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NO YOUTH LEFT BEHIND: REFLECTIONS FROM UNDERGRADUATE MATHEMATICS

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ABSTRACT: With the initiative of Council of Higher Education (HEC), all graduates from high schools almost have a chance to take a place in undergraduate programs because of the newly founded universities in all cities in Türkiye. The problems arise in the first year of higher education for the students who have not enough competences in mathematics. The program's courses in universities are similar but the enrolled students in programs are not homogeneous in their mathematics backgrounds. No Youth Left Behind (NYLB) in placement is achieved for schooling purposes, but is it reasonable to say NYLB in first year mathematics is achieved. Thus, the aim of study is to find the way for achievement in transition and first year mathematics in higher education. In order to accomplish the aim, the head of mathematics department in citywide should be co-head with the head of departments at university.

Key words: Undergraduate Mathematics, Function, Transition

INTRODUCTION

With the initiative of HEC in Türkiye, all graduates from high schools almost have a chance with 74,86% gross schooling (TUİK, 2014) and their chances will be increased by newly founded higher education institutions in the following years, to take a place in undergraduate programs only with ranking system in entrance examination without considering academic abilities of candidates. That's why the process of placement can be called a continuation instead of transition from high school to higher education.

Increasing higher education schooling to get enough places at universities for the high school graduates can be thought as the democracy of equality in reaching the higher education and building socially well environments. By the years pass away, the ratio of continuing tertiary education increases as Sewell & Hauser (1972) states that a student in the high socioeconomic status category has a 2,5 times greater chance of continuing his or her education beyond high school than one in the low socioeconomic status category whereas Hoffman, Vargas and Santos, (2009) state that young people from middle- and upper-income families are five times more likely to earn a two- or four-year college degree than those from low-income families. Tanrıkulu (2011) states principle factors for increasing higher education schooling ratios as employment and its impact on income and also population at age of higher education. The stated findings constitute the reasons of growing number of universities to form socially well prepared societies, taking low socioeconomic students into consideration. From this point there is no problem in No Youth Left Behind (NYLB) Act. The problems arise in the first year of higher education with students who have not enough competences in mathematics. The program's courses in all universities are almost similar but the students in programs are not homogeneous in their backgrounds in mathematics. NYB in placement is achieved, but is it reasonable to say No Youth Left Behind in first year mathematics achievement. In the study, No Youth Left Behind is investigated from two perspectives; one is from high school to university and the other is from university to anywhere but not the following year at the university.

This state of students' feeling is explained by rite of passage and Mutch (2005) see transition as the process you go through mentally when you face a big life change, and recognizes the first year of higher education experience as an identifiable period of transition. In this study, I examined the period from high school to university exam and from there to the first year of higher education from the point of "rites of passage". Theory is combined with the lens of mathematics, how the transition period is experienced by students from the line of

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mathematics. Transition period includes three phases as Clark and Lovric (2008) explains; Separation (from high school) takes place while students are still in high school, and includes anticipation of forthcoming university life; Liminal (from high school to university) includes the end of high school, the time between high school and university, and the start of first year at a university and Incorporation (into university) includes, roughly, first year at a university. When separation and incorporation phases are thought together Clark and Lovric (2008) asks for what to teach students to prepare them for university and the other asks for finding effective ways of students' prerequisite knowledge can be found not only at the liminal phase as a question of "how can we prepare students in the separation phase so that they can study / review functions" that is also needed at higher education level. Then the problem of curriculum gap arises in the form of continuing or background about the functions to be studied at higher education. The curriculum gap is explained by Brandell, Hemmi and Thunberg (2008) as students' abilities to draw accurate sketches of elementary functions are below what is expected.
Liminal phase considering the university examination, the similar history can be found in Japanese higher education system. Increasing number of universities lowers the level of students and importance of the university exam and produces the new problem of students without enough competencies to be seat at the first year of university courses (Mori, 2002). When transition and curriculum gap are introduced together, the aim of study is to find the way for achievement in transition and first year mathematics in higher education

METHODS

In this study, to minimize the curriculum gap, at the beginning of the course the functions are review from the perspective of modelling. Modelling contributes towards giving more meaning to the learning and teaching of mathematics (Blum, 1993). In the first step of this study, the 42-students of Bayburt University in economics program of Faculty of Economics and Administrative Sciences are introduced learning model activities (group learning and problem solving) and students' task papers are analysed under the implementation of quantitative approach.

