

The Dynamic Integrated Approach to teacher professional development:

Rationale and Main Characteristics

Panayiotis Antoniou^a & Leonidas Kyriakides^b

^a Faculty of Education, University of Cambridge

^b Department of Education, University of Cyprus

Abstract

This paper refers to the Dynamic Integrated Approach towards teacher professional development which attempts to merge research findings on teacher effectiveness and teacher professional development. The theoretical framework and the major features of the DIA are presented. It is argued that the DIA can be effectively implemented through five steps: Establishing clarity and consensus about aims and objectives, identifying needs and priorities for improvement through empirical investigation, provision of improvement guidelines, reflection opportunities and coaching on effective teaching by the advisory and research team, establishing a formative evaluation mechanism and finally establishing a summative evaluation system. Results of empirical studies providing support to the basic elements and the overall effectiveness of the DIA are also presented. Implications of the findings are discussed and suggestions for further research, particularly in exploring the conditions under which the DIA could have a long lasting effect on teacher effectiveness, are finally drawn.

Keywords: Dynamic Integrated Approach, teacher professional development, teacher effectiveness, improvement of teaching skills, developmental levels of teaching skills.

Word count: 8971

1. Introduction

Teacher training and professional development are considered essential mechanisms for deepening teachers' content knowledge and developing their teaching practices in order to enable them to teach to high standards (Darling-Hammond & McLaughlin, 1995; Cohen & Hill, 2001). Over the last years, the demand for improving the quality of teaching and learning and the demand for increasing accountability have put issues related with effective professional development high on the agenda of educators, researchers and policy makers. The underlying rationale is that high quality teacher professional development could facilitate

improvement of teaching practices, which could in turn translate into higher levels of student achievement (Borko et al., 2010; Desimone, 2009).

Despite the recognition of the importance of teacher professional development, most training opportunities remain fragmented, poorly aligned with curricula, and inadequate to meet teachers' needs and priorities for improvement (Borko, 2004; Cohen & Hill, 2001). In this context each year schools, districts, and educational systems spend a considerable amount of money and resources on in-service seminars and other forms of professional development, which are intellectually superficial and don't take into account the knowledge base of effective teaching and how teachers could better learn and implement such practices (Kyriakides et al, 2009; Ball & Cohen, 1999). At the same time, policy makers, especially in the recent standards reforms, have in many cases completely disregarded the expertise and concerns of classroom teachers (Elmore, 1997; Schubert, 1998).

This is exactly why there is now more than ever the need to support and guide teachers to effectively respond to the growing demands of raising student learning standards by developing effective professional development programs that could promote changes in classroom practices (Spillane, 1999; Ball & Cohen, 1999). At the same time, it is acknowledged that teacher professional development is a dynamic process, highly related with teacher agency and teachers' critical role in facilitating their own learning. In this sense, effective professional development is a dynamic and complex interplay between individual agency and structured support that teachers themselves recognise as relevant and essential.

The Dynamic Integrated Approach (DIA), proposed in this paper, aims to promote improvements in teacher pedagogical knowledge and teaching skills. This is important to clarify since different professional development programs may have various aims and objectives related with teacher knowledge, perceptions and practices (see Shulman, 1987 for a review). It is also acknowledged that there are various types of professional knowledge, such as the empirical, the normative, the critical, the ontological and the experiential knowledge about education (see Kincheloe, 2004) and different forms such as the content and the pedagogical content knowledge (Ball et. al, 2004) all of which are of crucial importance to effective teaching. The DIA aims towards improvements in teaching skills (pedagogical knowledge), without undermining other types of educational knowledge and without excluding them from the process. Pedagogical knowledge goes beyond knowledge of subject

matter *per se* to the dimension of knowledge for effective teaching. Thus, it relates to teacher behaviour in the classroom that could maximise student learning gains. The question that may arise at this point, however, relates to the content of teacher professional development programs, i.e., which skills should be targeted, who is to decide and why? Despite the large body of literature on professional development, surprisingly little attention has been paid to the actual content of the professional development activities (Garet et al., 2001). This content can be derived from a variety of sources, such as the various task analyses of teaching, attempts to specify the attributes of the teacher as professional or even competences specified by external agencies. Nevertheless, this paper supports that we need to be in a position to justify this selection on the basis of research findings. From this perspective, it is argued that we need to utilise and reflect on the knowledge base of the Educational Effectiveness Research (EER) describing teaching practices, strategies and actions that were found to have a positive impact on student outcomes. This is important as identifying specific practices fundamental to supporting student learning is at the heart of building an effective system for the professional training and development of teachers (Ball & Forzani, 2011).

2. Merging findings from research on teacher professional development with research on teacher effectiveness

Educational Effectiveness Research addresses the question of what works in education and why and attempts to identify factors situated at different levels that are associated with student achievement (Scheerens & Bosker, 1997). During the last thirty-five years specific types of teacher behaviour in the classroom were found to be associated with student achievement (e.g., Muijs & Reynolds, 2001). Although one would have expected strong associations between research on teacher professional development and on teacher effectiveness, research in the two fields has been conducted apart from and without much reference to one another. This mutual isolation is particularly unfortunate for one attempting to draw implications for teacher education and professional development from EER and visa versa. A similar argument related with merging findings of research on teacher effectiveness and teacher professional development has already been implied but was not developed further either for research or for policy purposes (see Gage, 1978; Katz and Raths, 1984). Three decades after these publications, very similar conclusions were drawn by the AERA panel on

research in teacher education (Cochran-Smith & Zeichner, 2005). Few investigators of training methods rationalize their selection of teaching skills in terms of research on teaching effectiveness and very few evaluate the impact of the teaching skills they develop on such dependent variables as student learning. At the same time, researchers of teacher effectiveness spend little time speculating about the methods that might be used to develop teaching skills that were found to be associated with student outcomes.

