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Comparison of Turkish and Indonesian secondary mathematics curricula; reflection of the paradigms

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Abstract

The aim of this study is to compare the secondary school mathematics curriculum of Turkey and Indonesia with respect to the paradigm embedded into them. 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. 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.

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Keywords: comparative education; Turkish education system; Indonesian education system; secondary mathematics curriculum; paradigms.

1. Introduction

In International standard classification of education, making a comparison about a system between one country with other countries may be accepted as one of the possible ways to improve quality in education, because comparing two systems help us to realize what is the differences and similarities which advice the education

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authorities to reorganize or revise the existing system to reach the goal successfully. Moreover, a comparison may also mean to make an analysis between one system and other systems in terms of security, differences, paradigms, 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)

To reach the main goals of education, both Turkish and Indonesian government should strive to improve the quality of education in each country through the comparative studies which may be among neighboring countries or with the countries from different continent having a position in international studies such as TIMSS and PISA. So comparing the Turkey and Indonesia in terms of mathematics curriculum would be beneficial in educational studies:

> 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 the curricula in Turkey and Indonesia would very interesting because in addition to less research conducted and non-neighboring countries from two different continents the researchers are Indonesian studying in Turkey and Turkish respectively. From personal experience for about 2 years studying Masters in Secondary Mathematics Education in Turkey, Indonesian researcher saw many reasons, such as the similarities of culture, political situation and for teaching and learning that why a comparative research in both countries would be vitally essential. 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). Examining general education may help to see overview picture of the systems so that after this point paper commences by outlining the general state of education in both countries to end with the purpose of the study.

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. However, almost no country has put considerable attention on education for adults.

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 adults (people) about the formal school education schools is needed, so the state's interventions (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 principle of decentralization which is to be chosen in decision making of the education sector. Turkey and Indonesia are two examples of democracy countries. Central Government intervene the education by providing state's land for the construction of the faculties of agriculture and engineering; helping schools with the 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.

Education Management both in Turkey and Indonesia are developing pattern of decentralization, so the

management of education in Turkey and Indonesia are managed by the aspirations and needs of people in local government.

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. At the 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.

Curriculum is in the heart of every country's education system. It reflects the culture, social perspectives, paradigms and topics even maybe hidden pedagogical strategies. It has also (inter-)link to the textbooks, teachers and students. Some researchers showed that teachers were firmly following the curriculum and that they seemed concerned with covering the content of the curriculum (Delice, 2003; Pepin, 1999). The textbooks are the written documents including the content of the curriculum that teachers can utilise in their teaching. The aim of this research is to compare the secondary school mathematics curriculum between Turkey and Indonesia with respect to the paradigm embedded into them.

2. Methodology

The aim of this research is to compare the secondary school mathematics curricula between Turkey and Indonesia with respect to the paradigm embedded into 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 even mathematics curricula from deeper perspective this is a comparative study with qualitative approaches methodologically. 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 analyzed using coding by theme and presented by descriptive statistics.

3. Findings

3.1. General comparison of the curricula

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. That the curriculum development is the process consists of making decisions on learning objectives, selecting the learning contents and teaching methods, developing or improving the teaching materials and evaluating the curriculum. The programs aim to meet the needs of the individual and of society, to integrate theory and practice, to provide learner-centered education, to emphasize interdisciplinary subjects, and to provide settings rich in learning opportunities.

Recent curriculum acts in Turkey and Indonesia develops previous curriculum that is competency-based curriculum earlier. Competency-based curriculum is "*outcomes-based curriculum*" and therefore the curriculum development is aimed at achieving the competencies which are defined from Learning Outcomes Assessment. 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.

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.

3.2. Comparison of the mathematics curricula

School system in Turkey is four years for primary schools, four years for middle schools and four years for secondary high schools. While in Indonesia has a system which students have to study six years for primary school, three years for middle school and three years for secondary high school.

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

Table 1. 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 Functions		ID		
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 Diagonally				ID
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 them, but when it is viewed from the material which is taught, it can be seen that the material subjects in Turkey are simpler than in Indonesia. The density of the material needs to be evaluated by the Indonesian 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 on line through the Ministry of Education web page and including the new year 9 and 10 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. Discussions, conclusion and suggestions

Educational challenges which are faced with neighboring countries by the two countries are very competitive. Turkish territory which is adjacent to the continent of Europe, where many European countries have good qualities such as Germany, the Netherlands and France and Indonesia which is competing with good countries in Asia such as Singapore, Malaysia, China, Japan and even other neighboring countries which are located on the continent of Australia make these two countries continue to develop themselves through curriculum adjustments, additional educational facilities, improving the quality and welfare, teaching, scholarship and a student exchange to another country to be able to equal and even superior to the competitor countries.

In Turkey, we can look very good cooperation between the school and the community. One of the examples for close relationship is between the school and 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. Then what about in Indonesia? Similarly, Indonesia is improving continuously starting from curriculum transformation, improvement of school facilities to the improvement of the teachers' welfare. The curriculum in Indonesia also changes ranging from behavior into constructive.

According to Fajrun (2006) Education in Turkey can be more advanced than in Indonesia. The role of the public and companies (stakeholders) is very high, so the education in Turkey is more advanced than in Indonesia. On the other hand Indonesian children achievements is also good. Indonesian children are mostly successful in the area of science Olympics that young scientists have having world-class achievement. This might be sealed by the son of Indonesian, Habibie's competence which can be given as an example to be recognized in international world.

In both countries there has been a serious reform act in almost 8 years and the behaviorist paradigm changed into constructivist paradigm. These changes *maybe* 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. We 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". Turkey and Indonesia 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 high 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 1.). The common topics and years are solely Analytic geometry, trigonometry and circle. This is a big gap and might be check 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 so that the future of a nation.

In conclusion, the government of Turkey and Indonesia are supposed to compare the differences and similarities in corresponding curricula and use them for the sake of the need for improving the quality of education in the two countries. Some suggestions might be given in conclusion after discussion that two countries should exchange the lecturer and students at high school and university level (teacher candidates). Having paradigm shift in the curricula brings some problems beyond being solutions to some problems as well. 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, teachers teaching styles and in stake exams even assessments rather than staying as a name on the paper.

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