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**COMPARISON OF TURKISH AND INDONESIAN SECONDARY
MATHEMATICS CURRICULUM;
REFLECTION OF THE PARADIGMS**

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(Master Thesis)**

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TÜRK VE ENDONEZYA ORTAÖĐRETİM MATEMATİK ÖĐRETİM
PROGRAMLARININ KARŞILAŞTIRILMASI;
PARADIGMA YANSIMALARI

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(Yüksek Lisans Tezi)

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APPROVAL

Based on the thesis defense examination held on 16th Mart 2015, we certify that the thesis entitled “Comparison of Turkish and Indonesian Secondary Mathematics Curriculum; Reflection of the Paradigms”, which is completed by Budy Sugandi who is candidate for the Master of Education Degree, is worthy of acceptance.

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ABSTRACT

Turkey and Indonesia have very competitive neighbouring countries respectively such as Germany, Netherlands, France and Singapore, Malaysia, China, Japan which give them educational challenges and also make some changes in their education systems. To have a better place among developing and competitive neighbour countries Turkey and Indonesia have made some reforms in primary and secondary school mathematics curricula respectively. The aim of this study is to compare the secondary mathematics curriculum of Turkey and Indonesia with respect to the paradigm embedded into them. Methodologically, this is a comparative study with qualitative approaches. The main data collection tools are the curricula and mathematics textbooks of both countries so that document analysis is the methodological technique to be utilised in this research. The data is analysed by coding and presented by descriptive statistics. In the implementation of education system in both countries, Turkey and Indonesia have run into paradigm transformation which started from behaviourist and then changed to constructivist since 2005 and 2007 respectively. It seems the paradigm in two countries shifted from what to teach to how to teach, however the problem is preparedness for the policies and the related situations. We argue that Turkish and Indonesian governments may use the similarities and differences in the comparison for the sake of the need for improving the quality of education in the two countries because of the similar cultural facts.

Keywords: Comparative education, Turkish education system, Indonesian education system, Secondary mathematics curriculum, Paradigm

ÖZET

Bu çalışmanın amacı, Türkiye ve Endonezya ortaöğretim matematik öğretim programlarını paradigma yansımaları açısından karşılaştırmaktır. Türkiye ve Endonezya, sırasıyla Almanya, Hollanda, Fransa, Singapur, Malezya, Çin ve Japonya gibi eğitim zorlukları yaşayan ve eğitim sistemleri içinde bazı değişiklikler yapan rekabetçi komşu ülkelere sahiptirler. Araştırma amacı düşünüldüğünde bu çalışma nitel yaklaşımı benimseyen bir karşılaştırma çalışmasıdır. Temel veri toplama kaynakları her iki ülkenin matematik öğretim program ve matematik dersi kitapları olduğu için doküman analizi araştırmanın veri toplama aracıdır. Elde edilen verilerin analizinde betimsel istatistik kullanılmıştır. Türkiye ve Endonezya'da eğitim sistemi, sırasıyla 2005 ve 2007 yılından itibaren davranışçı paradigmadan yapılandırmacı paradigmaya değişim göstermiştir. Her iki ülkenin matematik öğretim programları dikkate alındığında ne öğretilmesinden nasıl öğretilmesine kayan bir paradigma değişimi olduğu görülmesine rağmen eğitim politikaları ve bununla ilgili durumlarda paradigma değişikliğine uyum için hazırlıkların yapılamaması problem olmaktadır. Türk ve Endonezya hükümetlerinin eğitim kalitelerini artırabilme ihtiyaçları uğruna kullanabilecekleri benzerlikler ve farklılıklar araştırma sürecinde tartışılmıştır.

Anahtar Sözcükler: Karşılaştırmalı Eğitim, Türk Eğitim Sistemi, Endonezya Eğitim Sistemi, Ortaöğretim Matematik Müfredatı, Paradigma

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LIST OF ABBREVIATIONS

The following abbreviations have been used in the thesis,

TR	Turkish Republic
ID	Indonesia
MET	Ministry of Education of Turkey
MEI	Ministry of Education of Indonesia

CHAPTER 1

INTRODUCTION

Education is a key to get a success in a country, even the progress of a country depends on how a government glorify state and get the education balanced, because education is a fundamental right of every citizen. All Turkish and Indonesian citizens are entitled to get good quality of education in accordance with the interests and talents regardless of gender, social status, economic status, race, ethnicity and religion. Bakker and Wolf (2001) noted that in developed countries there are more professional, managerial, and technical jobs than skilled manual jobs and there is often a big gap between the earnings of university-educated people and those of others.

Psychologically, that strong curiosity of human, has prompted a person to know and learn more about the living conditions which are prevailing in the outside of their communities or the country. By knowing the circumstances which are prevailing in the outside of their communities and can find out other people's lives will result in the establishment of mutual understanding and cooperation and helping each other to achieve the goals and progress together. To find out the existence in the outside of their communities or other nations, it is needed comparison studies. Rapple (1989) emphasised that comparison is clearly very useful because learning about another society provides people with greater knowledge of their own society.

According to a basic understanding, comparison study has a meaning as analyzing two or more things to look for the similarities and differences. Thus, in other words, it will be able to provide a notion and understanding of a wide range of educational systems which exist in various countries and regions of the world, especially the education system in Turkey (TR) and Indonesia (ID) with a wide range of historical background.

The comparison study of the education system will lead to growth and development of the ability to compare different educational systems of various countries and regions of the world. Balci (2007) defined the aim of comparison as to define, convince, inform and benefit in addition to showing similarities and differences. Then apart from this comparison study, one will be easier to analyze and deduce the sources of the strengths and weaknesses of the education system that are oriented on international and universal educational purposes. From those things, as a nation who also love the creation of an education system that can foster positive value and open to a variety of business innovation and reform education in ID. In order to develop national education. Bereday (1964) stated that comparative education seeks to make sense out of the similarities and differences among educational systems. And this renewal can be done by the presence of a comparison study between several state educational systems so we can know the advantages and disadvantages of each system that has been done in that country.

My area of study is mathematics at the secondary curriculum. The basis of my study is to compare the curriculum in TR and ID in terms of the paradigm, how the curriculum is implemented, and the process until the impact which is generated. Bray (2004) noted some of the purposes of comparative education identified by earlier scholars. He started with one of the great grandfathers of the field of comparative education, Sir Michael Sadler. According to Bray (2004), Sadler suggested that the practical value of studying, in a right spirit and with scholarly accuracy, the working of foreign systems of education is that it will result in our being better fitted to study and understand our own. However, comparing the two curriculum is not easy especially it is still very rare research which compares the curriculum of both countries, but with the help of related references and in-depth discussion, hopefully this study could provide a valuable contribution to the world of education, especially for education in TR and ID.

One of the constraints in mathematical learning is there are many schools that implement the learning process with conventional methods. Students are bored,

feeling sleepy, and not enthusiastic so learning process which is supposed to involve students to ask questions actively and discuss the material can not be seen. Advocates of everyday mathematics say that this focus not only prepares students for the specific content studied but that real world problems provide learners with a bridge between the abstract role of mathematics and their role as members of society (Broomes, 1989). Lack of teacher strategies in managing the learning activities result in material transfer process is not effective and has an impact on student learning outcomes which is not optimal. This means that in the classroom the teacher becomes a super hero, who is the most powerful, the most intelligent, able to resolve problems, so students which are supposed to be placed as central in the learning process are neglected. Through active learning students construct their own knowledge and add an intellectual value on it (Ward & Tiessen, 1997). Passive students on the other hand, are limited to what is presented to them (Carr, Jonassen, Litzinger & Marra, 1998). In such a class it becomes very hard to keep the students motivated to learn. In order for learning to occur, students should explain the new phenomena with already existing knowledge (Clements, 1997). Students are one of the components that occupy a central position in the learning process, because it is relevant to the above description that students or children who are educated become the subject matter of learning. In the learning process, students as those who achieve their goals, have a goal and then want to achieve effectively. Students will be a determining factor, so it can demand and affect everything necessary to achieve learning goals. It is also one of the three major areas of emphasis in teaching mathematics which are facts and skill, understanding and problem solving (Gadanidis, 1988).

From the above, it can be described that, in order for learning mathematics is done well, the student should be placed as central in the learning process, the student is required to possess the competencies and impart knowledge or ideas, so that students can understand the material totally. They need to learn and practice skills to protect and preserve the environmental quality. Environmental education

should lead to the acquisition of knowledge, the development of analytical skills, the beginning of environmentally conscious attitudes and ultimately to responsible behaviour (Alp et al., 2006 & Erdogan et al., 2009). One of the ways to do that is that students must learn actively. Active here means that learning must take place in an atmosphere so that students can ask questions and express ideas actively.

To make students able to possess competencies and impart knowledge or ideas can be accomplished, then the teaching process must be done correctly. One of the major contributors to the teaching process is done well, is by a comparison study between the state curriculum. Through the curriculum comparison between countries, advantages and disadvantages of each country will be analyzed to be used as an evaluation of the curriculum that is being implemented.

Learning will be effective if the mental readiness of students are taken into account and the implementation of the curriculum is good. Through quality curriculum, the implementation of the teaching will be good. So learning and teaching processes need interaction between teachers and students, which in this case teachers expect their students get the knowledge, skills and abilities or attitudes that are relevant to the purpose of teaching process which are adapted with the capabilities of the students. Weaver and Kintsch (1992) viewed word problem solving as a type of problem solving by analogy and found out that students can and do take advantage of clearly represented structural similarities among word algebra problems and they can learn to do so with reasonable effort.

In international standard classification of education, making a comparison about the system of a country with other countries is one way to improve education's quality. From that comparison, it will be analyzed between one system and other systems in terms of security, paradigms, differences, processes, etc. until the effects that occur in educational and social settings.

to know how others stand, that we may know how we ourselves stand; and to know how we ourselves stand, that we may correct our mistakes and achieve our deliverance that is our problem. (Arnold, 1960-1976 in Rapple, 1989)

Education system in each country has advantages and disadvantages, including in TR and ID. TR is a country which is sandwiched by two continents (Asian and European) and ID is a country in Asian continent that has many islands. Geographical circumstance like these may determine the direction of educational policy of each country. Thus, special education may have been used as a means of getting struggling students around the policy (Roderick, 2005).

Before the comparison of the general goals of TR and ID, listing the general goals of their education systems is thought to be useful: Government should concern about goals of education that exist in ID that the main targets of education are children and teenagers (ID Law No. 20, 2003). This law mandates a great renewal in education system. As a continuation from that law, for the first time in our education required national standard for the content or can be abbreviated as Content Standard by (ID Law No. 22, 2006). Because it is a national standard, so that standard should be applied by all of education systems in ID. Referring to this content standard, other standards such as standard of teacher's competency and standard of mathematics book/instructional materials, the guidelines can be prepared for preparing mathematics curriculum. However, approximately one year after the launching of ID Law No. 22 of 2006 on the content standard, was still experiencing problems or obstacles, especially in mathematics lesson in terms of teachers' understanding about content standard document or in terms of content standard implementation.

TR national education system's general goals were defined in Basic Law of National Education No. 1739 as (MoNE-Ministry of National Education, 2005): The general goals of national education are:

1. To raise all individuals as citizens who are committed to the principles and reforms of Atatürk and the nationalism of Atatürk as expressed in the Constitution, who adopt, protect and promote the national, moral, human, spiritual and cultural values of the TR Nation, who love and always seek to exalt their families, country and nation, who know their duties and responsibilities towards the TR which is a democratic, secular and social state governed by the rule of law, founded on human rights and the tenets laid down in the preamble to the constitution and who have internalized these in their behaviors;
2. To raise them as constructive, creative and productive persons who are physically, mentally, morally, spiritually and emotionally balanced, have a sound personality and character, with the ability to think freely and scientifically and have a broad worldview, that are respectful for human rights, value personality and enterprise and feel responsibility towards society;
3. To prepare them for life by developing their interests, talents and capabilities, providing them with the necessary knowledge, skills and attitudes and the habit of working with others and ensure that they acquire a profession which shall make them happy and contribute to the happiness of society;
4. In this way, to increase the welfare and happiness of TR citizens and TR society, and support and accelerate economic, social and cultural development within national unity and cohesion, on the other hand, make the TR Nation a constructive, creative and distinguished partner of contemporary civilization (MoNE, 2005).

To reach the main goals of education, both TR and ID government should strive to improve the quality of education in each country, one of them might be through the comparison study which may reveal the working and not well working part in education system. So comparing the TR and ID in terms of mathematics

curriculum would be beneficial in educational studies in terms of giving a reflection of the general education system as well as being an important part of every education system:

studies that cross national boundaries provide participating countries with a broader context within which to examine their own implicit theories, values and practices. As well, comparative studies provide an opportunity to examine a variety of teaching practices, curriculum goals and structures, school organizational patterns, and other arrangements for education that might not exist in a single jurisdiction (Robitaille believes, 1994 in Kaiser, 1999).

Comparing between curriculum in TR and ID is very interesting because the researcher is Indonesian and studying in Turkey. From personal experience for about 2 years studying Masters in Secondary Mathematics Education at Marmara University, Istanbul, Turkey, the researcher saw a lot of reasons why comparison research in both countries is important, such as the similarities of culture, political situation and for teaching and learning. Moreover, comparing two educational systems can give greater opportunities for understanding the impact of culture, personal and contextual factors, and of educational interventions (Schmidt et al., 1998). Although there are some studies comparing the education system in the countries like comparing the education system between United Kingdom (UK) and the Turkish Republic (TR) by Ali Delice with title A Comparative Study of Students' Understanding of Trigonometry in the UK and the TR but from is almost none between ID and TR.

1.1. Research Questions

TR and ID have many similarities both in the field of culture, economic development, political situation and the teaching and learning activities. These resemblance would give an interesting opportunity to make a comparison to analyze the prominent and subtle features of each country. In the education system, TR and ID are both have been experiencing a paradigm shift from

behaviorism to constructivism maybe not explicitly printed in official documents. This shift really may not mean the progression have been successful and completed, but the efforts to improve and to enhance the quality of education should be continued to run, one of the help may reveal through this comparison. The aim of this study is comparing TR and ID secondary mathematics curriculum with the essential components as textbooks and examinations to diagnose the paradigm lying behind the both countries' motive. So the research focus in this research is formulated as following questions:

- To what extent do TR and ID secondary school mathematics curriculum reflect a paradigm?
- To what extent do TR and ID secondary school mathematics textbooks reflect a paradigm?
- To what extent do TR and ID secondary school mathematics curriculum and textbooks are related in terms of a paradigm?