The development of the DIA is based on the argument that research on teacher training and development should increasingly take into account the results of research on teacher effectiveness, addressing skills that are found to contribute to student learning. By establishing links between EER and research on teacher professional development, both fields could have mutual benefits. Particularly, research on teacher professional development could expand its research agenda by taking into consideration the impact of effective programs on student outcomes and at the same time EER could identify the extent to which its validated theoretical models can be used for improvement purposes. In this way, stronger links between research, policy and improvement of teaching practice could be established (Antoniou & Kyriakides, 2011). From this perspective, the dynamic model of EER (Creemers & Kyriakides, 2008), which is considered to be the latest development in the field (Sammons, 2009), could contribute to establishing a theory-driven and evidence-based approach to teacher professional development.

3. The dynamic model of EER

The dynamic model is multilevel in nature and refers to factors, associated with student outcomes, operating at four different levels: student, classroom, school and system. The teaching and learning situation is emphasised and the roles of the two main actors (i.e., teacher and student) are analysed (Creemers & Kyriakides, 2008). Particularly, at the classroom /teacher level the dynamic model refers to eight factors which describe teachers' instructional role: *orientation, structuring, questioning, teaching-modelling, applications, management of time, teacher role in making classroom a learning environment, and classroom assessment*. These eight factors do not refer only to one theory of teaching and learning such as direct teaching or constructivism (Joyce, Weil, & Calhoun, 2000); rather an integrated approach in defining effective teaching and student learning is applied.

In addition, an essential difference between this model and those developed in the 1990s is that a specific multidimensional framework is used to measure the functioning of factors. Thus, each factor can be defined and measured by using five dimensions: *frequency*, *focus*, *stage*, *quality*, and *differentiation*. Specifically, frequency is a quantitative way to measure the functioning of each factor, whereas the other four dimensions examine qualitative characteristics of the functioning of each factor. The dimensions are not only important from a measurement perspective but also from a theoretical point of view. Actions of teachers associated with each factor can be understood from different perspectives and not only by giving emphasis to the number of cases or to the duration of the actions within a teaching episode (i.e., frequency dimension). In addition, the use of these dimensions may help us develop strategies for improving teaching since the feedback provided to teachers could refer not only to quantitative but also to qualitative characteristics of their teaching practices.

4. Levels of teaching skills based on the Dynamic Model

The dynamic model is also based on the assumption that teacher factors are inter-related and the importance of grouping of factors has been demonstrated (Creemers & Kyriakides, 2008). Specifically, a longitudinal study revealed that the eight teacher factors and their measuring dimensions can be grouped into five levels, situated in a developmental order. These levels were found to be associated with student outcomes, thus, teachers who demonstrate competencies at higher levels were found to be more effective than those currently performing at the lower levels. This association was found for achievement in different subjects and for both cognitive and affective outcomes (see Kyriakides et al., 2009).

The above finding is in line with the theories related with the stage models of professional development. Over the past three decades, cognitive psychology has produced a range of models of how teachers and other professionals develop expert skill (e.g., Berliner, 1994; Dreyfus & Dreyfus, 1986; Sternberg et al., 2000). Although these models vary with respect to both the number of stages that must be passed through and the nature of each stage, all have fixed sequences of stages representing successively higher level of knowledge and skills acquisition. For instance, Dreyfus and Dreyfus (1986) argued that acquisition in each new area typically proceeds through five skill stages: novice, advanced beginner, competent,

proficient and expert. What seems to be the principle advancement of the five levels proposed by Kyriakides et al., (2009), compared with the previous stage models, is that the content of each level is now clearly determined (in terms of specific teaching skills), whereas previous stage models suffered from vagueness on what could actually constitute each developmental level (Dall’Alba & Sandberg, 2006). The teacher factors of the dynamic model included in each level are presented in Figure 1.

Insert Figure 1 about here

As we can observe from Figure 1, the five levels are described in a distinctive way. The first three levels are mainly related with the direct and active teaching approach by moving from the basic requirements concerning quantitative characteristics of teaching routines (e.g., management of time, providing structuring and application tasks) to the more advanced requirements concerning the appropriate use of these skills as these are measured by the qualitative characteristics of these factors (e.g., asking process and product questions, providing appropriate feedback). These skills gradually also move from the use of teacher-centred approaches to the active involvement of students in teaching and learning. The last two levels are more demanding since teachers are expected to differentiate their instruction (level 4) and demonstrate their ability to use the new teaching approach by engaging students in orientation and modelling tasks (level 5). Based on the above findings, the DIA to teacher professional development has been developed aiming to facilitate the utilisation of the knowledge base of EER for improvement purposes. The main assumptions, features and implementation phases of DIA are presented in the following sections.

5. The Dynamic Integrated Approach: Assumptions and Main Features

The first essential characteristic of the DIA has to do with the fact that teacher factors concerned with teacher behaviour in the classroom were found to be related to each other, as discussed in the previous section. The grouping of factors highlights the need for establishing an integrated approach to teacher professional development, which could be situated between

the competency-based approach (Brooks, 2002) and the holistic approach (Feiman-Nemser, 1990). Therefore, the DIA is based on the assumption that improvement of teacher effectiveness can be focused neither on the acquisition of isolated skills/competencies (Gilberts & Lignugaris-Kraft, 1997) nor in reflection across the whole process of teaching in order to help teachers get “greater fulfilment as a practitioner of the art” (Clarke & Hollingsworth, 2002, p. 948) without considering the professional needs and developmental priorities of the teachers.

Second, the DIA takes into account the importance of identifying specific needs and priorities for improvement of each teacher / group of teachers through empirical evaluations. This implies that, unlike most professional development approaches with a "one size fits all" orientation, the content of the training program should vary accordingly, since teachers with the same profile (i.e., teaching experience, initial training qualifications) may have different priorities for improvement. In order to identify these priorities, multiple evaluation data related with teacher behaviour in the classroom should be collected and factors that need to be addressed and further developed should be identified.

