Examining the Reflection of Mathematics Education on Sustainable Development in the Light of the Quality of Life Index in Turkey, PISA and TIMSS *

Habip Mehmet SEVGİ [1], Soykan UYSAL [2]

* This article is presented in "Second International Conference on Sustainable Business and Transitions for Sustainable Development 2013 in Opole University in 20-22 June 2013 with the name of "The Reflections of Mathematic Education on Sustainable Development" and supported by Selcuk University Scientific Research Projects (BAP) with the project number 13701096.
[1] Lecturer, Selçuk University, Akşehir Vocational School, Konya, Turkey.e-mail: hmsevgi@selcuk.edu.tr
[2] Instructor, Selçuk University, Akşehir Vocational School, Konya, Turkey.e-mail: soykanuysal@selcuk.edu.tr

Abstract
There is a linear relationship between the levels of development of people and countries development. So, if a country wants to be developed, it should increase the level of the development of the citizens. The most effective way to increase the level of the development of the society passes through education. The countries which are investing on education provide sustainable development at the same time. It is possible to see its examples in our environment. In this paper, we are going to collapse the title of education in to mathematic education and examine the relation between mathematic education and sustainable development. Based on mathematic education process may increase the levels of development of individuals, obtaining sustainable development is going to be emphasized. The mentioned situation is going to be supported in the light of the quality of life index in Turkey, PISA and TIMSS practices with examples.

Key Words. *Education, Mathematics Education, Sustainable Development, Quality of Life Index in Turkey, PISA, TIMSS.*

Introduction

Sustainable development means to program development by giving opportunity for today's and future's natural resources and needs by bridging between human and nature without consuming natural resources. Sustainable development is a term which has a few dimensions like ecology, economy, culture and spatial (Yapıcı, 2003). We always see human in each of these dimensions. However, there is a need for qualified human resources for sustainable development. This is possible only through education.

When we consider developed countries, we see that the quality of life standards and per capita income is high. We also see that in developed countries, literacy rate is high. This shows us that there is a linear relationship between development and education. According to Hanson (2008) in traditional development models education and development is an absolute corner of the triangle. Ergün (2011) likened the model of sustainable development as a triangular prism:

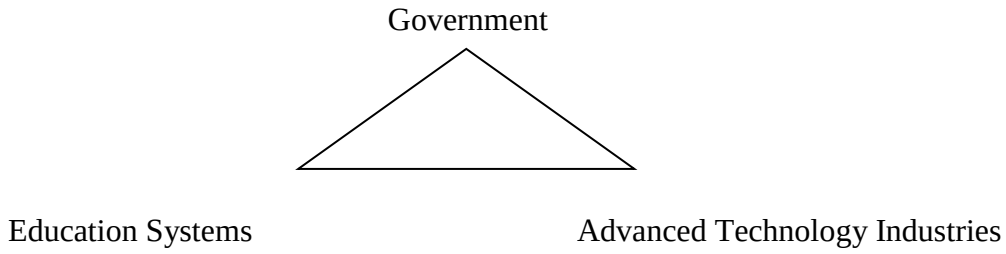

Figure 1. *Development Triangle (Hanson 2008)*

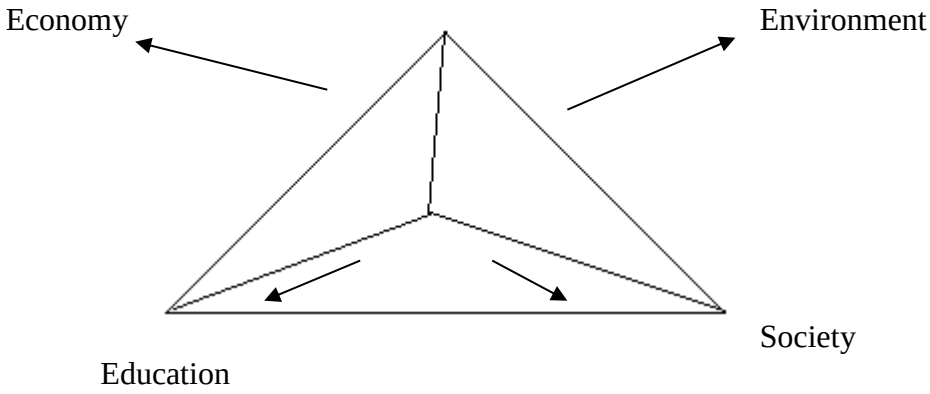

Figure 2. *Development Triangle Pyramid(Ergün 2011)*

The last two figures show that education is one of the elements essential for development.

