

D-RASATI



Best Practices in Teacher Professional Development:

A Literature Review

Final Draft

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Best Practices in Teacher Professional Development: A Literature Review

Final Draft

Executive Summary

This review is presented in the context of the D-RASATI project to improve the Lebanese educational system through the provision of Teacher Professional Development (TPD) support to public school teachers with focus on the school subjects of English, Mathematics, and Science.

The main purpose of this literature review is to describe the best practices in professional development and derive lessons that can be used to design effective and efficient professional development for teachers in Lebanon. The review compares traditional and new approaches to professional development, highlights the characteristics of effective professional development with emphasis on bridging the gap between theory and practice, and describes models of professional development in different subject areas. Finally, recommendations are provided based on the review and analysis.

Teachers and the quality of their teaching have always been considered critical components of education systems. Studies highlight the fact that student performance improves if the quality of teaching is improved. Consequently, teachers should be given opportunities for continual professional development in order to improve the quality of their teaching.

Many innovative and creative teacher professional development programs are producing more successful teachers than ever before. Such programs incorporate a deep understanding of content and how to teach it, a strong appreciation of the role of culture and context in child development and learning, and an insistence on collaborative work and ongoing assessment of teaching to promote learning for all students. Schools can become good places for teaching and learning if teachers are provided with enough time for collaboration, collective planning, peer observation and coaching, developing curriculum and assessments, and jointly examining student work.

The research literature in education suggests that effective teacher professional development, unlike training in other fields, should include ongoing workshops, follow-up, study groups, reflection, observations, and assessment in order to be effective. Effective teacher professional development is also characterized by being highly applied, practice oriented, and iterative. It should also address teachers' and students' needs, focus on student learning outcomes, model learner-centered instruction, use formative and summative evaluation, and be long-term, on-going, sequenced, cumulative, and technology-based. More specifically, professional development programs for teachers of math and science should focus on both content knowledge in the math and science subject areas, as well as training and follow-up on pedagogical content knowledge.

Most experts in the field support moving away from an in-service training model, where teachers are expected to learn a clearly defined body of skills through a well specified process, often delivered in one shot workshops or courses taught away from the school premises. New approaches to professional development focus on collaboration between teachers (i.e. through communities of practice) which has proven to have positive effects on teachers' instructional strategies and students' learning.

In light of the best practices highlighted above, it is recommended that a teacher professional development program for Lebanon be content-focused, and linked to classroom practice. The structure of the program should be collaborative, school-based and continuous.

Preamble

During the past two decades, Lebanon has continued to face the ongoing challenge of building its post-war infrastructure in the various domains of national life, including reforming its educational system. In 1989, the Lebanese Parliament signed the Taif Accord which ended the Civil War (1975-1989) and paved the way for initiating an educational reform in order to address the problems caused and/or aggravated by civil strife. These problems included a pressing need to address the challenges of national discord, out-dated curricula, low standards, and a surplus of unqualified and demoralized teachers and administrators. It was also urgent to provide quality schooling for a growing population of school age children, build new schools, renovate destroyed ones, establish more balance between formal and vocational education, and achieve better coordination between pre-college and college education (BouJaoude & Ghaith, 2006).

In 1994, the Lebanese government launched the first major post war effort to improve the educational system by adopting a new plan for educational reform that aimed at revamping the system and improving standards through introducing new curricula in order to equip students with the skills and competencies of modern education, and to instill the values of national unity, tolerance, democracy, anti-violence, respect for diversity, and openness to other cultures. The outcomes of these initial reforms have resulted thus far in 1) a new framework for basic and secondary education (1995), 2) a new curricula and textbooks (1996-1999) for all school subjects, and 3) the implementation of a series of teacher-training programs and workshop sessions that have continued to the present and have reached all public as well as a considerable number private school teachers and administrators. New course syllabi, teacher training guides, and evaluation manuals for all grade levels and subject areas have also been developed and disseminated to teachers. In addition, the Center for Educational Research and Development, CERD, has collaborated with the French Cultural Center in Lebanon on an initiative to improve the overall French language proficiency and pedagogical preparation of teachers and trainers through the provision of high-intensity instruction in language and pedagogy.

In order to build on these efforts, the Ministry of Education and Higher Education (MEHE) developed a National Education Strategy in 2009 which identified priorities for the next phase of reform. Based on these priorities MEHE then developed the Education Sector Development Plan which includes 10 programs focused on improving the Lebanese educational system and providing all students with a high quality education which is aligned with national and international standards. The Education Sector Development Plan was ratified by the council of Ministers on April 22, 2010. In recognition of the critical link between effective teaching and improved student achievement one of the priority programs in the plan is entitled Professionalization of Teaching Workforce whose objective is to “improve and upgrade the quality of teaching and learning in Lebanese schools through:

- (i) developing a national system of professional standards for teachers and other types of educational staff,
- (ii) developing a comprehensive policy and strategic framework for teacher professional development, deployment, utilization and career development;
- (iii) creating a new model of Teacher Professional Development (TPD) to improve teaching quality; this comprises Initial Professional Development (pre-service teacher education and induction programs) as well as Continuous Professional Development (CPD)
- (iv) improving teacher utilization mechanisms in Lebanese public schools; and

(v) improving current incentives to teachers in correlation with CPD, career development and advancement as well as more effective teacher deployment and utilization policies.” (Ministry of Education and Higher Education [MEHE], 2011, p. 16).

In addition to the above this subcomponent includes activities related to modernization of school management and curriculum development to insure “alignment of curriculum and learning resources with national needs and international trends” (MEHE, 2011, p. 24).

Though these renewed reform efforts are being undertaken in Lebanon, a country which is still in transition and in which the lack of political consensus and other considerations can impede the desired pace of change, renewed directions have been set and progress is evident. This review is presented in the context of the D-RASATI Project which supports improving the quality of public school education in Lebanon with a focus on strengthening the capacity of MEHE/CERD to provide effective Teacher Professional Development (TPD)

Introduction

Teachers and the quality of their teaching are recognized as critical components of any education system. Studies highlight the fact that student performance improves if the quality of teaching is improved (Seferoglu, 2010). Moreover, studies have consistently shown that teachers who are not well equipped with knowledge about how children learn, and how to address students’ needs, rely primarily on rote methods of learning. Furthermore these teachers are less skilled at managing complex forms of instruction that aim at deeper understanding. They are also less capable of identifying children’s learning styles and needs (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). This combination of understanding and skills is even more critical in science and math classrooms where addressing students’ misconceptions and unproductive learning and problem solving strategies requires that teachers identify these misconceptions and unproductive strategies, address them directly, and provide students with higher-order thinking skills that help them avoid these problems in the future.

A growing body of literature has investigated the professional development of teachers in many different ways. At the core of such endeavors is the understanding that professional development is about teacher learning, learning how to learn, and transforming teachers’ knowledge into practice for the benefit of their students’ growth. Studies reveal that teachers’ professional development has a strong influence on practice when it focuses on enhancing teachers’ pedagogical content knowledge and knowledge of their students’ skills and conceptual understanding (Wei et al., 2009).

Many innovative and creative teacher education programs are producing more successful teachers than ever before. Such programs incorporate a deep understanding of content and how to teach it, a strong appreciation of the role of culture and context in child development and learning, and an insistence on collaborative work and ongoing assessment of teaching to promote learning for all students. This marks a shift from behaviorist approaches which view teaching as the implementation of set routines which do not necessarily lead to student success. Schools can become good places for teaching and learning if teachers are provided with enough time for collaboration, collective planning, lesson study, peer coaching, developing curriculum and assessments, and jointly examining student work (Wei et al., 2009). Supporting the continual professional development of

teachers is essential for improving the quality of teachers and teaching, and as a result increasing the learning achievement of students (Seferoglu, 2010).

Professional development of teachers is a complex process as it requires teachers to be emotionally and cognitively involved individually and collaboratively, and to be willing to examine their beliefs and enact change in their practices. Formal structures such as in-service training and workshops may serve some of the aforementioned requirements while involvement in the production of curricula, discussions among peers, analysis of assessment data and student work, and sharing of instructional strategies serve others. Thus, there is a constant need to study, experiment, discuss, and reflect on the effect of traditional and alternative forms of professional development on learning and teaching, the expectations of the education system, and the educational needs of students when thinking about teacher professional development (Avalos, 2011).