Thirdly, it is acknowledged that teachers should be actively involved in their professional development in order to better understand how and why the factors / teaching skills addressed have an impact on student learning. For example, in training courses on improving factors concerned with classroom management, teachers need to discuss and reflect in order to gain a better understanding of how the factors addressed are related with the effective use of teaching time which is always limited. This implies that we should use the knowledge-base of EER in order to design professional development programs which aim not only to help teachers understand the importance of teacher factors, but also to develop their skills associated with these factors and implement those skills in their classrooms. In this context, the approach promotes the establishment of strategies for teacher professional development which place emphasis on the evidence stemming from theory and research. Thus, the value of a theory-driven approach to teacher training and professional development is stressed. Taken together with the need to collect multiple evaluation data about the skills of teachers to identify their improvement priorities mentioned above, it is argued that a theory-driven and evidence-based approach to teacher training and professional development should be established.

Fourth, teachers should become aware of both the empirical support available related to the factors involved in their developmental program and the way these factors operate within a conceptual framework (Sammons, 2009). Through this approach, teachers are offered the opportunity to utilise in a flexible manner the existing knowledge-base on effective teaching, adapt it to their specific needs, and develop their own strategies and action plans for improvement. Thus, the DIA is neither based on improvement prescriptions nor on predetermined requirements for teachers to follow in order to improve their skills; nor does it rely solely on teachers to identify by themselves what can be done and how in order to improve the quality of their teaching. The DIA provides teachers with the opportunity to identify their improvement needs and make use of the available knowledge-base in order to develop their action plans and critically reflect on their efforts in order to improve their teaching skills.

Fifth, building upon the previous point, the DIA supports that the Advisory and Research Team (ARTeam), responsible for the coordination and the general provision of the developmental program, has an important role in facilitating and supporting teachers in their efforts to develop and implement their action plans in their classrooms. Although each teacher is treated as a professional responsible for designing his/her own action plan and implementing his/her own improvement strategies, teachers are not left alone to design and implement their strategies and actions, but are encouraged to make use of the expertise and knowledge of the ARTeam and any other available resource within and/or outside the school. In such an integrated approach, teachers are the ones to take decisions relating to the improvement actions and tasks to be designed and implemented. By doing so, not only is ownership of the improvement effort established, but the teachers' experiences and the context of the school and classroom are also taken into account (Muijs, 2008). At the same time, the ARTeam has an important role to play in designing teachers' improvement strategies. The ARTeam is expected to share its expertise and knowledge with practitioners and help them develop strategies and action plans that are in line with the relevant knowledge base of effective teaching. To foster such discussions, the ARTeam must help teachers to establish trust, develop communication norms that enable critical dialogue, and maintain a balance between respecting individual community members and critically analysing issues in their teaching.

Sixth, monitoring the implementation of teacher action plans in classroom settings is an essential part of the DIA. During this procedure, teachers are expected to continuously develop and improve their action plans based on the information collected through formative evaluation. Critical reflection on the implementation of the action plans is also an important aspect of formative evaluation (Admiraal & Wubbels, 2005). It is important to stress that critical reflection and collaboration with peers are essential elements in all aspects of learning and throughout the improvement process. Thus, the DIA seeks to initiate changes in educational practices, by encouraging teachers to systematically reflect on and work with other teachers throughout the whole curriculum, in order to improve the effectiveness of existing practices and assisting on the development of new, based on the grouping of factors included in the dynamic model of EER and their particular priorities for improvement. For example, teachers could be encouraged to keep their own reflective diaries in order to identify ways to improve their action plans. At the same time, the ARTeam should help teachers collect additional data from other sources and test the internal validity of their evaluation mechanism by comparing data collected from different sources.

Finally, the DIA refers to the importance of conducting summative evaluation in order to identify the impact of the developmental program on the teaching skills of the participating teachers and on the learning outcomes of their students. Despite the number of studies on teacher professional development, the majority of these do not measure the impact of different approaches and programs on student learning outcomes (Cochran-Smith & Zeichner, 2005; Borko, 2004). Measuring the short- and the long- term impact of the proposed approach is important since it could help us to investigate the added-value of using the DIA. The results of summative evaluation are also important for taking decisions on whether some groups of teachers have developed their practices successfully and, thus, need to design new action plans in order to address new priorities for improvement. This implies that teachers should be continuously involved in improvement efforts in order to move from their current level to more demanding levels of effective teaching.

6. Main Implementation Steps

In the context of the framework described above, this section describes the basic implementation steps and procedures of the DIA. As demonstrated in Figure 2, the DIA is based on a sequence of five basic implementation steps which are elaborated below.

Insert Figure 2 about here

A) Establishing clarity and consensus about the general aims and the objectives of the teacher professional development program

At this very first step of the DIA, it is emphasised that the ultimate aim of the improvement effort is to enhance student learning. To achieve this, professional development is expected to help teachers improve their teaching skills and classroom practices, thus, the importance of the classroom level, as the central point for improvement is acknowledged (Reynolds et al., 1993). As Scott and Dinham (2002, p. 112) argue, ‘...quality of teaching becoming a major focus in the educational systems of many countries responding to teacher demands for professional development that matters in their everyday tasks and activities.’ This step is based on the assumption that it is important to start with a clear understanding of the destination and how improvement of quality in education will be achieved. This could also be considered as “a purposeful task analysis” (Wiggins & McTighe, 1998: 8), suggesting a planning sequence. Commitment to the implementation of the professional development program by both the participating teachers and the research and advisory team should be established. The importance of developing a theory driven, but at the same time, evidence based program to address the specific needs and priorities for improvement of the participating teachers is elaborated. Thus, at the next step data should be collected in relation to teaching skills in order to identify the professional needs and the priorities for improvement for each teacher.