Method

The study includes assessments about Turkey and mathematic education on the basis of the quality of life index according to "Turkey and Regional Differences in Quality of Life's" (Şeker 2013) article. Also in this study, by looking at the results of the PISA and the TIMSS assessments were completed for sustainable development and mathematic education in some countries in the world. The main purpose of this research was to make generalizations which were response to the following research questions by looking at the quality of life index, the results of the PISA and the TIMSS. We considered to sustainable development instead of development, welfare, economy and education. And so,our research questions:

1) Is there a linear relationship between mathematics education and sustainable development in Turkey in the light of quality of life index?

2) Is there a linear relationship between mathematics education and sustainable development in some countries in the world in the light of PISA?

3) Is there a linear relationship between mathematics education and sustainable development in some countries in the world in the light of TIMSS?

Findings

This part of the study, assessments were made about Mathematics Education and sustainable development in Turkey and some countries in the world in the light of quality of life index in Turkey, PISA and TIMSS.

1. Mathematics Education And Sustainable Development In Turkey In The Light Of Quality Of Life Index In Turkey

According to research held by Şeker (2013), the highest quality of life index of 10 provinces in Turkey are Istanbul, Ankara, Izmir, Kocaeli, Bursa, Eskişehir, Antalya, Adana, Konya and Mersin. The lowest quality of life index of 10 provinces in Turkey are Hakkâri, Sirnak, Mus, Bitlis, Iğdır, Ardahan, Van, Siirt, Batman, Ağrı. Also, according to the index of the quality of working life in the provinces is rated as 1st, 2nd, 3rd and 4th. For example, while Istanbul, Ankara and Izmir provinces are determined in the first place according to life

quality index; Kocaeli, Bursa, Eskişehir, Antalya, Adana, Konya, Mersin, Gaziantep, Kayseri, Samsun and Trabzon are the provinces that place in the second place according to life quality index in Turkey. In quality of life index, it is observed that the more provinces are in the third and fourth groups. There are 30 provinces in the third gruop and 25 provinces in the fourth group. This situation shows that Turkey is concentrated in medium level of quality of life. We can see Ağrı, Siirt, Van, Ardahan, Iğdır, Bitlis, Muş, Şırnak ve Hakkâri among the provinces with the lowest quality of life. In the following of the study, it is sorted like below by using factors determining the quality of life:

Table 1. *Quality of Life in the provinces in Turkey Ratios* (Şeker, 2013)

	The three provinces			**Last three province**		
Health	İstanbul	Ankara	Kayseri	Kütahya	Ardahan	Bilecik
Social Life	İstanbul	Ankara	İzmir	Şanlıurfa	Şırnak	Ağrı
Demand Potential	İstanbul	Ankara	İzmir	Siirt	Kırıkkale	Hakkari
Range of Transportation	İstanbul	İzmir	Ankara	Şırnak	Gümüşhane	Hakkari
Infrastructure	Ankara	Karaman	Gaziantep	Bitlis	Muş	Hakkari
Demographic Structure	Ankara	Eskişehir	İstanbul	Ağrı	Muş	Van
Green and Smokeless	Giresun	Eskişehir	Artvin	Hakkari	Tekirdağ	Şırnak
Finance	İstanbul	Ankara	İzmir	Hakkari	Ağrı	Muş
Commercial Life	İstanbul	İzmir	Antalya	Batman	Siirt	Muş
Economic Capacity	İstanbul	Ankara	İzmir	Muş	Siirt	Hakkari
Education	Ankara	İstanbul	Eskişehir	Mardin	Şırnak	Hakkari

According to the above analysis at the provincial level, we say that the cities like İstanbul and Ankara etc. are economically and as well as educationally developed cities and also the cities like Hakkâri, Şırnak etc. are economically and as well as educationally underdeveloped cities. So it is seen that education is an essential prerequisite for the development. By the way, we can say that, Turkey which is trying to be among developed countries should increase firstly the level of education of its citizens for sustainable development. Skilled people will benefit to both the environment and the economy and also their countries. So that these goals can only be reached Turkey in 2023.