The purpose of this literature review is to describe widely accepted best practices in professional development and derive lessons that can be used to design effective and efficient professional development for teachers in Lebanon. The review compares traditional and new approaches to professional development, highlights the characteristics, content and structure of effective professional development with emphasis on bridging the gap between theory and practice, and describes models of professional development in different subject areas.

Traditional Versus New Approaches to Professional Development

Stein et al. (1999) provided a concise overview of the contrasts between traditional in-service staff development and new models of professional development. Regarding traditional in-service approaches, they wrote, “these forms of professional development were designed to support a paradigm of teaching and learning in which students’ roles consisted of practicing and memorizing straightforward facts and skills, and teachers’ roles consisted of demonstrating procedures, assigning tasks, and grading students” (p. 238). By contrast, “The new paradigm for professional development represents a clear departure from the use of workshops to teach techniques toward the use of multiple professional development strategies to build teacher capacity to understand subject matter, pedagogy, and student thinking” (p. 26). Table 1 (adapted from Borko, Jacobs, Koellner, 2010) presents Stein, Smith, and Silver’s summary of the contrast between traditional and new approaches to professional development.

Table 1
Characteristics of Old versus New Paradigms to Professional Development.

	Traditional in-service staff development	New model of professional development
Strategies	Focus on activities (techniques, ideas, and materials) Dominant formats are workshops, courses, and seminars	Focus on building capacity to understand subject matter and guide students' development of concepts Uses a variety of formats including the provision of in class support and scaffolding of teacher participation in practice-related efforts (i.e. grade – level meetings, after school meetings)
Knowledge and beliefs	Short duration with bounded personal commitments Teacher educator sets the agenda Theories of teacher learning based on the psychology of the individual Translation of new knowledge to classroom is a problem to be solved (usually by the teacher)	Longer duration with more open ended personal commitments Iterative co-construction of agenda by teachers and professional developer over time Theories of learning that include social and organizational factors Challenge is to scaffold teacher learning that is both immediately relevant to practice and builds a more generalized knowledge base
Context	Particularities of context not factored into staff development Takes place away from schools, classrooms, and students	Particularities of context play an important role in shaping professional development Takes place in a variety of locations, at least some of which occur in schools and classrooms
Critical Issues	Focus is on developing the teacher (teachers participate as individuals) Leadership training not an issue	Focus is on developing the instructional program and the community in addition to the teacher (teachers participate as an organizationally cohesive unit) Leadership training is a big issue

Adapted from Stein, M.K., Smith, M.S., and Silver, E.A. (1999). The development of professional developers: Learning to assist teachers in new settings in new ways. *Harvard Educational Review*, 69 (3), 237-269.

Characteristics of Effective Teacher Professional Development

Characteristics of effective teacher professional development have been described by experts in the field of education like Darling-Hammond and MacLaughlin (1995) and Loucks-Horsley et al. (1998). More recently, large scale surveys have aimed at identifying the factors that render professional development effective. Garet et al. (2001) conducted a study that involved 1,027 teachers in the USA and reported six characteristics of effective math and science professional development programs. Penuel et al. (2007) surveyed 454 teachers to determine characteristics of professional development that affect teacher knowledge and implementation. These experts and surveys have identified common features of effective professional development that include 1) engaging participants in inquiry-based learning, modeling teaching strategies, 2) connecting professional development to classroom work, and 3) the continuity of the professional development activity. Furthermore, these studies reveal other important characteristics of professional development for science and math teachers such as focusing on science content knowledge and also the importance of integrating activities with what teachers do in the classroom. The characteristics identified by Capps and Barbara (2009), Darling-Hammond and MacLaughlin (1995), Garet et al. (2001), Loucks-Horsley et al. (1998), Penuel et al., (2007) are presented in Table 2 which is an adaptation of table developed by Capps and Barbara (2009).

Table 2

Summary of Characteristics of Effective Teacher Professional Development

Darling-Hammond and MacLaughlin (1995)	Loucks-Horsley et al. (1998)	Garet et al. (2001)	Penuel et al. (2007)
- Engages teachers in concrete tasks of teaching, assessment, observation, and reflection - Engages participants in inquiry, reflection and experimentation - Promotes a collaboration between participants and professional developers - Connects or is coherent with classroom work - Sustaining and continuous support - Connects to other aspects of school change	- Emphasizes inquiry-based learning, investigations, and problem solving - Helps build pedagogical skills and content knowledge - Models the strategies teachers will use with their students - Builds learning communities where continued learning is valued - Supports teachers in leadership roles - Links to the educational system. (Reform initiatives, curriculum, etc.) - Changes to ensure positive impact	- Focuses on content knowledge - Provides opportunities for active learning - Coherency with other activities - Diverse forms of activity (workshop, study group) - Collective participation of teachers from same school - Duration of activity is extended	- Discusses alignment with local, state, and national standards - Engages teachers in aligning activities with standards - Emphasizes content of particular curriculum during professional development - Ongoing, coherent professional development - Reform-based professional development

In their turn, Borko, Jacobs, and Koellner (2010) focused on the characteristics of professional development related to 1) the content of effective teacher professional development, and 2) the process and structure of high quality professional development. These are detailed below.

Content

Two features stand out as content characteristics of effective professional development:

- 1) Content should be ‘situated in practice’, and
- 2) Content should be focused on students’ learning.

Situating the content of teacher professional development in the practice of teaching renders teachers’ learning relevant to their classroom practice. Specifically, effective professional development engages teachers in inquiry about assessment, observation, the concrete tasks of teaching and reflection, and provides them with the opportunity to link their learning and classroom instruction (Borko, Jacobs & Koellner, 2010). Studies on effective teacher professional development illustrate the importance of sustained, content- focused professional development for changing practice in ways that improve student learning.

Additionally, students’ thinking and learning are other crucial components of effective teacher professional development (Borko, Jacobs & Koellner, 2010). Indeed, effective professional development activities help teachers to learn how to analyze and interpret students’ ideas, examine student work, evaluate student assessment results, anticipate students’ misunderstandings and misconceptions, and improve their instructional practices based on what they have learned.

Process and Structure

The following features related to the process and structure of teacher profession development stand out in the literature review:

1. Modeling desired instructional practices
2. Engaging teachers in active learning
3. Continuity through learning communities
4. Link to broader school reform efforts

With regard to process and structure, effective teacher professional development models preferred instructional strategies, engages teachers in active learning, and builds professional learning communities. When effective instructional strategies are modeled during professional development, teachers are given the opportunity to experience these strategies as learners, and then reflect on their learning and on the effectiveness of the strategies thus making these experiences more meaningful and likely to influence practice (Saxe, Gearheart, & Nasir, 2001). For instance, professional development models with a cyclical approach might engage teachers in developing and enacting a lesson plan designed to meet the needs of all students, and then encouraging them to individually and collaboratively reflect on their experiences. Professional development activities that give teachers the opportunity for such professional inquiry support on-going learning and encourage change.

In addition, effective professional development takes into consideration teacher input regarding what and how they will learn as well as their choice regarding learning pace and direction,. It also engages teachers in learning opportunities that are job-embedded, instructionally focused, collaborative, and on-going once support for teacher commitment and

intrinsic motivation is established. In summary, effective professional development should consist of activities that are continuing and sustainable over time, and that provide the opportunity for teachers to engage in cycles of experimentation and reflection in collaborative communities of practice (Hunzicker, 2010)

Effective professional development for teachers is on-going, which involves a combination of contact hours, duration, and coherence. Reform- style professional development activities, such as study groups, mentoring relationships, and task forces that require active, collaborative participation over time have been found to be particularly effective (Lieberman & Pointer Mace, 2008; Porter et al., 2003). Even traditional forms of professional development such as workshops and in- service training have a positive effect on teaching practice and student learning outcomes when they engage teachers for many hours (Quick et al., 2009).

Closely related to number of contact hours is the duration of professional development. This is because teachers often need several months or even years for transition from personal concerns about a new innovation to planning, implementation, and management concerns aimed at addressing student needs.

