Differentlated Teaching and Constructive Learning Approach by The Implemetation of ICT in Mixed Ability Classrooms*

Stavroula VALIANDE[1], Bülent TARMAN[2]

ABSTRACT

The aim of this paper is to demonstrate the need for a genuine constructive implementation of information technology in teaching practices and outline how information and technology can enhance and add to the effectiveness of differentiated teaching in mixed ability classrooms by using screening model. Along with the rapid changes in the era of information and technology around the world, education must find the best ways of utilizing new technologies in learning process, targeting to add value for learning outcomes and promote independent learning for all students. Both differentiated teaching and the theory behind the creation and use of educational software is drawn from the constructive learning theory where each person construct its own body of knowledge in interaction with its environment based and combined with prior knowledge and dexterities. Findings of this study show that differentiated instruction occurs efficiently when teachers implement ICT effectively.

KEYWORDS: Differentiated teaching, constructivist approach, ICT, (Information and Communication Technology) mixed ability classroom

Karma Sınıflarda Öğretim Teknolojileri Destekli Farklılaştırılmış Öğretim ve Yapılandırmacı Yaklaşım

ÖZET

Bu araştırma, öğretmenlerin, farklılaştırılmış öğretimi etkili bir şekilde gerçekleştirebilmek için eğitim ve bilişim teknolojilerini ne kadar etkili kullandıklarını, ne tür etkinlikler yaptıklarını ve bu konuda karşılaştıkları sorunların neler olduğunu saptamak amacıyla, tarama modelinde tasarlanmıştır. Bilim ve teknolojide yaşanan hızlı gelişmeler eğitim sisteminde de önemli değişmeler yaşanmasına neden olmaktadır. Sürekli değişen ve gelişen dünya, yenilikleri ve gelişmeyi kavrayan, bununla birlikte kendi sorumluluklarının farkında olan bireylere ihtiyaç duymaktadır. Modern hayatın yeni koşulları öğrenme anlayışının değişmesini zorunlu hâle getirmiştir. Bu durum, bireylerin içinde yaşadıkları toplumun etkin bir üyesi olmasını, kendisine aktarılan

bilgileri aynen kabul eden, yönlendirilmeyi ve biçimlendirilmeyi bekleyen değil, bilgiyi yorumlayarak anlamın yaratılması sürecine etkin olarak katılmasını zorunlu hale getirmektedir. Yapılandırmacı yaklaşım, öğrencinin öğrenme sürecinde aktif olduğu, kendi öğrenmesinin sorumluluğunu aldığı, kavramları kendi ön-bilgi ve öğrenme stillerine göre zihninde yapılandırdığı bir öğretim ortamı sunmaktadır. Çalışmanın sonuçları göstermiştir ki eğitim ve bilişim teknolojilerinin etkili kullananıldığı durumlarda farklılaştırılmış öğrenme süreci daha etkili gerçekleşmektedir.

ANAHTAR KELİMELER: Farklılaştırılmış öğretme, yapılandırmacı yaklaşım, BIT (Bigi ve İletişim teknolojileri), karma sınıf

INTRODUCTION

In our era where information is easy to access there is a greater need for the development of skills, dexterities and higher order thinking skills for accommodating the knowledge in a beneficiary way for solving problems. Student's, in this sense must become "constructors" of their own knowledge and information must be functionally linked with centers of knowledge, guiding and supporting their actions. The developments of metacognitive skills are basic and essential to face the unknown and to meet with the challenges that emerge from a multicultural society and promote the creation of a society and economy of knowledge. The development of ICT dexterities is also essential, important and could support the effective construction of knowledge in a more personalize way creating and developing prospects for lifelong learning (Yücel at al., 2010). The theory of constructivism in all forms: discovery learning (Bruner, 1961), problem based learning (Barrows & Tamblyn, 1980; Barrows, 1993), learning by doing (Papert, 1980) and experimental learning (Kolb & Fry, 1975) can be seen as the way to lead to students in learning how to learn, based on their prior knowledge and dexterities by being actively involved in their learning process (Vygotsky, 1978, Salomon & Perkins, 1998).