2. Mathematics Education and Sustainable Development In Some Countries In The World

Korea turned in to a advanced industrial society from backward agricultural society in a term. In this turn, export-oriented manufacturing, high savings and investment, stable macroeconomic policies have played an important role (Ergün, 2011). We see similar situations in some countries such as Finland, the Netherlands, Japan and Canada. In the foundation of the developed countries about which we have been talking, education is an essential factor. We see examples of this in the evaluations which are held at the internationally level.

2.1. Mathematics Education and Sustainable Development In Some Countries In The World In The Light Of PISA

Program For International Student Assessment (PISA) is an international study that was launched by the OECD in 1997. It aims to evaluate education systems worldwide every three years by assessing 15-year-olds' competencies in the key subjects: reading, mathematics and science. Across OECD countries, governments are seeking policies to make education more effective while searching for additional resources to meet the increasing demand for education. The 2008 edition of Education at a Glance: OECD Indicators enables countries to see themselves in the light of other countries' performance. It provides a rich, comparable and up-to-date array of indicators on the performance of education systems and represents the consensus of professional thinking on how to measure the current state of education internationally. The indicators look at who participates in education, what is spent on it and how education systems operate and at the results achieved. The latter includes indicators on a wide range of outcomes, from comparisons of students' performance in key subject areas to the impact of education on earnings and on adults' chances of employment (OECD, 2008).

The top five countries and Turkey's the results of mathematic course evaluation in PISA 2003 and 2006 exams,

Table 2. *The Top Five Countries And Turkey's The Results Of Mathematic Course Evaluation In Pisa 2003 and 2006 Exams*

	Finland	**Korea**	**The Netherlands**	**Japan**	**Canada**	**Turkey**
PISA 2003	1	2	3	4	5	28
PISA 2006	2	1	3	5	4	29

According to Table 2, if we examine the five most successful countries' and Turkey's placement, the first noticeable factor is that the first five countries are the countries which have high economy development. So there is a positive relationship between the development and level of achievement in mathematics. In the successful countries, per capita income is very high. However, Korea's per capita income is lower than other four countries; we can say that, PISA success is higher than those four countries. Turkey where per capita income is very low in the other five countries, so we can say that PISA results are worse. Five times more money is spent on students aged 6-15 in the successful countries than Turkey. It is know that when we consider the annual salary range of elementary teachers, in the countries which are successful in PISA, the annual salary range is higher than Turkey (approximately 2.5 times) . According to Table 2, another factor determining the ranking of Turkey and successful five countries may be the indicators of physical infrastructure. There are averagely 15,9 students in Finland, 31,6 students in Korea, 22,4 students in the Netherlands, 28,3 students in Japan; 27,2 students in Turkey per a classroom in the most successful countries. This situation tells us that it is insufficient to explain the relationship between students per classroom and success or unsuccess. However, in the successful countries there are 16 students per a teacher, in Turkey and Korea it is 26,7 students per a teacher. According to Table 2, another factor which determines the ranking between Turkey and the most successful five countries can be the compulsory education period. In addition, the literacy rate is 99% in successful countries while the rate in Turkey is 88% . According to Table 2, another factor which determines the ranking between Turkey and the most successful five countries can be the socio-economic status. There is a direct correlation between parents' education level and students' success. In Turkey high school graduate parents' level is 25% while this level is approximately 90% in successful countries. While in Turkey 45% of students which are in the 15-19 age group goes on their secondary education, this ratio is

nearly 90% in successful countries. In Finland, more than 90% of students who completed their compulsory education continue their secondary education and 65% of students who completed their secondary education continue higher education. It is also observed that the students in the successful countries are more advanced (Aydın et al. 2013). This situation stated in Sarıer's study (2010) like 'Socio-economic and socio-cultural variables create a big difference in terms of academic success among students'.