Professional Development and School Reform

With regard to the structural characteristics of professional development, effective professional development is coherent and on-going , it is school-based and integrated with other aspects of school change (Borko, Jacobs, & Koellner, 2010). Thus, effective professional development must be a coherent part of school reform efforts (Wei et al., 2009). According to Wei et al. (2009, p. 14)“ for substantial change to occur, curriculum, assessment, standards, and professional learning should be seamlessly linked in order to avoid disjuncture between what teachers learn in professional development and what they are able to implement in their classrooms and schools”. Effective professional development is coherent because it is connected to clear goals such as school improvement plans or state learning standards. Moreover, according to Hunzicker (2010), effective professional development supports teacher motivation and commitment to the learning process. The needs of individuals are combined with those of school or district goals in effective professional development activities, and learners from all levels are engaged, including teachers, professionals, and administrators. When teachers’ varying professional development experiences are related to each other as well to school goals or state learning standards, teachers are able to see the big picture. This causes teachers to perceive their learning experiences as more valuable, which makes them more likely to change their teaching practice to positively influence student outcomes.

Research on Effective Professional Development in Practice: Link to Student Achievement

Empirical evidence on the effectiveness of professional development and the link to student achievement is quite limited. As Knapp (2003) cautioned, “The actual benefits of the asserted attribute of good professional development have rarely been examined systematically, either separately or in combination” (p. 120). Most of the research

investigates the relationship between effective professional development and changes in teachers' knowledge and instructional practices. Few research programs have explored the links between teacher learning, classroom practices, and student achievement. Nevertheless, the studies in this limited body of literature are widely read and cited, and have been a motivating force as educational practitioners and policymakers push for improved professional development opportunities. These studies place particular emphasis on the importance of ongoing efforts to build teachers' pedagogical content knowledge in order to change practice and thus improve student learning.. Highlights of the research are presented below.

First, Saxe, Gearheart, and Nasir (2001) found that student achievement improved most when teachers were engaged in sustained, collaborative professional development that specifically focused on deepening teachers' content knowledge and instructional practices. The three teacher-learning opportunities they reviewed included: traditional professional development workshops, a professional community- based activity which offered support to teachers using new curriculum units, and the Integrated Math Assessment (IMA) approach which directly engaged teachers in learning the math in the new curriculum as well as facilitating discussion around pedagogical content knowledge necessary to teach the units. The researchers found that students whose teachers participated in the IMA program showed the greatest gains in conceptual understanding.

Next, Cohen and Hill (2001) describe two active learning approaches that proved successful in California's statewide math reform effort. During this reform period , new curriculum and assessment approaches were developed based on the framework established by the National Council of Teachers of Math (NCTM). Elementary teachers and students were required to understand complex concepts of math. The first professional learning activity was organized around new curriculum units developed to teach the new state standards. Teachers taught the units and debriefed their experiences with other teachers and prepared for subsequent units. Teachers who attended these workshops over time reported more reform- oriented practices in their classrooms, and their schools showed larger gains in achievement.

Finally, Yoon et al. (2007) analyzed the findings from over 1,300 studies and evaluation reports addressing the impact of professional development on student learning, and identified only nine studies using control groups with pre- and post-test designs that could evaluate impacts on student achievement. The review of these nine studies concluded that sustained and intensive professional development was related to student achievement gains.

To summarize, though limited, the research described above shows that professional development activities which are focused on improving teachers' pedagogical content knowledge help teachers to improve their instructional practices and, as a consequence, improve student achievement.

Models of Professional Development

The literature includes descriptions of a number of teacher professional development models that have been implemented in various educational contexts. These models include: Standardized Teacher professional development; Site-Based Teacher professional development, Self-Directed Teacher professional development, and school based collaborative approaches. Some of these models of professional development are described below.

Standardized Teacher Professional Development

Jovanova-Mitkovska (2010) defines standardized teacher professional development as a “centralized approach that involves the participants in sharing skills and knowledge with a larger group of educators, face to face or via multimedia. Often applied to dissemination of results and skills of other teachers...” (p. 2923) this model employs a centralized approach where one or two teachers at a certain school are selected to participate in centralized workshops about certain topics. These teachers then return to their school to share their information with their colleagues. The implementers of this model usually share skills and knowledge with large groups of educators through face to face interaction, broadcast or online means. If implemented properly, the model is useful to:

1. Expose teachers to new ideas and new colleagues.
2. Disseminate knowledge and instructional methods to teachers in other countries or districts of a country.
3. Show commitment to take action.

It should be mentioned that workshops associated with standardized teacher professional development may only enhance teacher’s awareness about new teaching methods and instructional practices or new curricula but, without further follow-up and support such training will not usually result in effective changes in teaching and learning.

Site-Based Teacher Professional Development

According to Jovanova-Mitkovska (2010), site-based teacher professional development “involves learning extensively by teachers in the school or region, aimed at long term changes in instructional methods. These approaches are often implemented in schools, resource centers or other training centers. Teachers working with facilitators or master teachers with the intention of acquiring a higher level in the development of their technological skills, as facilitators, instructors, are directed towards the contents of curricula, achievements, performance and technology” (p. 2923).

This model engages a group of teachers in a school or region in intensive learning and aims at enhancing profound and long-term changes in instructional methods and practices. Master teachers or facilitators work with teacher trainees focusing on specific situational problems which individual teachers might encounter. This model 1) brings people together to address local needs over a period of time, 2) encourages individual initiative and collaborative approaches to find solutions for problems, 3) allows more sustained and intensive learning, and 4) provides continuous opportunities for professional learning among a single set of teachers.

Site-based teacher professional development is most adequate as a follow-up on standardized teacher professional development or when the goals are to change instructional practices, enhance teacher’s subject knowledge and achieve ongoing excellence in teaching and learning. It is also beneficial if a core group of teachers from each school are able to participate in professional development, technology is used in professional development, and facilitators and master teachers are identified regionally to work with teachers.

Despite the strengths of on-site training in building communities of practice to address local needs and build local expertise, there are several limitations involved in this form of

training relative to time intensity, difficulty to provide expertise, recurrent expenditures, creating training materials, and transportation (Jovanova-Mitkovska, 2010).

Self-Directed Teacher Professional Development

Jovanova-Mitkovska (2010) defines self-directed teacher professional development as the independence of learning, sometimes initiated by the individual who uses available resources which may include computers and the Internet. This form of development also means placing emphasis on teachers' personal goals as well as selecting activities that will enable them to realize their set goals. It involves seeing examples of teaching and learning in the classroom, reading professional literature, case studies, on line courses, or visits to classrooms of other colleagues.

Similarly, Mushayikwa and Lubben (2009) define self-directed professional development as "the professional development arising from the teachers' own initiative, i.e., the process is internally determined and initiated" (p. 2). In this model, teachers specify their own professional development needs and select activities that will help them attain these goals. The techniques used in this form of teacher professional development include: Watching videos with examples of best practices, reading books, keeping journals, performing case studies, taking online courses, and observing classes taught by colleagues. Advice from experienced colleagues may also be considered as a form of self-directed teacher professional development. This model of professional development may also take various forms such as when master teachers provide feedback to young teachers, or when a team observes best practice video lessons and discusses and reflects on them. According to this model, the primary responsibility for training is the teacher's. As such, this form of training may require little of the school, but may not be beneficial for teachers with basic and intermediate skills.

According to Muhayiwka and Lubben (2009), teachers are driven by seven main concerns when engaging in self- directed professional development. These are:

- 1) Professional identity
This emerged partly as a concern for professional well-being (i.e. self-esteem, self-respect, self-confidence) and partly for professional recognition (i.e. commanding respect, trust and credibility from students, colleagues and society).
- 2) Career development (i.e. keeping up-to- date with developments in their teaching subject, getting support for life-long learning, and routes to higher qualifications and job changes).
- 3) Subject content knowledge. This emerged in cases where the school curriculum changed, or where teachers felt the need to extend their repertoire of content applications.
- 4) Practical knowledge and professional skills such as the acquisition of teaching resources to assist in the organization of teaching (i.e. to diversify assessment, to develop skills to implement new teaching approaches and to improve classroom interactions).
- 5) Improving pedagogical content knowledge in adapting subject content to make it more relevant to the local context (i.e. adapting content to different student abilities, taking into account language and numeracy proficiencies; adapting content to the local environment, adapting content to the social and historical context of students, and thus making it relevant to their everyday experiences).