1.2. Research Purpose

The curriculum is a vital key in achieving educational goals in every countries' education system. The curriculum will only be efficiently and effectively carry out the functions of education when supported by teachers who have professional skills and quality textbooks. The curriculum is a direction to where education will be guided and directed, or will produce what kind of educational output. Therefore, the fundamental thing that should be a concern and an important consideration in the curriculum is the educational paradigm in the teaching and learning process. The curriculum should accommodate all the potential and talent of the students that can be actualized in a concrete and practical. Curriculum development could open up new opportunities for a great and dynamic education process. In such a context, curriculum development is not solely based on the needs of reality that can be captured through the five senses, but also the hearts, minds and instincts future. This research compares the secondary school mathematics curricula between TR and ID with respect to the paradigm embedded

in them. It would contribute in optimizing teaching and learning in the classroom to achieve student outcomes.

1.3. Methodology

The aim of this research is to compare the secondary mathematics curricula between TR and ID with respect to the paradigm embedded in them. As it may be seen there are two countries and their curricula. Our intention is to get deeper data to make the similarities and differences explicit. Accordingly, since this study is looking for evidence to compare two countries in terms of their education system and particularly mathematics curricula from deeper perspective. This is a comparison study with qualitative approaches methodologically. The main data collection tools are the curricula and mathematics textbooks of both countries. Document analysis is the methodological technique to be utilised in this research. The data is analyzed by descriptive statistics using coding by theme.

1.4. Limitation of Study

There is research on comparison of educational systems, curriculum, length of study, learning outcomes and others. TR and ID are both developing countries making efforts to improve the quality of education. Moreover, many of the students get obstacles in learning mathematics, so it needs special effort to make it easy to understand. The application of mathematics lately has changed a lot and fast because of the presence and development of electronic technology in the world of work.

Each country has a different curriculum, but has the same goal which is to promote education in that country. The methodology used in this research was limited in them with textbooks and relevant printed documents.

CHAPTER 2

LITERATURE REVIEW

In this chapter a preparation for the aim of the study will be done. General view of education issues in TR and ID, education in TR, education in ID, comparison education between TR and ID, curriculum, textbooks and examination will be presented.

2.1. General view of education management in TR and ID

Education management both in TR and ID are developing pattern of decentralization, so the management of education are managed by the aspirations and needs of people in local government. City and district directorates consist of branches, bureaus, permanent boards and commissions according to the characteristics of the service (MoNE, 2005).

At the national level, a special department was established to implement all government policies in the education sector at all levels of government and to all levels of education. However, because most of the authority and responsibility of the education have been submitted to the local government, the Department of Education only run center for monitoring and enforcement. The Education Act and its regulations set out duties and responsibilities of the Minister of Education and the duties and responsibilities of school boards, school board supervisory officers, principals, teachers, parents and students (OMoE, 2010b).

In TR the CHE (Council of Higher Education) is responsible for the governance of all higher education system (CHE, 2010). The Ministry of National Education has provincial organizations in 81 cities and 924 districts. There is a directorate of national education in each city and district (Güven & Ayla, 2010). In ID Local government level, a special department was also formed. This department has a function to make policies and determine their respective education budget, especially for primary and secondary education. Furthermore, to solve the

problems which are associated with the technical things (such as; the school curriculum, the determination of the certification requirements, teachers, and school funding), a special education department was formed to deal with that problems. Although the ministries are responsible for the education in jurisdictions, local authorities have important responsibilities on the governance of schools. Local governance of education is usually entrusted to school boards, school districts, school divisions, or district education councils (CMEC, 2008).

Moreover, to achieve the goal of mathematical learning process not as a set of routinized rules; choosing suitable substituents and symbols, to detect the relationship between each of the variables, their real life situation by means of this model to model and should be handled for testing a dynamic with a proses. Using mathematical modeling helps students to develop mathematical thinking skills. That way students can see the role of mathematics in real life and to value mathematics. Mathematical modeling, the nature of problems in all areas of life so much easier for us to see the relationship and our general result is a dynamic method that facilitates our results. Mathematical modeling, through the students' mathematics in real life that was isolated as a discipline tend to see resolved, mathematics, a dimension, the real life problems through modeling solution that produces a systematic way of thinking to realize that be ensured. In this way, real-world situations and explain predictions for the future to do the math for how much useful offer a language that the students see the certain value real life problems, starting with the mathematical modeling of the problem mathematization and the results achieved true to life interpretation is completed.

2.2. Education in TR

The TR is one of the developing countries in the world, since on the foundation of the Republic of Turkey in 1923, Turkey aims to improve standards in the arena of economical, social, political, and educational system compatible with those of the developed countries through various reforms. The net effect of these factors is

that Turkey's energy demand has grown yearly and is expected to continue growing rapidly (Kaygusuz, 2007).

Reforms in the field of education were among the most important changes in the 1920s (Cakiroglu & Cakiroglu, 2003). In 1924, the TR education system was centralized and all educational institutions were put under the control of the Ministry of National Education (MNE) (Binbasioglu, 1995). Energy supply infrastructures within TR as in many developing countries which are being rapidly expanded as policy-makers and investors around the world increasingly recognize electricity's pivotal role in improving living standards and sustaining economic growth (Kaygusuz, 2007). There is a growing concern that long-run sustainable development may be compromised unless measures are taken to achieve balance between economic, environmental, and social outcomes (IEA, 2005).

The TR government began to pay serious attention to the environment during the 1960s. The education system in TR centralized and all educational institutions were put under the control of the Ministry of National Education (MNE). Changing the country's system of teacher education is the focus of reform. About a decade later, the TR government approved the first policy pertaining to environmental rights and protection as a part of the third five year development plan, which covered the years between 1973 and 1977 (Hotinli, 2002).

Before 1980, teachers graduating from institutions with diverse experience, but in 1981, all teacher education institutions are under the authority of the Higher Education Commission (HEC). For the integrated system performed with teacher training. Then, in 1989 the Council mandated that prospective teachers have to do education in college for four years to qualify for a teaching certificate (Binbasioglu, 1995).

Wave of reform in teacher education TR is strong enough at the end of 1990s. In 1998, with support from World Bank, teacher of HEC restructured with educational programs to improve the quality, this is part of four-year project

involving changes in all primary and secondary mathematics. As a result of this change, existing programs are closed and replaced with 28 elementary and 12 high school mathematics teacher education program. As a part of the changes in teacher education curriculum, including mathematics teacher education curriculum needs to be revised substantially. The curriculum was effective from the beginning of the fall semester of 1998.

The National Education System, determined by National Education Basic Act No. 1739 (Milli Eğitim İstatistikleri (2012-2013), MEB): Upper Secondary Education, General Secondary Education, Vocational and Technical Secondary Education and Open Upper Secondary School.

2.2.1. Preparation to integrate with the European Union

In general, TR can benefit in many ways the education system that is integrated with the European Union (EU). Steps taken to join the EU since the 1990s have contributed to an increase in environmental education activities and projects in schools (Erdogan et al., 2009). In particular, TR hopes to become more advanced in education. In addition to the reorganization in the political, economic and social, education is considered as an important component of the integration process with the EU. TR's long-standing wish to become a member of the European Union so motivated teachers and curriculum developers to revise teacher education programs and improve the level of teaching standards.

2.2.2. Changes in the mathematics curriculum

In 2003, the TR Ministry of National Education organized a team of curriculum development for elementary school mathematics curriculum revision there. The new curriculum is designed as part of the curriculum reform initiatives are more massive that included five areas, namely: mathematics, science, social sciences, life sciences and Turkish. One of the main goals of the reform of the curriculum is to promote the teaching and learning environment where students can share their ideas and actively participate.

All over the world, there has been increased attention on the professional education of teachers at all levels (Bishop, Clements, Keitel, Kilpatrick, & Leung, 2003; Darling-Hammond & Bransford, 2005). Among other disciplines mathematics teacher education has been at the focus of reform in teacher education (Lin & Cooney, 2001). The curriculum for the education of mathematics teachers has also been considered a very crucial aspect of the mathematics teacher education enterprise (Grossman, Schoenfeld, & Lee, 2005). The new curriculum is placed a heavy emphasis on the development of children's cognitive, emotional, attitude, interest, confidence, confidence, anxiety, self-regulation, psychomotor development and social skills. In addition, the curriculum promoted students through discussion, inquiry, and curiosity about what is going on in their family, school, and community. In such a class it becomes very hard to keep the students motivated to learn. Passive students on the other hand, are limited to what is presented to them (Carr et al., 1998). In order for learning to occur, students should explain the new phenomena with already existing knowledge (Clements, 1997).

One of the key factors in improving instruction and student understanding in the mathematics classroom is the role of the teacher (Hiebert et al., 1997). Teachers respect and follow all aspects of human rights and ethical values of mathematics in the classroom. Teachers are also expected to work towards helping students develop positive attitudes about mathematics.

Effective teachers must know and understand the mathematics they are teaching, and they must flexibly draw on that knowledge (Hill, Schilling, & Ball, 2004). While challenging and supporting students, teachers need to understand the gap between what their students know and what they need to learn (NCTM, 2000). NCTM (1991) emphasizes that “teachers must help every student develop conceptual and procedural understandings of numbers, operations, geometry, measurement, statistics, probability, functions, and algebra and the connections

among ideas”. In addition, it is explicitly stated in the new curriculum that mathematics teachers should enjoy teaching and responsibilities of mathematics.

Mathematics teachers not only need to have sufficient content knowledge of mathematics, but also pedagogical content knowledge (Even, 1990). As with all other teachers, math teacher is responsible for organizing and leading social activities such as sports events, national ceremonies, and extracurricular activities. The curriculum states that teachers should develop and implement learning activities that promote mathematical understanding, regularly monitor and evaluate student learning, effectively manage time learning, and encourage students to evaluate their own and the progress of their colleagues.

Teachers need to know why mathematical statements are true, how to represent mathematical ideas in multiple ways, what constitutes an appropriate definition of a term or concept, and methods for appraising and evaluating mathematical methods, representations, or solutions (Hill, Schilling & Ball, 2004). Subject matter knowledge and pedagogical content knowledge are essential in effective mathematics teaching and in the preparation of mathematics teachers (NCTM, 2000). Finally, they need to continue to improve the professional knowledge and experience through a variety of activities, including following the scientific research literature and conduct small-scale research projects.

Dogan and Olkun (2006), in practice, while developing a curriculum all these three models can be mixed or used at the same time since social problems, individual needs and interests, and core subjects are all important considerations that cannot be ceased from. Therefore, it is very usual to use some aspects of each model to make a less objectable curriculum. Basic characteristics of the three curriculum development models mentioned above can be summarized as in Table 2.1.

Table 2.1. Basic Characteristics of Program Development Models

Program	Emphasis	Content	Methods	Teacher	Environment
Subject centred	Subject	Different diciplines	Direct instruction, question-answer	Subject specialists	Classroom, boks
Learner centred	Learner's abilities and interests	Activities based on abilities and interests	Learning by doing, problem solving, projects	Teacher, guide, psychologist	Flexible volumes, different materials
Problem centred	Social problems	Different social problem	Problem solving, cooperative learning	Socially conscious individual, rich general culture, subject specialists	Flexible volumes, different materials

The process of program development in TR is summarized in Figure 2.1. As seen the figure, it starts and ends with assessing the needs of the individual and/or society. This approach may produce more responsive curriculum.

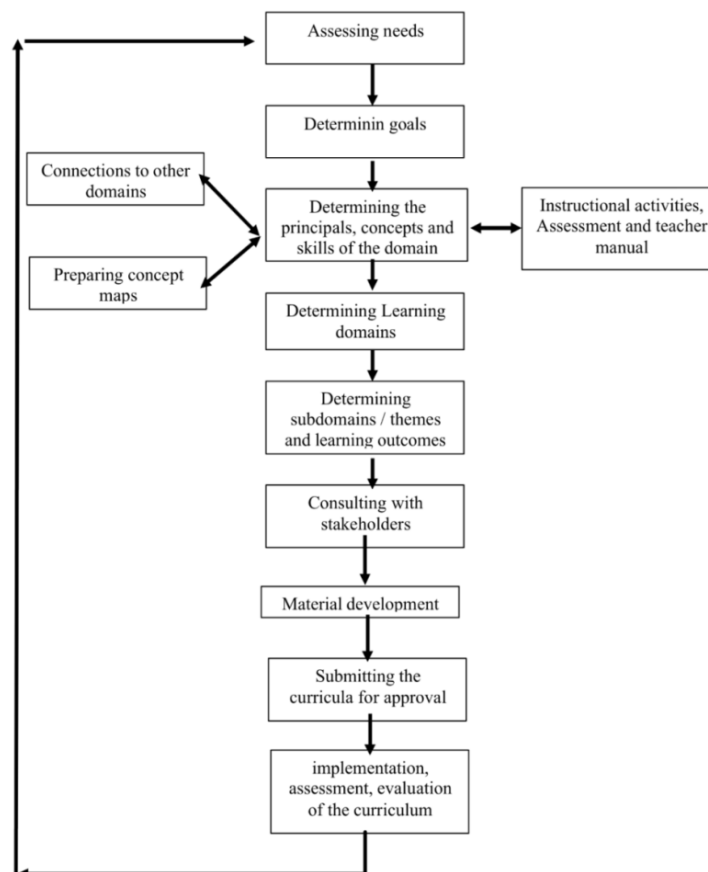


Figure 2.1: The Program Development Model of the New Curriculum (Dogan & Olkun, 2006)

Curriculum developers are aiming to improve the quality of mathematics teacher education to that of international standards, but to revise the curriculum is not enough to achieve the desired level. Implementation of the new curriculum programs will be monitored and continuously evaluated to improve the quality of teachers to the highest level. Curriculum implementation will be supervised by the HEC of TR, through continuous feedback from the teacher educators. Further monitoring efforts can be made by the individual teacher education program to explore the strengths and weaknesses of the revised curriculum.

