



Professional Development of Science and Physics Teachers in England*

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Abstract

Problem Statement: In this age, the importance of lifelong learning is known very well. Today, it is not possible to continue a profession for years with the training or education that has been followed to get the diploma to do that profession. In many countries teachers are trained with a bachelor degree. It is not expected that teachers can continue teaching only with the bachelor degree in education without any in-service training or professional development. Science and technology changes and improves very fast. Teachers who educate young generations, our future, should follow the changes and improvements in science and technology and adapt themselves into these changes. England is one of the important countries in the field of education. Therefore “How professional development of science and physics teachers is organized and designed in England?” is the problem statement of this research.

Purpose of the Study: This research was done to express the professional development programs for science and physics teachers in England. It is important to learn different approaches in different countries in order to get benefit from the good examples. In the field of education, England is an important country. Therefore this country has been chosen as a subject of the research to learn more about the professional development of teachers in England.

Method: This is a descriptive study that aims to describe the current situation. In this study, document analysis method was used. Document analysis method is used often in social sciences. In document analysis it is aimed to reach the primary resources. The documents were analyzed and the data were provided after analysis. In document analysis expert knowledge also can be used. In this research by contacting a British researcher, expert knowledge also gathered to reach more accurate and up-to-date data.

Findings and Results: There are many professional development programs for teachers in England but there is no national certification or rewarding system. The responsibility to provide professional development programmes for teachers are shared between government, governmental bodies, local

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educational bodies, school administration, headmasters and teachers. Teacher professional development mainly consists of two parts: programmes for general pedagogical skills and programmes for improving subject knowledge. It is generally accepted that teacher professional development is the main element to have a more effective education.

Conclusions and Recommendations: Research associations in England express that there are additional requirements in the nature of science and the professional development of teachers should keep teachers up-to-date about the developments in science. In England there are different alternatives for professional development of science teachers. These are: Continuous Professional Development Pilot Programme for Science, Science Learning Centres, Chartered Science Teacher, Science Teachers' Network, My Continuous Professional Development, and Science Education Association.

Keywords: Professional development, science and physics teachers, England.

INTRODUCTION

It is known that there is a correlation between student achievement and teaching quality of a teacher (Parkerson, Schiller, Lomax and Walberg, 1984, Akt. Lynn, 1988). Student achievement depends on the quality of education and the quality of education depends on the quality of teachers. Therefore all countries try to improve their teacher training systems ("Education of Primary", 2007). Nowadays it is accepted by all countries and institutions that teachers have an important role in school development and students' learning. UNESCO also agrees with this fact and defines teacher professional development as the "priority of priorities" (UNESCO-UNEP, 1990).

Teacher training generally has two parts: (i) initial teacher training and (ii) professional development or in-service training. In many researches it is concluded that professional development of teachers throughout all teaching career is important. Moreover it is important to create a synergy between education and practice in teacher training (Luukkainen, 2000_a). Teacher training should prepare the candidates to expertise and work life which changes continuously and in which there are new expectations every time. Teachers should be trained to be an active part of an education system (ETUCE, 1995).

Initial teacher training, internship and professional development of teachers should be connected in order to maintain the development of teachers. For teacher professional development, competencies for different levels of teaching profession and performance standards could help to create a framework (OECD, 2005).

If teachers can not renew themselves in teaching profession, in other words if they do not participate in lifelong learning or they can not continue this, they will meet many difficulties (Kısakürek, 2003). Therefore professional development of teachers is as much important as initial training of teachers.

There are different terms to explain professional development of teachers. Continuous development, professional development, professional learning, in-service training, continuous professional development, continuous career development and lifelong learning are some of them (Woolls, 1991; Turbill, 1993; Hoban, 1996;

George and Lubben, 2002). In all of them the aim is to develop teachers' skills to improve students' learning.

Professional development includes both learning in courses and learning in a profession. This term is commonly used in many professions. Continuous professional development requires aiming to improve professional knowledge and skills after initial training. In teaching profession this focuses more on provided education than the product. The change in terminology is a result of shift in emphasize from provider of education to individual. In other words, now an individual is responsible for his/her career development by herself/himself (Gray, 2005).

The main goal is to increase the standards in education and concentrate on the quality of education in order to increase the level of achievement. Professional development is important for school development and to increase student achievement. It is necessary to train teachers to develop their teaching abilities and strategies to improve students' learning. If new teaching abilities will be integrated with the current behavioural settings the advices of professional colleagues and additional support would be necessary. This shows the necessity of continuous professional development throughout the teaching career (ETUCE, 1995).