The transition period from the students' view can be understand as to find a place but then the emerging problems linking high school and first year at the university arises in so many different levels that need to be overcome for the sake of our nation's young generation. To reveal the existing situation, students' thoughts in first year mathematics are investigated in qualitative approach. In the second step, the same students' thought about the education in high school, in higher education and the process of Student Selection and Placement System (OSYS) are obtained using the open questioned survey to get their feelings about all aspects of the transition period.

Curriculum Gap; Functions

High school mathematics program (NME, 2005) aims to develop eight significant mathematics skills of students. In this study, two of them, problem solving and modelling, are taken in to consideration to use concrete link between high school and higher education. The transition period links students' mathematical knowledge between high school and higher education in modelling using functions. Modelling is taught for the revision of functions that students should be familiar from high school mathematics lessons. The problem, in lesson plan, which includes the skills named modelling, problem solving and topic of function, given in the mathematics program is "In meteorology, the balloon is inflated with helium gas and with related rate of 1.5 cm/sn. Find the function of volume V in terms of time t?" (NME, 2005, p.41). It is used to get idea of students' mathematics level and use that information to form groups in problem solving activity. The implementation of the problem solving approach with the problem task given in the math class as a group work is "when you turn on a hot-water faucet, the temperature T of the water depends on how long the water has been running. Draw a rough graph of T as a function of time t that has elapsed since the faucet was turned on" (Stewart, 2009, p.15).
The problem task is formed with Polya's five steps in problem solving evaluation approach (Baki, 2006); Understanding Problem, Making Plan, Implementation of Plan, Evaluation and Making New Problem, with voluntarily formed 2-person groups of total 42. The task is distributed to groups as mentioning to work alone at the beginning of activity and later on to work as a group for the prequisite of group working. At last, they share their solutions to whole class by writing them on the blackboard. After all, I combine all solutions by negotiating with students to draw the common result for the task problem. Groups' papers are evaluated according to the problem solving evaluation scale Baki (2006).

Transition

The transition period's phases are to be asked to students at survey. For each phase, one open ended question is used to get students' inner thought during the whole transition period. The questions and the responses are evaluated to get the idea of situation that students face as rite-of-passages. For separation phase, high school period, "What are your experiences about mathematics in high school?", for liminal phase, the period from high school to university, implies the university exam, waiting for results, making the selection for placement

according to points and ranking in exam, the question "What are you experiences about OSYS?" and for incorporation phase, includes the first year in the university, the question is "What are you experiences about mathematics at university?".

RESULTS and FINDINGS

The Function

The students draw their solution on the blackboard to see all in one shot to analyze as a class and two of them are given in Figure 1. The graphs are different in detail but when you look them to get the pattern, there are some similar ones. Even they can be grouped according to their similarities. This is caused by the problem text that the value of temperature is not given and they choose their own values.

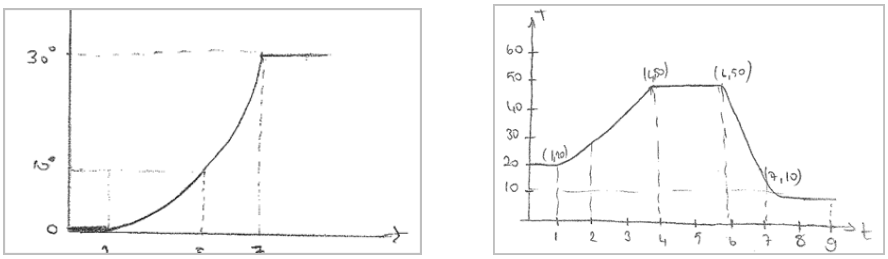

Figure 1. Samples of Students'Works

The problem solving evaluation scale, according to analyzing of task papers, findings and their descriptive statistics at level three are given in Table 1 with all steps in Polya's problem solving process that are evaluated with five dimensions. With 71%, it is known that students have a difficulty of understanding problem in the perspectives of rewriting them in a different way. 60% of students have the difficulty in forming strategy to lead solving problem. Whatever their strategy is, students try to calculate and graph something with 45%. Backward study on the solution steps or in giving arguments to verify the solution steps, there are no such task papers. In making new problem with the logic of the given one, there are no great efforts but only 40%. In problem solving evaluation steps with five dimensions, implementation of plan works better besides the others.

