

The Active Involvement of Teachers in Action Research for Differentiation of the Teaching-Learning Process: Understanding the Needs of Students and Weaknesses of the Curriculum

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Abstract

The current participatory action research examines teachers' involvement in differentiated teaching and learning strategies in mixed ability classrooms describing their steps from the point of defining the problem to the development and application of action in an effort to evaluate the impact of differentiation in developing and improving the reading abilities of students who are in the first class of the lyceum. It utilizes classroom observation, diary entries, interviews as well as pre and post tests. The action research illustrates the problems that arise during the course of implementation of the principles of differentiation, focusing on the ways in which teachers re-evaluate their perceptions on learning through individual and collective reflection, meet the needs of students and tackle weaknesses of the curriculum through co operation. At the same time, it also underscores the positive impact of differentiation on learning outcomes and the changed perceptions of students towards learning.

Keywords: action research, differentiated teaching and learning, reading comprehension

1. Introduction

Ruys, Defruyt, Rots, & Aelterman (2013) have noted that although it is widely accepted that schools are obliged to adjust their curriculum in order to cater for the developmental needs and capabilities of all students, the complete implementation of differentiated instruction in daily practice is still lacking and remains a challenge (Burton, 2003; Humphrey et al., 2006). Research findings indicate that a significant number of teachers adopt a uniform and one-size-fits-all teaching approach for all students (Tomlinson, Moon, & Callahan, 1998; Guild, 2001), thus failing to design courses that reflect student diversity (Subban, 2006). The root cause of this phenomenon lies in the inadequate training of teachers (Hardré & Sullivan, 2008; Ruys et al., 2013), since the successful implementation of differentiated instruction is based, on the one hand, on their ability to understand and correctly assess both individual and collective needs of students, on their in-depth knowledge of their teaching subject, as well as on their creative dexterity in adapting the curriculum, teaching strategies, resources, learning activities, the assessment and learning environment appropriately so that they can meet the needs, interests and learning profiles of all their students (Tobin & McInnes, 2008; Santangelo & Tomlinson, 2012).

On the other hand, it is noted that as differentiation is not just a teaching strategy but also an innovative way of thinking about teaching and learning (Tomlinson, 2009) its successful implementation is based primarily on the perceptions of teachers of what learning is and how it can be achieved (Moon, Tomlinson & Callahan, 1995). By implication, this raises the question of what the best way of training teachers is, so as to achieve conceptual change, which will then motivate them to consciously engage in the diversification of teaching techniques, as well as the acquisition of the necessary knowledge and skills required in its application (May, 2007; Santangelo & Tomlinson, 2012).

Researchers point to the need for further research which examines how teachers understand, engage with and respond to diversity in their classrooms in greater depth (Humphrey et al., 2006; Ruys et al., 2013). It is this aspect which this participatory action research wants to explore, aiming to thoroughly and systematically study the processes that occur during differentiation of teaching-learning in mixed ability classes, noting and recording the difficulties encountered but also the actions set in motion to remove them, as teachers restructure and adapt the given curriculum so as to respond to the degree of readiness, learning profiles, interests and motivations of students in their first year of the lyceum during the teaching of reading skills. The following questions were set: a) What problems/challenges do teachers face in their efforts to develop and implement differentiated lessons and in what ways are these lessons handled so as to ensure successful teaching in classes of mixed readiness? b) What effect does the active involvement of teachers in action research have in their own educational training and development?

2. Methodology

Action research was used in an effort to ensure the active participation of teachers who face the challenge of teaching reading comprehension in mixed ability classes, initially in the in-depth analysis of student needs (clarification of the problem), the reconstruction of the curriculum for reading comprehension and its readjustment to student needs (action development). In a cyclic, spiral process of continual observation of their lessons, individual and collective reflection and evaluation of their actions teachers amended and redesigned their intervention (Carr & Kemmis 2010), which aimed towards the improvement of the reading comprehension skills of their students.