Although the need for active citizens through education is recognized, school failure caused mainly by the ineffectiveness of educational systems and their malfunction in corresponding to student needs (educational, physical, mental, social etc.) brings out the need from a shift to a more student centred teaching approach. Differentiation, a highly student centred approach can confront both, the chain reactions by increased diversity in mixed ability classes and the continuation of the phenomenon of school failure (Valiandes & Koutselini, 2008).

Differentiated teaching and learning, bases mainly on constructivism, is a multiphase, multifaceted and complex approach in achieving learning for all students in mixed ability classrooms. Teacher, not as a protagonist but as an orchestrator of the learning process decides which education material, at which point, for which students, in which environment, in what profundity according to students' readiness level, their learning style, their interests (Tomlinson, 2001, 2003), their socioeconomical status and finally their personal

characteristics that can affect learning. To do so teacher must be ready to use all his skills and professional knowledge in order to change and adopt his teaching to his students and not the other way round.

Today more than ever teacher has more to grasp on than a book and blackboard. Technology gave teachers many different tools that can be used as means for teaching. New technologies provide the educational world, essential tools that if used appropriately can determine what children learn and alter how children learn everything based on the framework of modern theories of learning (Negroponte et al., 1997). Teachers' role is to utilize education software in a constructive teaching approach by offering guidance and support whenever necessary and thus facilitate the active participation and learning so that students can build their own interpretations and comprehensive knowledge within their social context by cooperating and interacting with others (Strommen & Lincoln, 1992).

Exploitation of information technology in learning process based on constructivism meets the theory and practice of differentiation, where simultaneously students' needs are met by transformation of teaching routines and learning process. In order to transform their teaching, teachers must revise their perception and their teaching theory and practice, leading to a conscious alteration of their teaching actions.

In this paper we will first give an outline of the main axis of the theory and practice of differentiation and present evidence of its effectiveness. Second, we will sketch the role of ICT in today's' classrooms and demonstrate the need for a genuine constructive implementation of Information technology in every day teaching practices. Finally we show how information technology can enhance and add to the effectiveness of differentiated instruction in mixed ability classrooms.

What is Realy Differentiation

Differentiation and differentiated teaching as shown by a recent research (Valiandes, 2010) is misunderstood by most teachers in a way that they believe that differentiated teaching is using different methods and different materials in everyday teaching. Of course there is some truth in this but this statement is still far from the main theory and practice of differentiation. Differentiation is everything and anything teacher does or chooses not to do during the learning process targeting to the fulfillment of his students needs and the facilitation of learning for all. Differentiation is not a recipe to be applied (Tomlinson, 2001, 2005). It requires deep knowledge of the theoretical framework and differentiating process and the ways that theory is translated into action. In consequence high quality and continuous teacher's training, reconstruction of the curriculum and the creation of supporting educational material constitute main parameters for an effective differentiating practice (Valiandes, 2010).

Differentiated teaching and learning is a multiphase, multifaceted and complex approach in achieving learning for all students in mixed ability classrooms. In practice, differentiating teaching is a highly flexible and responsive procedure and requires skillful teachers which also have a very good overall knowledge about their students and their gradual progress. Linear processes and sure pathways to follow are never the way for differentiated teaching.

Teachers differentiate their work by providing students with various, interrelated, well planned educational activities based on their prior knowledge and dexterities, by adapting and regulating the curriculum, according to the diversity and differentiated needs of the specific students (Mitchell & Hobson, 2005). Lesson planning is guided mainly upon the uniqueness of each and every student (Willis & Mann, 2000). In this sense teaching which accomplishes, through the exploitation of various methods, means and materials, to correspond to the particular needs of each child is a clear example of effective differentiated teaching.

Literature reveals that differentiated instruction can be applied and achieved by changing different aspects of teaching. The main areas of diffusion of differentiation are the adaption of what is taught (content), the encouragement of critical thinking (process), the provision of a variety of opportunities for students to demonstrate and prove what they have learned (product), in a pleasant and secure environment, reinsuring that most students including students with learning difficulties get an opportunity to achieve high academic outcomes (Smutny, 2003; Lewis & Batts, 2005). Tomlinson (2001) suggests that differentiation can be applied as differentiation of content, process, product and differentiation of learning environment and evaluation methods. Koutselini (2008) moves one step ahead stating that if differentiation really cares about bringing equal learning opportunities for all in mixed ability classrooms then teacher must consider other factors affecting learning outside the school borders. Student's socio-economic status, their self-image and other personal characteristics can affect learning and opportunities to learn and have to be given a serious consideration when differentiated instruction is applied. Teacher is solely the one to decide on the type and area of differentiation, taking into serious consideration the particular needs of each student (Smutny, 2003).