Table 1. Problem Solving Evaluation Scale

Problem Solving Evaluation Process	n	%
Understanding Problem	12	29
Making Plan	17	40
Implementation of Plan	19	45
Evaluation	-	-
Making New Problem	17	40

Groups' tasks finding in Table 1 emphasis the weakness of students' problem solving skill that are aimed in high school and also in higher education.

The Transition Period

For the transition period survey findings are given in three phases. Separation phase (Figure 2), all the responses are coded and then categorized under three themes; high school type, mathematics lesson and mathematics teacher. High school type; I see myself in lack of knowledge graduated from vocational high school, need to shadow education, prepares us to university examination. Mathematics lesson; more about memorization, not oriented to university examination, not related to university mathematics topics, mathematics topics are not completed, topics in high school mathematics should be similar to university examination. Mathematics teacher; I wonder what happens if someone from HEC comes to any of the high school's any mathematic lesson, university teachers should have classes in high schools.

Liminal phase (Figure 2), all responses are categorized under two themes; system and placement. System; we are experimental subject, having not enough information about the system, tiring empty brains. Placement; I do not know but when I see my community, everybody seems to be placed in any university, do not know how OSYS place students, no placement according to abilities, nobody is in the university that they wish, no examination but place everybody where they want.

Incorporation phase (Figure 2), all responses are categorized under four themes; mathematics exams, mathematics topics, mathematics teacher and class attendance. Mathematics exams; examinations are difficult, the entire fault is not our, because it is known that we are not good at mathematics, we are not mathematicians so

easy questions. Mathematics topics; not see the mathematics topics in high school, study topics from economics perspective, should start from lower levels that we do not know. Mathematics teacher; understand topics because teach well, teaches for understanding not for memorization. Class attendance; when attend the class I understand, where is the problem; math education which is not given us in high school or OSYS which places us at university with such a mathematics knowledge or students who do not put enough effort to get the knowledge. Class attendance is considered as inner source of phase so there is no linkage with other phases.

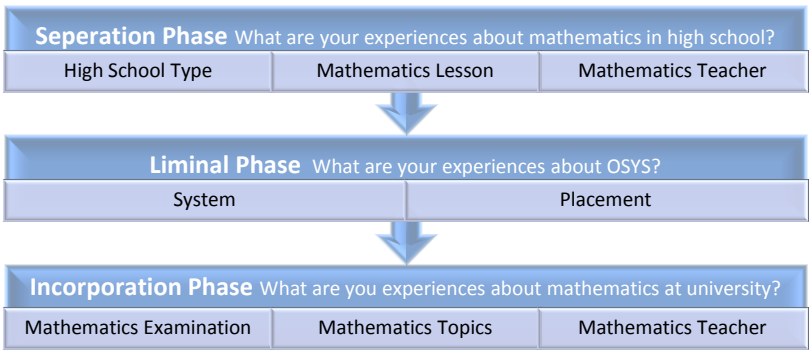

Figure 2. Transition Period

The phases of transition period are interlinked in three main issues as shown in the same column (Figure 2.). The first is, high school type, system-placement and mathematics examination reveals importance of school type and OSYS and their effects on undergraduate mathematics examination. The second is, mathematics lesson in high school and mathematics topics in university is explained by disconnection. The third is, mathematics teacher in both class presents the method used in teaching. Hence, the link among phases are set by the students is line to carry out the remedial education.