2.1 Participants

Two teachers participated in this action research in collaboration with the University of Cyprus. The teachers became involved in the action research out of inner impulse, wanting to meet the challenge of teaching mixed ability classes. The first teacher, who has twenty-one years of teaching experience, participated in the research in the context of her doctoral studies, while the other holds a Master's degree in Special Education and has ten years teaching experience. Students (N = 82) from four classes in the first year of the lyceum were taught reading comprehension from October 2012 to April 2013 according to the principles of differentiation. In order to investigate the effectiveness of the actions developed, a control group of 81 students, who were from four different departments and in their first year at the lyceum, were taught by two other teachers in a monolithic, undifferentiated fashion.

2.2 Tools of Measurement

Various research tools were used in the triangulation of data and the scientific consolidation of research results (Altrichter, Posh, & Someky, 2001): teacher journal entries, student observations, student interviews and pre and post tests.

2.3 Procedure

Initially the challenge of teaching reading comprehension in mixed ability classes was the problem encountered. Different actions were designed and implemented in a thorough definition of its dimensions (compilation of curriculum for reading comprehension in the first class of the lyceum, analysis of needs through the use of pre tests and student interviews). Various actions were then developed and implemented in an effort to solve the problem (design of differentiated lessons meeting various students' particularities). The actions undertaken were evaluated through teacher observations which supplied reflection and fruitful dialogue among teachers and were re-evaluated throughout the intervention. Finally quantitative (post tests) and qualitative (teacher and student interviews) data were collected for the final evaluation of the action taken. More specifically, teacher journal entries aimed towards a documentation of their work (description of challenges/problems encountered in teaching & framework in which they appeared, expression of thoughts, feelings and value judgments), as well as reflection through an analysis of their own personal values and theories (Altrichter et al., 2001). In addition, the two participant teachers observed each other's lessons at various intervals. Each teacher observed the implementation of what they had designed together, noting information on the successful implementation of differentiated teaching as well as the nature of problems inhibiting its success. Finally, after each observation, a fruitful dialogue between the teachers took place where their views on what had been observed or what they felt required improvement were expressed. Decisions regarding what was to be explored or changed were taken jointly.

The views, actions and relationship of those involved constituted a subject of renegotiation and redefinition based on rules of justice and morality, within the boundaries of equality and interaction, according to the critical, emancipatory model of action research (Kemmis, 2009).

2.4 Analysis

Discourse analysis was conducted (Gee, 2011) for the interview data together with journal entries. Student performance in the pre and post test underwent statistical analysis with the use of the logistic model Rasch (through the logistic programme Quest) and Regression Analysis (through the statistic packet SPSS19).

3. Results

3.1 Teachers as Researchers

In this research teachers played a catalytic and determining role in analyzing students' needs, defining, analyzing and prioritizing the objectives of teaching-learning, designing and implementing differentiated lessons, and evaluating and redesigning depending on the new needs of students (Koutselini, 2008a; Tricarico & Yendol-Hoppey, 2012). This circular, spiral path is outlined in order to highlight the difficulties faced by teachers in the process of diversifying their teaching, as well as the actions they developed to overcome them.

3.1.1 Identification and Clarification of the Problem

The absence of a curriculum. Within the context of clarifying the problem teachers realized the crucial importance of a curriculum, which would act as their navigator in the complex task of differentiation (Koutselini, 2008b). Such a curriculum was absent, from the educational system of Cyprus, since the New Curriculum for Teaching Greek of 2010 was applied only under a pilot phase in high school classes, whilst the lyceum followed the Programme for the Teaching of Modern Greek (Cyprus Ministry of Education and Culture, 2012), which suggested only within what time frame specific chapters of the school textbook should be taught. Therefore, the questions recorded in the teachers' diaries were highly pertinent: "What knowledge/skills should a good reader possess? What reading strategies should he or she develop to become an autonomous reader?" They realized that they were unable to define the reading skills their students already possessed - an essential procedure in the design of an environment conducive to the construction of knowledge (Koutselini, 2008b). Teachers were concerned as to whether they would be able to adopt a different approach to teaching than the one set out by the educational system of Cyprus and which teaching inspectors called upon teachers to follow - evidence of which is found in an entry of one of the teacher's journals: "What will I tell the inspector that I teach if he comes to inspect?" (24 October 2012).