An important element that all teachers should consider, when attempting differentiation, is that the starting point of every student is different regarding student's competences, learning profile and dexterities (Schlechty, 1997; Smutny, 2003). In order to deliver a highly effective lesson, learning process must be aligned with the student's level of readiness (Vygotsky, 1978) that will allow students to engage in the learning process.

Researchers and educators in favor of differentiated teaching believe that it is the answer to equity and effectiveness for all in mixed ability classrooms. Gayfers' research on non graded classroom (1991), reports the precedence in

academic outcomes of students received differentiated instruction compared to students that were taught mainly with traditional teaching methods (one method fids them all). Academic improvement of students by differentiated teaching is also supported by McAdamis (2001) research, where students with low academic outcomes showed an important improvement after differentiation of teaching. Of course there have been other research on differentiated instruction concerning specific group of students, talented - special education students – students work on specific knowledge or skill area, in mixed ability classrooms (Baumgartner, Lipowski, & Rush, 2003; Geisler et al., 2009; McQuarrie, McRae, & Stack-Cutler, 2008; Tieso, 2002; Rock and et al., 2008). Although all these research have shown that differentiation can be effective for targeted groups in mixed ability classroom, there was no study for the effectiveness on all students. However this crucial question has been answered by recent research which has shown that differentiated instruction can be effective for all students in mixed ability classrooms regardless their readiness level, their gender and most important their socioeconomic background (Valiandes, 2010).

Information Technology and Differentation For Construction of Knowledge For All

Information has brought a tremendous change in almost every aspect of our everyday life and simultaneously has effected education in all levels and all aspects. No one can deny the reality of technologies effect on education but there is still a strong debate concerning the effectiveness of information technology. The main axes of the effectiveness of implementing ICT in learning process is the way this implementation accommodates, supports and promotes the construction of knowledge in a more effective way.

This debate springs from the use of computers by teachers mostly for presentations and visualization purposes or as an electronic typewriter, giving little or no space for the use of computers in activities that accommodate the construction of students' knowledge. In this way curriculum content is neglected (Moursund, 1995) and computers are used mainly to attract student's interest and to make the learning process more interesting and "fancy". Teachers and educators must realize that information technology can be a powerful pedagogical tool if use appropriately by giving students opportunities to interact through well design computer activities. In this sense teacher must use technology, similar with any other teaching means, and utilise the advantages that information technology can offer in pathways of the construction of knowledge (Bransford, Brown, & Cocking, 1999). Teachers must understand that there is a need for a fundamental change in their teaching routines by which they will promote the use technology as a tool for organization, communication, research, and problem solving (Eisenberg & Johnson, 2004).
The need for integration of ICT in the learning process is now greater than ever. The potential of ICT, to promote new teaching objectives, change traditional teaching practices and develop new teaching methods has been noticed and

emphasized by many researchers (Jonassen, 1994; Mayer, 1999). While others, believe and state that educational applications of ICT in teaching and learning can support the process of construction knowledge (Mayer 1999, Raptis & Raptis 1999), if intergraded in an active process based on exploratory and collaborative activities. Today the debate is not focused primarily on whether the use of ICT can be effective for learning but how to apply and integrate ICT in the learning process, in order to help cognitive development of students (Clements, 2000).

The use of ICT as cognitive tools (cognitive tools - Jonassen 1994) and systems that enable the symbolic expression and the construction of concepts and knowledge lead to conceptual change and learning (Komis, 2004). Cognitive tools according to Jonassen (2000) are those tools of ICT which may trigger students' cognitive mechanisms and motivate them to get actively involved in cognitive processes. Students' active involvement will allow them to analyze the content they are working and at the same time promote and facilitate the organization and representation of their cognitive structures. In this course effective learner engagement in a way that would not be possible in the absence of technology. Modeling Software constitutes a good example on how technology can support learning. Working on solving problems requires a large amount of cognitive load (Salomon, 1984), computer software can assist learner by undertaking a substantial lower cognitive load enabling students to work on a higher level of cognitive work with less working load (Mandinach, 1989).
Living in a world of technology teachers using differentiated teaching must find the way to integrate Information technology effectively (Jonassen, 2000; Schlechty, 1997; Schank & Cleary,1995) in their everyday learning process, in order to improve the quality of teaching, learning and management in schools. The active use of technology by students, embedded in their knowledge construction process (Perkins, 1992) is at the same time a need, in order to prepare students in becoming independent learners and critical thinkers, enabling them to utilizing information and knowledge gained by the use of technology resources (interactive open software, close software, internet, social sites etc.) and a must in differentiated teaching giving students different choices of path to follow in constricting their personal knowledge.

