). Confronting prospective teachers' ideas of evolution and scientific inquiry using technology and inquiry-based tasks. *Journal of Research in Science Teaching*, 42(6), 613-637.
- Darling-Hammond, L., & McLaughlin, M. W. (1999). Investing in teaching as a learning profession. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession* (pp. 376-411). San Francisco: Jossey-Bass Inc.
- Day, C. (1999). *Developing teachers: The challenge of lifelong learning*. Great Britain: Falmer Press.
- Demir, A., & Abell, S. K. (2010). Views of inquiry: mismatches between views of science education faculty and students of alternative certification program. *Journal of Research in Science Teaching*, 47(6), 716-741.
- Denzin, N. K., & Lincoln, Y. S. (2003). *Collecting and interpreting qualitative materials*. London: SAGE.
- Dobber, M., Akkerman, S. F., Verloop, N., & Vermunt, J. D. (2012). Student teachers' collaborative research: Small-scale research projects during teacher education. *Teaching and Teacher Education*, 28(4), 609-617.
- Fox, R. (2001). Constructivist examined. *Oxford Review of Education*, 27(1), 23-35.
- Gitlin, A., Barlow, L., Burbank, M. D., Kauchak, D., & Stevens, T. (1999). Pre-service teachers' thinking on research: Implications for inquiry oriented teacher education. *Teaching and Teacher Education*, 15(7), 753-769.
- Jaatinen, R. (2001). Autobiographical knowledge in foreign language education and teacher development. In V. Kohonen, R. Jaatinen,

- P. Kaikkonen & J. Lehtovaara (Eds.), *Experiential learning in foreign education* (pp.106-140). England: Longman.
- John-Steiner, V., & Mahn, H. (1996). Sociocultural Approaches to Learning and Development: A Vygotskian Framework. *Educational Psychologist*, 31(3/4), 191-206.
- Joyce, B., & Weil. M. (1996). *Models of teaching* (5<sup>th</sup> ed). Needham Heights, MA: Allyn and Bacon.
- Haefner, L. A. (2004). Learning by doing? Prospective elementary teachers' developing understanding of scientific inquiry and science teaching and learning. *International Journal of Science Education*, 26(13), 1653-1674.
- Hall, E. (2009). Engaging in and engaging with research: Teacher inquiry and development. *Teachers and Teaching: Theory and Practice*, 15(6), 669-181.
- Joram, E. (2007). Clashing epistemologies: Aspiring teachers', practising teachers', and professors' beliefs about knowledge and research in education. *Teaching and Teacher Education*, 23(2), 123-135.
- Kaartinen, S. (2009). Meaningfulness via participation: sociocultural practices for teacher learning and development. *Teachers and Teaching: Theory and Practice*, 15(5), 601-616.
- Kauchak, D. P., & Eggen, P. D. (2003). *Learning and teaching research-based methods* (4<sup>th</sup> ed.). Boston: Allyn & Bacon.
- Kohonen, V. (2001). Towards experiential foreign language education. In V. Kohonen, R. Jaatinen, P. Kaikkonen, & J. Lehtovaara (Eds.), *Experiential learning in foreign education* (pp. 8-60). England: Longman.
- Lee, C.-S., & Kolodner, J. L. (2011). Scaffolding Students' Development of Creative Design Skills: A Curriculum Reference Model. *Educational Technology & Society*, 14(1), 3-15.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. USA: Sage Publications.
- Little, J. W. (1999). Organizing schools for teacher learning. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession* (pp. 233-262). San Francisco: Jossey-Bass Inc.
- Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research* (3<sup>rd</sup> Ed). USA: Sage Publications Inc.
- Miles, M. B., & Huberman, A. M. (1994). *An expanded sourcebook: Qualitative data analysis*. 2<sup>nd</sup> Edition. London: SAGE publication.
- Mills, G. E. (2003). *Action research: A guide for the teacher researcher* (2<sup>nd</sup> ed.). New Jersey: Merrill Prentice Hall Publishers.
- Newman, W. J. Jr., Abell, S. K., Hubbard, P. D., McDonald, J., Otaala, J., & Martini, M. (2004). Dilemmas of teaching in elementary science methods. *Journal of Science Teacher Education*, 15(4), 257-279.
- Parsons, M., & Stephenson M. (2005). Developing reflective practice in student teachers: Collaboration and critical partnerships. *Teachers and Teaching: Theory and Practice*, 11(1), 95-116.
- Pendry, A., & Husbands, C. (2000). Research and practice in history teacher education. *Cambridge Journal of Education*, 30(3), 321-334.
- Pugach, M. C., & Blanton, L. P. (2009). A framework for conducting research on collaborative teacher education. *Teaching and Teacher Education*, 25(4), 575-582.
- Richardson, G. M., & Liang, L. L. (2008). The use of inquiry in the development of preservice teacher efficacy in mathematics and science. *Journal of Elementary Science Education*, 20(1), 1-16.
- Samaras, A. P., & Gismondi, S. (1998). Scaffolds in the field: Vygotskian interpretation in a teacher education program. *Teaching and Teacher Education*, 14(7), 715-733.
- Santrock, J. W. (2001). *Educational psychology*. USA: McGraw-Hill Inc.
- Schulz, R., & Mandzuk, D. (2005). Learning to teach, learning to inquire: A 3-year study of teacher candidates' experiences. *Teaching and Teacher Education*, 21(3), 315-331.
- Scott, D. (2008). *Critical essays on major curriculum theorists*. London: Routledge.
- Short, K. G. (2009). Inquiry as a stance on curriculum. In S. Davidson & S. Carber (Eds.), *Taking the PYP forward: The future of the IB primary year's program* (pp. 11-26). Woodbridge, UK: John Catt Educational Ltd.
- Sozibilir, M. (2007). First steps in educational research: the views of Turkish chemistry and biology student teachers. *European Journal of Teacher Education*, 30(1), 41-61.
- Spronken-Smith, R., Bullard, J., Ray, W., Roberts, C., & Keiffer, A. (2008). Where might sand dunes be on Mars? Engaging students through inquiry-based learning in geography. *Journal of Geography in Higher Education*, 32(1), 71-86.
- Supovitz, J. A., Mayer, D. P., & Kahle, J. P. (2000). Promoting inquiry-based instructional practice: The longitudinal impact of professional development in the context of systemic reform. *Educational Policy*, 14(3), 331-356.
- Van der Linden, W., Bakx, A., Ros, A., Beijaard, D., & Vermeulen, M. (2012). Student teachers' development of a positive attitude towards research and research knowledge and skills. *European Journal of Teacher Education*, 35(4), 401-419.
- Volkman, M. J., Abell, S. K., & Zgagacz, M. (2005). The challenges of teaching physics to preservice elementary teachers: Orientations of the professor, teaching assistant, and students. *Science Education*, 89(5), 847-869.
- Warford, M. K. (2011). The zone of proximal teacher development. *Teaching and Teacher Education*, 27(2), 252-258.
- Woolfolk, A., Hughes, M., & Walkup, V. (2008). *Psychology in education*. London: Pearson Longman.