The top five countries and Turkey's the results of mathematic course evaluation in PISA 2009,

Table 3. *The top five countries and Turkey's the results of mathematic course evaluation in PISA 2009*

	Shanghai-China	**Finland**	**Korea**	**Hong Kong-China**	**Liechtenstein**	**Turkey**
PISA 2009	1	2	3	4	5	33

When we analyze Table 3, while new countries are added to PISA exam in 2009, Finland and Korea are still among the top three. Although Turkey fell back in the range in 2009, we can tell that at least some improvement has succeeded.

In a study which was about Finland which gains the highest score in PISA which is held in every three years, there are main four factors in education system behind the success of Finnish students. These four factors are:

- Teacher training programs
- Traditional school life
- Culturally overview of the teaching profession
- In-service teacher training (Eraslan, 2009).

A similar situation lies behind the success of South Korea. In South Korea, beside the university exam point plus lycee mean grade points, students must enter a skill exam and interview for entering the Education faculties which is different from Turkey.. Teacher Training Programs are very important in South Korea like Finland (Aras and Sözen 2012).

2.2. Mathematics Education and Sustainable Development In Some Countries In The World In The Light Of TIMSS

The Trends in International Mathematics and Science Study (TIMSS) is an international assessment of the mathematics and science knowledge of 4th and 8th grader (loosely, ages 9/10 and 13/14, respectively) students around the World and centered in The Netherlands. TIMSS was developed by the International Association for the Evaluation of Educational Achievement (IEA) to allow participating nations to compare students' educational achievement across borders. The trends in International Mathematics and Science Study (TIMSS) provides reliable and timely data on the mathematics and science achievement of U.S. 4th- and 8th-grade students compared to that of students in other countries. TIMSS data have been collected in 1995, 1999, 2003, 2007, and 2011. The next data collection is in 2015. In 2011, more than 60 countries and other education systems, including the United States, participated in TIMSS. More than 20,000 students in more than 1,000 schools across the United States took the assessment in spring 2011, joining almost 500,000 other students around the world who took part in TIMSS. Because the Progress in International Reading Literacy Study (PIRLS) was also administered at grade four in spring

2011, TIMSS and PIRLS in the United States were administered in the same schools to the extent feasible. Students took either TIMSS or PIRLS on the day of the assessments.

Turkey started to be part in TIMSS in 1999 and 2007 in the level of 8 th grades and in 2011 in the level of 4th and 8th grade. You can see the distribution of achievement in 2011 TIMSS year by year in the table 4. As it is seen in the table 4 that the highest mathematic achievement points are from the Far East countries' students such as Singapore, South Korea, Hong Kong, China-Taiwan and Japan. The mean points of these countries are between 606 and 585 points. There are 27 countries of which the mean standard point is upper TIMSS's standard point 500. The lowest mathematic achievement points are from Middle East and Africa.

Table 4. *Distribution of TIMSS 2011 Mathematics Achievement: 4 Classes*

Place	**Countries**
1	Singapore
2	South Korea
3	Hong Kong
4	China-Taiwan
5	Japan
6	North Irland
7	Belgium
8	Finland
9	The United Kingdom
10	Russia
35	**Turkey**
46	Oman
47	Tunis
48	Kuwait
49	Morocco
50	Yemen

Turkey's standard mean point for TIMSS is 469 which is really under the TIMSS's standard mean point 500 and all the students mean point 492. In terms of ranking Turkey is in 35th country amoung 50 countries and it is in the last place among the European countries (Yücel et al. 2013). When table 4 is examined it is obvious that the developed countries are the most successful countries in TIMSS results. It is possible to say that the undeveloped African and Middle East countries are the last countries in the range.

As it is seen in the table 5 that the highest mathematic achievement points are from the Far East countries' students such as Singapore, South Korea, Hong Kong, China-Taiwan and Japan. The mean points of these countries are between 613 and 570 points. There are 14 countries of which the mean standard point is upper TIMSS's standard point 500. The lowest mathematic achievement points are from Middle East and Africa.