2.3. Education in ID

It is important to know the curriculum development of a country, ranging from policy formulation to implementation of the curriculum, because the success of a country's education can not be separated from education policy which is imposed including curriculum development. The development of the curriculum here could be curriculum development in general or it may be the development of curriculum for one or more subjects. Knowledge and understanding will be more meaningful if we review more than one country, either in the form of a review of the similarities and differences, or the strengths and weaknesses.

For enhancing mutual cooperation in education between both of those countries, the signing of the Memorandum of Understanding (MoU) was held in 2009 between TR and ID. The signing of the MoU is intended to provide a legal basis for the educational cooperation between the two countries. National Education Ministry of Indonesia (2004-2009), Bambang Sudibyo, said that with MoU, there will be a technical meeting joint working group which will design further forms of this cooperation and the outline has determined. In this cooperation, it was approved for information exchange in education, then exchange of lecturers, teachers and students. Director General of Higher Education also gives scholarships for Indonesian lecturers to study in other countries and in 2009, more than 1000 lecturers studied in many countries around the world, especially in TR.

Every year TR Government gives a chance to the best students all over the world to join Turkish Government Scholarship or can be called *Turkiye Burslari* for undergraduate, graduate and postgraduate students in universities in TR, moreover they also offer scholarship to join Turkish language courses and help for researchers. Similarly, Indonesian government also gives scholarship chance to developing countries.

In general education policy that is taken in a country tends to be used as a tool of state intervention to its citizens. Form of that intervention can be a justification of certain knowledge, the institutional setting of the school, long education and degree, as well as educational qualifications which are associated with the job position. Among the school level (ranging from elementary to university level), generally the state prefer to concentrate more power to intervene educational schools that are offered for the children, adolescents and young people.

The question is, why countries prefer to focus on the education of children compared with adult education? Heidenheimer (1990) gave an answer as follow: that most countries chose to concentrate more on their interventions for children and adolescents' education because the state has a responsibility to create cadres of the nation. The others have a reason that schools is quite attractive to be controlled, which there is generation that is very easy to be influenced. There are also some countries that have a reason about voting rights for political elections in the future need socialization process, and it is suitable for young children through schools.

Meanwhile education is a basic need that must be fulfilled. Therefore parents put their children in various educational institutions, especially formal educations which are organized or accredited by the state. State intervention in the formal school education seems often overlooked by parents. Because of that, a mechanism of control by people about the formal school education schools is needed, so the state's policies in the education sector are significantly positive for

the next generation, as well as to reduce the possible chances of irregularities which can be made by the state in the intervention activities. In democratic countries, the awareness to monitor and limit government intervention in the education sector is characterized by the principle of decentralization which is chosen in decision making of the education sector. TR and ID are two examples of democratic countries. Central government intervene the education by providing state's land for the construction of the faculties of agriculture and engineering; helping schools with providing the facilities, providing free education for students from lower social-economical groups, providing loans for students; providing a budget for research purposes, a foreign students exchange and helping various other students' needs.

Political education in ID is likely to transform from centralized to decentralization. Beginning of the intervention of state upon education sector is very large, very rich and very vulgar. This condition reached its peak when the Ministry of Education of ID was held by Daoed Joesoep. At that time there is no freedom in schools and colleges. Even it was impossible to make a dissent. School and college like a big class for indoctrination of government's ideology that does not want any open criticism. The curriculum is designed such a way that the subjects that are politically be very important. Pancasila subjects, history, civics, and even religious were designed to thicken about the intervention of the state to the brain, the mind and attitude of its citizens.

Along with the fall of the new order regime, which was dropped by a total reform of the society which was led by the student community, then a new vigorous era came to reduce the role and intervention of the central government in handling a variety of policy issues, includes education policy. The first inspiration arised from the enactment of regional autonomy in reformer. It is said reformers because it had existed autonomy law area but it did not have the spirit of reform and only a formality (ID Law no. 22, 1999).

In his book entitled *Rebuilding Education*, Tilaar (2002), stated that the policy of decentralization of education in ID is not just the desire and the will, but it is a necessity. After the political reform movement launched in 1998, the future of the ID must rise to a strong and dignified nation, which means that the education sector must be placed at the important and urgent position. With regard to the urgency of the education sector that it must be done in education reform from centralization to decentralization.

2.4. Curriculum

Donald states (in Sukmadinata, 2005), the school system is formed of four subsystems, which are teaching, learning, and curriculum. Teaching is a professional activity or treatment which is provided by a teacher. Learning is an activity or efforts which done by students as a response to teaching process which is given by the teacher. All engagement activities that allow and respect to the interaction of teaching and learning process are called learning. Curriculum is a plan that provides guidance or handle in the process of teaching and learning activities.

Taba (1962), the difference between the curriculum and teaching lies not in its implementation, but the breadth of coverage. Curriculum is about the purpose of the content and methods which are more general, while the narrower, more specifically becomes the task of teaching process. According to Taba both of them form a continuum, curriculum lies at the end of the general purpose or long-term goals, while teaching at the other end that is more specific or near from the goals. Limit between both of them are very relative, depending on the interpretation of teachers.

From the opinions of experts about the definition of curriculum, henceforth three concepts are known, which are: curriculum as a substance, as a system of curriculum, and the curriculum as a field of study (Sukmadinata, 2005): the first concept, the curriculum as substance. A curriculum is seen as a plan of learning

activities for students at school, or as a set of goals to be achieved. A curriculum can also mean a document that contains the formulation of objectives, instructional materials, and learning and teaching activities, schedules, and evaluation; Second concept, the curriculum as a system, the system of curriculum. The curriculum system is part of the school system, the education system. A system of curriculum includes personnel structure and working procedures how to prepare a curriculum, implement, evaluate, and refine. Results of a curriculum system are the formulation of a curriculum, and the function of the curriculum is how to maintain the system in order to remain dynamic curriculum; Third concept, the curriculum as a field of study, is the field of curriculum studies. It is a field of study curriculum experts and expert of education and teaching process. The purpose of the curriculum as a field of study is to develop knowledge about curriculum and curriculum system.

Curriculum development is the planning of learning opportunities intended to bring about certain desired in pupils, and an assessment of the extent to which these changes have taken place (Nicholls in Hamalik, 2007). This formula shows that curriculum development is the planning of learning opportunities that are intended to bring students toward certain changes which are expected. While the definition of learning opportunity is a relationship that has been planned and controlled between the students, teachers, materials, equipment, and the environment where students learn their desire to be occurred.

In the definition above, the actual curriculum development is a cyclic process, which never ends. The process consists of four elements which are (Hamalik, 2007): objective, methods and materials, assessment and feedback. Development of curriculum is a main point in implementation of education, and therefore the development and implementation should be based on the principles of macro development.

Public policy in curriculum development should be in line with the vision, mission, and strategy of national education development as outlined in the national education policy of increasing enrollment, quality, relevance, and efficiency of education. Public policy in the development of the national curriculum includes principles (Hamalik, 2007): balance of ethics, logic, aesthetics and cinestetica, similarity for getting the opportunity, strengthening national identity, facing the century which is full of knowledge, welcoming the challenges of information and communication technology, developing life skills, integrating essential elements into the curriculum, iternative education, being focus on children as builders of knowledge, multicultural education, continuous Assessment and lifelong education.

Seller and Miller (1985) suggested that the process of curriculum development is a series of activities which are carried out continuously. Seller considered that curriculum development should start from determining the orientation of the curriculum, like general policies, such as the direction and purpose of education, views on the purpose of learning and the purpose of the students, a view of the successful implementation of the curriculum, and so forth.

From the above explanation, the dynamic development of the existing curriculum in TR and ID become very important as a guide learning tool, implemented and evaluated in the learning process, so as to create a superior learners and able to face global challenges.

2.4.1. Behaviorism

Behaviorist theory is a theory of behavioral development, which can be measured, observed and produced by students in response to stimuli. Responses to stimuli can be reinforced with a positive or negative feedback on the behavior of the desired condition. Punishment is sometimes used in eliminating or reducing incorrect action, followed by describing the desired action.

Behaviorist learning theory is a theory proposed by Gage and Berliner about changes in behavior as a result of experience. This theory is then developed into the flow of learning psychology that influence the direction of development of the theory and practice of education and learning, known as behaviorist flow. This emphasis on the formation of the flow behavior appears as a result of learning.

Behaviorist theory with a model of stimulus-response relationship, seated people who learned as a passive individual. Response or a particular behavior by using the method of training or habituation. The emergence of behavior will be stronger when given reinforcement and will disappear when subjected to punishment.

Learning is the result of an interaction between stimulus and response (Slavin, 2000). A person is considered to have learned something if he can show changes in behavior. According to this theory in learning what is important is that the form of stimulus inputs and outputs in the form of the response. Stimulus is what is given by teacher to the learner, while response is a form of a learner's reaction towards the stimulus given by the teacher. The process that occurs between stimulus and response is not important to note because it can not be observed and can not be measured. What can be observed is the stimulus and response, therefore what is given by the teacher (stimulus) and what is accepted by learners (response) must be observed and measured. This theory prioritizes measurement, because the measurement is an important thing to see happen whether or not the change in behavior.

The behaviorist explains that learning as a process of change of behavior in which reinforcement and punishment becomes a stimulus to stimulate the students to behave. Educators who are still using behaviorist framework usually planned curriculum content knowledge by compiling into small parts that are marked with a particular skill. Then, the parts are arranged in a hierarchy, from the simple to the complex (Paul, 1997).

Outlook behaviorist theory have embraced by educators. But from all the existing theories, the theories of Skinner is the greatest influence on the development of behaviorist learning theory. Programs such as the Teaching Machine Learning, Learning with program, modules and other learning programs are grounded in the concept of stimulus-response relationship and the importance factors amplifier, a learning program that implements learning theory proposed Skinner.

Behaviorist theory has been criticized because it is often not able to explain complex learning situations, because many variables or matters relating to education and/or learning that can be converted into a relationship of stimulus and response. This theory is not able to explain the deviations that occur in the relationship of stimulus and response. Behaviorist theory also tends to lead students to think linear, convergent, uncreative and unproductive. The view of this theory is that learning is a process of forming or shaping, which helps students to achieve certain targets. Because there are many factors that influence the learning process, it cannot be fully explained by the behaviorist theory.

2.4.2. Constructivism

Constructivist theory is grounded in the philosophy of John Dewey's philosophy and researchers such as Piaget, Vygotsky, Gestalt, Bartlett and Brunner. There is no one single constructivist learning theory, but there is a constructivist approach in science and mathematics education, educational psychology and anthropology.

The most prominent change seems to be the way the content is delivered. Such constructivist pedagogies as active learning, use of manipulatives, cooperative learning, and the use of realistic and authentic tasks are emphasized in the new curriculum. Through active learning students construct their own knowledge and add an intellectual value on it (Ward & Tiessen, 1997). Some constructivist study emphasizes shared and the social construction of knowledge, see other social

forces seem less important (Cognition and Technology Group at Vanderbilt, 1991; Driscoll, 1999; Perkins, 1991; Wittrock, 1992).

Now many educators use the term constructivism and not always in the same way. Generally, constructivism assumes that people develop and internalize, construct knowledge of the external environment, but there are a variety of different approaches to constructivism. Here follows the category Moshman (1987, 1997) to help organize three different approaches, known as constructivism rational, radical, and dialectical.

Constructivism Rational

Rational constructivism emphasizes how individuals reconstruct external reality. Constructivism build an accurate mental representation schemes and condition-action rules. So learning is to build an accurate mental structures that reflect "some real ways" in the external world. Many aspects of information processing are consistent with constructivism; in fact, some scholars treat this kind of constructivism as part of a cognitive perspective, for example, a study of cognitive/rational (Greeno, Collins & Resnick, 1996). Study constructivism recognizes the superiority of some over others understand; Consequently, direct teaching, feedback and explanation seems a great way to affect learning.

Piaget's theory is very typical of this form of constructivism. He proposed a sequence of the universal developmental stages, each covering a more complicated form of cognition and functional than this in the previous stage (Miller, 1993). Piaget special concern is with logic and knowledge required as understanding that the set or class must have at least as many members of each set of parts (Smith, 1993). For example, we can not determine whether there is a woman or a man again in a given school without empirical facts about the relative number of them, but we can be sure that there is at least as much as men in every school there is a woman, without any empirical facts. Piaget denied that knowledge does not depend on the knowledge of a particular environment and can

not be learned from this environment. In contrast, knowledge of the innate nature is very important in the classification of our behavior and is constructed through coordination and reflection on these behaviors. In short, rational constructivism shows the construction as a rational process that led to results that are guaranteed to increase.

Radical Constructivism

Radical constructivism that maintains knowledge is not a reflection of the external world despite the fact that experience affect thinking and thinking affect knowledge. Knowledge is constructed largely by the interaction between personal and cultural barrier and ideology. There is no basis to evaluate or interpret any belief as any good or worse than any other. Radical constructivism argue that constructivism information processing is trivial because it does not take the idea far enough for knowledge construction (Derry, 1992; Garrison, 1995).

Radical constructivism became popular recently with the emergence of post-modern ideas and criticism in American education (Moshman, 1997). The situation is particularly difficult for those who are concerned about the development and education. How to acquire constructed knowledge significantly so that if there is a development process is an advance in understanding or reasoning? How can we attempt to get students construct if there is objective knowledge? (Moshman, 1997).

Dialectical Constructivism

Vygotsky's theory as a description of cognitive development through the provision, internalization, and using tools such as language culture is a good example of dialectical constructivism (Bruning, Schraw, and Ronning, 1995). Vygotsky argued that knowledge is constructed socially, namely, that knowledge become a mainstay of what the contribution of participants. Thus, the

development can be different in the context of different cultures; in other words, learning is situated. This does not mean that all learners can reach to the the same construction. The possibility of multiple realities, with different explanations works differently in different situations is the key idea. According to Vygotsky the possibility of a universal knowledge is less fundamental than the context-specific aspects of cognition. Dialectical constructivism is a pluralist and rational perspective that ignores the extreme relativism of radical constructivism without entering yourself to universalism associated with rational constructivism (Moshman, 1997).

Behaviorist theory is a theory of behavioral development, which can be measured, observed and produced by students in response to stimuli. Responses to stimuli can be reinforced with a positive or negative feedback on the behavior of the desired condition. Punishment is sometimes used in eliminating or reducing action is not correct, followed by describing the desired action.