- 6) Peer networking, such as the practice of comparing and sharing experiences and skills (i.e. peer coaching, mentoring and tutoring often through professional discussions and groups).
- 7) Perceived benefits for teachers and students (i.e. teachers' concerns to improve students' performance, attitudes, and classroom participation).

Professional Communities of Practice

Traditional approaches to professional development are not connected closely enough to classroom practice, and are not aligned with current theories of learning and school reform. Traditional approaches are being replaced by new approaches that are more closely aligned with constructivist and situative theories and reform efforts. These newer approaches are grounded in classroom practice and involve the formation of professional learning communities (Hunzicker, 2010). These are often organized via networks that connect teachers around subject matter or other shared educational concerns.

Unlike traditional approaches to professional development, new approaches are based on a socio-cultural perspective that focuses on the process of becoming a member of a community. According to this constructivist view, learning is an individual endeavor, socially and culturally situated. The emphasis on constructivist views of learning has resulted in professional development activities that focus on providing long-term, inquiry- or learner-centered structures that support teachers as they collaboratively develop the professional knowledge they need to use in their own context. This new vision of professional learning communities as a structure of professional development is closely connected to calls for instructional reform, both generally and in specific content areas.

Research increasingly illustrates how teachers learn by working together in professional learning communities where they engage in continuous and constant dialog and examination of their practice and their students' performance to develop and enact more effective instructional practices. Examples of joint work among teachers are (1) shared planning activities and collaboration on curriculum adaptation and development, (2) work in grade-level teams that share students or content goals, (3) analyzing student work and student data, (4) developing study groups, and (5) observations and constructive critique of each other's instruction based on a shared understanding of effective teaching and goals for student learning (Gallagher et al., 2011; Lieberman & Wood, 2002; Wei et al., 2009).

These new approaches emphasize professional growth within a group of educators in the work setting. These communities can serve as opportunities for organizational improvement, professional development, innovation and enhancement of practice as well as for breaking traditional teacher isolation. On-going dialogue, individual and group reflection, systematic action, and mutual respect create an environment for nurturing deep learning which engages members of the community and supports their professional growth. Development of personal expertise results from deep learning through interaction (Hadar & Brody, 2010).

Teachers' understanding of professional development is improved through communal discourse and collaborative work. Teaching and learning have been shown to improve when teachers collectively question their routine, examine new paradigms, find generative means to acknowledge and to respond to differences and to conflict, and engage actively in supporting professional growth (Hadar & Brody, 2010).

McLaughlin and Talbert (2001) found in a five-year case study of nearly 900 educators that teachers who belonged to strong professional communities were better able to adapt to the challenges of teaching today's students. Also, in a study of 24 schools in the midst of 'restructuring', Newmann et al. (1996) found that in the more successful schools professional development is focused on groups within the school rather than individual teachers. Indeed, when teachers have the opportunity to become actively engaged in their own learning through observations, close study of student work in collaboration with colleagues, and joint curriculum planning, they are more likely to improve.

Little (2003) studied three different school-based and grade-level teacher communities to understand the specific dynamics between colleagues that enable teacher communities to become intellectual, social, and material resources for teacher growth and learning. Through observations, interviews, school documents and audio and videotaped records of interaction among teachers in school, Little found that learning occurred as teachers learned to describe, defend, and adjust their practices according to an emerging, collectively held standard of quality teaching.

Finally, Wei et al (2009) identify the following five attributes of effective professional communities: 1) supportive and shared leadership, 2) collective creativity, 3) shared values and vision, 4) supportive conditions, and 5) shared personal practice.

Peer Observation and Developing Study Groups

Peer observations of practice require teachers to visit and observe each other's classrooms to provide feedback. Teachers can also use videotapes of teaching as a way to make aspects of their practice public and open to peer-critique, learn new practices and pedagogical strategies, and analyze aspects of teaching practice that may be difficult to capture otherwise. Peer observations support individual learning, community improvement and improved student learning.

A study using observations and interviews of teachers using the observations protocols in 12 schools revealed remarkable changes in practice. Teachers' instruction became more student-centered, and teachers also reported having more opportunities to learn and a greater desire to continuously develop more effective practices. The development of study groups is also a feature of new approaches to professional development. When teachers in professional communities study practice and research together, they can support one another in implementing new ideas (Wei et al., 2009).

In an intervention study, Hollins et al. (2004) report that teachers who engaged in a structured dialogue to solve problems of literacy learning ultimately researched and adopted new practices which influenced student achievement. The inquiry groups participated in a five step process in which they identified challenges, selected approaches to meet the challenge, implemented the approach, evaluated the approach and then formulated a theory for future practice based on their experiences. Over the course of the two-year examination of these study groups through observations and interviews, the authors found that teachers developed more positive views of their students' abilities, engaged in meaningful collaboration to develop new instructional strategies, and adopted more successful practices.

School-Based Coaching

One strategy that combines some features of traditional development with the need for learning about practical applications and practice is the use of school-based coaches. With an increased focus on improving literacy and math instruction in elementary schools, many school districts and providers of professional development have used coaches to tighten the connection between the training they provide in external institutes and teachers' applications of the strategies in their classrooms. Coaching models recognize that if professional development is to take root in teachers' practice, on-going and specific follow-up is necessary to help teachers incorporate new knowledge and skills into classroom practice both in the long and short terms. Several evaluations have suggested that there is a link between coaching models of professional development and reforms in literacy instruction.

A special subset of coaching strategies (i.e. mentoring) has been developed as part of induction programs for new teachers. Requirements for such programs have been adopted in more than 30 states in the USA, and often serve as the primary source of professional development for teachers in the first years of their careers. In their review of the impact of induction programs, Ingersoll and Kralik (2004) found that mentoring programs increase teacher retention. Some research also suggests that well developed induction programs, which include mentors who have structured time with beginning teachers and receive training directly related to the needs of beginning teachers can increase teacher retention rates and improve performance of the retained teachers.

Collaborative Action Research

One of the major limitations of traditional models of professional development is the passive role imposed on teachers, who find it difficult to implement ideas that are often conceptually and practically far removed from their classrooms. Specifically, professional development opportunities are often limited in the degree to which teachers can work actively and collaboratively. True collaboration involves equity and mutual participation. Moving teachers from the passive role of many in-service endeavors to truly collaborative ones requires opportunities where teachers can generate, invest in, and participate actively and equally in the professional development activities before them.

Professional development must include opportunities for active interpretive processes that examine the complex contexts of classrooms and schools. To encourage this type of analysis, teachers should be helped to use alternative forms of inquiry such as peer observations, interviews, biographies, and journals to better investigate the nature of schooling and school issues. Collaborative action research attempts to redefine teacher professional development by encouraging reflective inquiry within school communities that promote dialogic examinations of practice.

Action research is a form of inquiry that addresses these essential characteristics of effective professional development. As an alternative to more traditional forms of scientific research delivered to teachers, action research recognizes teachers' central roles in decision making, based upon the needs of their students and schools. Implicit in this approach is a fundamental recognition of teachers as active and empowered decision makers who are valid producers of knowledge. Through action research, teachers can come to understand and appreciate research as a meaningful process. While many methods of inquiry foster teacher reflection, action research has become the centerpiece of many professional development

programs. At the heart of action research is a methodology that encourages teachers to raise questions about theory and practice, and encourages evolution of teaching through systematic inquiry.

During the last decade, increasing numbers of educators have viewed reflection as an essential element of teaching and teacher development. Various methodologies designed to promote reflection have encouraged teachers to become critical consumers of research, participants in research discussions, and developers of research-based approaches to classroom decision making. Though studies indicate that teacher research can be a valuable form of reflective inquiry, teacher research often stays within the boundaries of individual contexts or classrooms, limited by individual experiences and perspectives unless schools establish formalized opportunities for exploring research through discussion and analysis. One way to overcome this isolation is to encourage collaboration with informed peers through established frameworks within school communities. Unlike many traditional means of professional development, collaborative methods provide teachers with opportunities to interact professionally on topics that are relevant and applicable in their classrooms (Hofman & Dijkistra, 2010).