Table 5**.** *Distribution of TIMSS 2011 Mathematics Achievement: 8 Classes*

Place	Countries
1	South Korea
2	Singapore
3	China-Taiwan
4	Hong Kong
5	Japan
6	Russia
7	Israel
8	Finland
9	USA
10	The UK
24	**Turkey**
38	Indonesia
39	Syria
40	Morocco
41	Oman
42	Ghana

Turkey's standard mean point for TIMSS is 452 which is really under the TIMSS's standard mean point 500 and all the students mean point 478. In terms of ranking Turkey is in 24th country among 42 countries and it is in the second last place among the European countries before Macedonia (Yücel et al. 2013).

It is obvious that as it is same with 4t grade, in 8th grade the developed countries are in the first places in the Mathematic achievement, Turkey is in 24th country which is developing country and the last countries are African and Middle East countries which are undeveloped countries.

When TIMSS 1999, 2007 and 2011 mean is compared, it is understood that TIMSS Mathematic Achievement mean is getting higher. However, it shows us that Turkey can not catch the upward trend of success. So it is obvious that Turkey's new education program can not achieve the wanted mathematic achievement.

TIMSS 2011 put forward other elements determining rankings of mathematic achievement. For example, when we consider the mathematic achievement points, the successful students have other resources for mathematic in their houses, their schools are in the cities of which population is more than 100.000, the socio-economic status of the successful students is high and the successful student's teachers are experienced (especially 4th grade teachers) (Yücel et al, 2013). The elements are the determining elements for both sustainable development and development status. There is a positive relationship between mathematic achievement level and sustainable development. Let's find out that relationship.

Results

There is a positive relationship between Mathematics Education and sustainable development. We see that the results section which is about the quality of life index in Turkey, PISA and TIMSS practices. As it is mentioned in Findings 1, we can see that education situation is better conditions in the cities which has no problem about infrastructure, transportation variety, more social and have beter economical life.(cities that have the quality of life in the first degree). We can give Ankara, İstanbul and Izmir as example of this kind of

cities (Şeker, 2013). The positive positions in the cities that have the quality of life in the first degree reflect to the mathematic success of the students that are living in these cities. We also see that the general and especially mathematic success of students living in developed cities is better when we consider the central examination which is held by the ministry of education in Turkey. For example according to the results of 2013 Transition to Higher Education Examination the most successful city in Turkey is Ankara. According to 2013 Placement Test there are 19 students got full score 500 points 9 of which are from İstanbul, 2 of which are from İzmir and 1 of which is from Ankara and 1 of which is from Aydın. On the other hand, we can see that education situation is worse conditions in the cities which has problems about infrastructure, transportation vareity, more social and have worse economical life. (cities that have the quality of life in the fourth degree). We can give, Hakkari and Mardin as example of this kind of cities. The lack of success of mathematic can be seen in the cities which are in the third or fourth range when we consider the quality of life. The negative positions in the cities that have the quality of life in the third and fourth degrees reflect to the mathematic success of the students that are living in these cities. We also see that the general and especially mathematic unsuccess of students living in undeveloped cities is worse when we consider the central examination which is held by the ministry of education in Turkey. For example the most unsuccessful city is Hakkiari according to 2013 Transition to Higher Education Examination.

According to the classification in Turkey depending on the quality of life index, we see that first and second group provinces with a high quality of life and success have better success on mathematics too. It shows us that there is a positive relationship between mathematic success and development especially sustainable development. The situation is similar in the third and fourth degree group cities. So we can say that the mathematic success is worse in undeveloped cities.

We can also see the examples of such situations all over the world. We can also see that mathematic success is parallel to a country's development status as we mentioned in the Findings 2. Similar to the situation in Turkey, we see that there is a direct correlation between development and mathematic success.

If we consider the subject within the framework of the structure of Eco-Economy-Society-Education, we can say that countries can achieve sustainable development when they evaluate these four subjects together. The importance of mathematic can not be ignored in these four structures. It is possible to form a direct relation between sustainable development and mathematic success. We can see that situation when we take in to account PISA and TIMSS results of developed countries. We see that the investment on education reflects on economy and the investment on economy reflects on education.