METHODS

A small scale research was conducted with the participation of 30 elementary teachers who differentiate their teaching. Both qualitative and quantitative data were used in order to get an overall picture of the practices of implementing ICT in learning process, the attitude of teachers towards the implementation of ICT in their teaching and the problems that such an implementation encounters. A-five-level-likert-scale questionnaire consisted of 15 items, mainly about the implementation of ICT in everyday teaching process, was filled in by thirty teachers. Furthermore semi-structured interviews were taken by randomly selected eight teachers in order to cross check the results of the questionnaire

and at the same time get more detail information of issues concerning the effective implementation of ICT in differentiated teaching.

Qualitative research uses case study design which means researchers select a subject phenomenon for in depth examination regardless of the number of sites or participants for the study. Selected phenomena may vary from one administrator to one concept or from one program to one process. Thus, case study design is employed for this study to gain an in-depth description, understanding and interpretation of a situation. While a five level likert scale questionnaire was the primary data collection method, in-depth interviews, document analysis and researcher observations were supplemental for this case study. The participants were engaged in one-on-one, in-depth interviews for between sixty and ninety minutes. These interviews employed common, semi-structured conversational interview techniques and audio taped. Several observation sessions were conducted. Each of the observation took 40- 60 minutes. During these observations, the focus was on collecting data regarding classroom materials, props, artifacts, documents and activities which show the degree of teachers' implementation of ICT in everyday teaching process. All audio taped interview sessions were transcribed and classroom observation notes typed as word documents. Completed interviews and transcription of recordings allowed identification of categories of issues, concerns and experiences. Analysis of transcripts involved coding and clustering patterns that appeared as it is discussed in the following sections.

RESEARCH RESULTS

Teachers Practices in Implementing ICT in Learning Process

The answers given by the teachers on the questionnaire reveal that teachers believe in the added value in learning by the implementation of ICT (Mean=4,3 , SD = 0,59) and they do make an effort to implement ICT in their teaching. Teachers believe that the level of implementation of ICT in learning process is not the optimum with a level of implementation is 3,3 with a SD of 0,79. This is explained mainly by some main restrictions in ICT implementation in teaching. The number of students in classroom (Mean=3,5 , SD = 0,59), the pressure to cover curriculum content (M=3,33, SD=1,24) , limited teaching time (M=3,03, SD=1,115), the lack of computer skills by students (M=2,83 , SD=1,1) and hardware problems (M= 2,87 , SD=1,10) are only some of the problems that teachers have to face. According to teachers their computer skills and their knowledge on how to implement technology are very good and thus for these questions as shown on table 1 there is a low mean value of 1,87 and 2,23 irrespectively. Of course one must comments that the mean value for knowledge on how to implement technology in learning process is slightly higher demonstrating the need for further training for teachers.