In this age, the importance of lifelong learning is known very well. Today, it is not possible to continue a profession for years with the training or education that has been followed to get the diploma to do that profession. In many countries teachers are trained with a bachelor degree. It is not expected that teachers can continue teaching only with the bachelor degree education without any in-service training or professional development. Science and technology change and improve very fast. Teachers who educate young generations, our future, should follow the changes and improvements in science and technology and adapt themselves into these changes.

Science has an important place in the development of countries. Therefore all the countries pay special interest in science education in order to follow the developments in science and technology and train people who can produce new knowledge and technology (Ayas, 1993).

Science education has various challenges. For example (Rodrigues, 2005):

- In many countries there is a decline in the number of students who choose science and technology education in secondary school and at university.
- There is an increasing gap between the number of new science teachers and the number of retired teachers or the ones who stop teaching.
- In many countries there is a very intensive science curriculum which does not attract students' interest.
- Resources (staff, material, time) are inadequate.
- There are problems in the ways of teaching science.
- The nature of scientific knowledge could not be transformed enough to students.
- There are problems about teacher qualifications.

In many studies it is found that there is decrease in the interest of young people in science and mathematics. It is thought that the reason of decreased interest of young people in science is teaching methods of science that are used in schools.

Therefore teachers have key role to renew science education (Rocard et al, 2007; Osborne and Dillon, 2008).

In Europe science education is now in the centre of interest. The main reason of this interest is decreasing number of students who choose science at higher education. The continuous and systematic professional development is emphasized as one of the ways to solve this problem (Osborne and Dillon, 2008).

In order to be a developed country and to be able to compete with the other countries in this globalized world, it is necessary to have a good education system and qualified teachers to work with this system. In order to teach young people who can contribute to development of science and technology and adapt themselves in the changes in science and technology. Science teachers should develop themselves continuously. It is important to know different trends in teacher education in different countries. In order to develop teacher education system in a country, it is necessary to know about the developments, problems and the solutions for these problems in other countries. England is one of the important countries in the field of education. Therefore "How professional development of science and physics teachers is organized and designed in England?" is the problem statement of this research.

METHOD

Model of Research

This is a survey research which aims to define the current situation (Karasar, 1998, s. 77). The data were collected by document analysis method which is one of the qualitative research methods. Qualitative research is defined as a research in which observation, interview and document analysis methods are used and a qualitative process is followed to display perceptions and events in natural environments with realistic and integrated ways (Yıldırım and Şimşek, 2005, s.39). Document analysis method is a commonly used method in social sciences. This method can be used as only method or it can be used with the other qualitative methods. With document analysis method the documents about the subject of the research are analyzed (Yıldırım and Şimşek, 2005).

In this research for document analysis it was aimed to reach the primary sources. The collected documents were analyzed and the analysed data were provided. The documents were collected from internet and from the printed scientific resources about the professional development of teachers in England. The documents for the research were found in ministry and government documents, from teacher associations, in the reports and publications of science and physics associations and websites. Moreover, by contacting the expert from The Science Council in London more actual documents were found.

FINDINGS

Teacher training in England has started in 1798. In that year the first teacher training college was opened in England (Moon et al, 2003). With the transformation of the old polytechnics into university, now teachers are trained at university level in England (Schnur and Golby, 1995).

In England, teachers should have “Qualified Teacher Status” in order to work at public schools. This status is given with the completion of teacher training programme and the accreditation of it by Teacher Training Institution (“ITT in England and Wales”, 2004). There are different models to get “Qualified Teacher Status”. The most common model is the one that is given by universities with a 1 year post-graduate programme. The successful completion of this programme leads to the “Qualified Teacher Status” (Stephenson, 1999).

Professional Development of Teachers

The professional development of teachers is getting more important for the government of the United Kingdom in order to reach the national goals such as creating more effective schools and increasing the standards of students’ achievement (O’Brien and MacBeath, 1999). Recruitment is the powerful force to professional development agenda. In one hand it is important to have enough experienced teachers and on the other hand it is important to supply enough professional development opportunities for teachers because the teaching force is getting older (in England 50% of the teachers are above the age of 45) and it is expected that next 15 years many teachers will retire. In England, more than 50% of the new teachers leave the profession after working five years. This situation causes anxiety about the number of teachers and some questions come into mind about professional development opportunities and guidance at the beginning of the career (HCEC, 2004).