Professional Development through Applied Engagement

The Professional Development through Applied Engagement (PDAE) approach was developed and implemented successfully in Egypt. According to Abd-El-Khalick PDAE has the following characteristics:

PDAE is a bottom-up approach: It deems practicing teachers as primary assets in their own and their colleagues' professional development, irrespective of their formal knowledge of curriculum, pedagogy, and subject matter. PDAE adopts an alternative perspective to those that permeate many educational interventions in developing nations, which essentially view practicing teachers as a burden to educational reform. This "burden," as it were, is often tackled through professional development activities that aim to update teachers' knowledge and understandings of curriculum, pedagogy, and subject matter. In particular, PDAE recognizes the importance of capitalizing on teachers' practical knowledge (in contradistinction to their formal knowledge) in the process of transforming their own practice. Such knowledge develops through participation in, and reflection on, teaching; it is mostly tacit, inarticulate, and situation and context-bound (p. 90).

The PDAE framework described above involves providing incentives and support to teacher initiated professional development activities that satisfy specific criteria. As an example of an activity that embodies the nature of PDAE activities, Abd-El-Khalick (2009) describes the EGYPTIAN Teacher Opportunities for Professional Growth Grants (TOPs) which provided elementary school teachers in a number of governorates in Egypt to develop and implement innovative student-centered activities in their classrooms. These teachers were invited to present proposals to develop and implement classroom activities that aimed to improve the quality of student learning. Consequently, a number of these proposals that focused on Arabic, math, and science were funded with the stipulation that grantees would invite TOPs staff to visit their classrooms and videotape one or more classroom sessions in addition to participating in group interviews focused on their involvement with the TOPs. Evaluation of the program showed that it was successful and that teachers were enthusiastic

According to Abd-El-Khalick (2009), the Egyptian Ministry of Education attempted

to improve the quality of primary education in several governorates by helping Arabic, science, and math teachers to adopt student-centered pedagogical approaches that focused on using hands-on, cooperative, and project-based learning, critical thinking, and integrated learning across the curriculum (Education Development Center [EDC], 2002). The project adopted a “train-the-trainers” model to make the training more efficient and sustainable. Abd-El-Khalick (2009) suggests that “the trainers engaged groups of primary teachers in their respective governorates in intensive, six-day PD workshops, in which they experienced the target pedagogical approaches as learners and then reflected on their experiences from the lens of improving their own classroom instruction.” (p. 87). This approach seemed to produce positive results. However,

A majority of teachers were in a “transitional stage” in their teaching. These teachers had departed from traditional practices and embraced the concepts of student-centered teaching. However, teachers had yet to internalize the underlying philosophy and genuinely apply the associated key practices of student-centered teaching (EDC, 2003). In particular, teachers seemed to understand the principles but were either not able to overcome the “risks” associated with student-centered teaching, or did not know how to translate these principles into actual teaching practices and instructional activities (p. 87).

Abd-El-Khalick attributed the lack of change in teacher practices to the top-down professional model used in the training. Consequently, to address this problem a variety of school-based teams were formed with the aim of improving the quality of education by working closely with teachers, local authorities and schools. At a later stage “Teacher Learning Circles” were established to help teachers reflect on their teaching practices by engaging in research activities to collect and analyze evidence related to student learning outcomes. Teachers, however, did not have the requisite research skills and needed to be involved more intimately in their own development. Consequently, teachers were excited about involvement in this project because it empowered them to work like professional.

To summarize, the standardized-based model employs a centralized approach where one or two teachers at a certain school are selected to participate in centralized workshops about certain topics. The site-based model engages a group of teachers in a school or region in intensive learning and aims at enhancing profound and long-term changes in instructional methods and practices. In the self-directed model, teachers specify their own professional development needs and select activities that will help them attain these goals. Most experts in the field support moving away from an in-service training model, where teachers are expected to learn a clearly defined body of skills through a well specified process, often delivered in one shot workshops or courses taught away from the school premises. New approaches to professional development focus on collaboration between teachers which proved to have positive effects on teachers’ instructional strategies and students’ learning.

Professional Development in the Subject Areas

Determinants of Foreign Language Acquisition

The literature on the determinants of foreign language acquisition suggests that mastery of a language other than one’s own is a complex process determined by the successful interaction of a number of critical input, output, and context variables (Kagan, 1995, p. 1). Krashen (1988) underscored the pivotal role of linguistic input as a strong determinant of acquisition provided that input is comprehensible, accurate, developmentally

appropriate, and redundant to learners and is given in a motivating, supportive, and stress-reduced environment. Swain (1985) stressed the role of communicative/functional, frequent, and identity-congruent output as a significant factor in second language (SL)/foreign language (FL) acquisition. Along similar lines, Omaggio-Hadley (2001) proposed the following “principles and priorities” of proficiency-oriented language instruction conducive to language acquisition:

1. Use of language in context
2. Early expression of own meaning
3. Active communicative interaction
4. Creative language practice
5. Authentic language (various text types)
6. Carrying out real life functions in the target language
7. Focus on accuracy of language production
8. Consideration of learner’s affective and cognitive needs
9. Promotion of cultural understanding and appreciation

The above mentioned determinants of SL/FL acquisition call for using interactive and communicative language teaching methodologies that maximize opportunities for classroom interaction in a class climate conducive to personal as well as academic support. Chief among the communicative language teaching methodologies that are supported by strong theoretical and empirical evidence is cooperative learning (CL) due to its wide applications and numerous structures of classroom management that cover a wide range of cognitive and non-cognitive outcomes critical to SL/FL proficiency development. For instance, Olsen and Kagan (1992) maintained that cooperative learning offers three major benefits:

1. provides rich alternatives to structure interaction among students,
2. addresses content area learning and language development needs within the same organizational framework, and
3. increases opportunities for individualized instruction.

Along similar lines, Coelho (1992) argued that cooperative learning provides a culturally- appropriate learning environment that empowers minority students through improving race relationships and encouraging exploratory talk to assist students in comprehending and internalizing new ideas and information. Similarly, McDonnell (1992) argued that the cooperative classroom is well-suited for second language learners as it enables them to communicate, collaborate, problem-solve, and think critically. This makes CL an appropriate mechanism for TPD as suggested by Shaw (1992), Winn-Bell Olsen, (1992) and Ghaith and Shaaban (1995). These approaches were premised on the assumption that cooperative learning is well-suited for building the knowledge base of teaching with regard to content, procedural and curricular knowledge, as well as knowledge of students’ psycho-social characteristics and motivations to study a language other than their own. Appendix I presents a detailed discussion of cooperative learning models and methods that can be used in professional development activities.

Research on Professional Development of English Teachers

Goldschmidt and Phelps (2010) examined the impact of professional development on teachers’ knowledge in four specific domains: Comprehension Content Knowledge; Comprehension Knowledge of Content and Teaching; Word Analysis Content Knowledge; and English language. Specifically, they aimed to find out if a professional development

program significantly improves English teacher content knowledge and whether teachers retain that knowledge six months after the program is completed. The professional development program included an initial 40-hour summer institute, 40 hours of follow-up professional development during the school year, and 40 hours of team meetings. The content coverage of the program was divided among word analysis, comprehension, and writing. About one quarter of the time was spent on deepening teachers' understanding of reading research as well as specific aspects of teaching reading. Less time was devoted to assessment and diagnostic strategies. Results of the study indicate that teachers demonstrated significant knowledge growth between pre and post assessments but pre-existing knowledge gaps were not systematically reduced.

Thanh and Nguyen (2009) conducted a study which aimed at exploring the experiences of a small group of beginner Vietnamese English Teachers during their participation in a professional development technique entitled the Critical Friends Group (CFG) over one semester in Vietnam. CFGs are expected to promote both teacher learning and student outcomes because teacher participation in the CFG leads to greater reflection on teaching, which then supports change in practice aimed at improving student achievement. Through observations and interviews, the researchers gained insights into the participants' experiences as well as the application of CFG as a model of English teachers' professional development in Vietnam. A CFG encompasses a small number of English teachers (i.e., 10 to 12 teachers) who meet once a month for at least two hours. There are three types of CFG protocols.