Recommendations

When we look at Turkey example, PISA and TIMSS results it is seen that sustainable development is possible with education. The countries willing to provide development should increase their qualified manpower for their level of sophistication. Education is for training qualified people. Mathematics education should be emphasized in education. Because according to Baki (2006), mathematic brings to people these skills:

- Logical, critical and creative thinking,
- Problem solving, to be resolving consistent and patient,
- Practicing the power of abstraction and generalization,
- Transferring capabilities and subsequent developments in alternative situations,

• The systems development work habits and timely completion of tasks,
• Using mathematics as a means of communication and etc.

The person who gains these skills will be the qualified person who countries need for development. The word of the first female president of Turkish Mathematic Association Prof. Dr. Betül TANBAY is an evidence on the issue: "G8 countries are currently the most successful countries in mathematics. It is not a coincidence that the countries with better economy are successful in mathematics. It is said that the countries such as Brazil, Mexico and Turkey will be a member of the 10 greatest economies of the world of 2050. I can say that Brazil and Mexico are lucky on the issue because they give importance to mathematics. The mathematics research centers in these countries are very good. But Turkey doesn't care mathematics. That's why you will see that Turkey will not enter the league that he really wants. The countries like China, India, Korea, Mexico, Brasil but Turkey know to enter the league mathematics is very important." Also Saygılı et al (2007) voice similar thinkings on the same issue. "There should be formed a link between education and its return. Education is a future investment of individuals, firms and countries. So it is like other investments, these units should take the value of their investments. The dynamics of sustainable economic growth is the increase in productivity and increase in productivity needs that there should be created a system which the investors are rewarded. Individuals are taken on the basis, based on the knowledge and skills of employment, promotion and remuneration policy are very important. On the other hand firms are taken on the basis, economic and social environment which the investors are rewarded and on the basis of country, an open-minded, creative, education system that educates individuals to teamwork are important for the process of sustainable development and development of Turkey."

Countries should devote a huge share of cost for mathematics and education which requires a long-term process and dedication. Financial support should be supplied for education which is one of the pillars of sustainable development. After exceeding the economic problems, education program and special mathematics education program should be adopted for for quality and success in education. The adopted programs should supply success in international evaluations. The programs that are not successful should be reviewed according to the successful programs in successful countries. There is no other faster way except for education for sustainable development which is need qualified human for both Turkey and other countries**.**

References

Arat, Ş. (15.08.2011). *Prof. Dr. Betül Tanbay ile Söyleşi*, Hürriyet Gazetesi,

http://egitim.hurriyet.com.tr/haberler/15.08.2011/matematigi-kotu-olan-herkesin-hayatindan-bir-ucube-.aspx (Access Date 31.05.2013).

Aras, S. ve Sözen, S.(2012). *Türkiye, Finlandiya ve Güney Kore'de Öğretmen Yetiştirme Programlarının İncelenmesi*, Niğde Üniversitesi 10. Fen Bilimleri ve Matematik Eğitimi Kongresi, http://kongre.nigde.edu.tr/xufbmek/dosyalar/tam_metin/pdf/2527-31_05_2012-

11_40_01.pdfhttp://kongre.nigde.edu.tr/xufbmek/dosyalar/tam_metin/pdf/2527-31_05_2012-11_40_01.pdf (Access Date 31.05.2013).

Aydın, A., Sarıer Y. ve Uysal, Ş. (2012). *The Comparative Assessment of the Results of PISA Mathematical Literacy in terms of Socio-Economic and Socio-Cultural Variables.* Education and Science Magazine,Vol. 37, No 164.

Baki, Prof. Dr. A. (2006) *Kuramdan Uygulamaya Matematik Eğitimi,* Derya Kitabevi.

http://www.tac.k12.tr/icerik.asp?id=94&dil=tr (Access Date 31.05.2013).

Çelen, F. K., Çelik, A. ve Seferoğlu, S. S. (2011). *Türk Eğitim Sistemi ve PISA Sonuçları*. İnönü Üniversitesi Akademik Bilişim 2-4 Şubat 2011, Malatya, http://yunus.hacettepe.edu.tr/~sadi/yayin/AB11_Celen-Celik_Seferoglu_PISA-Sonuclari.pdf (Access Date 31.05.2013).

Çetin, M. (2006). *Teori ve Uygulamada Bölgesel Sürdürülebilir Kalkınma,* Celal Bayar Üniversitesi İktisadi ve İdari Bilimler Dergisi, Cilt 7, Sayı 1.