3.1.2 Development and Implementation of Action

Development of a programme for reading comprehension. Although the official policies of the educational system proved restrictive, the teachers decided to proceed with the action research as they felt that their actions aimed towards finding solutions to issues which arose in mixed ability classes. The absence of a programme mobilized teachers to develop one for teaching reading comprehension in the first class of the lyceum; this programme identified and analyzed clearly the knowledge/skills a literate person was expected to possess according to the relevant literature (Vacca, Vacca, & Mraz, 2014). Aptitude indicators in reading comprehension were established and hierarchized from the simplest to the most complex so that every time teachers designed a course they could establish and define prerequisites, substantive and transformational knowledge and skills in relation always to the degree of preparedness of each student. By breaking down the complex into simple components and cultivating skills for building knowledge, qualitative changes in teaching were sought, since the work carried out in the context of differentiated instruction should not be based on the constant repetition of the same or on the accumulation of knowledge (Koutselini, 2008b).

Bearing the specific programme in mind teachers designed tests assessing reading skills for the analysis of student needs before the intervention as well as for their evaluation during the intervention. Through the use of specific aptitude indicators, the functional process of differentiation was facilitated, turning theory into practice (Koutselini, 2008b). Definition of student readiness. Within the framework of action research teachers wanted to clarify which reading skills their students possessed and drew useful information from the interviews about reading strategies students possessed and utilized. It was found that the low performance of the majority of students in the first trial evaluated was in line with the limited knowledge students had of reading strategies, as shown from the interviews.

More specifically, the moderately weak to lower performance readers were not applying any reading strategy before or after reading a text in order to check their level of understanding.

The strategies which they mentioned that they knew and applied related mainly to the re-reading of an incomprehensible extract and with finding ways to understand the meaning of unknown words. In spite of that, they stated that if the text seemed too difficult to understand, they simply gave up, not knowing what else to do: "If I carry on reading and realize that I don't understand something, I give up and leave.

How long must I torture myself, Miss? ...What can I do" (weak reader).

Although moderate and more competent readers knew and made use of certain strategies before, during and after reading, a detailed analysis of their written work showed that most students, regardless of their reading skills, applied these strategies in a rudimentary fashion. Reading the title and the author's name before reading the text, for example, did not lead students to a conscious understanding of the subject matter or the author's style of writing, nor did it encourage them to learn more about the specific topic. At the same time, when they re-read the elusive text they did not strive to identify the topic sentence in each paragraph or its supporting details. They also struggled to determine what guided them towards identifying the key information and distinguishing it from secondary elements, demonstrating the superficiality of their statement "I underline the main points." They also failed to utilize appropriate strategies to find out the meaning of unknown words, since more than half the students stated that they sought help from someone, and only one third of them sought for the interpretation in relation to the context or used a dictionary. Design of differentiated lessons. The fact that students had limited knowledge of reading strategies explained their poor performance in pre-tests and is in keeping with the relevant literature (Ivey & Fisher, 2006; Reutzel & Clark, 2011), which illustrated that readers who face difficulties in understanding extracts do not use reading comprehension strategies effectively. That is why it was considered imperative to teach these strategies during the intervention. At the same time, knowledge of the strategies which students already possessed and applied was particularly helpful for the design of differentiated lessons, as it allowed teachers to activate prior knowledge and strategies and subsequently teach new strategies which catered to the specific needs of each child.

3.1.3 Evaluation and Redesign of Action

Difficulties. By noting their actions whilst teaching, as well as those of their students whilst learning, teachers defined the difficulties encountered at this stage of the research, and reflected upon them both individually and collectively, seeking the reasons behind these difficulties. The qualitative data showed that problems arose from: a) teachers' inability or weakness to ascertain students' readiness, despite having studied the results of pre tests, b) teachers' inexperience in the design of appropriate activities in order to meet pupils' multifaceted particularities (readiness, interests, learning profile, incentives) as well as the c) ineffective classroom organization. The result included inflexible working methods on the part of students, volatile situations when it came to group work, and ineffective use of class time. Feelings of fear and insecurity appeared in teachers' journals with questions as to their adequacy to fulfill what they knew about differentiated teaching theoretically. Teachers were concerned about the difficulties they faced when it came to the flexible organization of the class, the loss of teaching time, as well as their feelings of inadequacy and the sense that their prestige was somehow compromised and they were not in control of the class.