Perhaps many of us ask that nowadays there are calculators and computers so the benefits of mathematics as a tool for life have been reduced. It is true, with the presence of both of these tools, life problems can be solved easier and can be settled in a short time. But we still have to keep in mind that these tools also use mathematical principles. Without the principles and concepts of mathematics both of these tools (calculators and computers) may not exist. Because mathematics is so important in life, it is not surprising that learning of mathematics has developed and adapted to the needs of the times.

2.5. Textbooks

The textbook is one of the elements in the standard of education infrastructure and should be based on the national education goals. In the process of teaching and learning in school, textbook is a contributory factor for students and is an important media of learning. Textbook is seen as a means to communicate content, which means the textbook used in school by teachers or learners should

be able to clearly communicate information, concepts, knowledge, and develop skills so as to be understood by learners and teachers. In other words, a textbook is a media for the presentation of a subject in sequence for the purpose of teaching and learning that is useful to the construction of a specific learning situation (Pusat Perbukuan Depdiknas, 2005).

According to a research conducted by Patrick in Abdulkarim (2007), school books, especially textbooks are the instructional media that the role is dominant in the class. This is because the book is an essential tool to deliver curriculum materials, so textbooks occupy the central role. Loveridge in Muslich (2010) described that school textbooks are books that contain materials that have been selected on the particular field of study, in a written form that meets certain requirements in the teaching and learning activities, and systematically arranged to be assimilated.

One of the principles of mathematics curriculum according to the NCTM (2000) is coherent and because textbooks are part of the curriculum, the content of textbooks should also be coherent. The coherence of textbook according to Ainsworth and Burcham (2007), text coherence can be defined to be the extent to which the relationships between the ideas in the text are made explicit. In addition to idea concepts and their definition the representations and pictures are also important and reflect the paradigm as well (Delice, Kardes & Aydin, 2009)

The coherent mathematics textbooks are indispensable to answer the demands of the curriculum. It is based on the opinion of Roseman, Stern and Koppall (2010), to form an organized mental model requires a coherent textual presentation of the new ideas, adequate prior knowledge, and active processing by the learner to integrate both new and prior knowledge. In fact, there is a tendency that the mathematical skills in textbooks do not meet the coherent principle. One of indication is, there is no special space in the textbooks where students can run its

procedures. This leads to the mathematical procedure is considered as finished goods are ready to be used, so that students only need to memorize.

If the problem is ignored, it could lead to the failure of students to learn through textbooks. Research conducted by McNamara and Kintsch (in Ainsworth & Burcham, 2007) stated, "a text that lacks coherence results in greater post-test scores by forcing the high knowledge reader to work harder for a deeper level of understanding, leading to better comprehension". In other words, only students who have high knowledge to understand the content of textbooks is less coherent. According to the opinion of Roseman, Stern and Koppal (2010), to identify the material/subject in school textbooks that the coherence will be examined, should be a material that is quite extensive and intertwined with each other.

Some things become a problem at the level of secondary school in TR and ID all this time is teacher-centered learning. Teachers deliver lessons using expository, meanwhile the students only write in a notebook. In such learning process, the teacher is considered successful if the class can manage such a way that students in an orderly and calm following the lessons delivered by teachers. Teaching is considered as the process of delivering the facts to students.

The practices of education that have been taking place at school is very far from the true nature of education, the education that makes students as human beings who have the ability to learn in order to develop their potentials and further knowledge for the benefit of themselves. According to Zamroni (2000), the practice of education thus isolate themselves from their surroundings and the world of work, and not to be able to make the students as a whole human being and personality.

The truth of content is not limited to what is presented by the teacher. Teachers must change its role, no longer as the highest authority of science and indoctriner, but a facilitator who guides students toward the formation of knowledge by themselves. Through the new paradigm, it is expected that students could be

active in learning process and discussion in the class, be brave to convey their ideas and accept the ideas of others, and have a high confidence (Zamroni, 2000).

This section will describe some of the new approaches in the learning of mathematics relevant to the new paradigm of education as described above. The approaches are: constructivist and contextual teaching and learning. Moreover every education system may have a philosophical base namely a paradigm which may respect the programme makers philosophy integrated by the contemporary approaches or cultural-political-social structure of the society.

According to the constructivist ideology, knowledge is a construction of a person knowing something. Knowledge can not be transferred from the teacher to others, because each person has his own scheme of what he knows. Formation of knowledge is a cognitive process in which a process of assimilation and accommodation to achieve a balance to form a schema are new. Someone who learned it means shaping understanding or knowledge actively and continuously (Suparno, 1997).

The principles of constructivism are widely used in science and mathematics learning. The principles drawn are (Suparno, 1997):

1. The knowledge constructed by the students themselves, both personally and socially
2. Knowledge can not be transferred from the teacher to the student, except only with the involvement of the student himself to reason
3. Active students construct consequential, so the concept does always change to the concept of a more detailed, complete, and in accordance with the scientific concept
4. The teachers simply help provide the means and situation that students' construction process runs smoothly

According to the constructivist philosophy, to think good is more important than having the right answer to a problem that is studied. Someone who has a good way of thinking, in the sense that the way of thinking can be used to deal with a new phenomenon, will be able to find a solution in the face of other problems (Suparno, 1997).

It is often revealed that according to the new paradigm of education, the role of the teacher should be changed, which is not simply pass on the subjectmatter to the students, but should be able to be a mediator and facilitator. The function of mediator and facilitator can be described in several tasks as follows.

According to Chambliss and Calfee, as quoted by Muslich (2010), textbooks are invaluable tools for learners to understand and learn from the things that are read and to understand the world (outside of himself). One of media that can be used by teachers and students in the learning process is a text book. Muslich (2008) argued that the textbook is a book that contains a description of the subject matter or a particular field of study, arranged systematically and has been selected based on specific goals, learning orientation, and student progress.

Applying Vygotsky's (1978) approach about activity theory, which explains the relationships between three components (subject, mediating artifact, and object), in the context of teachers' and students' use of mathematics textbooks, three triangular models representing the relationships among the student, teacher, textbook, and mathematical knowledge are developed. These relationships include student-textbook-mathematical knowledge and student-teacher-textbook, as demonstrated in Figure 2.2:

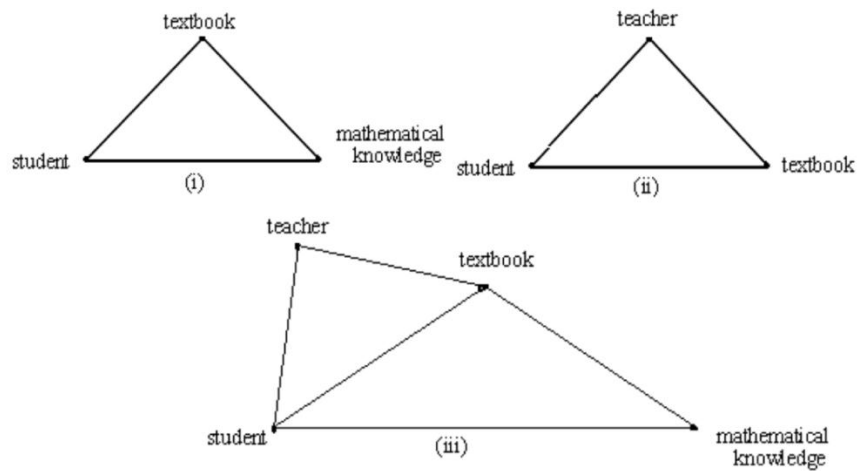


Figure 2.2: Triangular Representations of the Relationship Among Student, Textbook, Teacher and Mathematical Knowledge

Rezat (2006), after analyzing the models above, argues that the model of textbook use is best demonstrated by using the shape of a three dimensional tetrahedron, which is more comprehensive because of the four well-located corners: student, textbook, teacher, and mathematical knowledge/didactical aspects of the mathematical knowledge. Thus, this time, it displays all possible relationships among the components in textbook use, including the contexts teacher-textbook-mathematical knowledge (didactic aspects) and student-teacher-mathematical knowledge.

It is an interactive part within the activities of teaching and learning mathematics. In order to develop a better understanding of the role of the mathematics textbooks within the activities of teaching and learning mathematics an activity theoretical model was developed (Rezat, 2006):

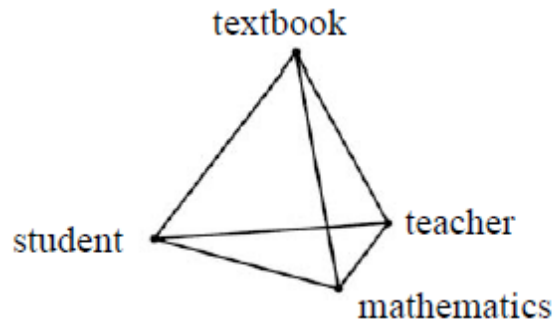


Figure 2.3. : Tetrahedron Model of Textbook Use

In the model displayed above, each set of three corners represents a triangular relationship consisting of the subject, the object and the mediated artifact (subject-mediator-object). Namely, the set student-teacher-textbook represents the triangular sub-model where the student is the active subject, the textbook is the object used, and the teacher is the component who mediates the relationship. The triangle student- textbook-mathematical knowledge, on the other hand, represents the context where the textbook mediates between the student and the mathematical knowledge. The set teacher-textbook-mathematical knowledge (didactical aspects) means that the textbook mediates the teacher's use of mathematical knowledge or didactical aspects of mathematical knowledge within the textbook. Finally, the student-teacher-mathematical knowledge triangle displays the case where the teacher mediates the knowledge by applying it in the classroom with the aim of delivering it to students (Rezat, 2006).

This model is based on the fundamental model of didactical system: the ternary relationship between student, teacher, and mathematics (Chevallard, 1985). Textbooks should be used to meet the demands of the curriculum in order to achieve educational goals. General mathematical competence should be mutually coherent, as proposed by Kilpatrick, Swafford & Findell (2001), "Mathematical proficiency is not a one-dimensional trait, and it cannot be achieved by focusing on just one or two of these strands". Similar statement disclosed by Herman (2011) who says that every general mathematical competence is not a separate

domain, but the fifth is the connection of mutual interaction skills that strengthen the building of knowledge, skills, abilities, and one's view.

Contextual learning is started from the assurance that someone is interested in learning when he sees the meaning of what he learned. People will look at the meaning of what he has learned when he is able to relate the information received with the knowledge and previous experience. Contextual learning system is based on the assumption that the meaning emanating from the relationship between content and context. Context gives meaning to the content. Broader context, in which students can make connections, more meaning contents captured by the students. The largest part assignment of teachers, thus, is to provide context. If students can more linking school with this context, the more meaning they will get from these lessons. Finding meaning in the knowledge and skills to bring to the mastery of the knowledge and skills (Johnson, 2002).

When students discover the meaning of a lesson in school, they will understand and remember what they have learned. Contextual learning enable students to be able to connect a school lesson with the real context in daily life, so they are able to know the meaning of what is learned. Contextual learning expand their personal context, so that bu providing new experiences for students, it will stimulate their brain to make new connections, and as a consequence, the studetns can find the new meaning (Johnson, 2002).

Contextual learning is a holistic system (overall). It consists of parts which are interrelated, which when combined will produce effects that exceed what can be produced by a section alone (single). Just like the violin, cello, clarinet and other instruments in an orchestra that has a different sound, but together the musical instruments to produce music. Thus, the separate parts od CTL involves a different process, when used together, allow studetns to make connections to find meaning. Each of the different elements in the CTL system contribute to helo students understand the meaning of the lesson or the tasks. Combined, these

elements form a students that lets students see the meaning of the school, and save it (Johnson, 2002).

From the description above, CTL is defined as an educational process that aims to help students see the meaning of lessons that are learned by the students, by connecting these subjects in the context of everyday life, both personally, socially, and culturally.

Examination

A test will be defined as a systematic procedure for measuring a sample of an individual's behavior (Brown, 1970). The definition contains two key points to note in understanding the meaning of the test, the first is the word systematic procedure which means that a test should be developed, implemented (administered) and processed according to certain rules that have been set. The second one is the measuring of an individual's behavior, means that the tests measure only a sample of the behavior of the individual being tested. The test can not measure the whole (population) behavior, but it's limited to the contents (items was) test is concerned. The Economic and Social Research Institute in Ireland described 'high-stakes tests as standardized examinations, the results of which have significant consequences for schools and/or students' (Smyth, Banks and Calvert 2011). Heubert's (2000) description was very similar to that of Smyth et al. (2011), that is that high-stakes assessments are those used to make significant educational decisions about students, teachers, schools or school districts.

A test will contain questions and/or issues to be addressed and/or resolved by the individual being tested, so it's called achievement test. This concurs with an expert who stated that the type of ability test that describes what a person has learned to do is called an achievement test (Thordike & Hagen, 1975). According to that opinion, achievement test usually consists of a number of items about which has a certain difficulty level (there are easy, medium, and hard). The test

should be done by the students in a specified time. Therefore, the achievement test is a test of power. Its purpose is to measure students' ability to answer questions or concerns.

Test is a set of questions that must be answered by the students. In this case, the test results of learning can be classified into three types based on the form of its implementation, namely oral test, writing test, and action test. The written test in practice more emphasis on the use of paper and pencil as his main instrument, so do the problems or test exam answers on the exam paper in writing, either by hand or using a computer. Meanwhile, oral test or interview conducted with face-to-face conversation between teacher and students. Meanwhile, the act refers to the process of testing a person's appearance of doing something work unit. Heyneman (2009) explained why end of school examinations are necessary. He asserts that countries need to be able to choose the best students for universities, and he said, “for modern nations to prosper, they must choose, so far as possible, future leaders on the basis of their personal potential for achievement”. Examinations are a fair way of choosing students and he added:

on the other hand, fair competition to be a leader may contradict the natural tendency for families to protect and advantage their own children and relatives. In a democracy, the public often takes an active interest in the fairness of the education system. If the public does not believe the education system to be fair, it might be said that current leaders— whether in commerce, science, military, or politics – had acquired their positions of leadership through privilege rather than achievement. If the school system can not be trusted, it may detract from a nation’s sense of social cohesion, a principal ingredient of all successful modern societies. (p. 2-3)

In terms of the form of questions and possible answers test is divided into: essay test is a test that’s arranged in the form of structured questions and students do prepare, organize their own answer from each question with their language. The essay test is very useful to develop the ability to explain or express an opinion in his own language.