In England different institutions take part in teacher training. The Ministry of Education has responsibility to define the standards of “Qualified Teacher Status” and requirements of programmes for “Qualified Teacher Status”. The Teacher Training Agency focuses on initial teacher training and at the same time gives guidance for the induction period (Neil and Morgan, 2003).

Professional development can happen in different ways. Different approaches for professional development should be known and advantages and limitations of each should be taken into account. The governmental initiatives, that depend on the expectations about creating a dynamic education system and meet the requirements of each child, express professional development of teachers as main source. This is related to creating strong connections between professional development and making a career. The contribution of teachers who improve their expertise and help colleagues to improve their expertises should be taken into account and be rewarded (DfES, 2005).

The key role in renewing teaching profession is in professional development from in-service training to continuous professional development (“Teacher Training”, 2004).

From the end of 1990s, there have been changes in teacher training, in the period from initial teacher training, induction, professional development to being a head teacher, in England. The General Teaching Council is responsible for the development of different regions and each general teaching council defines its priorities. However, there are similarities in teachers’ progress in the system. The general structure that is valid in the whole country is as follows (Neil and Morgan, 2003):

- Initial teacher training
- Induction (first year in the profession)
- Early professional development (generally lasts two years)
- Continuous professional development (throughout teaching career)
- Advanced skills teacher
- Headmaster

The period following induction is called continuous professional development in England. There are regulations for induction; however, there are no regulations for the years after induction. The General Teaching Council mentions that teachers are followed to improve their professional skills (Neil and Morgan, 2003).

With the foundation of the Teacher Training Agency in 1995, for the first time an institution that is responsible for the professional development of teachers, was founded in England. When the agency reviewed the current situation in 1995 at the first time, it was found that the coordination and evaluation in professional teacher development were inadequate and there was not enough focus on the developments in class (OECD, 1998). The Teacher Training Agency was restructured in 2005 and called “Education and Development Agency for Schools” (TDA, 2010).

In England there are many professional development programmes for teachers but there is no national system of certification and recognition (Osborne and Dillon, 2008). The responsibility in teacher professional development is shared between the government, governmental bodies, local education authorities, school administration bodies, headmasters and teachers (Luukkainen, 2000_b).

There are five main levels for teachers’ career development. These are (Forde et al, 2006):

- Newly Qualified Teacher
- Classroom Teacher
- Performance Threshold
- Advanced Skills Teacher
- Excellent Teacher

Local bodies are not the main designers of professional development programmes but they have a role in providing these programmes. 48% of the activities are organized by local education bodies and 40% is organized by schools. The roles of local education bodies are different in different parts of the country. Sometimes it is compulsory to send teachers to the courses opened by local education bodies and sometimes the local bodies do not open that kind of courses. As a result, the quality and the type of courses provided to teachers are different in different regions in England (OECD, 1998).

Teachers have an active role in planning teacher professional development. The half of the activities (54%) is chosen by teachers, 6% is chosen by local educational bodies and the rest is chosen by headmasters. This shows that teacher professional development is organized by common initiatives of teachers, local educational bodies and schools (OECD, 1998).

Professional Development of Science and Physics Teachers

The number of science teachers is not enough and more science teachers are needed in England. Because of this need, some teachers teach science in spite of not having science teaching education (Case, 2006).

Teacher professional development consists of two parts: programmes for general pedagogical skills and programmes for improving subject knowledge. It is generally accepted that teacher professional development is the main element to have more effective education. However, sometimes it is mentioned that professional development for subject areas has special importance in teaching science (“Chapter 5”, 2008). Teachers complain that there is not enough professional development programmes for science. Science develops fast and teachers need to adapt themselves into changes in the subject area. Most of the current professional development activities are related to general teaching subjects. These do not meet the needs of science teachers (Case, 2006). Research councils in England define that there are additional needs in science subjects and professional development of science teachers should keep them up-to-date with the new developments in science (“Chapter 5”, 2008).

There are negative conclusions about the professional development programmes for science area. It is explained that science teachers do not have science related professional development but more general professional development. According to a research, half of the science teachers at secondary level do not join any subject related professional development programme and 73% of the teachers indicated that they would like to participate more in subject related professional development programmes (“Chapter 5”, 2008).