CONCLUSION

The mathematics levels of students in modelling task of the functions (Table 1.) reveals the weakness of the understanding, making plan, evaluation and making a new problem that are the dimensions of the problem solving process. It is strange that understanding and making new problem have same percentages explains without understanding there is nothing to do. Beside these, implementation of the strategy whatever they choose shows the greatest percentage as 45% can be understand as students just know to do some manipulation even without knowing what they are doing, which represents the term "memorization". The findings shows that OSYS places every graduate at higher education from the socially well-being generation perspectives but OSYS should think also the cognitive states and needs of the students as well.

To avoid the disadvantages of shadow education for students, higher education institutions should find the ways as "remedial education" to help first year students for their academic achievements. Mori (2002) states that higher education institutions make students' transitions smooth and one major issue under dispute is who is responsible for remedial education. Otherwise, after first year in higher education NYLB will be accomplished as not passing the following year means that it is the end of university life.

RECOMMENDATIONS

It is concluded that each youth should have a right to study in higher education by providing not only more places for them but also preparing them to be ready to study in higher education. As Mori (2002) states who is responsible for remedial education especially the ones coming from the disadvantaged high school such as vocational, implies that there should be close and immediate cooperation between NME and HEC, opposite to giving majority of responsibility to high school (HEC, 2007), about findings ways of strengthening students' cognitive level even starting from kindergarten to higher education. In order to accomplish this cooperation, the head of mathematics departments in citywide should be co-head with the head of departments at university.

REFERENCES

Baki, A. (2006). *Kuramdan Uygulamaya Matematik Eğitimi*. Trabzon: Derya Kitabevi.
Blum, W. (1993). Mathematical modelling in mathematics education and instruction. Inside *Teaching and learning mathematics in context*, Edited by Breiteig (etc.), (pp.3–14). Ellis Horwood Limited, Chichester.
Brandel, G., Hemmi, K., & Thunberg, H. (2008). The Widening Gap – A Swedish Perspective. *Mathematics Education Research Journal*, 20(2), 38–56.

Clark, M. & Lovric, M. (2008). Suggestions for a Theoretical Model for secondary –Tertiary Transition in Mathematics. *Mathematics Education Research Journal,* 20(2), 25–37.
HEC (2007). *Türkiye'nin Yükseköğretim Stratejisi*. Ankara: Yükseköğretim Kurulu.
Hoffman, N., Vargas, J., & Santos, J. (2009). New Directions for Dual Enrollment: Creating Stronger Pathways from High School Through College. *New Directions For Community Colleges*, 145: 43–58.
Mori, R. (2002). Entrance examination and remedial education in Japanese higher education. *Higher Education*, 43, 27–42.
Mutch, C. (2005). The Transiton from High School to University: An Analysis of Advice for Students, Faculty and Administration. Received March 24, 2014 from http://www.cshe.nagoya-u.ac.jp/ publications/ journal/no5/10.pdf
NME (2005). *Matematik Dersi Öğretim Programı ve Kılavuzu*. Ankara: Talim ve Terbiye Kurulu Başkanığı.
Psacharopoulo, G. & Tassoulas, S. (2004). Achievement at the higher education entry examinations in Greece: A Procrustean approach. *Higher Education*, 47, 241–252.
Sewell, H. W. & Hauser, R. M. (1972). Causes and Consequences of Higher Education: Models of the Status Attainment Process. *American Journal of Agricultural Economics*, 54(5), 851–861.
Sewell, H. W. (1971). Inequality of Opportunity for Higher Education. *American Sociological Review*, 36(5), 793–809.
Stevenson, D. L. & Baker, D. P. (1992). Shadow Education and Allocation in Formal Schooling: Transition to University in Japan. *The American Journal of Sociology*, 97(6), 1639–1657.
Stewart, J. (2009). *Calculus.* USA: Cagne Publication.
Tanrıkulu, D. (2011). *Türkiye'de Yükseköğretime Erişim*. Ankara: Siyaset, Ekonomi ve Toplum Araştırmaları Vakfı Yayını.
TUİK (2014). Öğretim Yılı ve Seviyelerine Göre Okullaşma Oranı. Received March 24, 2014 from http:// www.tuik.gov.tr/PreTablo.do?alt_id=1018