In the first type, teachers work collaboratively to look at student work where a teacher brings a sample and presents it along with a question. Members of the group then take roles to describe and hypothesize about the work while the presenting teacher takes notes. Afterwards, the presenting teacher shares what he/she found useful in the conversation and the group debriefs the entire process. The second type of CFG protocol is used for peer observation and it involves two teachers using a predetermined format and focus for observing each other's teaching. The study conducted by Thanh and Nguyen (2009) focused on this type of CFG protocol.

The third type, problem solving protocols, opens with the presenter asking a question about a specific dilemma. Participants then ask probing questions and discuss the problem among themselves while the presenter takes notes. When the discussion is finished, the presenter shares what s/he heard was useful for his or her dilemma. Results of the study demonstrated that all participants expressed great pleasure with their CFG experience as it offered them an opportunity to exchange their professional ideas, learn from each other, and help each other to professionally develop. Teachers also reported that the professional development activities helped them in improving their teaching performance through peer observation and discussion which allowed them to adopt new instructional strategies. The evidence showed that they adjusted their own techniques in order to make their lessons more interesting.

Along the same lines, Stillwell (2008) describes 'mentor development' which is a means of professional development through peer observation. The study was conducted on 18 native English speaking teachers in Chiba, Japan. The results of the study showed that such a program allowed teachers to learn from one another through classroom observations and peer mentoring, where observers practice teacher-educator skills by taking the role of mentor in post observation conferences. A third colleague attended the post observation conference

with the aim of helping both the mentor and observed teacher reflect on and learn from their interaction during the conference, and to explore the implications these discoveries may have for effective teaching.

To be effective and highly skilled, English teacher should be given the opportunity for continuous professional development. According to the Australian Association for the Teaching of English, English teachers need to have 1) access to new research and knowledge in the teaching of literacy and language development, 2) adequate, up to date qualifications in both content and pedagogy, 3) opportunities to share expertise with other experienced teachers which help them reflect on their instructional practices, 4) opportunities to renew their discipline, especially for teachers whose education took place some years ago, 5) a commitment to attend ongoing professional development activities, and 6) recognition at all levels of the education system and other stakeholders (e.g. parents...) of the value and importance of professional development. Access to professional development enables English teachers to 1) improve their students' learning outcomes, 2) act efficiently in curriculum planning, 3) reflect on existing practices, 4) develop excellent teaching practices and programs, and 5) participate in the implementation of curriculum initiatives.

Professional Development of Math Teachers

Swan and Swain (2010) conducted a nine-month design-based research study that aimed at investigating the impact of a professional development program on the practices and beliefs of 24 numeracy teachers. The purpose of the professional development program was to engage teachers in exploring ways of teaching and learning numeracy. More specifically, the program encouraged teachers to explore teaching approaches that require students to work collaboratively, discuss and explain ideas, challenge and teach one another, create questions for each other to solve, and to share methods and results. Teachers analyzed research-based principles for teaching and engaged in a design-research process by testing and refining teaching activities to embody these principles. The pedagogical principles adopted in the study included the following:

1. Build on learner's pre-existing knowledge by developing formative assessment techniques;
2. Expose and discuss common students' misconceptions;
3. Use higher-order questions that enhances explanation, application and synthesis rather than mere recall;
4. Use cooperative small group work that encourages critical, constructive discussion rather than argumentation or uncritical acceptance;
5. Encourage reasoning rather than 'getting answers'; replacing a focus on 'coverage' with an emphasis on learning;
6. Use rich, collaborative tasks that are accessible, extendable, and encourage decision making and creativity;
7. Create connections between topics so that students do not see math as a set of unrelated techniques to be memorized.

The principles were introduced to teachers using a four-stage procedure:

1. Existing values, beliefs, and practices were recognized. Teachers were invited to describe the situations in which they worked. In this process, the researchers elicited their existing beliefs about math, teaching and learning, and their classroom practices.

2. Contrasting practices were offered and analyzed. Teachers were confronted with practices that contrasted with their own through working on classroom tasks, then watching their use on video.
3. Teachers were encouraged to suspend disbelief and adopt new practices.
4. Teachers were given time to reflect on their new experiences.

The types of tasks that were devised and modified with the teachers were classifying mathematical objects, interpreting multiple representations, evaluating mathematical statements, creating and solving problems, and analyzing reasoning and solutions.

Data from questionnaires, interviews and classroom observations suggest that many of the teachers' practices and beliefs were profoundly affected. Practices became less transmission-oriented and teachers started to create new, collaborative learning environments in which students were challenged to face difficulties and take on more engaging and active classroom roles. Teachers recognized the limitations of transmission methods, they moved from a "telling" role into a "not telling" role. They recognized that they had previously not allowed learners to think for themselves and reacted against it.

Cavanagh and Prescott (2010) investigated the growth of reflective practice among three beginning secondary math teachers during a one-year university teacher education program and concurrent professional fieldwork practicum. The participants were interviewed three times during the practicum and once more in their first year of teaching to investigate the nature and depth of their self-reflections about their practicum and their relationship with their supervising teachers. Lee's (cite year) three-stage hierarchical model of reflective practice was used to interpret the interview responses. The following illustrates Lee's three levels of reflective practice:

1. Recall-general descriptions of classroom practice; evaluating the success or failure of actions; focusing on the technical aspects of teaching
2. Rationalization-account of critical incidents; searching for causes to guide future actions.
3. Reflectivity- analysis of experiences; considering various perspectives; identifying the influence of supervising teachers.

Results revealed some improvement in the participants' ability to reflect on their teaching during the practicum, while also highlighting the importance of the practicum school context in their professional formation and professional development. The beginning teachers developed a greater capacity for reflection in their first year of teaching.

Kramarski and Revach (2009) conducted a study that aimed at investigating math teachers' professional knowledge among elementary school teachers exposed to a professional training program that either supported self-regulated learning (SRL) or offered no SRL support. The SRL support was based on the IMPROVE meta-cognitive self-questioning method that directs students' attention to understanding when, why, and how to solve problems. Sixty-four elementary teachers participated in a month-long professional development program to enhance mathematical and pedagogical knowledge. The course was part of a 3-year professional development program. This mixed-methods study included quantitative assessments of teachers' professional knowledge in mathematical problem solving and in lesson planning, as well as qualitative interviews and videotaped observations of two teachers. Results indicated that teachers in the SRL program outperformed those in the

no SRL program on various problem solving skills (e.g. reflection and conceptual mathematical explanations) and lesson planning (e.g. task demands and teaching approach). Videotaped observations of actual teaching indicated that the SRL- trained teachers demonstrated more teaching practices that aimed at promoting students' understanding and better supported students' regulation of their own learning, compared with the no-SRL trained teacher.

Nelson and Slavit (2007) presented five case studies of grade six to grade eight science and math teachers engaged in supported collaborative inquiry. The research focus was on teachers' growth trajectories linked to their participation in professional learning communities (PLCs) supported through a professional development project. The professional development project model used in the study included the following specific criteria:

1. Teachers actively seek a shared vision of effective teaching and learning through facilitated dialogic interaction.
2. Teachers actively strive to emerge as an interdependent group with a shared understanding of group norms and goals.
3. Teachers work together in the design of an inquiry focus.
4. Teachers are supported in the design and implementation of inquiry.
5. Teachers are actively supported in obtaining intellectual and material resource support from building administrators.

Results of the case studies demonstrated the importance of facilitator support in providing explicit assistance for teachers in the inquiry cycle. Collaboration or the tendency to co-participate in the work of the PLC proved to be easier for those teachers who had previously shared professional experiences. The case study data indicated that dialogic inquiry grounded in classroom-based data is a key element in teachers' professional growth.

Unal, Demir, and Kilic (2011) conducted a study which aimed at examining the effect of professional development of math teachers on students' performance in math. A total of 4498 8th grade students and 146 school teachers from Turkey participated in the Trends in International Math and Science Study (TIMSS) in 2007. The participants were those who completed all questions in the teachers' questionnaire related to professional development and students who participated in the math test. The performance of student was measured according to content and cognitive dimensions. Content areas included Numbers, Algebra, Geometry, Data and Chance while cognitive domains included knowing, applying and reasoning. Statistical analysis methods were used to identify differences if any in the math performance of students based on their teachers' professional development experiences. The results revealed that professional development made a significant positive difference in student performance.