Table1. *Results Of Teachers Questionnaire On The Implementation*

	Questions	1 f %	2 f %	3 f %	4 f %	5 f %	Mean	Std. Devia tion
1.	Do you use ICT for presentations during learning	0 0	1 3,3	2 6,7	12 40	15 50	4,37	0,76
2.	Use of concept mapping software	11 36,7	7 23,3	9 30	3 10	0 0	2,13	1,04
3.	Do you provide students opportunities to work with technology	2 6,7	6 20	6 20	11 36,7	5 16,7	3,37	1,18
4.	How would you describe the level of implementation of ICT in your teaching	5 16,7	12 40	12 40	1 3,3	0 0	3,30	0,79
5.	Your ICT skills keep you for implementation ICT in an	13 43,3	10 33,3	5 16,7	2 6,7	0 0	1,87	0,93
6.	Limited knowledge of implementation of ICT in the learning process is restriction on implementation ICT effectively	9 30	8 26,7	10 33,3	3 10	0 0	2,23	1,00
7.	Hardware problems consist one of the reason for not optimizing implementation of ICT in learning process	0 0	17 56,7	3 10	7 23,3	3 10	2,87	1,10
8.	Teaching time is not enough in order to implement ICT in every day learning process	1 3,3	11 36,7	9 30	4 13,3	5 16,7	3,03	1,15
9.	Pressure to cover curriculum content is a restriction on implementing ICT	1 3,3	9 30	6 20	7 23,3	7 23,3	3,33	1,24
10.	Number of students in the classroom can be one reason for a limited implementation of ICT	0 0	6 20	11 36,7	5 16,7	8 26,7	3,50	1,10
11.	Students' lack of computer skills is a restriction on implementing ICT in learning process	4 13,3	8 26,7	10 33,3	5 16,7	3 10	2,83	1,17
12.	Preparation time for the implementation of ICT is time consuming and demanding	7 23,3	10 33,3	5 16,7	6 20	2 6,7	2,53	1,25
13.	Do you believe that implementation of ICT is value added to students learning	0 0	0 0	2 6,7	17 56,7	11 36,7	4,30	0,59
14.	Do you use software that enables students to practice their knowledge	0 0	6 20	14 46,7	6 20	4 13,3	3,27	0,94
15.	Do you use software that enables students to construct their knowledge	3 10	13 43,3	8 26,7	6 20	0 0	2,57	0,93

Furthermore the results of the questionnaire reveal that although teachers believe that implementation of ICT can support learning they mostly use technology for presentation reasons (M=4,37). The use of software with preset practise activities) in order for students to practise knowledge learned is also at high level (M=3,27, SD= 0,93, where software for mapping concepts (M=2,13,

SD=1,04) or software that enables students work creatively and construct their knowledge is used less (M= 2,57, SD=0,93). This indicates that although teachers realize the important role ICT can play in learning process due to several factors mentioned before they do not implement ICT in the best way to support learning. Their understanding that there is still a long way to go in optimising implementation of ICT in the learning process brings out optimistic thoughts for the future. Of course education systems and curriculum developers all over the world should listen to the messages teachers send and promote curriculum changes that will allow teachers to optimize ICT implementation and make student's active long life learners by utilising technology tools in a creative, constructive and revealing way.

Teachers' beliefs, experiences and attitudes towards integration of ICT in Differentiated Teaching

Teachers in semi-structured interviews seem to agree with this article main theme by witch it is stated that implementation of ICT can support differentiation and the learning for all students in mixed ability classrooms. Most of the teachers state that through ICT integration in their teaching they are facilitated to differentiated their teaching in many ways and at the same time facilitate learning. According to the 8 semi-structured interviews of teachers that implement ICT and differentiate their teaching three main thematic categories where defined concerning the effective and optimum implementation of ICT in students' process of constructing their personal knowledge: 1) Added value on students learning of ICT implementation in learning process, 2) ICT implementation accommodates differentiated teaching and 3) restrictions for effective implementation of ICT in learning process.

Teachers based on their experience say that embedding technology into their teaching makes their lesson more interesting and as thus gains students interest to work actively and learn. Engaging students in active voluntarily participation based on their interest can promote learning (Valiandes, 2010). Teacher 3 stated *"I believe my students like working with computers and because they like it they work better and they gain more"* while teacher 7 said that *"I can see my students paying attention when I use technology in my teaching"*.

The use of computers has been seen by teachers in all stages of the learning process, allowing them to utilize computers for different purposes in different lesson stage (presentation, search, selection of information, creative work, solving problems and practicing knowledge e.t.c). Teacher 2 stated that *"I use computers in all stages of my teaching depending the subject, the software I have available, my students dexterities and many other factors ..."*. Although teachers state that they can use computers in all stages of their teaching most of them when analyzing   more the use of technology talk about using computers to present knew knowledge and to exercise by the use of computer on new knowledge. Teacher 5 said that "*students work on computers to exercise on the*

new knowledge and sometimes work on projects they have to prepare…" while on the other hand Teacher 1 stated that *"students can search in many electronic resources to find new material…"*. This result agree with the results of the questionnaire in which teachers did use technology more for visualization purposes and for exercise knew knowledge. All these advantages of implementing ICT lead teachers to believe and support that using ICT is value added to learning.