It was evident that despite teacher a's theoretical training in differentiated teaching-learning, which should have allowed teachers to proceed with confidence in clarifying their subject matter (knowledge/skills and reading strategies) and to explore their students' reading needs, putting into practice the rules of differentiation posed difficulties making them feel insecure and vulnerable. Bearing in mind the long centralization of the educational system in Cyprus and the control it applies via inspection, the explicit instructions of teaching and the requirement to use teaching materials set, it becomes evident that teachers find themselves in a position where they are unable to proceed creatively, autonomously and confidently from theory to practice (Koutselini, 2010). Apart from teachers' weaknesses, another factor making their work more difficult regarded the perceptions and attitudes the students themselves held towards Modern Greek as a subject, their teachers and the actual learning process, in previous school years. Students of various reading skills all expressed dissatisfaction with the teacher-centered approach enforced by their teachers, which led to an authoritarian climate in which students felt suffocated. The teacher, who was seen as representing the only source of knowledge for students, taught only what he or she considered useful, "wrote the new information on the board," and "repeated things which students didn't fully grasp over and over again."

What is more, the teacher demanded complete silence during the lesson or as students copied the material into their notebooks. The students answered questions only when asked to do so and had to memorize information in order “to do well in the test”.

Students admitted that they felt bored in class, some even tended to play games because teachers did not encourage them “to reflect, to think critically, and to find answers.” Instead, they were constantly bombarded with knowledge deemed “worthless” or tautological, rendering them in the passive role of a consumer of knowledge. This information was considered to be extremely useful because it motivated teachers to re-examine and reflect on their own incorrect perceptions which inhibited the application of differentiated lessons. The latter perceptions appearing in teachers’ journals regarded the view that the teacher was the source and transmitter of knowledge for students and that completing the syllabus was foremost. The following extract from a journal is indicative: “In today's lesson, the first 45 minutes were teacher-centered. Of course this was not my initial aim... I should not be disappointed by such incidents, nor be led by my fear towards teacher-centered models of teaching in order to feel in control of the class” (teacher a, 6 December 2013). Redesign of action. Reflection following the observations of their actions, as well as student feedback, contributed to the re-evaluation of teachers’ misconceptions regarding learning and teacher and student roles in the learning process (Koutselini, 2010), perceptions which echoed the modernity culture of enforcement and control which inhibited every effort for the acquisition of knowledge through interactive collaborative environments (Koutselini, 2008a).

“Before, I strongly believed that it was only when I gave and explained the new material, gave examples and wrote down the most important information on the board that students learnt. I was disappointed when I discovered that few students had learned the new information I had taught. My participation in the research helped me realize a lot of things” (interview - teacher b, April 2013). By using the information gathered, teachers devised a series of actions in order to teach more effectively in a dynamic learning environment. They designed activities with graded levels of difficulty which presupposed the reading and were related to the interests of students in order to motivate them to find out new things. Writing articles in the school magazine or online news letters, participating in interactive debates, and searching within texts for solutions to problems faced by students were activities chosen by teachers to reflect students’ interests within the wider context of the design of authentic activities (Ivey & Fisher, 2006; Irvin, Meltzer, & Dukes, 2007; Reutzel & Clark, 2011).

In order to carry out these activities, teachers gave students the opportunity to work alone initially and then to work with the person sitting next to them, or with members of a larger group. Teachers also moved around the classroom, sitting next to students, watching their progress, listening to their questions and providing them with appropriate feedback, guiding them towards the discovery of knowledge. In this way, the provision of ready-made knowledge was avoided, and it was the path to knowledge that was rewarded rather than the end result. At the same time, teachers created the appropriate conditions for the development of students’ cooperation skills. By utilizing the ideas that students had learned about the value of constructive dialogue, the students were asked to create and apply a code of behavior which promoted cooperation between team members, as well as to evaluate themselves and each other. Roles were assigned and positive behavior in group work was rewarded. In this way, the development of cooperation skills (active listening, respect for different opinions, discussion by using arguments and cooperation in order to successfully obtain common objectives) was achieved (Carpenter & Pease, 2013). Teachers also actively involved students in the selection of various texts (printed and electronic texts, comics, pictures, video clips) with graded difficulty that was consistent with their readiness and interests. Thus students were encouraged to bring in material that interested them and which would then be discussed in the classroom.