According to a research that was made by The Science and Technology Council, teachers indicated that they did not attend a professional development programme that is related to their subject area and that meets their individual needs. They also defined that they have limited opportunity to learn from their colleagues. They criticised performance evaluation and professional development systems in their schools, too. Teachers who are in their first years in profession indicated that after taking the “Qualified Teacher Status” at the end of induction year, the importance given to professional development is getting lower (CST, 2000).

In England for the professional development of science and physics teachers there are different alternatives/associations. These are:

- Continuous Professional Development Pilot Programme for Science
- Science Learning Centres
- Chartered Science Teacher
- Science Teachers’ Network
- My Continuous Professional Development
- Science Education Association

Continuous Professional Development Pilot Programme for Science

This programme was developed for the teachers who do not have a bachelor or master degree in science but they teach science. The pilot phase of the programme was started at three universities (Universities of Edge Hill, Keele and Brighton). The expertise in the science programme is for the teachers who teach physics or

chemistry for 11-19 years olds but have no degree in science. Each participant follows a way that is developed according to the pre-knowledge of a participant. These programmes are accredited at master level (“Science”, 2008).

Science Learning Centres

In England one of the professional development mechanisms for science teachers are science learning centres. These centres provide lessons and resources for science teachers. In addition to this, professional institutions, such as Physics Institution, also contribute to professional development of teachers (Orr, 2008). Science learning centres support teachers to improve their skills by giving an opportunity to try actual scientific ideas and effective teaching approaches. The aim is to develop science education, improve emotions in teaching profession and motivate the students to learn science (SCL, 2008b).

There are learning centres in nine regions and there is one national centre in England. These centres provide courses about new scientific researches and industrial developments. All centres have new laboratories and information communication resources. There is cooperation with scientific institutions to provide up-to-date content to teachers (SCL, 2008b).

Science learning centre is a national network for professional development of science teachers. The courses that are provided by science learning centres are divided into two groups: for primary school teachers and for secondary school teachers. Some of the themes of the courses are (SCL, 2008a):

- Management and administration
- Science inquiry
- Evaluation
- Science in curriculum
- Enrichment
- Supporting science teaching
- Basic science and early childhood
- Creative and innovative approaches in teaching and learning

With these themes the following courses are provided by science learning centres:

- Creativity in science
- Evaluation in science for learning
- Supporting primary education science course
- Developing the role of a science teacher
- Scientific games and exploration for basic level
- Learning out of class: using school gardens
- Science and creativity
- Let’s talk about science
- Science and stories: using stories to support learning in the first grade
- Satisfactory science: how you should prepare your students and yourself to the tests.

The programme for secondary school teachers aims to make teachers to contact with their subject knowledge again, to bring interesting and attractive information to

the class and increase the skills in practice. Secondary school core programme consists of ten themes. These are (SCL, 2008c):

- Actual science
- Developing information and communication technologies
- Supporting and enriching learning
- What is science
- Management and administration
- New initiatives in science curriculum
- Practical studies
- Science for the ones who has no science background
- Supporting science teachers
- Teaching, learning and evaluation.

The courses for secondary school teachers are given in table 1 below.

Table 1. The professional development courses for secondary school science teachers

Actual science	<ul style="list-style-type: none"> ○ Bringing actual science in a class: Astrophysics ○ Bringing actual science in a class: Climate change ○ Bringing actual science in a class: Genetics ○ Bringing actual science in a class: Science for sustainability ○ Bringing actual science in a class: Nanotechnology ○ Bringing actual science in a class: New materials
Developing information and communication technologies (ICT)	Enriching science with ICT
Supporting and enriching learning	<ul style="list-style-type: none"> ○ Girls at physics ○ Learning out of class ○ Science for highly gifted students ○ Teaching science for students who needs special education
What is science	What is science
Management and administration	Providing effective professional development
New initiatives in science curriculum	<ul style="list-style-type: none"> ○ Finding out the big picture, subjects to study together ○ Developing 3rd grade science: teaching and learning
Practical studies	<ul style="list-style-type: none"> ○ New methods in physics ○ Science demonstrations: effective and secure ○ Reduced level chemistry ○ Practical ecology ○ New methods in chemistry
Science for the ones who has no science education background	<ul style="list-style-type: none"> ○ Chemistry for teachers who are not expert in chemistry ○ Physics for teachers who are not expert in physics
Supporting science teachers	○ Supporting science teachers
Teaching, learning and evaluation	○ Evaluation for learning: thinking, learning and evaluation

Reference: Adapted from Science Learning Centres (SLC) (2008_c). Science Learning Centres Secondary Programme 08/09'.