Implementation of ICT according to teachers can accommodate differentiated teaching in an effective way since it allows students to work according to their readiness level, their own work pace, their learning profile and their interests. *"The level of work on computers can easily alter or chosen so that students work according to their working level"* (teacher 4) and *"they can work without any pressure to follow the work of the rest of the class…"(teacher 7)*. Students have the opportunity to work on different theme according to their interest and work with a tool and an environment that suits their learning style. "Students who like to work with computers are happy, enthusiastic, get more engage in their work have better results than working in any other way." (teacher 6). Working individually with computers promotes the development of skills and dexterities for individual construction of knowledge that constitute one of the main targets of modern schooling. Shifting from all class lecturing to individual students work on computers teachers can both easily monitor and evaluate students work and progress and at the same time find time to work with students that need personalize help and support in their work.

All these advantages can be utilized and prosperous if certain restrictions are retained to the minimum. Lesson preparation time for implementation of ICT, according to teachers, constitutes a demanding and time consuming procedure. Teachers have not the time or the energy to prepare technology integrated lessons very often thus teachers must be given more preparation time and prepared constructive approach computer activities that can be implement in their teaching. *"Preparing a lesson that I will use computers is not the easiest thing to do and it takes me a lot of time" (teacher 3)*, "I need help or extra time to be able to prepare and use computers more in my teaching" (teacher 8). Teaching time is not always enough for implementing ICT due to pressure caused to teachers to cover curriculum content. *"There is not enough time to use computers often enough because we have to move on…"* (teacher 2) and "*sometimes although I have planned to use computers in my lesson I don't get the chance since this is time consuming, time that I don't have"*. Curriculum content has to be revised in order to include only the core knowledge and skills that students really need (Koutselini & Valiandes, 2007) this will give time to teachers to work continuously on students' dexterities to learn by using the advantages of technology. Simultaneously students that are computer illiterate will have the opportunity to learn more and work better with computers in general. Teachers did mention that sometimes hardware problems keeps them for implementing ICT in their teaching but they emphasis more on the lack of

computer software that are student friendly and enable students to work without the need of teachers' help. According to teachers there is a need for the development of educational software that will provide students with feedback on their work so that they can reconstruct previous misconceptions on prior knowledge and construct new knowledge. Teacher 2 stated that *" ... there is a need for development of software that will gradually lead student to construct knowledge ... a software that will give feedback and is in a sense interactive".* Finally teachers believe that they need to be trained on a constant basis in order to get inform and trained on new educational software and the way to implement specific software in their everyday teaching.

CONCLUSION

It is clear that teachers believe in the added value of implementing ICT in learning process but at the same time they realize that there is still a long way to go for optimizing the use of information technology in teaching in order to support students' knowledge construction process. Even if that is the case, according to teachers implementation of ICT, can serve different aspects of teaching and learning that support the theoretical background of differentiation. Using ICT can meet up with some of the student's interests and the way they like to work, therefore teachers can use ICT to differentiated teaching according to students' learning style and students' interest (Tomlinson, 2001; Valiande, 2010). Furthermore individual work by student's provides the teacher with the opportunity to adjust the level of their work according to their readiness level and at the same time allow each student to work on it's own pace taking the time he needs to fulfill his personal targets. Students' individual work on computers allows teacher to monitor students work and indentify the problems they encounter. In such classrooms teacher can spare time to work with gifted or struggling students individually for differentiated scaffolding according to their needs (Valiandes, 2010). Students can also cooperate in preparing projects and solving problems, by working together on the same task or through network, that can promote cooperation and communication even outside classrooms. Although there is evidence to support that the use of Informational Technology in differentiated teaching can be under specific presuppositions effective there is a need to exploit through experimental research the presupposition of effective implementation of ICT in constructing knowledge through differentiated teaching.