B) Identify needs and priorities for improvement through empirical investigation.

The use of a validated framework, such as the dynamic model of EER, on the basis of which the content of the professional development program could be selected and formulated, cannot in itself ensure that the program will be effective for all participating teachers. The DIA supports that not only should a theory-driven approach be followed to improve quality of teaching, but emphasis should also be placed on collecting data in order to identify the teaching needs and priorities for improvement for different groups of participants, thereby facilitating the design of relevant improvement efforts with differentiated content and focus. This is important, since teachers seem to consider new initiatives on their individual merits, particularly in relation to how they will benefit classroom teaching (Corkindale & Trorey, 2002). Teachers have turned away from various professional development approaches, which are not seen to have ready relevance to and application in, the classroom and are not geared to teachers' needs (Dinham et al., 2000).

From this perspective, the second step of the proposed approach is based on the assumption that in any effort to train teachers, an initial evaluation of their teaching skills should be conducted to investigate the extent to which they possess certain teaching skills whilst identifying their needs and priorities for improvement. The teaching skills of the participants can be evaluated by the ARTeam, by utilising the instruments applied in studies testing the validity of the dynamic model at the teacher level (see Kyriakides & Creemers, 2008; Antoniou & Kyriakides, 2011). Based on the evaluation results, teachers are allocated into different groups based on their professional needs (i.e., level of teaching skills). The results of the initial evaluation provide suggestions for the content of training for different groups of teachers. This is important, since the content and development of educational material for the training programs should correspond to the professional needs and *proximal development* of each group of teachers. According to Berliner (1994), it would be beneficial to assist those willing to progress by providing training and feedback appropriate to their level of development. For example, teachers must master simple but necessary routines such as teaching skills related to the “direct teaching approach” in order to move to higher levels involving the use of “new teaching approaches” and differentiation. Furthermore, the DIA supports that the effort to identify teachers' needs and priorities for improvement should be guided by the knowledge base of EER as it is described in the dynamic model. This is an important issue that needs to be taken into account in conducting the initial evaluation especially since the dynamic model refers to teaching skills found to be related to student achievement.

C) Provide guidelines for improvement and reflection opportunities

Having identified teachers' needs and priorities for improvement, teachers in each group should then engage in developmental activities directed towards improving their teaching skills. Thus, the third step of this approach relates to the provision of appropriate material and guidelines to teachers for designing their action plans for improvement. The ARTeam also provides the teachers of each group with supporting literature, research findings and activities related to the teaching skills in their developmental level. For example, the teachers in the first level of teaching skills should focus and receive material and guidance on the distribution of teaching time and ways of dealing with time management effectively. Case studies could be administered to the teachers in this group to discuss the importance of the quantity of teaching time as an effectiveness factor associated with student learning. In addition, material from the literature could be provided regarding the management of the classroom as an efficient learning environment, in order to maximise engagement rates (Creemers & Reezigt, 1996). Through discussion, it is expected that teachers will realise that learning takes place in restricted time limits in which many important activities should take place. Extra-curricular administrative activities such as announcements, dealing with discipline problems and commenting on irrelevant issues could further reduce the time available for learning. Thus, the teachers are expected to understand that actions should be taken in order to improve their skills in management of time and reflect on how to allocate time in each learning activity sufficiently. In addition, examples for teaching specific subjects from the school curriculum could be discussed with teachers. In this way, teachers are encouraged both to reflect on these aspects of their teaching practice and provide their own examples. Moreover, teachers are provided with opportunities for collective reflection and critical learning, features closely related to active learning (Elliot & Calderhead, 1995). Besides individual reflection, collective reflection can be a fruitful tool for enriching and widening a person's thinking, especially since teachers' work conditions are often claimed to support individualism and privacy. The underlying assumption is that the group-based management structure could utilise the accumulated experience and knowledge of the team to facilitate improvement. As Desimone (2009) argues, 'Such arrangements set up potential interaction and discourse, which can be a powerful form of teacher learning' (p. 184).

Subsequently, with the support of the ARTeam teachers should develop their own action plans for improvement. It is also emphasized that no single strategy will always work in every school, for every teacher, all of the time. Local customisation is necessary for the success of programs of teacher learning or professional development (Fishman, Marx, Best, & Tal, 2003). The basic elements of a general plan of action should also be discussed. Such action plans could include:

1. A statement of the general idea related to the purpose of improvement.
2. A statement of the factors and dimensions the teacher plans to improve.
3. Specific actions the teacher will undertake in this direction. For example, one teacher situated at level 2, focusing on lesson structuring, may decide to modify the way he/she retrieves and relates prior knowledge to new knowledge by asking questions, assigning a relevant problem and asking students to interpret a map or tree-diagram which requires knowledge from previous lessons.
4. A statement of the resources required in order to undertake the proposed courses of action (e.g., materials, rooms, equipment).
5. *Evaluation*: Teachers should use various techniques and methods for gathering evidence on the effectiveness of their action plans. For this reason, teachers are encouraged to keep a reflective diary. This diary could contain personal accounts of observations, feelings, reactions, interpretations, reflections, hunches, hypotheses and explanations. Teachers could also ask their pupils to keep diaries, which could enable the teacher to compare their experiences of the situation with those of the pupils'. Moreover, other teachers at the school could observe their teaching (e.g., acting as “critical friends”), following a peer-coaching approach (Joyce & Showers, 1995).

D) Establish a formative evaluation mechanism.