Subino (1987), stated that based on the level of freedom possible answers in the form of test descriptions, test items can be distinguished on the test items that require free answers. Test items with answers tend to be bound limit, both the content and form of the answer; whereas items with the free answers tend not to limit, both the content and answers.

Analytical test is the oldest test, but this form is still used widely in the United States until now, even a form of question that is also still widely used in other parts of the world (Gronlund, 1977). Analytical test has several advantages compared to an objective test, such as (National Education Research and Development, 1984):

1. Allows the testee to answer the question completely freely
2. It is the best test to measure the ability to explain, compare summarize, distinguish, describe, and evaluate
3. It is the best test to measure the writing skills of expression
4. Provide opportunities for students to improve writing skills, organizing ideas and think critically and creatively
5. Can be widely promoting the students learn about most of the concepts and generalize
6. When compared to other forms, analytical test is relatively easy to make
7. In practice the students are not likely to guess the correct answer; and
8. It may be more appropriate to measure cognitive abilities that is relatively higher

Analytical test has certain characteristics, as proposed by Wirasmita (1981: 24):

1. Each question should be a clear formulation, definitive and passive
2. Each question should be accompanied by a clear indication of the answer desired by the participants
3. The questions should cover all the most important and comprehensive material

4. Comparison of the difficult, medium, and easy question to be balanced, although there is no definitive benchmark. Preferably comparison: hard = 30% - 25%, moderate = 50%, and easy = 20% - 25%, so after the questions are prepared, arrange immediately the answer key, by considering many possible answers

Objective test is a test that is structured in such a way that it provides the alternative answer. This test is composed of a variety of forms, such as: true-false, multiple choice, matching, relationship analysis.

In principle, the form of objective tests have weaknesses and strengths, but usually this form can objectively test all material that has been taught, while analytical form is rather difficult to measure all of the material that has been taught, because the scope of this form is very narrow.

From the explanation above, my study compares the curricula of the two countries TR and ID to answer the research questions. In addition, I will also consider the dynamics of educational change that occurred in the respective countries. The significance of this study is that the results can be used for the improvement of the educational systems in TR and ID.

CHAPTER 3

METHODOLOGY

A research is primarily a quest to collect data, to conduct measurement, to analyze, synthesize, compare data and interpret findings. This chapter presents the research methodology adopted in this study and discusses the methodological approach which seems to be the most appropriate to the nature of the research topic and to the research question. However, it has been recognised that it is necessary to have a clear understanding of philosophical frameworks in social sciences in order to set the selected methodology in context. This issue is deciding the paradigm, the theory of research methods, that underpins this research (see in Romberg, 1992 & Ernest 1994). The relationship between research methods and paradigms is discussed by Guba and Lincoln (1994) who think paradigm are superior to methods of enquiry in a research:

both qualitative and quantitative methods may be used appropriately with any research paradigm. Question of methods are secondary to question of paradigm, which we define as the basic belief system or World view that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways.

They also continue to assert that (ibid, p.116) paradigm issues are imperative and a researcher should have a clear understanding about what paradigm informs and guides his or her approach. From the philosophical point of view Hughes (1990) aptly states the significance of defining a paradigm and its relation to the instruments and methods. Its significance comes from the fact that every research instrument is inextricably embedded in dedications to particular versions of the world. None of the methods of the enquiry are self-validating so that their effectiveness depends on epistemological justifications and, most importantly, research instruments and methods cannot be divorced from theory (Delice, 2003).

The aim of this study is comparing TR and ID secondary mathematics curriculum with the essential component as mathematics textbooks to diagnose the paradigm lying behind the both countries' motive. So the research focus in this research is formulated as follows with the questions:

Investigation of TR and ID secondary school mathematics curriculum;

- To what extent do TR and ID secondary school mathematics curriculum reflect a paradigm?
- To what extent do TR and ID secondary school mathematics textbooks reflect a paradigm?
- To what extent do TR and ID secondary school mathematics curriculum and textbooks and related in terms of a paradigm?

3.1. Research paradigm

Mathematics education both in TR and ID is currently in a paradigm shift. There is a strong awareness, especially among policy makers, to renew mathematics education. The aim is that the learning of mathematics more meaningful for students and can provide adequate competence for further study or to enter the workforce. Action is defined as demonstrations of deeper learning in responsible behaviour through responsible action; a manifestation in practice of the other essential elements of the curriculum (International Baccalaureate-IB, 2007).

According to Mc Millan and Schumacher (in Hajar, 1999), a research is simply an approach to develop and acquire knowledge that is valid and reliable, which in general has four steps, namely the determination of methodological issues, a statement of hypothesis to be tested, collection and analysis of data and interpretation results and conclusion of the problem. Hajar (1999) defines research as a process of collecting systematic and logical analysis of the information (data) for a particular purpose.

Students are considered to be successful in learning if they are able to remember a lot of facts, and are able to convey these facts back to others, or use them to answer the question in an exam. Teachers themselves explain the subject matter to the students. A good teacher is a teacher who mastered the material, and during the learning process capable to deliver the course material. The new paradigm of education places more emphasis on the learner as a person who has the potential to learn and grow. Students must be active in the observation and development of knowledge. Thus, special education may have been used as a means of getting struggling students around the policy (Roderick and Nagaoka, 2005).

From the above description, in general the authors conclude that research is an activity search for and collect data systematically to be studied analytically and synthesis to produce a logical conclusion for the achievement of a goal.

Meanwhile, research method defined by Sukmadinata (2008) as a series of means or conduct of research activities are based on the basic assumptions, views philosophical and ideological, questions and issues faced. Some researchers call it as a research tradition. A research method according to him has a research design that describes certain procedures or steps that must be taken, data sources and the conditions in which the data is collected and the way in which how the data is collected or processed.

Sukmadinata (2008) defines research methodology as the means used to collect and analyze the data, which was developed to acquire knowledge by using procedures that are reliable and trustworthy. The procedure developed systematically as a plan to generate data about a particular research problem. Thus the validity and reliability of knowledge gained through research is also determined by the reliability and the reliability of the methodology used. The research method is also interpreted by Donald Ary, et al. (1982), as a general strategy adopted for data collection and analysis in order to answer the problems faced or as a plan for solving the problem being investigated.

Meanwhile, Sugiyono (2010), research method is defined as a scientific way to get data with the purpose and usefulness. Being scientific means that research activities are based on the characteristics of science, namely rational, empirical and systematic. Rational means that the research activities is carried out in ways that make sense. Empirical means that what is done is observed by the human senses so that others can observe and know the procedures used. Systematic means that the process used in the study uses certain measures that are logical.

This study sought to compare the curriculum of the secondary school in TR and ID with the scientific method to collect valid data and then perform analysis to conclude as problem solving in the field of education, especially in TR and ID.

The use of qualitative and quantitative approaches as collection instruments used in this study, but in terms of the type of the data, the use of qualitative is the primary choice. More detailed discussion will be described in the next section.

3.2 Qualitative Approaches

Millan and Scumacher (in Sukmadinata 2008), in dividing the types of research methods, before explaining their research methods to first distinguish quantitative and qualitative approaches. A quantitative approach can be defined as research that is based on the philosophy of positivism, used to examine the population or a particular sample. The sampling technique is generally done at random, using a data collection instrument of research. Data analysis is quantitative/statistical hypothesis testing goals have been set. Philosophy of positivism perceive reality as something that is relatively fixed, concrete, observable, measurable, and the relationship is causal symptoms.

A qualitative approach is often called naturalistic study because research is done on natural conditions. This study is based on the philosophy that is based on postpositivist interpretive and constructive paradigm that sees social reality as something holistic, complex, dynamic, and as having full of meaning.

Developmental research is defined by Borg and Meredith (1989) as the research methods used to develop and validate the products that are used in education and learning. It is a "bridge" between basic research with applied research, where basic research aims to discover new knowledge about the fundamental phenomenon and applied research aimed at finding practical knowledge that can be applied. Although there are times when the applied research as well as to develop the product. Research and development aims to discover, develop and validate a product.

Furthermore, Borg and Gall (1983) stated that one way to bridge the gap between research and practice in education is developmental research. In general, the study of developmental research is longitudinal including discovery, development and testing of a product or process. To study the needs analysis that is able to produce products that are hypothetical commonly using methods of basic research. Then, to test the hypothesis, experimental or action research is used. Once the product is tested, it can be applied. The testing process with the experimental design is called applied research.

The research methodology under the umbrella of evaluation research is the process of making judgements about the merit, value, or worth of educational programs (Gall et al, 2007). Development methodology is a process used to develop and validate educational products (Borg and Gall, 1983). Developmental research has been widely used in the development of the natural sciences and engineering. Almost all technology products, such as electronic equipment, motor vehicles, aircraft, ships, weapons, drugs, medical devices, multi-storey buildings and household appliances are modern, are produced and developed with this method. It can also be used in the field of social sciences such as psychology, sociology, education, management, and so on.

In contrast to Sugiyono, Ary (1982) in his book: *Introduction to Research in Education* which is translated to *Pengantar Penelitian dalam Pendidikan* by Arief

Furchan stated there are four categories used to classify educational research: experimental, ex-post facto, descriptive, and historical.

For this research I used descriptive categories with sub categories (curricula, textbooks, schemes of work and examination) in TR and ID. Data collection yielded mostly qualitative data, which was in forms of written accounts or spoken words. To deal with qualitative data I noted patterns and themes and constructed categories. Quantitative data were similarly categorised.

3.3. Validity and Reliability

In principle, research is measuring, and therefore devices are required to measure in order to obtain results that are valid and reliable. The results of the study will be valid if there is a similarity between the data collected with the actual data. If the object is red, while the data collected gives that the data is white, then the research is not valid. Meanwhile, to be considered reliable, according to Sugiyono (2010), data needs to be similar in two different times. If yesterday's object is red, then today and tomorrow it remains red. For reliability, according to Sugiyono (2010), data needs to be similar in two different times. If yesterday's object is red, then today and tomorrow it remains red.

According to Thoha (2001), validity is often interpreted as authenticity. Meanwhile, according to Purwanto (2011), validity is a quality that shows the relationship between measurement (diagnosis) with the meaning or purpose of learning or behavioral criteria. A tool is considered to have validity when the content of that measuring instrument is worth measuring object that should be measured and in accordance with certain criteria.

While an instrument is considered to be valid if the measuring instrument used to obtain the data (measures) were valid. Lacity and Jansen (1994) defines validity as making common sense, and being persuasive and seeming right to the reader.

For Polkinghorne (1988), validity of a theory refers to results that have the appearance of truth or reality.

The instruments in the natural sciences usually need to have the validity and reliability. These instruments can be trusted because they have been tested for validity and reliability before they are used to obtain the data. While the instruments in the social sciences are standardised because they were tested for validity and reliability. Many are not standardised yet. Instruments that were not tested for validity and reliability, when used in a research, data generated cannot be considered as showing the truth. Therefore, before they are used for measuring, the instrument must be calibrated (tested for validity and reliability).

Reliability comes from the words “trust” and “reliable”, which means trustworthy. Reliability relates to the accuracy and consistency (Purwanto, 2011). According to Djunaedi and Fauzan (2009), reliability means consistency in which an instrument yields the consistent scores. Thoha (2001), reliability has various other names such as stability, consistency and so on, but the main idea contained in the concept of reliability is the extent to which a measurement can be trusted. From the definition of reliability it can be concluded that reliability relates to the ability of a measure to take measurements carefully. Reliability is the accuracy and precision that is generated by the measuring instrument in measuring.

Each measuring instrument should have the ability to provide consistent measurement results. The smaller the error in the measurement, the more reliable the measuring device. In other words, the greater the measurement error, the more unreliable the measuring instrument. In this study, the criteria of the instrument is based on empirical facts that already exist in the form of secondary school curriculum documents TR and ID. This document is obtained from official sources published by the ministry of education and textbooks. To explore whether the curriculum is one of the factors of students' performance in this research, an important aim in this research is to discover what is written in all possible

documents used in the classroom: curriculum, textbooks, schemes of works and exam papers.

The idea of validity hinges around the extent to which research data and the method for obtaining the data are accurate, honest and on target (Denscombe, 1998). In line with recommendations by Lincoln and Guba (1985), transferability or external validity for this study may be maintained through the use of multiple data sources and “thick” description. Use of the multiple-method, which is the approach used in this study (see p. 48), is one of the characteristics in qualitative research that provides rich and ‘thick’ data and increases the confidence in their validity (see also Robson 1993; p. 69, Cohen et al., 2000, p. 112-113; Smith 1996, p. 193). The technique of multiple-method holds that a robust assertion is established when more than one source of data coincides (Yin, 1994). In addition to this approach, face and content validity are also used in a research study. Face validity is about an instrument, whether it measures what it is designed to measure at the face level. Content validity is defined as the agreement among professionals that the instrument appears to accurately reflect what it intends to measure (Zikmund, 1991). It is technique involving a step that the judges check the meaning of the items and their acceptability for the purpose of measurement or the study.

3.4. Data analysis

After data collection, the next phase of research commenced by the determination of the meaning of the data through analysis. However analysing the data, particularly the qualitative data compared with quantitative data, was not easy work to do (see Robson 1993 & 2002). TIMSS (Schmidt et al., 1997) is used in the document analysis. Official government documents such as the curriculum almost always define at the national level statements of students learning goals, topics to be thought, textbooks to be used. These documents, however, differ in the degree of detail with which the learning goals, topics to be taught, textbooks to

be used are specified. These are the facts that might have direct influence on students' performance and on teachers 'privilege' in different countries.

Data analysis technique was decided depending on the research design, research instrument and the method of data collection of this research (Delice, 2003). In this study, the research instruments used in data collection yielded mostly qualitative data. So, I had to deal with qualitative data analysis to make sense of this data in term of the written accounts, students and documents about the situation, noting patterns, themes, categories and regularities (Cohen at al. 2000).

Coding is one of the ways to analyse qualitative data. Robson (1993) defines a code as symbols to classify or categorise a group of words and moreover he highlights them as retrieval and organising devices to find and then bring all occurrences of a particular kind together. That technique seems to convert qualitative data into quantitative data. That reveals an issue of analysing of the qualitative and quantitative data, which should be clarified at this stage, to discuss, could this approach affect the 'thick' and 'rich' data gathered in qualitative research? The answer might be given by arguments done by Silverman (1993), Miles and Huberman (1998) and Behrens and Smith (1996); using numbers or words in analysing the data are not the main matter. This discussion between the analysis of qualitative and quantitative data is briefly summarised by Ely et al. (1991) who argue that the important thing is qualitative/quantitative researchers' decision-making process in establishing findings that should be elucidated by researchers themselves. To deal with qualitative data in reasonable way, to overcome with the overwhelming amount of the data qualitative data, to organise data and make analysis as practical as possible, all qualitative data were categorised and coded.