The preceding review suggests that PD for mathematics teachers improves their ability to improve student performance and to reflect on their teaching particularly where the school context plays a pivotal role in their professional formation and professional development. In addition, the review suggests that beginning teachers develop a greater capacity for reflection in their first year of teaching and that dialogic inquiry grounded in classroom-based data is a key element in teachers' professional growth.

Professional Development for Science Teachers

Science education calls for teachers with specific qualifications. To be able to teach science effectively in a way that enhances students' understanding and ability, science teachers need a thorough understanding of the ways their students learn science content and skills, and what sort of learning difficulties they may encounter and why. Furthermore, it is crucial that science teachers understand how science can be interesting or challenging for their students. Consequently, science teachers need to develop a large repertoire of instructional strategies and representations of science content which they can use in classrooms in a flexible way to meet different students' needs. Moreover, they need to know and use a large variety of formative and summative assessment techniques, which goes beyond the traditional and familiar ways of testing (Van Driel & Abell, 2010). Thus, the challenge for science teacher educators is to help teachers develop into adaptive experts; "professionals who have developed a set of important routines, but at the same time, keep looking for new possibilities to improve and adapt their practice, and experimenting with new approaches" (Van Driel & Abell, 2010, p. 717).

The use of inquiry-based instruction in the science classroom has been advocated by educational theorists and researchers. Inquiry-based instruction has the potential to promote student understanding and engagement in science. However, most teachers are underprepared to teach science using this approach. Consequently, teacher professional development is commonly used to support teachers in enhancing their knowledge and understanding of content, changing their teaching practice to become more inquiry-based, and improving student achievement. Capps and Crawford (2009) presented a critical review of research on 14 inquiry-based professional development programs. Data from the review demonstrated that in-service programs which immerse teachers in authentic inquiry will more likely 1) enhance teacher knowledge, 2) prepare teachers to implement inquiry instruction, 3) shift teachers' beliefs closer to inquiry, and 4) lead to enhanced student understanding. The researchers used a combination of expert opinion, surveys on professional development in science/math, and reform documents to develop a list of nine common features of successful science inquiry professional development programs. These features included: long duration, continuity, coherency with standards, development of lessons, modeling of inquiry, authentic experiences, reflection, emphasis on transfer, and content matter.

Blank, de las Alas, and Smith (2008) evaluated a sample of 25 professional development initiatives across the USA conducted between 2004 and 2007. The evaluation results showed that 1) one-third of the evaluation studies reported measurable effects on teacher professional development, 2) professional development programs for teachers of math and science that focused on both content knowledge in the math and science subject areas as well as training and follow-up on pedagogical content knowledge had significant results, 3) one-third of the programs reviewed had well-developed evaluations that demonstrated positive measurable results of student achievement and/or changes in instructional practice.

An Inquiry Learning Partnership (ILP) for professional development (PD) was formed between a university, a science center, and two urban school districts to offer 4th-6th grade teachers specific science content and pedagogical techniques intended to integrate inquiry-based instruction in elementary classrooms (Buczynski & Hansen, 2009). Pre/Post content exams, PD surveys, focus groups, and assessment data revealed that teachers increased their science content knowledge, teachers reported implementing inquiry practices in their classrooms, and students experienced gains on 5th Grade standardized science achievement exams. However, while some teachers were successful in transferring knowledge and skills

gained in professional development to their classrooms, others encountered barriers to implementing what was learned from the professional development activities. These obstacles included limited resources, time constraints, mandated curriculum pacing, language learning, and classroom management issues.

Professional Development for Elementary Teachers in Different Content Areas

According to Parise and Spillane (2010), the importance of teacher learning in improving classroom instruction and student achievement is emphasized in recent education reform. In their study, Parise and Spillane shed light on teachers' learning opportunities that include formal professional development and on-the-job learning that occurs through interactions with colleagues. The authors explored the relationships between teachers' formal professional development, on-the-job learning opportunities and instructional change using data from 30 elementary schools in a mid-sized urban school district in the USA. Results demonstrated that formal professional development and on-the-job opportunities to learn are both significantly associated with changes in teachers' instructional practice in math and English language arts.

As with many district wide reform efforts, the San Diego (USA) reform sought to improve classroom instruction by focusing on building the capacity of teachers. Quick, Holtzman, and Chaney (2009) examined teacher professional development practices in the district and their impact on literacy instruction. Through examination of the literature on effective professional development, school staff's conceptions of what makes professional development effective, and detailed data on professional development experiences of 100 elementary teachers, the researchers explored the extent to which characteristics of effective professional development align with what is actually taking place in schools. The researchers also examined the relationship between professional development characteristics and teachers' use of instructional practice that have been shown to predict student growth in reading comprehension. The researchers found that professional development which emphasizes content and curriculum and that incorporates coaching correlates with improved classroom instruction.

Status of Teacher Professional Development in Lebanon

Currently, the Center of Educational Research and Development (CERD) handles the professional development of public school teachers within Lebanon through the implementation of a series of yearly regional training plans. These plans are conceptualized and implemented through six training centers distributed all over the country as follows: Beirut, Tripoli, Nabatiyeh, Saida, Zahle, and Jounieh. Another component of the Ministry of Education and Higher Education that works with teachers is the Department of Guidance and Counseling. This Department is charged with supporting teachers to improve the quality of teaching and learning. Their work involves identifying areas that need improvement through a variety of ways such as analyzing student performance on public exams, analyzing teacher-made exams, and collecting insights from inspectors' reports on their school visits. Consequently, members of the Department of Guidance and Counseling organize what are called "Education Days" during which methods to address areas of need are discussed. In addition to the "Education Days", the Department of Guidance and Counseling organizes one-on-one meetings with teachers either upon the request of teachers or school principals or based on data collected on the performance of the teacher. In addition, members of the Department of Guidance and Counseling sometimes receive special requests from schools or school principals to work with teachers on improving their skills in a variety of topics.

As is manifest from the description above, there are two entities in the Ministry of Education and Higher Education that deal directly with teachers regarding professional development or related issues: CERD and the Department of Guidance and Counseling. In addition, the Educational Inspectorate, a component of the Central Inspection Board which reports to the Prime Minister and is not a part of the Ministry of Education and Higher Education is basically responsible for compliance of school personnel with rules and regulations but may also play an educational role as per its official mandate. In general, CERD is charged with training teachers, the Department of Guidance and Counseling is charged with supporting teachers, while the staff members of the Educational Inspectorate are charged with ensuring that teachers abide by the rules and regulations of teachers as civil servants. To coordinate professional activities a joint committee constituted of members of CERD, the Department of Guidance and Counseling, the director of elementary education, the Director of Secondary Education, and the Director General of the Ministry of Education and Higher education has been formed. One serious concern with the above structures is that the roles of the entities that deal with in-service teachers regarding educational issues are not clearly delineated resulting in possible confusion among teachers.

During 2010-2011, CERD proposed and implemented a number of training plans that focused on training the teachers of English, Science, Math and Arabic. Although the plans were designed to cover all the regions of Lebanon as well as address these main subject areas, analysis of the plans has shown a number of shortcomings and inconsistencies relative to program incomprehensiveness and imbalance across the cycles of the educational system. In addition, the proposed plans seem to lack theoretical foundations, while the practical explanations of a number of activities need to be improved. Specifically, the plans did not always 1) address the teachers' training needs in a substantial and comprehensive manner, 2) relate to any specific theoretical framework that would guide the content of training or suggest a coherent and comprehensive scope and sequence of topics, objectives, and skills, 3) show consistency in terms of content, focus, training methodologies, and modes of delivery, 4) cover various components, areas, and aspects of the curriculum, 5) include relevant and high priority topics and themes, 6) provide comprehensive coverage of all the teaching points, competencies, techniques/strategies, and skills implied by the titles of some workshop sessions, 7) present clear and accurate descriptions of some workshop sessions, and 8) demonstrate integration of technology and practical hands-on activities. Moreover, these plans are not based on an agreed upon system of professional standards for teachers of professional standards for teachers, an important issue highlighted in the National Education Strategy of the Ministry of Education and Higher Education and being addressed presently within the context of the D-RASATI project.