While planning lessons, teachers also took care to meet the different learning profiles of their students, thus taking into consideration what research findings have shown about the positive contribution of differentiation of learning and teaching to students’ performance and the improvement of learning outcomes when teaching respects the learning profile of each individual student (Farkas, 2003; Sternberg & Zbang, 2005). For example, at the level of processing informative material, visual and auditory stimuli and various codes (language, pictures, charts, and diagrams) were used, and new items of information were linked in constructive ways to pre-existing ones, with suggestions being offered on how to organize the latter. Teachers designed activities which allowed students to work alone (e.g. text production by using information from the texts studied in class), or with the members of their group (e.g. debates on a subject that arose from the texts), as well as guided activities which presupposed a series of steps (e.g. collect their classmates’ opinions about the use of greeklish), and creative activities that

allowed students the freedom of choice (e.g. writing a discursive text through the use of any textual medium).

3.2 The contribution of action research

Working within an active research framework, teachers were freed from the obsession to complete the syllabus and disregard their students, realizing the need for teaching learning strategies which enable students to learn how to learn and how to move from being passive recipients of information to becoming actively involved in the learning process, becoming students who know how to discover and produce knowledge (Ivey & Fisher, 2006; Koutselini & Patsalidou, 2015). They developed problem solving skills, searching for underlying causes, developing activities to eradicate them. They evaluated and redesigned their actions responding to students' views. Actions they developed proved their occupational emancipation and maturity (Koutselini, 2010) and contributed positively to the teaching of reading skills as well as altering students' perceptions on learning and the learning process. Teachers felt more effective as a result of their actions (Carr & Kemmis, 2010): "Now that we have completed this effort I am excited, as I have learnt new methods of teaching and I also felt that my students responded" (teacher b). The contribution of teaching on learning outcomes. As the aim of the action research is to empower the teacher to meet the challenges of teaching, making him or more effective, it is necessary to present the effect of the actions developed on the students themselves. The hierarchical regression analysis showed that the distribution of the performance of students of the experimental (N= 82) and the control group (N= 81) in the final assessment test A2 was interpreted by the participation in the intervention and by the performance in pre-test A1 only. The participation in the intervention contributed more to the interpretation of the distribution of the performance (38%) than the performance in pre-test A1 (21%) (Table 1).

Table 1: Hierarchical Regression Analysis for Variables that Explain the Performance in post-test A2

Independent variables	B (SE)	β
Second step		
Participation in the intervention	1.66 (0.12)	0.73***
Performance in pre-test A1	0.68 (0.08)	0.47***

Notes: $R^2=0.59$ for the second step * $p<0.05$, ** $p<0.01$, *** $p<0.001$

It is noteworthy that, as revealed by the hierarchical regression analysis, the variables of gender, teacher b's classes and the low education of the mother (primary and or lower secondary school) interpreted – before the implementation of the intervention – 26% of the distribution of the performance in pre-test A1 (Table 2).

Table 2: Hierarchical Regression Analysis for Variables that Explain the Performance in Post-Test A1

Independent variables	B (SE)	β
Boys	- 0.76 (0.11)	- 0.46 ***
Classes of Teacher b	- 0.38 (0.13)	- 0.2 **
Mothers' education (primary and/or lower secondary school)	- 0.31 (0.14)	- 0.15 *

Notes: $R^2= 0.26$ * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Nevertheless, after the intervention, the variables of gender and the mother's low level of education did not affect the interpretation of the distribution of the performance in post-test A2. This reveals that the impact of the intervention stopped the negative role of these two variables in students' performance in pre-test A1 and shows the catalytic role of the intervention in boys' performance as well as in the performance of students whose mothers have low education. At the same time, the students of teacher b increased their performance by 1.66 points in post-test A2 as a result of their involvement in the intervention whilst their performance in pre-test A1 remained constant. Additionally, student discourse analysis revealed a broadening of students' reading strategies, after the intervention as well as the clarity and accuracy used to describe each strategy explaining its role in understanding.