CHAPTER 4

RESULT

This chapter presents the results. Raw data is presented alongside its analysis. Space constraints prevent the presentation off all data collected and analysed. Curriculum and textbook will be presented.

4.1. Curriculum

TR and ID have very competitive neighbouring countries respectively such as Germany, Netherlands, France, Singapore, Malaysia, Japan which give them educational challenges and also make some changes in their education systems. Progress that has been achieved by TR over the last 3 years includes: curriculum development, physical abilities of students, the repair and construction of new school buildings, improving the quality of teachers, guidance and counseling and the use of ICT in schools. Especially about the program to improve the quality of teacher, school registers the teachers which are considered to require a development program to the training institutions in TR a year before that teacher will join the training. The school knows better what is required for their teachers or the teachers whose their competencies are needed to be improved.

About the reason that they are very concerned with education is that their country in the future will be led by their children. Therefore, if they are given a good education then this country will be managed well by them too. Another reason that they said is when they give their donations to the school, they will intend to give a charity in accordance with religious.

Similarly with TR, ID is improving continuously. Started from curriculum transformation, improvement of school facilities to the improvement of the teachers' welfare. The curriculum in ID also changes ranging from behavior into constructive. The changes from the old to the new mathematics curriculum which is the first reform movement, are summarized in Table 4.1. These comparison is important in terms of

the first meeting and comparison of two curriculum with different paradigms. These changes are related to the content, delivery, and assessment aspects of the new curriculum. It seems that the newly developed TR primary mathematics curriculum adopted a mixed model while emphasizing the subject centred model in the content development and learner centred models in the pedagogies and assessment techniques. In this respect, this can be considered a deep change in terms of both content and pedagogies but not in the way the content is developed. The content seems to be developed based on a subject centred approach.

Table 4.1. Comparing the Old and the New Turkish Curriculum (MEB, 2004)

OLD	NEW
Elementary school mathematics curriculum for grades 1 through 5 contains 1249 behavioural objectives. Textbooks written based on these objectives were very uniform and dull. Both the textbook writers and the teachers are restricted to make very limited decisions.	There are 368 learning outcomes that summarize the knowledge and skills for students to develop. These outcomes can be obtained through different learning activities. So, the textbook writers and teachers are relatively freer to produce or choose activities.
The content for 4th and 7th grade is too dense to follow for students considering their development.	The content is distributed evenly from grade 1 through grade 8.
Teaching methods, techniques and strategies are not student centred.	Teaching-learning activities prepared parallel to learning outcomes require student centred methods, techniques, and strategies.
Content is organized based on how to teach.	Content is organized based on how students learn.
There are overlapping content in other subject areas.	There are connections to other subject domains.
There are few examples of realistic mathematics.	Daily use of mathematical knowledge is emphasized.
There are limited number of alternative assessment techniques, extra curricular activities, research, and projects.	Alternative assessment techniques, extra curricular activities, research, and projects are included.
All students are expected to exhibit the same performance, with no local flexibility or individual differences. There is little room for students to choose from the alternatives. There is little mention about developing positive attitude in students.	Respect for individual differences, different learning and thinking styles is suggested. There is more room for students to choose from the alternatives. There is more emphasis on how to develop positive attitude towards mathematics and on student motivation.

As an innovation that is being implemented, curriculum trip certainly will not run perfectly. Therefore, continuous efforts to improve the management of curriculum at the school and classroom practicing become important. Development activities about teachers' knowledge and skills in applying a curriculum should be done, and the activities should be facilitated by school, department of education, and especially the central government. Supervision should be learned by every teacher in order to improve the learning process and to make sure as a learner who continues to hone the own skills.

Cognitive theory of information processing, understand the mind as a symbol-processing systems, which alter the sensory information into the structure of symbols (eg, impression, scheme), then this process is also knowledge that can be stored in memory and retrieved when needed. Learning is a modification of the structure of the internal symbol. The outside world is a source of information, but the important learning happens "inside the head" of the individual (Schunk, 1996a). Constructivist perspective opposed to the study of learning.

There are differences in the form of implementation of constructivistic learning and behaviorist learning. Learning process according to constructivistic helping students to internalize and to transform new information. Transformation occurs by generating new knowledge which in turn form new cognitive structure. In details the differences of characteristic between constructivistic learning and behaviorist, as follows in Table 4.2.

Table 4.2. Comparison of the Behaviorist and Constructivist Categorisations.

Behaviorist	Constructivist
Curriculum is presented of the parts to the whole by emphasizing the basic skills.	Curriculum is presented of the whole to the parts, and more emphasized on wider concepts.
Learning is very obedient to the established curriculum.	Learning more appreciate the appearance of question and students' ideas.
Curricular activities relying so heavily on textbooks and workbooks.	Curricular activities relying so heavily on primary data sources and manipulation of materials.
Students are thought as "blank paper" while teachers generally are being dictated in order to convey information to students.	Students are thought as brilliant thinkers who are able to create new theories about themselves.
Assessment of student learning or knowledge is seen as a part of learning and usually is done at the end of the lesson by means of testing.	Measurement process and learning outcomes established in the unity of learning activity, the teacher observes the things that are being done by students as well as through works and tasks.
Students usually work by themselves, without group process on learning.	Students usually study and work on group process.

Behaviorist theory in its development has been criticized by the theoreticians and practitioners. According to the critics, this theory is not able to explain complex learning situation, because a lot of things in the world of education that can not be converted to a stimulus response relationship. For example: not always a stimulus capable maintaining one's motivation to learn. Criticism is also directed at the weakness of this theory are direct linear thinking, convergent and less creative, including issues shaping (formation) which tends to restrict the freedom to think and imagine.

Basically the theory of constructivism emphasizes the importance of students construct their own knowledge through active involvement of the teaching and learning process. The process of learning is more colored than teacher centered student centered. A large part of learning takes place with the time based on the student's activity.

This has implications for the theoretical basis of learning in the world of education in TR and ID. Original theory of learning in both countries over behaviorism dominated flow, but this time change to the basic theory of learning refers to the flow of constructivism.

Provide learning experiences that allow students to be responsible in making the design, process, and research. Because giving a lecture is not the main task of a teacher. Provide activities that stimulate the curiosity of students and help them to express ideas and communicate their scientific ideas (Watt & Pope, 1989). Provide the means to stimulate students to think productively. Provide opportunities and experiences that supports the students' learning. Teachers should encourage students. Teachers need to provide the experience of conflict (Tobin, Tippins, & Gallard, 1994). Monitor, evaluate, and indicate whether the students thought is working or not. The teacher shows the students' knowledge and questioned whether it applies to new issues that is related. Teachers help students to evaluate hypotheses and conclusions.

4.2. Comparison of the Topics in TR and ID Secondary School Mathematics Curricula

This paper will be focus on comparing the mathematics courses at the secondary school. Here is a list of topics subject area:

Table 4.3: Comparison of the Topics in TR and ID Secondary School Mathematics Curricula

Topic of Subjects	9th Grades	10th Grades	11th Grades	12th Grades
Equations and Inequalities	TR		TR*	
Functions	TR			
Triangles	TR	ID*		
Vector	TR		ID	TR
Data	TR			
Probability	TR	TR		TR
Counting		TR		TR
Functions transactions and applications		TR		
Analytical Geometry		TR/ ID	TR/ ID	TR
Quadrangles and polygons		TR		
Quadratic equations and functions		TR		
Polynomial		TR		
Circle		TR/ ID		
Geometric objects		TR	ID	
Logic			TR	
Arithmetic			TR	
Trigonometry			TR/ ID	
Exponential and logarithmic functions			TR	
Transformation Geometry				
Derivative		ID		TR
Integral		ID	ID	TR
Composition and Functions Inverse		ID		
Functions				
Sequence and infinite		ID		
Linear Programming		ID		
Interpersonal Line		ID		
Statistics		ID		
Enumeration Rule		ID		
The matrix system of linear equations			ID	
Compound interest; installments; Annuity			ID	
Three Dimensional			ID	
Matrix				ID
Infinite sequence				ID
Flower; growth, and decay				ID
Diagonal space; Diagonal field; field				ID
Diagonally				
Concept Riemann sum				ID
Fundamental Theorem of Calculus				ID

*TR: Turkey ID: Indonesia

When it is viewed from the side of the paradigm and the purpose of education, there is no significant difference between the them, but when it is viewed from the material which is taught, it can be seen that the material subjects in TR are more simple than in ID. The density of the material needs to be evaluated by the ID government as they relate to the burden of student learning in the classroom as well as the preparation of the students in the school final exams and national exams.

The textbooks are written with firmly tighten to the mathematics curricula. All contents are the same as the objectives in the curricula and followed the paradigm traces such as constructivism. TR textbooks are published online through the Ministry of Education web page and including the new year 9th and 10th textbooks. They are physically so thick and has a vision of “the only textbook” which means no need to go to any other resources. They have a structure that trying to help students to construct the knowledge so discovery method is tried to be used. However some textbooks are not in the same line. Textbooks are reflecting the topics and objectives in detail but they are different in terms of presentation and questions.

4.3. Textbooks

Textbooks have an important place in the teaching and learning. Textbooks were ‘in line’ with the curriculum and teachers were very careful to provide supplementary documents if the textbooks were not in line with the curriculum (Delice, 2003). To view the coherence of material’s conceptual understanding in secondary school mathematics textbooks in TR and ID, can be seen by observing the presence of material that associate with the previous concept (prior knowledge), states the draft (a summary concept), giving examples or counter-examples of the concept, presenting concepts in a variety of forms of representation, and linking various mathematical concepts internally or externally. Prior knowledge is important to do because according Harsono (2003), learners should be given the opportunity to look back on what they understand or know.

Presenting concepts in a variety of forms of representation used to support conceptual understanding. According Gagatsis & Shiakalli as quoted by Kartini (2004), different representations that refer to the same concept would complement each other and all together contribute to global understanding.

Linking various mathematical concepts internally or externally is required in the math textbook for students to see that math concepts are not mutually exclusive. Internally related to each other is defined as relationship between mathematical concepts to each other, while externally interpreted as mutual corelation between mathematical concepts with other sciences. Based on the observations, all math textbooks only associate with their own mathematical concepts. This is in line with the opinion of Roseman, Stern and Koppall (2010) "... textbooks were more likely to make connections among key ideas". Yet according to Hernawan (2012), the learning that takes into account links with other science can make students learn to associate the process and content of interdisciplinary learning at the same time.

To see the coherence between the presentation of conceptual understanding and procedural fluency in mathematics textbooks of TR and ID, can be seen by observing how to apply the concepts learned in performing the procedure and describes a sufficient condition of a concept when using the procedure. In order to apply the concepts learned in running the procedure in the mathematics textbooks, should be able to provide convenience to students. Kilpatrick, Swafford & Findell (2001) states their opinion, "when students practice procedures they do not understand, there is a danger they will practice incorrect procedures, thereby making it more difficult to learn correct ones". In secondary school mathematics textbooks in TR and ID, it's found that the application of the concepts used are accurate and efficient. To see the coherence between the presentation of conceptual understanding and strategic competence in secondary school mathematics textbooks in TR and ID, can be seen by observing how the present explanation of strategies that can be used to solve problems, using strategies to

solve problems, resolve a problem in a variety of forms of mathematical representation, resolve a problem with linking the various concepts of mathematics, and the grant of a problem at the beginning of the discussion of the concept.

Textbooks are very important in learning. textbooks are documents that contain about curriculum content, exercises that teachers can use when they are teaching their students. Presentation and content are two important factors that make textbooks very useful and usable in teaching and learning process.

However, research about textbooks is still not enough as Usikin (1999) has pointed out, in recent times only a few that discussed about comparing mathematics textbooks. "Only 5 of 627 studies of mathematics education in 1995 and only 3 of 529 studies published in 1996 are textbook comparisons at any level". It becomes an entry for researchers to increase the research in this field.

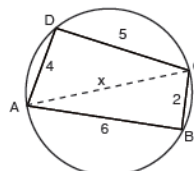
Both in TR and ID, textbooks are published in essence by the Ministry of Education of Turkey (MET) for TR and Ministry of Education of Indonesia (MEI) for ID, in addition to the textbook is also produced by some private publishers with reference to the standards MET and MEI. Here are some trigonometry questions of secondary school mathematics textbooks in TR and ID (Figure 4.1.):

Trigonometry questions in ID

1. A 160 cm boy is standing in front of a tower and is looking at the top of tower with 30 elevation angle, then he walks 20 m long to the tower with 60 elevation angle. The height of the tower is . . . m.

Trigonometry questions in TR

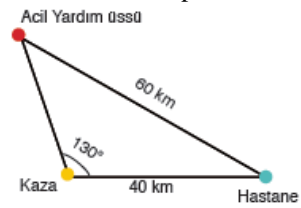
1. ABCD is a rectangle formed by four chords of circle.



If $|AD| = 4$ cm, $|DC| = 5$ cm, find the value of x ?

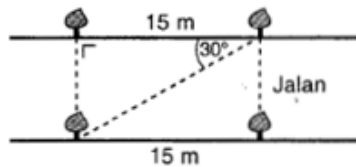
2. An ABC triangle is known with $\angle B = 45^\circ$ and CD is the high line from the point C. If $BC = 8$ cm and $AD = 12\sqrt{2}$ cm, specify the length of AC.

2. As shown in this picture:



The emergency aid of helicopter flies from its base, stops by the place of accident to take the victim to the hospital. Find the distance of emergency aid's base to the place of accident.

- 3.



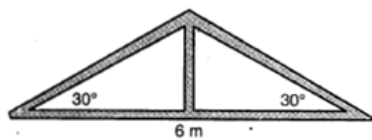
A road is planted by trees in the right a left side as shown in the picture above. If $\sqrt{3} = 1,73$, so that the width of the road is . . . m.