Chartered Science Teacher

Teaching science is a complicated and difficult process. Skilled science teachers should have knowledge about pedagogy, science education and science. With the status of “chartered science teacher” the expertise of teachers in science teaching is accredited (ASE, 2008). Chartered science teacher is a status that shows the expertise of a teacher in science teaching. The main elements in the role of a chartered science teacher are knowledge and skills of pedagogy, science education and science.

Chartered science teacher status (TSC, 2008):

- encourages high quality science teaching and learning,
- recognizes high and developing professional expertise,
- it is evidence for effective application and continuous professional development.

Chartered science teacher should:

- works together with colleagues to improve science teaching in classes or in laboratories,
- in contact with other chartered science teachers,
- presents that s/he continues and updates his/her professional expertise and qualification.

Science Teachers’ Network

The Science teachers’ network was founded by The Physics Institute in order to support teachers in the United Kingdom. There are regional coordinators who organize group activities and in-service training courses. This network provides various in-service training activities and education packets to support teachers’ teaching. The courses are free, there is no fee. All teachers can participate in these activities. Some of the subjects of the courses are:

- New ideas (includes 19 new ideas, can be organized as a lesson or workshop),
- Son of new ideas (another 19 new ideas),
- Software for schools,
- Make and buy rocket launcher,
- Van de Graff generator,
- Laboratory games (IOP, 2008).

My Continuous Professional Development

The Physics Institute provides various activities to support continuous professional development of science and physics teachers. One of these activities is “My Continuous Professional Development”. “My Continuous Professional Development” is an online tool with which teachers can write their development aims, can record of their activities and responsibilities. Chartered science teachers use “My Continuous Professional Development” for a year to save the developments in the lessons. When chartered science teachers meet the following requirements, then their status (chartered science teacher) is validated (IOP, 2008):

- Having 35 points for that year (informal development activities 1 point for 1 hour, formal development activities 2 points for 1 hour)
- Making “reflective analysis” for each activity (shows what has been learnt, what is the contribution to professional competency)

Science Education Association

This association provides one day courses for teachers in science education. Some of the courses are:

- Universal science for 11–16 years olds,
- Cultural understanding with help of science,
- What is science for 14–15 year olds?
- Learning and teaching science in England for the teachers who had teacher training in other countries,
- Creating difference in Physics,
- Improving Physics knowledge and skills,
- What is chemistry?
- Working with chemicals,
- Practical microbiology,
- What is biology?
- Health and security for new teachers,
- Laboratory management.

In addition to these, the Science Education Association can open courses for a school or a region on request (TSC, 2008).

FINDINGS AND CONCLUSION

In England it is accepted that the professional development of teachers is a main element to have more effective and high quality education. Professional development of science and physics teachers generally has two parts in England: programmes to develop general pedagogical skills and programmes to improve science knowledge.

Research associations in England express that there are additional requirements in the nature of science and the professional development of teachers should keep teachers up-to-date about the developments in science.

In England there are different alternatives for professional development of science and physics teachers. These are;

- Continuous Professional Development Pilot Programme for Science,
- Science Learning Centres,
- Chartered Science Teacher,
- Science Teachers’ Network,
- My Continuous Professional Development,
- Science Education Association.

These programmes are for science and physics teachers, who have no education background in science or physics, were trained as a science or a physics teacher, experienced teachers and non experienced teachers. In other words, there are professional development programmes for all kinds of teachers. In this way, in England it is aimed to meet all the needs of teachers. Teachers have chance to

develop their level of expertise and go forward in career steps with the help of professional development programmes.

There are different associations/bodies which provide professional development courses for teachers in England. This variety gives teachers a chance to choose a professional development course according to their needs and interest. The importance of science and technology education is noticed in England. Therefore there are developments about professional development courses for science teachers. It is important to provide different alternatives to the teachers. By this way, it will be possible to reach different teachers from different schools and regions. In Turkey in-service training courses are mainly provided by The Ministry of National Education. It would be more effective when there is cooperation with science associations to offer more up-to-date and useful courses to teachers.

Because of the need for more science teachers, there are teachers who teach science without having science teaching training in England. It is found that in England there are professional development courses especially for the science teachers who have no science education. So, while designing and opening professional development courses different needs and different teachers are taken into consideration. It is known that in Turkey there are teachers who teach science without science education background, too. Designing and providing professional development courses for that kind of teachers in Turkey is suggested. This will contribute to have high quality and effective education.