The next implementation step of the DIA refers to the establishment of formative evaluation procedures. Formative evaluation is the method of ongoing and concurrent evaluation which aims to improve the program (Popham, 2006). The formative evaluation procedures should be carried out on a regular basis (e.g., in monthly sessions) to provide information and feedback for improving: a) the quality of teachers' learning, b) the extent to which they implement the teaching skills in their classrooms and finally, c) the quality of the program itself. Such formative evaluation procedures should involve: the

identification of the learning goals, intentions or outcomes, and criteria for achieving them; the provision of effective, timely feedback to enable teachers advance their learning; the active involvement of teachers in their own learning, and finally teachers responding to identified learning needs and priorities by improving their teaching skills. Furthermore, the monthly sessions could provide teachers with the opportunity to revise and develop further their action plans on a systematic basis, based on their own and others' experiences and also based on the literature on effectiveness factors which correspond to their level. This can be achieved with the assistance and guidance of the ARTeam. For example, through formative evaluation in each monthly session, teachers could be provided the opportunity to: a) report teaching practices and comment on them, b) identify effective and non-effective teaching practices, c) understand the significance of the teacher factors which correspond to their competency level, and d) understand how these factors could be linked with effective teaching and learning. At the same time, the teachers at each level should receive systematic feedback and suggestions from the ARTeam. During the program, members of the ARTeam should visit teachers at their schools to discuss emerging issues related to the implementation of their action plans and provide support and feedback.

E) Establish a summative evaluation system.

The final step of the proposed DIA is concerned with establishing a summative evaluation system. A value-added approach should be adopted (Antoniou & Kyriakides, 2011). This implies that at the beginning and at the end of the school year teaching skills and students' outcomes should be measured, so as to identify the net effect of the professional development program. Specifically, the teaching skills of the participating teachers should again be evaluated by focusing on the eight factors of the dynamic model concerning teacher behaviour in the classroom. Data on student achievement should also be collected, in order to measure the effectiveness of the DIA in terms of student achievement gains. The emphasis of the summative evaluation should not be on comparing teachers with each other, but on identifying the overall impact of the program on the development of teachers' skills and its indirect effect on student learning. The results of such an evaluation system could assist in measuring the effectiveness of the DIA and allow subsequent decisions to be made regarding the continuity of the program.

7. Studies providing empirical support to the DIA

Although further research is needed to test the overall effectiveness and the applicability of the DIA, some empirical support has already been provided to the basic elements of the DIA and to the impact of this approach on improving quality of teaching and student achievement.

Firstly, one of the basic assumptions based on which the DIA has been developed is that teaching skills could be grouped into different developmental levels, associated with teacher effectiveness (i.e., student achievement gains). This assumption has been supported by the findings of several studies. Particularly, the first study has utilised an experimental research design to implement and investigate the impact of interventions based on the DIA and on the Holistic Approach (see Antoniou & Kyriakides, 2011), upon improvement on teaching skills and on student achievement in mathematics. The sample of the study consisted of 130 primary school teachers. Data were also collected from all students ($n=2356$) of the teacher sample. At the beginning and at the end of the school year 2008-2009 the teaching skills of the participants were evaluated by external observers. Data on student achievement were also collected using written tests. In addition, teacher and student questionnaires were administered to collect data on their background characteristics. The observation data were then analysed using the same procedure described by Kyriakides et al. (2009). Using the Rasch and Saltus models, it was found that teachers could be classified into the same five levels based on their teaching skills. The same results were also identified in the second – final measurement of the same study. It was also found that teachers demonstrating higher levels of teaching skills were more effective, taking their student achievement gains as criterion of effectiveness (see Antoniou & Kyriakides, 2011). The same levels of teaching skills were also identified in a follow-up study, aiming to investigate the sustainability of the results of the DIA, one year after the end of the interventions (Antoniou & Kyriakides, in press).

Moreover, similar levels of teaching skills were also identified in a third study conducted in Canada (see Janosz, Archambault, & Kyriakides, 2011). The main aim of this study was to test further the validity of the dynamic model at the teacher level, by investigating the extent to which the teaching skills of teachers in Canada could be grouped into the same stages as those reported by the previous studies. The sample was taken from

seven primary schools in the suburb area of Montreal. All grade 3, 4, 5 and 6 students (n=959) from each class (n=42) of the school sample were asked to complete a questionnaire measuring the extent to which their teacher behaved in a certain way in their classroom. A generalisability study (Creemers & Kyriakides, 2008) on the use of students' ratings revealed that data from almost all the questionnaire items could be used for measuring teaching quality. Support for the construct validity of the questionnaire has also been demonstrated (see Kyriakides & Creemers, 2008). The results of the study conducted in Canada provide some support for the cross-cultural validity of the developmental levels of teaching skills.

The results of a fourth study also provided empirical support to the notion of developmental levels of teaching skills. This study was an attempt to investigate how the DIA could be used to offer teacher training concerned with specific teacher factors (see Christoforidou, Kyriakides & Antoniou, 2012; Creemers, Kyriakides & Antoniou, 2012). Thus, the focus of the DIA was on improving, not the whole range of teaching skills included in the dynamic model of EER, but particularly the teacher assessment skills. The results of this study provided further support to the assumption that teacher assessment skills can be grouped into different developmental levels. The use of a specific measurement framework to describe not only quantitative, but also qualitative, characteristics of classroom assessment helped us define specific assessment skills that are grouped into different types of teacher assessment behaviour. These types of teacher assessment behaviour are described in a distinctive way and move from relatively easy to more advanced skills. The developmental scale was identified also in the final measurement of teacher skills in assessment providing support for the generalisability of the results.