3. An engineer wants to measure the distances of unreachable point C to points A and B.



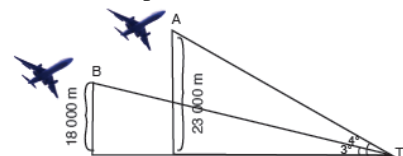
If $|AB| = 25$ m, $m(\widehat{ABC})=130^\circ$ and $m(\widehat{CAB})=40^\circ$, find the distances of point C and the point A and B.

- 4.



Mr. Danu will make a cantilever triangle as shown in the picture. If $\sqrt{3} = 1.73$, specify the length of wood needed to make a cantilever.

4. As show in the Picture, two aircrafts found at the points A and B.



Respectively their hights from the ground are 23.000 m and 18.000 m. Both of the aircrafts try to land at the point T. The angle of T and A is 4° and the angle of T and B is 3° . Find the distances of both aircrafts' runways.

Figure 4.1. Sample Question in TR and ID Textbooks

From the samples taken (Figure 4.1) about trigonometry chapter of the textbook used in TR and ID above, it appears that students are directed to be able to think

rational and creative, to communicate and cooperate, consistent, and resilient to face the problem and be able to transform the problem into opportunities. Textbook enable learners to rediscover various concepts and principles of mathematics through solving real problems in cultural environment. Activities learners construct various concepts, properties, and rules of mathematics through solving complex problems. Communication and collaboration among learners in understanding, analyzing, critical thinking and creative problem-solving becomes the main focus of mathematics textbooks in both countries such as TR and ID.

Learning mathematics in the textbook considering the connection mathematics with real problems and inter-materialmath in it. In the study of mathematical concepts and principles are very depending on the universe of discourse agreed and consideration cognitive reach learners at every level of education. For example, learning trigonometry given various types of problems that are both ordinary count related to the real life as in the sample questions above.

Nationwide examinations in TR and ID

Examination of education is one of the main components that can not be separated from the education plan. However, it should be noted that not all forms of examination can be used to measure the achievement of educational goals that have been set. Information about the education level of success will be seen if the evaluation tools are appropriate and can be used to measure each goal.

Both TR and ID are held National Exam (NE). NE is the ultimate test for students before graduation from secondary school as well as a government policy in the field of education to determine the quality standards of education. NE serves as a "quality control" of the education system, because control of the process, and the input of education is getting smaller, even when the centralized control center was actually in the field of education can not be done completely, because the mental fragility of the bureaucratic network due to various factors beyond the issue of education. The function of the national standards is the development of strategies

and plans after the data obtained from the national evaluation of learning such as the NE.

Standards are the benchmark. At any time the level of achievement of these standards needs to be known, to which its effectiveness. To the knowledge, facilities are required such as NE. NE does not need to cover the entire course content standards, of course, it is asked for costs and extraordinary power. Because it is simply to provide an overview map of the national education issues, the chosen few essential subjects. The subjects are including language, Mathematics, Natural Sciences, English, National History, and National Geographic (HAA Tilaar, 2006). NE remains crucial because it is not only to map the quality of the school, but also know the quality of students and education standards. NE is a test that is categorized as high-stakes because it is used to be a major determinant in assessing students, and even be the main determinant to establish whether a student passed or not.

TR and ID government have adopted a policy to implement the NE as one form of educational evaluation. NE serves as a means of controlling the quality of education nationwide, driving an increasement in the quality of education nationwide, an ingredient in determining the graduation of students, and as a material consideration in the admission selection in secondary education.

4.4. Comparison of education between TR and ID

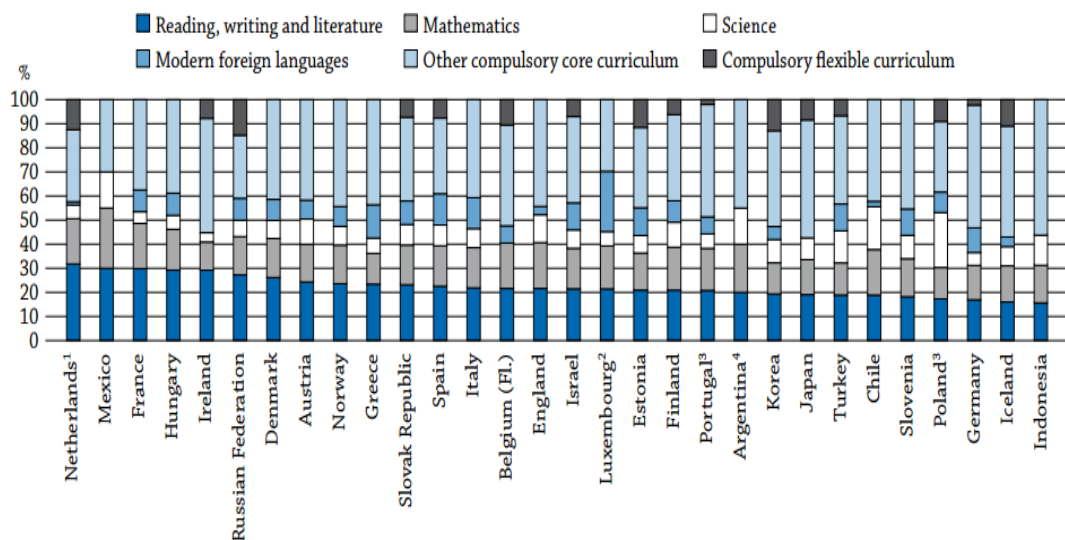
In the implementation of education system in both of those countries, TR since 2005 and ID since 2007 have run into paradigm transformation which started from behaviorist and then changed into constructivist.

Curriculum in TR and ID develops the previous one that is CB curriculum earlier. CB curriculum is "*outcomes-based curriculum*" and therefore its development is aimed in achieving the competencies which are defined from Learning Outcomes Assessment. Stenhouse suggested more open definition of a curriculum as 'an attempt to communicate the essential principles and features of an educational

proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice (Stenhouse, 1975).

Similarly, learning outcomes assessment and curriculum outcomes are measured from the achievement of competence. The success of curriculum is interpreted as the achievement of competence which is designed in the curriculum document by all students. To realize this curriculum, ID is doing some transformations which are ranging from contents to increasing school hours. The following Table 4.4 shows the Percentage of intended instruction time devoted to various subject areas within the total compulsory curriculum (OECD, 2011):

Table 4.4. Instruction Time per Subject as a Percentage of Total Compulsory Instruction Time for 9-11 Year-Olds



1. Includes 11-year-olds only.

2. German as a language of instruction is included in “Reading, writing and literature” in addition to the mother tongue Luxembourgish.

3. Includes 10-11 year-olds only.

4. Year of reference 2008.

Countries are ranked in descending order of the proportion of intended instruction hours devoted to reading, writing and literature.

Source: OECD (www.oecd.org/edu/eag2011). Argentina, Indonesia: UNESCO Institute for Statistics (World Education Indicators Programme).

Instruction time in reading, writing and literature, mathematics and science

According to OECD 2011, in OECD countries, 9-11 year-olds do not necessarily attend separate classes for each subject they study. Students at this age spend an

average of 48% of the compulsory curriculum on three basic subjects: reading, writing and literature (23%), mathematics (16%) and science (9%). On average, an additional 9% of the compulsory curriculum is devoted to modern foreign languages and 8% to social studies. Together with the arts (11%) and physical education (9%), these seven study areas form the major part of the curriculum for this age group in all OECD and other G20 countries with available data. Ancient Greek and/or Latin, technology, religion, practical and vocational skills and other subjects make up the remainder (11%) of the compulsory core curriculum for 9-11 year-olds (Table 4.4).

On average, the largest portion of the curriculum for 9-11 year-olds is devoted to reading and writing, but the differences among countries are greater than in other subjects. For example, in Indonesia, reading and writing accounts for 11% of compulsory instruction time while in France, Mexico and the Netherlands, it accounts for 30% or more of compulsory instruction time. There are also sizeable variations among countries in the time spent learning modern foreign languages. In Argentina, Chile, England, Japan, Mexico and the Netherlands, instruction in modern foreign languages accounts for 3% or less of instruction time; in Estonia, Germany, Greece, Israel, Italy, the Slovak Republic, Slovenia, Spain and Turkey it accounts for 10% or more of instruction time; and in Luxembourg, instruction in modern foreign languages accounts for 25% of the total instruction time.

Through these characteristics, it is expected that there will be a learning process which is centered on the students (Student Centered Active Learning), the trait of conceptual learning, textbook contains not only the subject matter but also includes learning process, as well as the expected competencies.

School system in TR is 4 years for primary schools, 4 years for middle schools and 4 years for secondary schools. While in ID has a system which students have to study 6 years for primary school, 3 years for middle school and 3 years for secondary school.

The educational philosophy in ID is an education which usually begins when a baby was born and lasts a lifetime. Education could have started before the baby was born like what many people do by playing music and reading to baby in the womb with the hope that they will be able to (teach) their baby before giving birth. The education system in ID is called as the national education system which has the overall sense of interrelated educational component in an integrated manner to achieve national education goals.

In general, private schools in these two countries have better quality than public schools. However, the problem is not all students can attend private school because the cost is expensive. In ID there is also a private school cooperation between two countries such as SEMESTA (TR and ID partnership schools), Goethe Institute (German-Indonesian educational institution cooperation), British International School, Australian International School, New Zealand International School, Deutsch International School which have good quality. For additional information, regarding higher education, both TR and ID have a university that has a high rank of world universities such as Middle East Technical University, Bogazici University, Marmara University and in ID there are Gadjah Mada University, Indonesia University and Institut Teknologi Bandung.

In TR, we can look very good cooperative relationship between the school and the community. One of the examples about the close relationship between the school with parents and the community around the school. The school provides a monitor camera that can be accessed directly by the parents from their house. Parents can know their children's activities in school, their activities in the classroom and others. So parents participate in supervising the learning activities. Thus the teacher can not do something bad. And the teachers treat their students very well.

The meaning of education is a conscious and deliberate effort to create an atmosphere of learning and the learning process to make students develop their potential actively to have the spiritual strength of religious, self-control, personality, intelligence, noble character, and the skills which are needed by themselves and society.

CHAPTER 5

DISCUSSION

The result in the last chapter generate many interesting discussion points but space does not allow me to discuss every issue. In this chapter I discuss major theoretical constructs that emerged from data analysis.

During these years, role of teacher in the learning process is very important. Similarly, in the era of globalization, in which computer technology is growing rapidly and replaces most of human works. However, the position of teachers can not be replaced by other media. This condition shows us that the role of teacher is still required under any circumstances. The process of learning will occur when there is interaction or reciprocal relationship between students and the environment in the educational situation in order to achieve the goals which have been determined.

Considerable (but not exclusive) emphasis at all levels on the relationship of mathematics is to the real world (MEG 1994, p. 3 in Fisher-Hoch and Hughes, 1996)

Transfer of knowledge can be obtained by the students from learning media, such as books, magazines, museums, internet, teachers, and other sources that may add the knowledge of them. However, the transfer of value will be obtained by students through teachers who instill attitudes and values of a matter which involves the psychological aspects of both teacher and student. Instilling attitudes and values which involves these psychological aspects can not be replaced by any media. Thus the teacher is the absolute media in the learning process of students.

I do not expect this comparison will necessarily to lead to improvement (Maeroff, 1991) in teaching and learning mathematics, whics is a cultural activity that is very difficult to understand (Gallimore, 1996). Because each culture develops its own norms and expectations, which are widely shared and so familiar, for

teaching and learning, these norms and expectation become nearly invisible to members within each culture (Delice, 2003). Comparison is a task that requires in-depth study and comprehensive to fulfill eligibility requirements. Dynamic of TR and ID development today demands that the curriculum development program needs to pay attention about the transformation which exists in the world today. According to Alp, Ertepinar, and Tekkaya (2006) and Erdogan, Marchinowski, and Ok (2009), the Turkish science curriculum should be improved in a way that would enable the students to become aware of environmental issues, understand them and proactively make decisions towards solving these problems and challenges.

The teacher as an educator does not only know about the material that will be taught, but he also has strong personality that makes it a role model for the students. This is important because as an educator, the teacher does not only teach students to know a few things. Teachers also need to practice the skills, attitude and mentality of students. Improving skills, mental and attitude must be practiced by students in their daily lives.

Educating is to instill the values which are contained in any materials which are delivered to students. The value will be more effective when it is balanced with a good example of a teacher who will be served as an example for the students. They might individually have a teaching approach or style or have been influenced by pedagogical factors (Delice, 2003). It is expected that students can appreciate these values and make it part of their lives. So the role and task of the teachers are not only stuffing the students with all the transferring of knowledge and making students know everything, but teachers also need to be able to act as a transferring of values.

5.1. Curriculum

In the education system, curriculum has a very important role in every country. Many things can be compared and developed from curriculum comparison between TR and ID.

In ID curriculum has changed for a long time since independent day in 1945 due to government policy in facing global challenges that is tailored with the circumstances and geographical of ID society. In TR since the last 50 years, there was only a slight change (see www.meb.gov.tr). Integration of the subjects, which are arithmetic, algebra and geometry, were suggested (Delice, 2003). Math is less emphasized on formal work and more connected to real life. This is in accordance with the improvements of curriculum so that the materials, curriculum and textbooks can support each other.

For meaningful student learning, the curriculum encouraged teachers to consider the outside contextual elements, such as lifestyle and geographical factors, while designing classroom tasks. Finally, assessment was regarded as an essential part of the classroom instruction (Irish National Council for Curriculum and Assessment, 1999; United Kingdom Qualifications and Curriculum Authority, 1999; National Council of Teachers of Mathematics [NCTM], 1995, 2000; Romberg, 2004). Teachers are expected to demonstrate a variety of skills and characteristics in order to effectively implement the curriculum in schools. Research suggests that this will give students a chance to express their ideas and increase self-confidence (Bandura, 1986). They must believe that all students can learn mathematics. Certain characteristics are very important in promoting equity in mathematics.

I see that the implementation of curriculum in TR and ID, the general objectives of the curriculum has been executed, math teachers of secondary school are aware of the important meaning of the presence of curriculum in the learning process. However, it is still found some problems in the learning process which are related

to the contextual development of lessons, implementation strategies/scientific learning methods and engineering application of authentic assessment, especially which are experienced by teachers who have been old and teachers which are located in the village. In addition, there are also schools that have not been able to develop learning process by leveraging IT to optimize students' learning outcomes, either because of the teacher's own competence or lack of facilities and infrastructure. Overall, both the TR and the ID teachers gave a different order of topics although there were some similarities. Despite all different view, teachers from both countries follow their nation curriculum and the differences in the curriculum might mirror in their teaching.