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GENİŞLETİLMİŞ ÖZET

Bilim ve teknolojide yaşanan hızlı gelişmeler eğitim sisteminde de önemli değişmeler yaşanmasına neden olmaktadır. Sürekli değişen ve gelişen dünya, yenilikleri ve gelişmeyi kavrayan, bununla birlikte kendi sorumluluklarının farkında olan bireylere ihtiyaç duymaktadır. Modern hayatın yeni koşulları öğrenme anlayışının değişmesini zorunlu hâle getirmiştir. Çağın gerektirdiği becerilere sahip bireyler yetiştirmek için geleneksel yaklaşımlardan farklı yaklaşımların benimsenmesine ihtiyaç duyulmaktadır. Günümüzde, nitelikli insanlara duyulan ihtiyaç giderek artmaktadır ve toplumların nitelikli insan güçleri de ancak nitelikli bir eğitim ile sağlanabilir. Bu nedenle günümüzde bireylerin pasif bilgi alıcısı konumundan çıkarak, bilgi üreten aktif bir durumda olması beklenmektedir. 21. Yüzyılda bireylerde olması gereken becerilerin başında eleştirel düşünme, sorgulama, karşılaştığı güncel ve toplumsal problemleri çözebilmek gelmektedir. Bu durum, bireylerin içinde yaşadıkları toplumun etkin bir üyesi olmasını, kendisine aktarılan bilgileri aynen kabul eden, yönlendirilmeyi ve biçimlendirilmeyi bekleyen değil, bilgiyi yorumlayarak anlamın yaratılması sürecine etkin olarak katılmasını zorunlu hale getirmektedir. Bu durum pek çok ülkenin eğitim programlarında etkin veya aktif vatandaş yetiştirilmesi hususunda vurgulanmaktadır. Ancak toplumun bütün bireyleri bilişsel, duyuşsal ve duygusal zekalarının farklılık arzetmesi veya kısaca kişisel farklılıklar aynı becerileri aynı şekilde öğrenip uygulayamamalarına neden olmaktadır. Çünkü her öğrencinin ilgi, yetenek, çevre ve karşılaşacağı sorunlar farklı olabilir. Bu noktada yapılandırmacı yaklaşım, öğrencinin öğrenme sürecinde aktif olduğu, kendi öğrenmesinin sorumluluğunu aldığı, kavramları kendi ön-bilgi ve öğrenme stillerine göre zihninde yapılandırdığı bir öğretim ortamı sunmasıyla, yeni yaklaşımlar içerisinde önemli bir yer tutmuştur.

Eğitimciler, içinde yaşadığımız bilgi ve teknoloji çağının gerektirdiği yeni teknolojileri kullanarak öğrenme sürecinde tüm öğrenciler için bağımsız öğrenmeyi teşvik etmeli ve öğrenmenin en iyi şekilde sağlanabilmesi için bir değer katmaya ve hatta bu doğrultuda en iyi yolu bulmaya çalışmalıdırlar. Bu anlamda bilişim teknolojisi her öğrencinin bireysel ihtiyaçlarının yerine getirilmesi ve akademik başarısının arttırılması doğrultusunda gerçekleştirilmesi gereken farklılaştırılmış öğretimin temel teorik arka planı ile birleşir. Bilgisayar kullanım yelpazesinin giderek genişlemesi ve eğitim öğretimin farklı alanlarında ve öğrencilerin hazırlık düzeylerinin farklılıklarının göz önüne alınması gerekliliği bilgisayarı oldukça yararlı bir araç haline getirmektedir. Böylece bilişim teknolojileri (özellikle bilgisayar) daha cazip ve etkili bir öğretim ve

öğrenme sürecinin oluşturulması hususunda her geçen gün artan bir öneme sahip olmaktadır.