"Before reading a text it is always good to see what type of text you are dealing with [...] because the vocabulary used is determined by the type of text. I pay attention to when and where the text was written in order to contextualize it. I also look at the title and speculate on the subject. I then think, "What do I know about this subject?" "What else would I like to know?" (weak reader before the intervention).

Contribution on the redefinition of learning. It was also discovered that after the intervention students reconstituted their original understanding of what knowledge is, how it is acquired, and what their own role is in the path towards its acquisition. However, after the intervention the meaning of knowledge changed for the students. They mentioned the reading skills and strategies they had learnt and the contribution of these skills and strategies in their comprehension of a difficult text. Students considered these skills and strategies useful and permanent knowledge which equipped them with the skills to find information in a text, something which they could not master previously. As a result, their feelings of “desperation” were eliminated. These reading skills and strategies had been acquired in a creative learning environment of acceptance, encouragement and expression of personal interest by the teachers; it was an environment in which students were given the opportunity to cooperate with their classmates, to communicate, to exchange opinions and express their disagreement. This learning environment motivated the efficient as well as the less efficient students to learn. It was obvious that this learning environment was different from the competitive and authoritarian climate which they had experienced before. These observations were perfectly encapsulated by one of the more competent students:

“The lesson was more interesting than lessons in previous years. When we studied a text, the way we saw the world changed and sometimes we managed to change the attitudes of the members of our group ... [he laughs] it was fun to cooperate with my classmates. The projections also made the lesson more lively and interesting. We created the lesson ourselves. The teacher didn’t constantly write on the board and tell us to learn what had been written down. We all spoke together and then the teacher would write what we had said on the board. I find all this positive... We found out knowledge ... All my classmates were more active than in any other lesson ... Even students who were not so good or who used to remain silent in other lessons, were active in this one.”

Discussion

In this research the catalytic role of the direct and active involvement of the teachers in the solving of problems which arise in the classroom is obvious. Solutions to the challenges of teaching in mixed ability classes are not given by the experts nor are they imposed by an external authority. On the contrary, teachers investigate, find and design solutions according to a cyclic, spiral procedure from student needs assessment (understanding of others) to definition, analysis and hierarchy of the objectives of learning and teaching (the realization of the particular demands of the subject taught in relation to students) and then from the design and implementation of differentiated lessons to the evaluation and redesign, allowing teachers to regulate their actions autonomously (Koutselini & Patsalidou, 2015; Tricarico & Yendol-Hoppey, 2012). Thus they become free from algorithmic approaches of curriculum development - all products of modernity - through which control of the teacher is sought, subsequently crushing his/her personality (Koutselini, 2010).

In this procedure of their occupational emancipation and maturity the role of conceptual change is crucial. Conceptual change is achieved through their active involvement in the construction and adaptation of the given curriculum to the micro level of the classroom, and through reflection and cooperation between the teachers themselves. This confirms research data which indicates that in order for teachers to realize their subconscious perceptions and possible misconceptions about teaching and learning it is necessary for them to have the opportunity to reveal and understand their false beliefs, as well as how these affect the transformation of their theoretical knowledge into active teaching (Hargreaves, 1998; Giroux, 2010; Papastephanou & Koutselini, 2006). It is also worthy to note that teachers listened to their students’ voices in order to address their diverse particularities (Koutselini, 2008a; Tomlinson, 2009). Actions developed contribute to a wider discussion on the requirements of effective teaching-learning, on adolescent reading skills (Biancoarosa & Snow, 2004; Cantrell & Carter, 2009) demonstration of the catalytic role of reading strategies (Afflerbach & Meuwissen, 2005; Irvin et al., 2007), the response to student readiness, their interests and student profiles (Tomlinson, 2009), the provision of substantial feedback aiming towards the improvement of their reading skills (Carpenter & Pease, 2013), as well as sincere interest, acceptance and encouragement (Subban, 2006; Tomlinson, 2009). Participants in the dynamic environment created by the action research progress from fixed logos to contradiction of it, and from deconstruction to reconstruction, thus achieving the transition from theoretical knowledge to action (Elliot, 1991).

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