The results of the above studies provide support to the identification of levels of teaching skills in different contexts and with a different focus of investigation ranging from the whole spectrum of teaching skills to specific teaching skills, such as classroom assessment. This is important, as one of the main criticisms against stage-related studies refers to their cross-sectional methodology (Kyriakides et al., 2009). Cross-sectional studies are very likely to give rise to a stage notion of development because they focus on measuring skills at different levels of experience. However, in the above studies, teacher skills were measured twice within a period of a year, with the same teacher sample. As the data indicate there was a strong correlation between the skills of teachers at these two points of time. Furthermore, taking student outcomes as criteria of effectiveness, it was found out that

teachers who use more advanced types of assessment behaviour were more effective than those demonstrating the relatively easy types. These results provide further support for the major assumption of the DIA, namely, that teachers can be classified into different levels in terms of their teaching skills. Thus, an initial evaluation of teachers' skills can help us identify improvement priorities that should be taken into account in designing teacher professional development programs.

Another basic element of the DIA is the important role of the ARTeam in all phases of the developmental program. Although each teacher is expected to develop his/her own strategies and action plans for improvement, it is acknowledged that the ARTeam has a crucial role in facilitating the improvement process, by carrying out the measurement of the teaching skills, providing appropriate literature and developmental activities, and supporting teachers in revising and implementing effectively their action plans for improvement. The important role of this team in the DIA has been supported by a study exploring the sustainability of the results of the DIA in relation to improvements made in teaching skills (see Antoniou & Kyriakides, *in press*). This study was related with the one year follow-up measurement of the teaching skills of teachers who participated in the experimental study mentioned above (i.e., Antoniou & Kyriakides, 2011). During the interventions and with the active involvement of the ARTeam teachers employing the DIA made a statistically significant progress in their teaching skills. One year after the end of the interventions the teaching skills of the same participating teachers were re-evaluated using the same procedures as in the initial study. The aim was to investigate whether teachers fall back to their initial stage or whether they kept on improving further their quality of teaching even after the intervention stimulus ended and without the engagement of the ARTeam. The results demonstrated that during the year that no intervention was offered, the teaching skills of the teachers had neither improved nor declined. Considering this finding, in relation to the improvement of teaching skills for those teachers employing the DIA during the interventions and with the assistance of the ARTeam, we could argue that this team has an important role in facilitating and steering the improvement effort. As King and Kitchener (1994) argue, stage growth does not unilaterally unfold but requires a stimulating and supportive environment.

Finally, in all the above projects (Antoniou & Kyriakides, 2011; Antoniou & Kyriakides, *in press*; Creemers, Kyriakides & Antoniou, 2012; Christoforidou, Kyriakides &

Antoniou, 2012; Janosz, Archambault, & Kyriakides, 2011) teachers employing the DIA managed to improve their teaching skills and their student achievement gains. On the other hand, teachers in the control groups or employing other approaches to teacher development such as the Holistic Approach (Antoniou & Kyriakides, 2011) and the competency-based approach (Christoforidou, Kyriakides & Antoniou, 2012) did not manage to improve their teaching skills nor their student achievement to the same extent. In addition, some teachers employing the DIA made sufficient progress to move on to the next level of teaching skills, based on the results of the final evaluations, whereas all teachers in the control groups or employing other approaches remained at the same stage at which they were found to be situated at the beginning of the studies. Although the effect sizes indicating the progress that the teachers employing the DIA had made were relatively small, one should bear in mind that these courses were provided for a relatively short period and only short-term effects were measured. One could expect even larger effects if the programs had been made available for a longer period and/or the long-term effects of the interventions had been measured.

8. Conclusions and suggestions for further research

This paper advocates the use of the DIA, an evidence-based and theory-driven approach towards teacher training and professional development and particularly towards the improvement of teaching skills and student outcomes. The proposed approach integrates research findings from teacher effectiveness, such as the grouping of teaching skills included in the Dynamic Model of EER, with research findings from teacher training and professional development, such as the utilisation of critical reflection, development of action plans, mentoring by the Research and Advisory Team and peer coaching. The findings of the studies utilising the DIA, briefly presented in this paper, reveal the added value of using this approach to improve teaching skills and student achievement.

The DIA and the results of the studies conducted so far to investigate the validity of this approach (e.g., Antoniou & Kyriakides, 2011; Antoniou & Kyriakides, in press, Christoforidou, Kyriakides & Antoniou, 2012), have important implications for organising teacher professional development courses. Such implications are related with the need to develop and provide developmental programs which address the participants' professional needs and immediate priorities for improvement. This also implies that we should move away

from professional development approaches with a "one size fits all" orientation and acknowledge in practice the need to differentiate the content of the various courses according to the participants' needs. Like Combs et al., (1974) argue, "in the first place, it is a fallacy to assume that the methods of the experts either can or should be taught directly to beginners" (p.4). Moreover, according to Berliner (1994), we probably need to think through the scope and sequence of teacher education experiences in the same way and with the same care that we develop scope and sequence guides for students from kindergarten to twelfth grade. Decision making, priority setting, and other aspects demonstrating personal control over the environment are characteristic of the developmental stage of competent teacher, rather than that of a novice.

This of course yields an additional implication, related with the need to measure and evaluate the teaching skills of the participating teachers. Based on the evaluation findings, teachers should be classified into groups according to the level at which they were found to belong. Thus, it is important to acknowledge that more resources may be needed in order to organise training courses based on the DIA, in comparison with other teacher professional development approaches. Such resources are related with the extra amount of time that tutors would need in order to carry out classroom observations and collect evaluation data on the teaching skills of the participating teachers. However, this is a crucial element of the DIA, since unless the teaching skills of the participating teachers are measured, improvement priorities cannot be identified and action plans addressing those needs cannot be developed. The studies, briefly reported in this paper, demonstrate that although the effective implementation of the DIA needs more resources, the approach could be considered as cost-effective since a significant impact on the quality of teaching and student learning has been identified.

Moreover, the results of the studies employing the DIA, provide support to the argument that it is time to stop assuming that all teachers are in possession of effective teaching skills that develop naturally and without the need for training and reflection addressing specific needs. As with all skill learning, regardless of whether it involves performance skills or cognitive skills, there is a need for programs that train for the desired skills (Cornford, 1996). This attempt is supported by Desimone et al. (2002), arguing that focusing on specific teaching practices in professional development, increase teachers' use of those practices in the classroom and thus students' learning. That is not to deny in any way

that reflective thinking and critical analysis are important and, for this reason these two elements have been utilized in the development of the DIA.