Bilişim teknolojilerinde izlenen gelişmelere paralel olarak farklılaştırılmış öğretim ve eğitim yazılımlarının oluşumu ve kullanımı ardındaki teori Yapılandırmacı kuramdan esinlenerek gelişme göstermiştir. Farklılaştırılmış öğretim öğrencilerin önbilgi, ilgi, öğrenme stilleri gibi farklı bireysel özelliklerini kabul eden ve bu özelliklere uygun tasarımlar geliştirerek her bireye başarılı olma fırsatı sunmak için geliştirilen bir öğrenme sürecini kapsar. Her öğrencinin bilgiyi kendi bünyesinde oluşturduğunu ortaya koyan Yapılandırmacı Kuram bu anlamda farklılaştırılmış öğretimin de gelişebilmesine fırsat sağlamıştır. Her kazanılan bilgiyi bir sonraki bilgiyi yapılandırmaya zemin hazırlarlar.Çünkü, yeni bilgiler önceden yapılanmış üzerine bina edilir. Yapılandırmacı öğrenme var olanlarla yeni olan öğrenmeler arasında bağ kurma ve her yeni bilgiyi var olanlarla bütünleştirme sürecidir. Ancak bu süreç, sadece bilgilerin üst üste yığılması olarak algılanmamalıdır. Birey bilgiyi gerçekten yapı!andırmışsa kendi yorumunu yapacak ve bilgiyi temelden kuracaktır. Yapılandırmacılık, bilginin biriktirilmesi ve ezberlenmesi değil, düşünme ve analiz etme ile ilgilidir.Yapılandırmacı öğrenmede asıl olan bilginin öğrenen tarafından alınıp kabul görmesi değil,bireyin bilgiden nasıl bir anlam çıkardığıdır. Her öğrencinin bilgiyi oluşturma sürecinin kendisine özgü olduğunu savunan yapılandırıcı kuram, doğrunun göreceli olduğunu savunmaktadır. Doğrunun ve bilginin göreceli olması her bireyin kendisine özgü bir doğrusunun olduğunu gösterir. Bu anlayıştan yola çıkan yapılandırmacı kuram, bireyler arasındaki her türlü faklılığın eğitim ve öğretim sürecinde kabul edilmesini ve sürecin işleyişinde dikkate alınması gerektiğini savunmaktadır. İşte bu nokta itibari ile eğitim -öğretim yazılımları yapılandırmacı yaklaşımla ilişkilendirilmiştir.

Bu çalışma yukarıda sözünü ettiğimiz farklılaştırılmış öğrenme ve bilişim teknolojileri arasındaki ilişkiden hareketle farklı seviyede öğrencilerin oluşturduğu karma sınıflarda bireysel farklılıkların bilişim teknolojisi ile öğrenci başarısı arasındaki yakın ilişkiyi incelemktedir. Eğitim-öğretim sürecünde bireysel farklılıkların dikkate alınması gerekliliğini savunan Yapılandırmacı kuram ve gerçek bir yapılandırmacı uygulama için Bilişim teknolojisine duyulan ihtiyaç konusunda öğretmenlerin uygulamalarına bakılarak düşünce ve görüşlerine yer verilmiştir.

Bu araştırma, öğretmenlerin, farklılaştırılmış öğretimi etkili bir şekilde gerçekleştirebilmek için eğitim ve bilişim teknolojilerini ne kadar etkili kullandıklarını, ne tür etkinlikler yaptıklarını ve bu konuda karşılaştıkları sorunların neler olduğunu saptamak amacıyla, tarama modelinde tasarlanmıştır. Bu modelin seçilmesinin nedeni tarama modelinin var olan bir durumu olduğu şekliyle betimlemeyi amaçlamasıdır. Otuz ilköğretim öğretmeninin katılımı ile gerçekleştirilen bu çalışmada hem nitel hem de nicel veriler kullanılarak farklılaştırılmış öğrenme sürecinde Bilişim Teknolojileri (BİT) uygulamaları hakkında genel bir resim elde etmek için BİT uygulanmasına yönelik

öğretmenlerin tutumları ve böyle bir uygulama ile karşılaştığı sorunlar belirlenmeye çalışılmıştır. Öğretmen görüşleri beşli likert tipli anket ile toplanmıştır, anketle toplanan verileri desteklemek, öğretmenlerin verdiği bilgileri doğrulamak amacıyla rastgele belirlenen sekiz öğretmenle yarı yapılandırılmış görüşme yapılmıştır. Görüşme sırasında veri kaybını önlemek amacıyla, öğretmenlerden izin alarak konuşmalar ses kayıt cihazıyla kaydedilmiştir. Anket ve görüşme öğretmenlerle birebir görüşülerek araştırmacılar tarafından kaydedilmiştir. Çalışmanın sonuçları göstermiştir ki öğretmenler eğitim ve bilişim teknolojilerinin etkili kullananıldığı durumlarda farklılalaştırılmış öğrenme süreci daha etkili gerçekleşmektedir.