Recommendations

The preceding analysis suggests an urgent need for conceptualizing and implementing a more coherent and much more comprehensive training program for all teachers of various subjects in public schools and in all cycles of Basic Education and Secondary Education. Such a program should be grounded in the training needs of teachers and should reflect contemporary and effective methods of professional development. Specifically, the envisioned training program should be comprehensive of the various aspects, competencies and skills proclaimed in the official curricula. It should also prepare teachers to design and deliver effective instructional units in order to enable learners to acquire the competencies and skills proclaimed in the national curriculum. This also entails addressing curricular

themes and goals using an effective and diversified range of teaching methods, instructional strategies, and techniques that are well-suited to the nature of the standards, skills and competencies under consideration. Of particular importance in this regard is focus on student-centered rather than teacher-centered teaching methods in order to create a highly interactive and supportive classroom environment with maximum opportunities for active language input and output.

In addition, it is important that the training program for the professional development of teachers follow a hands-on approach in which the methods and techniques of teaching are introduced, demonstrated, and applied to address some relevant and program-specific teaching content and skills. The program should also incorporate a variety of effective teacher development models (reviewed above) to ensure transfer of learning to the classroom and, ultimately, to improve teaching practices and student learning achievement. Finally, more attention should also be given to using technology in language and content area teaching, and to assessment and evaluation as well.

In this light, the following recommendations are made based on best practices in teacher professional development:

1. Devise and implement theoretically-based, comprehensive, and balanced PD programs..
2. Conceptualize and implement PD activities that are connected with classroom practices and aligned with the formation of professional learning communities that support teachers in developing their context-specific professional knowledge.
3. Engage participants in active and inquiry-based learning.
4. Model student-centered teaching strategies for teachers and involve them in continuous and long-term professional development.
5. Focus professional development activities on developing content knowledge and promote experimentation and reflection on practice.
6. Emphasize job-embedded and collaborative teacher learning through coaching, mentoring, study groups, and action research.
7. Design and demonstrate highly-applied, practice-oriented, and interactive professional development programs that address knowledge of content and curriculum as well as techniques of instruction and assessment.

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Appendix

Cooperative Learning Models and Methods

Cooperative learning is defined in the context of this review as a general term for an instructional approach that emphasizes conceptual learning and development of social skills as learners work together in small heterogeneous groups according to the principles of positive interdependence, individual accountability, face-to-face promotive interaction, and group processing (Johnson, Johnson & Stanne, 2000). Presently, there is more than “one flavor of cooperative learning” operationalized into a number of techniques and structures (Kluge et al., 1999, p. 19). These techniques and structures include Constructive Controversy (CC) (Johnson & Johnson, 1979), Cooperative Integrated Reading and Composition (CIRC) (Stevens, Madden, Slavin, & Farnish, 1987), Cooperative Structures (CS) (Kagan, 1985), Group Investigation (GI) (Sharan & Sharan, 1976, 1992), Jigsaw (Aronson, et al., 1978), Learning Together (LT) (Johnson & Johnson, 1975/1999), Student Teams Achievement Divisions (STAD) (Slavin, 1978), Teams-Games-Tournaments (TGT) (DeVries & Edwards, 1974), and Team Assisted Individualization (TAI) (Slavin, Leavey, & Madden, 1982). Table 4 below, adapted from Johnson, Johnson, and Stanne (2000), presents the various cooperative learning models, their history, developers and possible primary applications in the context of ESL/EFL instruction.

Table 4
Modern Methods of Cooperative Learning

Researcher-Developer	Method	ESL/EFL Primary Applications
Johnson & Johnson	Learning Together	Reading, Writing, Speaking, Culture
DeVries & Edwards	Teams-Games-Tournaments (TGT)	Language Rules and Mechanics
Sharan & Sharan	Group Investigation	Writing, Culture
Johnson & Johnson	Constructive Controversy	Culture
Aronson & Associates	Jigsaw Procedure	Reading
Slavin & Associates	Student Teams Achievement Divisions (STAD)	Language Rules and Mechanics
Cohen	Complex Instruction	None
Slavin & Associates	Team Accelerated Instruction (TAI)	None
Kagan	Cooperative Learning Structures	Speaking, Listening, Reading, Writing
Slavin & Associates	Curriculum Packages: Cooperative Integrated Reading and Composition (CIRC)	Reading, Writing

Ghaith and Shaaban (2005) described the dynamics of the various cooperative learning structures as follows:

Learning Together. This CL model organizes instruction according to the principles of heterogeneous grouping, positive interdependence, individual accountability, social/collaborative skills, and group processing. As such, learners in ESL/EFL contexts may work collaboratively together in small heterogeneous groups and in a classroom climate of academic and personal support in order to perform a certain reading act, write a composition, and/or prepare a group project or presentation about certain aspects of the target culture.

Teams-Games-Tournaments (TGT). In this method, instruction is organized into the five major components of lesson planning – class presentation, team study, tournament, determining individual improvement points, and team recognition. Initially, the teacher introduces the material under study in a class presentation, following which learners work together to complete worksheets in heterogeneous groups of four members, making sure that all team members have understood the material. A tournament is then held at the end of a week or unit during which team representatives of similar levels of ability (high, average, low) compete together to earn points for their teams. Finally, the achievement of various teams is determined by calculating the average improvements earned by the members of the teams. TGT is most appropriate for teaching spelling and the language rules and mechanics of the target language.

Group Investigation. This method divides work among group members who plan and carry out investigations, complete individual specific tasks, and then reconvene to discuss their work, coordinate the various tasks, and present a final group project. First, the teacher presents a problem to the learners who work in heterogeneous groups to scan topics, identify resources, assign primary responsibilities, individually research and then reconvene to prepare and present a group project. In the ESL/EFL context GI is particularly well-suited for completing complex tasks such as writing a research paper, preparing a presentation about some relevant theme or issue, and developing culture capsules, mini-dramas, and clusters to learn about certain aspects of the target culture.

Constructive Controversy. Learners in constructive controversy (CI) are assigned to heterogeneous groups of four members each, and each group is divided into two pairs. Instruction proceeds by stating an issue and assigning a position to be advocated by each pair. First, learners research and prepare the best possible case for their assigned position, present their best case to the two other members of their team, engage in open and free discussion, reverse roles to present the best case possible for the opposing position, and finally they drop all advocacy and strive to find a synthesis on which they can all agree by summarizing the best evidence and reasoning from both sides. CI is particularly well-suited for learning about and debating certain aspects of the native language and target cultures, thereby increasing ESL/EFL learners knowledge of cross-cultural variations in the belief systems, norms, and values as well enhancing the learners' general research and communication skills.

Jigsaw Procedure. This procedure can be used whenever the material under study is in a narrative or expository form. The material is divided into different sections. A member from each group is assigned a different section. Students from different groups who have been assigned the same section meet to form an “expert group” that works together to master the information in their section. Then each goes back to his/her original group to report their findings. Instruction proceeds according to the following stages of lesson planning: Reading

the assigned material, expert group discussion, team reporting, and finally team recognition as in TGT. Jigsaw is most appropriate for teaching literature, biography, a chapter in a book, or any other similar narrative, expository, or descriptive material.

Student Teams Achievement Divisions (STAD). This method is very similar to the TGT method described above except that, instead of a tournament, learners take individual quizzes and tests in order to determine their mastery of the material under study. Like TGT, STAD is most appropriate for teaching the language rules and mechanics of the target language.

Cooperative Learning Structures. The CL structural approach is based on using a variety of generic and content-free ways of managing classroom interaction called structures. These structures can be used for team and class building, communication, mastery learning, and critical thinking. Examples of these structures are: Round Robin, Mixer Review, Talking Tokens, and many other structures that are explained in Kagan (1989). Round Robin can be used to generate ideas for writing as well as a pre-reading technique to build reader's background knowledge in the ESL/EFL classes. Likewise, the Mixer Review could be used to review material already studied and ensure that learners have achieved mastery of vocabulary, spelling, and language rules and mechanics. Finally, the Talking Tokens can be used to organize group discussions, promote accountability, and ensure equal opportunities of participation and practice for all learners.