Particularly, according to the DIA, reflection for understanding and critical thinking on teaching skills and classroom practices, are important elements in all aspects of learning and performance. Through reflection teachers participate consciously and creatively in their own growth and development (Zeichner & Liston, 1996). Reflection enables practitioners to analyse, discuss, evaluate and change their own practice, adopting an analytical approach. From this perspective, the DIA supports that at the same time there must be appropriate content or a coherent body of knowledge, supported by empirical data and validated theoretical frameworks, to guide the reflection process and facilitate teacher improvement.

Suggestions for research on expanding the scope of the DIA are also made. Particularly, longitudinal studies in different countries could be conducted to provide further support to the assumptions upon which the DIA is based. For example, although several experimental studies have provided support to the levels of teaching skills, further studies could investigate further the generalizability of this finding. In addition, longitudinal studies lasting for more than two years could explore further the nature and characteristics of teacher development and the factors influencing their progression between levels. Moreover, more longitudinal studies are needed to investigate the long-term effect of the DIA on teaching skills and student learning outcomes, since so far only the short-term effect of the DIA has been investigated. This is important, as the sustainability of teacher professional development programs has not been investigated to any great extent (Avalos, 2011).

Moreover, studies can be conducted in order to identify the relationship between domain-specific and generic teaching skills (Seidel & Shavelson, 2007). Such studies may also reveal possibilities for establishing levels of effective teaching that refer to combinations of generic and domain-specific skills. Experimental studies could also be conducted in order to find out whether incorporating domain-specific skills when offering teacher professional development programs based on the DIA may have a stronger impact on student achievement than DIA programs concerned only with generic skills. Finally, case studies can be conducted to identify the difficulties that teachers experience in moving up to the next level of teaching skills and to clarify the barriers associated with bridging the gaps between levels. Case studies of teachers who drop to a lower level for a variety of reasons (including burnout)

could also be employed. The findings of these studies may also help us expand the DIA and cover issues associated not only with the improvement of their teaching skills, but also with other aspects that affect their professional careers. Such findings may also reveal that in helping teachers to improve their skills, other factors, such as their efficacy beliefs and attitudes towards the teaching profession should be considered.

References

- Admiraal, W., & Wubbels, T. (2005). Multiple voices, multiple realities, what truth? Student teachers' learning to reflect in different paradigms. *Teachers and Teaching: theory and practice*, 11(3), 315–329.
- Antoniou, P., & Kyriakides, L. (in press). A Dynamic Integrated Approach to Teacher Professional Development: Impact and Sustainability of the Effects on Improving Teacher Behavior and Student Outcomes. *Teaching and Teacher Education*
- Antoniou, P., & Kyriakides, L. (2011). The impact of a dynamic approach to professional development on teacher instruction and student learning: results from an experimental study. *School Effectiveness and School Improvement*, 22(3), 291-311.
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27(1), 10-20.
- Ball, D.L., & Cohen, D.K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In G. Sykes & L. Darling-Hammond (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 3-32). San Francisco: Jossey Bass.
- Ball, D.L., Thames, M.B. & Phelps, G. (2008). Content Knowledge for Teaching: What Makes It Special? *Journal of Teacher Education*, 59 (5), 389 – 407.
- Ball, D.L., & Forzani, F. M. (2011). Building a common core for learning to teach, and connecting professional learning to practice. *American Educator*, 35(2), 17-21, 38-39.
- Berliner, D. (1994). Expertise: The wonder of exemplary performances. In J. Mangieri & C. Block (Eds.), *Creating powerful thinking in teachers and students: Diverse perspectives*, (pp. 161–186). Fort Worth, TX: Harcourt Brace College.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3–15.

- Borko, H., Jacobs, J., & Koellner, K. (2010). Contemporary approaches to teacher professional development: Processes and content. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education*, Vol. 7 (pp. 548–556). Oxford: Elsevier.
- Brooks, R. (2002). The individual and the institutional: Balancing professional development needs within further education. In G. Trorey & C. Cullingford (Eds), *Professional Development and Institutional needs* (pp. 35-50). Hampshire, England: Ashgate Publishing.
- Christoforidou, M., Kyriakides, L. & Antoniou, P. (2012). The Impact of the Dynamic Approach to Teacher Professional Development upon Teachers' Skills in Assessment. Paper presented at the American Educational Research Association (AERA) Annual Meeting, Vancouver, British Columbia, Canada.
- Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education*, 18(8), 947–967.
- Cochran-Smith, M., & Zeichner, M.K. (2005). *Studying Teacher Education: The Report of the AERA Panel on Research and Teacher Education*. AERA Panel on Research and Teacher Education. Routledge.
- Cohen, D.K., & Hill, H.C. (2001). *Learning policy*. New Haven, CT: Yale University Press.
- Combs, A.W., Blume, R.A., Newman, A.J., & Wass, H.L. (1974). *The professional education of teachers: A humanistic approach to teacher preparation*. Boston: Allyn & Bacon.
- Corkindale, J., & Trorey, G. (2002). Career Dynamics in Further and Higher Education. In G. Trorey, & C. Cullingford (Eds), *Professional Development and Institutional needs* (pp.79-101). Hampshire, England: Ashgate Publishing.
- Cornford, I.R. (1996). Experienced teachers' views of competency-based training in NSW TAFE. In *Learning & work: The challenges: Con, fence papers*, Vol. 4 (pp. 105-115). Brisbane: Griffith University, Centre for Learning and Work Research.
- Creemers, B.P.M., Kyriakides, L., & Antoniou, P. (2012). *Teacher Professional Development for Improving Quality of Teaching*: New York, USA.
- Creemers, B.P.M., & Kyriakides, L. (2008). *The dynamics of educational effectiveness: A contribution to policy, practice and theory in contemporary schools*. London: Routledge.
- Creemers, B.P.M., & Reezigt, G.J. (1996). School level conditions affecting the effectiveness of instruction. *School Effectiveness and School Improvement*, 7(3), 197–228.
- Dall'Alba, G. & Sandberg, J. (2006). Unveiling professional development: a critical review of stage models. *Review of Educational Research*, 76, 383–412.

- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597 - 604.
- Desimone, L. M. (2009). Improving impact studies of teacher's professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199.
- Desimone, L., Porter, A., Garet, M., Yoon, K. S., & Birman, B. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, 24(81), 81-112.
- Dinham, S., Brennan, K., Collier, J., Deece, A., & Mulford, D. (2000). The Secondary Head of Department: Key Link in the Quality Teaching and Learning Chain. *Quality Teaching Series*, 2, 1-35.
- Dreyfus, H.L., & Dreyfus, S.E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: Free Press.
- Elliot, B., & Calderhead, J. (1995). Mentoring for teacher development: possibilities and caveats. In T. Kerry & A. Shelton-Mayes (Eds), *Issues in Mentoring* (pp.35-55). London: Routledge in association with the Open University.
- Elmore, R. (1997). Education Policy and Practice in the Aftermath of TIMSS. Available at: <http://www.enc.org/TIMSS/addtools/pubs/symp/cdl 63/cdl 63.htm>
- Feiman-Nemser, S. (1990). Teacher Preparation: structural and conceptual alternatives. In W. Houston (Ed.), *Handbook of Research on Teacher Education* (pp. 212-233). New York: Macmillan.
- Fishman, B., Marx, R., Best, S., & Tal, R. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and Teacher Education*, 19(6), 643-658.
- Gage, N.L. (1978). *The scientific basis for the art of teaching*. New York: Teachers College Press.
- Garet, M.S., Porter, A.C., Desimone, L., Birman, P.F., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.
- Gilberts, G.H., & Lignugaris-Kraft, B. (1997). Classroom management and instruction competencies for preparing elementary and special education teachers. *Teaching and Teacher Education*, 13(6), 597-610.
- Janosz, M., Archambault, I., & Kyriakides, L. (2011). The cross-cultural validity of the dynamic model of educational effectiveness: A Canadian study. *Paper presented at the*

- 24th International Congress for School Effectiveness and Improvement (ICSEI) 2011. Limassol, Cyprus, January 2011.
- Joyce, B., & Showers, B. (1995). *Student achievement through staff development* (2nd ed.). White Plains, NY: Longman.
- Joyce, B., Weil, M., & Calhoun, E. (2000). *Models of teaching*. Boston: Allyn & Bacon.
- Katz, G.L., & Rath, D.J. (1984). *Advances in Teacher Education* (Vol. 1). New Jersey: Ablex Publishing Corporation.
- Kincheloe, L. J. (2004). The Knowledges of Teacher Education: Developing a Critical Complex Epistemology. *Teacher Education Quarterly*, 31(1)49 -66. .
- King, P.M., & Kitchener, K.S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.
- Kyriakides, L., Creemers, B.P.M., & Antoniou, P. (2009). Teacher behaviour and student outcomes: Suggestions for research on teacher training and professional development. *Teaching and Teacher Education*, 25(1), 12–23.
- Kyriakides, L., & Creemers, B.P.M. (2008). Using a multidimensional approach to measure the impact of classroom-level factors upon student achievement: a study testing the validity of the dynamic model. *School Effectiveness and School Improvement*, 19(2), 183–205.
- Muijs, D. (2008). Widening opportunities? A case study of school-to-school collaboration in a rural district. *Improving Schools*, 11(1), 61-73.
- Muijs, D., & Reynolds, D. (2001). *Effective Teaching: evidence and practice*. London: Sage.
- Popham, W.J. (2006). Phony formative assessments: Buyer beware! *Educational Leadership*, 64(3), 86–87.
- Reynolds, D., Hopkins, D., & Stoll, L. (1993). Linking school effectiveness knowledge and school improvement practice: Towards a synergy. *School Effectiveness and School Improvement*, 4, 37–58.
- Sammons, P. (2009). The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools. *School Effectiveness and School Improvement*, 20(1), 123–129.
- Scheerens, J., & Bosker, R.J. (1997). *The foundations of educational effectiveness*. Oxford: Pergamon.

- Schubert, W. (1998). Toward Constructivist Teacher Education for Elementary Schools in the Twenty-first Century: A Framework for Decision-Making. Available at:<my.netian.com/~yhhknue/conedl9.htm>
- Scott, C., & Dinham, S. (2002). The beatings will continue until quality improves: Carrots and sticks in the search for educational improvement. *Teacher Development*, 6(1), 15-31.
- Seidel, T., & Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis research. *Review of Educational Research*, 77, 454-499.
- Shulman, L. (1987). Knowledge and teaching: foundations of the new reform. *Harvard Educational Review*, 57(1), 1-22.
- Spillane, J. P. (1999). External reform initiatives and teachers' efforts to reconstruct practice: The mediating role of teachers' zones of enactment. *Journal of Curriculum Studies*, 31, 143-175.
- Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J. A., Wagner, R. K., Williams, W. M., Snook, S. A., & Grigorenko, E. L. (2000). *Practical intelligence in everyday life*. New York: Cambridge University Press.
- Wiggins, G., and J. McTighe. 1998. *Understanding by design*. Alexandria, VA: ASCD.
- Zeichner, K., & Liston, D. (1996). *Reflective teaching: An introduction*. Mahwah, NJ: Lawrence Erlbaum Associates.