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İngiltere’de Fen ve Fizik Öğretmenlerinin Mesleki Gelişimi*

Özet

Problem Durumu: Günümüzde yaşamboyu öğrenmenin önemi herkes tarafından kabul edilmektedir. Artık bir mesleği yapabilmek için alınan temel eğitimle yıllar boyunca bu mesleğe devam etmek mümkün değildir. Pek çok ülkede öğretmenler lisans eğitimi ile yetiştirilmektedir. Öğretmenlerin hiçbir hizmetiçi eğitim veya mesleki gelişim programına katılmadan yıllarca öğretmenlik yapması beklenemez. Fen ve teknoloji hızla değişmekte ve gelişmektedir. Geleceğin teminatı olan yeni nesilleri yetiştiren öğretmenlerin de bu gelişmeleri takip etmesi ve kendilerini yenilemesi gerekmektedir. İngiltere eğitim alanında önde gelen ülkelerden biridir. Bundan dolayı İngiltere’de fen ve fizik öğretmenlerinin mesleki gelişimi nasıl organize edilmektedir?” sorusu bu araştırmanın problemini oluşturmaktadır.

Araştırmanın Amacı: Bu çalışma İngiltere’de fen ve fizik öğretmenlerinin mesleki gelişimlerini tanımlamak amacıyla yapılmıştır. İyi örneklerden ve deneyimlerden yararlanabilmek için başka ülkelerdeki farklı yaklaşımları bilmek önemlidir. Eğitim alanında, İngiltere önde gelen ülkelerden biridir. Bundan dolayı, bu ülke araştırma konusu olarak seçilmiştir.

Yöntem: Araştırma, genel araştırma modelleri açısından var olan durumu, var olduğu şekilde betimlemeyi amaçlayan tarama modelidir. Araştırmanın verilerinin toplanmasında nitel araştırma yöntemlerinden biri olan doküman incelemesi yöntemi kullanılmıştır. Doküman incelemesi yöntemi, sosyal bilimlerde yaygın olarak kullanılan yöntemlerden biridir. Araştırmada, doküman analizi yapılırken, birincil kaynaklara ulaşılmaya çalışılmış, dokümanlar çözümlenmiş, veriler analiz edilerek sunulmuştur. Doküman analizinde uzman bilgisine başvurmak da izlenen yoldan biridir. Bu araştırmada da, Londra fen konseyinden araştırma konusu ile ilgili deneyimi ve çalışmaları bulunan bir İngiliz uzmanın bilgisine başvurulmuştur. Böylece daha güncel ve gerçek bilgiler toplanmaya çalışılmıştır.

Bulgular: İngiltere’de öğretmenlere yönelik pek çok mesleki gelişim programı vardır. Ancak ulusal bir sertifikalandırma veya ödüllendirme sistemi yoktur. Öğretmenlere mesleki gelişim programları sunma sorumluluğu hükümet, hükümet organları, yerel eğitim otoriteleri, okul yönetimi, okul müdürleri ve öğretmenler arasında paylaşılmaktadır. Öğretmenlerin mesleki gelişimi iki bölümden oluşmaktadır: genel pedagojik becerilere yönelik programlar ve alan bilgisini

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geliştirmeye yönelik programlar. Daha etkili ve kaliteli bir eğitim için öğretmenlerin mesleki gelişiminin temel unsur olduğu genel olarak kabul görmektedir.

Sonuç ve Öneriler: Birleşik Krallıktaki araştırma konseyleri fen bilimlerinin doğasında ek gerekliliklerin yer aldığını ve fen öğretmenlerinin mesleki gelişmesinin, onları alandaki yeni gelişmeler konusunda güncel tutması gerektiğini ifade etmektedir. İngiltere’de fen ve fizik öğretmenlerinin sürekli mesleki gelişimini sağlamaya yönelik değişik alternatifler/kurumlar vardır. Bunlar; Pilot Fen Bilimleri Sürekli Mesleki Gelişim Programı, İmtiyazlı Fen Bilimleri Öğretmeni, Fen Öğrenme Merkezleri, Fizik Öğretmenleri Ağı, Benim Sürekli Mesleki Gelişmem ve Fen Eğitimi Derneği’dir.

Anahtar Sözcükler: Mesleki gelişim, fen ve fizik öğretmenleri, İngiltere.