Dokuzuncu Kalkınma Planı (2006) Resmi Gazete, Sayı 26215

http://www.dpt.gov.tr/DocObjects/View/13744/plan9.pdf (Access Date 31.05.2013).

Eraslan, A. (2009). *Finlandiya'nın PISA'daki Başarısının Nedenleri: Turkey İçin Alınacak Dersler*. Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi, 3(2), 238-248.

Ergün, M. (2011). *Eğitim ve Kalkınma*. Dicle Üniversitesi Sosyal Araştırmalar Merkezi 3. Sosyal Bilimler Sempozyumu, 5-12, http://www.egitim.aku.edu.tr/EgitimveKalkinma.pdf (Access Date 31.05.2013).

Hanson, M. (2008). *Economic Development,* Education and Transnational Corporations, New York: Routledge.

MEB, (2009). *Uluslararası Öğrenci Değerlendirme Programı.* http://earged.meb.gov.tr/arasayfa.php?g=83 (Access Date 31.05.2013).

MEB, (2013). *TIMSS 2011 Tanıtım Kitapçığı,* http://yegitek.meb.gov.tr/pdf/TIMSS_2011_kitapcigi.pdf (Access Date 31.07.2013).

OECD, (2008). *Education at a Glance,* OECD Indicators. www.oecd.org/edu/eag2008 (Access Date 31.05.2013).

Özenç, B. (2010). *PISA 2009 Sonuçlarına İlişkin Bir Değerlendirme*. Turkey Ekonomi Politikaları Araştırma Vakfı Değerlendirme Notu, Aralık, http://www.tepav.org.tr/upload/files/1292255907 8.PISA_2009_Sonuclarina_Iliskin_Bir_Degerlendirme.pdf (Access Date 31.05.2013).

Sarıer, Y. (2010). *An Evaluation of Equal Opportunities in Education in the Light of High School Entrance Exams (OKS-SBS) and PISA Results*. Ahi Evran Üniversitesi Eğitim Fakültesi Dergisi, 11(3), 107-129.

Saygılı, Ş., Cihan, C. ve Yavan, Z. A. (2007). *Eğitim ve Sürdürülebilir Büyüme: Turkey Deneyimi, Riskler, Fırsatlar*. Ankara. http://88.255.87.18/__rsc/shared/file/SerefSaygili-EgitimveBuyume.pdf (Access Date 31.05.2013).

Soylu, A. (2013). *Sürdürülebilir Kalkınma İçin İnsan Kaynaklarına Önem Verilmeli*. Zaman Gazetesi, 30 Nisan 2013, sf 20.

Şeker, M. (2013). *Turkey'de Yaşam Kalitesi ve Bölgesel Farklılıklar*. Zaman Gazetesi, 11 Mart 2013, sf 20.

Türkiye Cumhuriyeti Milli Eğitim Bakanlığı, Eğitimi Araştırma ve Geliştirme Dairesi Başkanlığı

(2010). *PISA 2009 Ulusal Ön Raporu,* http://istifhane.files.wordpress.com/2012/02/meb-pisa-2009-raporu.pdf (Access Date 31.05.2013).

Türkiye Cumhuriyeti Kalkınma Bakanlığı, Ekonomik Modeller ve Stratejik Araştırmalar Genel Müdürlüğü, Küresel Ekonomik Gelişmeleri İzleme Değerlendirme Dairesi (Ocak 2013). *Dünya Ekonomisindeki Son Gelişmeler Bülteni*, Sayı 1, 1-8.

Uysal, A. (2003). *Sürdürülebilir Kalkınma: Genel Bakış,*

http://www.tubitak.gov.tr/tubitak_content_files/vizyon2023/csk/EK-3.pdf (Access Date 31.05.2013).

Yapıcı, M. (2003). *Sürdürülebilir Kalkınma ve Eğitim*. Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi, 5(1), 223-229.

Yücel, C., Karadağ, E., & Turan, S. (2013). *TIMSS 2011 Ulusal Ön Değerlendirme Raporu*. Eskişehir Osmangazi Üniversitesi Eğitim Fakültesi Eğitimde Politika Analizi Raporlar Serisi I, Eskişehir.