5.2. Textbooks

Textbooks are learning tool that used in schools and colleges to support a teaching program. In the process of teaching and learning in schools, textbooks can be hold by teachers and students as reference or supplement/extra books. In the learning activities, students do not merely look at anything which are explained by the teacher. Students need a reference or benchmark to explore the science, so students' understanding can be improved then that ability can be further optimized. With the textbooks, students are led to practice or try out the theories that have been learned from the book. Therefore, teachers must intelligently determine which the best textbook that will be used in the studying process. It is influenced by an educational culture. In this way mathematics textbook provide a window into the mathematics education world of a particular country (Harries and Sutherland, 2000). Therefore the TR and the ID textbooks reflected their countries' curriculum.

Currently, TR and ID governments have provided a policy in the form of provision of electronic textbooks. Good textbooks have certain criteria or standards such specific about its relevance to the curriculum at this time, the suitability between the material and method which are presented, the content of a

book or a scientific angle, namely whether the theories which are used in the writing of textbooks are appropriate or not, etc.

The mindset deductive approach inductive learning, math abstract with the concrete approach, the hierarchical nature and consistency, as well as the use of a variable or an empty symbol of meaning, a constructivist mathematics learning characteristics should be taken into consideration in the implementation of learning in the classroom.

We have to keep in mind that ID is an archipelago (about 15 thousand to 17 thousand islands), this condition becomes one of the challenges for improving the quality of education in ID. It is no doubt that there is a gap between the educational quality of the schools in the city and in the village, between schools in the java island and other islands. The schools which are located on the java island are better due to the ease of access as close to the capital and supported by adequate facilities. According to Najah (2006) Education in TR can be more advanced than in ID. The role of the public and companies (stakeholders) is very high, so the education in TR is more advanced than in ID. Completion of an issue using various forms of mathematical representations is important to do so that the problem becomes more transparent so that students can understand the problem clearly. Mathematics textbooks TR and ID are both using three forms of representation, images, symbols, and illustrations/stories.

Assessment of high school students' learning outcomes in TR and ID which is conducted by educators, educational units, as well as the Government and/or independent agencies. Learning process in secondary school uses a scientific approach that involves observing, questioning, associating, experimenting, and networking. Steps of learning process cover preliminary activities, main activities, and closing activities. Assessment is done by educators during the learning process to give a poin of readiness, process, and students' learning outcomes that lead to the achievement of competencies which include attitudes, knowledge, and skills.

CHAPTER 6

CONCLUSION

The advancement of science and technology, especially in information technology, which runs faster in the past two decades is a sign of globalization. Such advancements have influenced the development of education in TR and ID. The influence can be seen in the shifting social condition, economic, politic which requires a new balance between the values, thoughts, and ways of life which applies on a local and global context. At present, only states that have an understanding and knowledge about the process and the threat of globalization which will have a chance to survive, productive, prosperous, peaceful, and safe in their communities and the world community (Yulaelawati, 2004).

Life which is peaceful, prosperous, and can be accounted in the world community can no longer be interpreted and associated with many natural resources. But it should be interpreted with high competitiveness, custom power and competence of a nation. With those three things, it will be easier for a nation to make a balance with other nations that have much more advanced. The high competitiveness requires high competence because in the century which is full of knowledge, political dynamics of a country in the global area is strongly influenced by the country's economic growth. Economic growth of a country is strongly influenced by the competence of its human resources.

In the century which is full of knowledge, open minded society about knowledge is needed so there will be nobody who is allowed not to acquire knowledge with high quality standards. The knowledge and skills that must be had by society are very diverse and have a good quality. Because of that, a curriculum that is able to be a tool for the attainment of knowledge and skills is required. The curriculum can be called a CB curriculum.

Based on theory, in general competence can be defined as a set of knowledge, skills, attitudes, and values that influence the performance of the role, actions, achievements, as well as the work of people. Thus, competence can be measured by a common standard and can be improved through education and training (Yulaelawati, 2004).

CB curriculum is expected to create graduates who are competent and intelligent in constructing identity, culture, and nation. It is based on the view that competence in the curriculum is developed with a purpose to provide the skills and expertise as well as the competitiveness of selling power to survive in a change, conflict, uncertainty, and in the complexities of life (Yulaelawati, 2004).

The ownership of competency can foster productive life and leadership. A nation that is strong and reliable requires to have a high standard of competence to meet the challenges of competition and technological change. Nation that can provide a high standard of competence among students as an effort to realize the achievement of national education goals can produce human resources which are capable in working, surviving, adapting and be able in competing.

In both countries there has been a serious reform act in almost 8 years and the behaviorist paradigm changed into constructivist paradigm. These change naturally but reflected into their curricula and textbooks. The point is whether the government asked for this shift or a team of people who had a role in that shift. Paradigm shift may be the reflection of the people who prepared the printed documents and were a group of academician, teachers, pedagogist and assessment people. Interesting thing is neither in reform act nor 2011/2013 changes nobody including the team prepared the new changes shouted out the constructivism is the paradigm behind the document. I think this theoretical ignorance reflected itself into the practice so that after years teachers have still seem to be behaviorist and textbooks have been trying to be constructivist. TR and ID have cultural and social similarities so that the differences and similarities between two curricula can

adapt to each other. That may be observed by conducting an experimental pilot study. One of the interesting findings appears to be the topics in different years of secondary school. There are some topics that are in TR but not in ID but there are some topics that are in ID but not in TR (Table 4.1). The common topics and years are solely analytic geometry, trigonometry and circle. This is a big gap and might be checked by a deeper content analysis. However what is highlighted in here is program developer have problem with teaching order of the topic and even about the topic to be included in the curricula. Even though this is global mathematics curricula the culture and the program developers paradigm influence the curricula so that the education system and the future of a nation.

In conclusion, the government of TR and ID are supposed to compare the differences and similarities in corresponding curricula and use them for the sake of the need to improve the quality of education in the two countries. Some suggestions might be given in conclusion after discussion that two countries should exchange the lecturers and students at secondary school and university level (teacher candidates). Having paradigm shift in the curricula brings some problems beyond being solutions to some problems as well. Brophy and Good(1986) reviewed the literature on teaching behaviours and found that students learn more in classes where their teachers spend most of their time actively teaching, rather than students working on their own without direct supervision. Therefore constructivism or behaviorism whatever the paradigm is first of all the education system and revised or radically changed printed documents (curricula) should be evaluated. All the changes, working and/or not working parts ought to be explicitly defined. Paradigm shifts should reflect itself in curricula, textbooks and teachers' teaching approaches even assessments rather than staying as a name on the paper.

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APPENDIX

List of Topic Subjects

TR Textbook	ID Textbooks
Topics – Grade 9th	
<p>CHAPTER 1: CLUSTERS</p> <ul style="list-style-type: none">➤ Clusters➤ Transactions in Clusters <p>CHAPTER 2: EQUATIONS AND INEQUALITIES</p> <ul style="list-style-type: none">➤ Real Numbers➤ First Degree Equations and Inequalities➤ Exponential Expressions and Equations➤ Applications of Equations and Inequalities <p>CHAPTER 3: FUNCTIONS</p> <ul style="list-style-type: none">➤ Concept and Representation of Function➤ Graphs of Functions <p>CHAPTER 4: CONGRUENT AND SIMILARITY OF TRIANGLES</p> <ul style="list-style-type: none">➤ Parity➤ Similarity➤ Auxiliary Elements of Triangle <p>CHAPTER 5: PERPENDICULAR TRIANGLE AND TRIGONOMETRY, TRIANGLE AREA AND VECTORS</p> <ul style="list-style-type: none">➤ Perpendicular Triangle and Trigonometry➤ Area of Triangle➤ Vectors and Operations in Vectors <p>CHAPTER 6: DATA, COUNTING AND PROBABILITY</p> <ul style="list-style-type: none">➤ Measures of Central Tendency and Dispersion➤ Representation of Data of Graphic➤ Probability	

Topics - Grade 10th

CHAPTER 1: POLYNOMIALS

- Polynomials Concept
- Factorization
- Factorization Methods
- Adding or Removing Terms Factorization
- Rational Expressions and Equations
- The Simple Rational Expressions as Count Writing Rational Expressions

SECTION 2: SECOND DEGREE QUADRATIC EQUATIONS, INEQUALITIES AND FUNCTIONS

- Equations
- A Second Degree Equation of Establishment
- Inequalities
- First or Second Degree Solution of Inequality Systems
- Quadratic Functions
- Finding some Points in Quadratic Function

SECTION 3: TRIGONOMETRY

- Trigonometric Ratio of Acute Angles in Right Triangle
- The Trigonometric Values of the Trigonometric Functions
- Periods Of Trigonometric Functions
- Functions of Inverse Trigonometric
- Relations Between Trigonometric in Triangle
- Sum and Difference Formula

CHAPTER 1: POWER FORM, ROOTS AND LOGARITHMS

- Power of Positive Integer, Zero and Negative
- Root Form and the Shape of the Roots of Algebraic Operations
- Rationalizing the Denominator
- Fractional Power
- Logarithm

CHAPTER 2: FUNCTIONS, POWER FUNCTIONS, QUADRATIC EQUATIONS AND QUADRATIC INEQUALITIES

- Function
- Drawing a Graph of the Function
- Quadratic Equation
- Quadratic Inequalities and Inequalities of One Variable
- The Application of Discrimination Quadratic Equations and Application of Quadratic Equations

CHAPTER 3: SYSTEMS OF LINEAR QUADRATIC EQUATIONS

- System of Linear Equations of Two Variables
- System of Linear Equations of Three Variables
- Systems of Quadratic Linear Equations

CHAPTER 4: MATHEMATICAL LOGIC

- Statement and Negasi
- Compound Statement and Quantifier Statement
- Compound Statements and Equivalent
- Conclusion

CHAPTER 5: TRIGONOMETRY

- Size of the Angles and Comparison of Trigonometry
- Functions, Trigonometric Equations and Identities
- Sine Rule, Cosine Rule, and the Area of the Triangle

CHAPTER 6: THREE-DIMENSIONAL SPACE

- The Position of Point, Line and Plane in Space
- Distance in Space
- Angle in Space

Topics - Grade 11st

CHAPTER 1: COMPLEX NUMBERS

- Complex Numbers

CHAPTER 2: EXPONENTIAL FUNCTION

- Exponential Function
- Logarithm Function
- Features of Logarithm Function

CHAPTER 3: PERMUTATIONS, COMBINATIONS, PROBABILITY AND STATISTICS

- Methods
- Factorial
- Permutations
- Combination
- Probability
- Statistic

CHAPTER 4: INDUCTION AND SERIES

- Induction
- Total of Symbol
- Features of Total of Symbol
- Multiplication Symbol
- Features of Multiplication Symbol

CHAPTER 1: STATISTICS

- Reading and Presenting Data
- Measuring a Central of Data
- The Size of the Location and Size of Data Dissemination

CHAPTER 2: OPPORTUNITY

- Rule Enumeration
- Chance of an Events
- Opportunities of Compound Events

CHAPTER 3: TRIGONOMETRY

- Trigonometric Formula for the Sum/Difference of Two Angles
- Double Angle Trigonometric Formulas
- Addition and Multiplication Formulas of Trigonometry

CHAPTER 4: EQUATION OF CIRCLES AND TANGENTS LINE

- Equation of a Circle
- Equation of Tangent Line of the Circle

CHAPTER 5: MATRIX, DETERMINANT AND SYSTEMS OF LINEAR EQUATIONS

- Matrix
- Multiplication of a Matrix by a Real Number
- A Matrix Revolution (Transpose)
- Systems of Linear Equations
- Determinants
- Sarrus Rule
- Additional (adjoint) Matrix
- Cramer Rule

CHAPTER 5: MANY TRIBES

- Definition of Many Tribes
- Distribution of Many Tribes
- Remainder Theorem and Factor Theorem

CHAPTER 6: COMPOSITION FUNCTION AND INVERSE FUNCTIONS

- Composition Function
- Inverse and Inverse Function of the Composition Function

CHAPTER 7: LIMIT FUNCTION

- Limit of Algebraic Function
- Limit of Trigonometric Functions

CHAPTER 8 DERIVATIVE FUNCTION

- Derivatives of Algebraic Functions
- Derivatives of Trigonometric Functions
- The Application of Derivatives

Topics - Grade 12nd

CHAPTER 1: FUNCTIONS

- Functions
- Set of Definitions of Functions
- Partial Functions

CHAPTER 2: LIMITS AND CONTINUITY

- Limit
- Continuity

CHAPTER 1: INTEGRAL

- Indefinite Integral and Definite Integral
- Trigonometric Functions Integral
- Substitution Integral and Partial Integral
- Some Application of the Integral

CHAPTER 2: LINEAR PROGRAM

- Two-variable Linear Inequality Systems
- Determining the Optimum Value and Objective Function

CHAPTER 3: DERIVATIVES

- Derivatives
- Applications of Derivatives

CHAPTER 4: INTEGRAL

- Certain Integral
- Indefinite Integral
- Application of Definite Integrals

CHAPTER 3: MATRIX

- Definition, Notation, and Order of Matrix
- Matrix Addition and Subtraction
- Matrix Multiplication
- Determinants and Inverse of Matrix
- Application of Matrix

CHAPTER 4: VECTOR

- The characteristic and Operations of Algebra Vector
- Scalar multiplication of Two Vectors
- Orthogonal projection of One Vector to Another Vector

CHAPTER 5: GEOMETRICAL TRANSFORMATION

- Translation and Reflection
- Rotation, dilatation, and Matrix Transformation
- Composition of Transformation

CHAPTER 6: SEQUENCE, SERIES AND SIGMA NOTATION

- Arithmetic Sequences and Series
- Geometric Sequences and Series
- Sigma Notation and Mathematical Induction

CHAPTER 7: FUNCTIONS, EQUATIONS, AND INEQUALITIES EXPONENT

- Exponent Function
- Exponent Equations
- Exponent Inequalities

CHAPTER 8: FUNCTIONS, EQUATIONS, AND INEQUALITIES LOGARITHM

- The logarithm Function
- Logarithmic Equation
- Logarithmic Inequality