AN ASPECT OF TEACHER PRACTICE IN TURKISH CLASSROOMS: DIFFERENCES IN TIME GIVEN TO STUDENTS TO DO MATHEMATICS IN TWO DIFFERENT TYPES OF SCHOOLS

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In this paper I will look at the structure of mathematics lessons in Turkish state schools and private colleges. Although teachers' practices have similar structural features in teachers' own accounts, there are different teacher privileging patterns in classrooms. In particular, the time given to student engagement with examples differs. In private colleges, time allowed for students engagement with problems is markedly less than in state schools.

INTRODUCTION

Mathematics education research increasingly sees mathematics as culture laden. This culture involves the classroom culture of teachers, that is how teachers organise the lesson structure and what teachers see as a relevant and more immediate for his/her students to learn. Kendal and Stacey (2001) show how teacher privileging resulted in different differentiation competencies in different classes.

Research shows that the amount of time spent by students on academic tasks correlates with their academic achievement. (Fisher et al.(1980) as cited in (Peladeau et al., 2003)). Nevertheless, increasing the time allocated for students to engage in educationally relevant classroom activity does not guarantee richer performance or increased learning. However, a teacher's preference on the time that she/he allocates for students to engage in an academic task may well be an indicator of the teacher's overall philosophy of subject matter (Berliner, 1990) and "both a person's philosophy of education and commonsense understandings about the meaning of 'quality instruction' can be examined using time variables"(ibid.)

THE RESEARCH

The research findings are a part of an ongoing project to investigate teachers' beliefs about teaching and learning and their actual practices in two different contexts in the Turkish education system for 17-18 year olds. Students of this age in Turkey are taught mathematics in two places. They attend state schools (SS), but at weekends or in the evenings most of them also attend courses in privately owned schools (PC). The main objective of private school courses is to prepare students for the university entrance examination (UEE), which is made up of multiple-choice questions. Private courses, rather than state schools, are the institutions where teaching for the multiple-choice tests is practiced. As one teacher put it [translated from the Turkish]:

> "The aim of mathematics teaching [in PC] is not to teach mathematics basically, but to prepare students for the examination they will take – to make them able to answer the questions that they will face in the examination in the most practical and easiest way. Our

aim is not teaching mathematics deeply and with its theory. As an educator in private courses, our aim is to prepare them for the examination in a practical manner."

I have used an exploratory case study methodology (Yin, 1994) in order to explore teaching in its natural context. Series of lessons of teachers from each kind of institution (SS and PC) were video recorded when they were teaching functions. 24 Teachers were also interviewed using an hierarchical focusing technique (Tomlinson, 1989) which is a particular version of a semi-structured interview that starts with the most general questions and goes on to specific issues that are not covered by respondent spontaneously. The research reveals a widespread divergence between PC and SS teachers in their mathematical practices. In this paper I will draw on the data obtained from interviews and video recordings of teachers in both type of schools.

ANALYSIS OF DATA

In the analysis of the video data, the results from piloting as well as early findings from the main data have revealed that the teachers followed particular patterns in their practices. The lessons contained academic and non-academic elements. The academic elements involve teaching and/or learning activities and the non-academic elements are generally class management activities or other activities, which do not involve formal teaching and/or learning. Academic parts of lessons involved what teachers from both type of institutions called 'content' and 'example solving'. (a direct translation of Turkish phrases that were used by teachers in the interviews). I have not used the phrase "problem solving" since the meaning attached to "problem solving" is different from "example solving" in its context [1]. In educational research the phrase "problem solving" generally refers to open ended questions, which mainly requires students to investigate/speculate the solution. "Example solving" is much more straightforward and generally requires procedural knowledge and calculation skills in this context.

Content: This is the theoretical stage of the lesson where teachers provide definitions of concepts and explains the concepts and procedures in mostly abstract and/or out of context terms. During the explanations teachers may give typical examples of concept(s) or abstract description of phases of mathematical processes involved. The starting point for this stage is, as it is observed in visual data, is mostly teachers' writing the title or sub-subtitle or sub-section of the topic to be taught or teacher's beginning to explain the topic verbally. The endpoint, however, varies. In most cases teachers wait for students to make notes of text on the board or teachers go directly to the example solving stage.

Example solving: In this stage, actual mathematical examples (or problems) with numerical context are processed. It is the application part of the lesson. It has three phases: presentation, engagement and resolving.

1 This is another indication of mathematics being context specific and culture laden. I would, hence, like to keep the authenticity of the expression.

1-Presentation: Teacher presents the example that s/he would like to give in this phase. The video data indicated that it mainly involves teachers' writing the example(s) on the board and when necessary, stating the problem verbally. This is the most straightforward of the three phases. As it is the first phase of the example solving, starting point for this is defined by teacher stating that s/he is giving an example or teachers' beginning to write an example on the board. The end point, however, is defined by the completion of the example presented or teachers stating what the question is verbally.

2-Engagement: In this phase of the example, the teacher waits for students to engage in the solution of the example in presentation, i.e. lets them try to solve it. It begins directly after the end of presentation phase and ends with the beginning of the resolving.

3-Resolving: This phase of the example solving involves a demonstration of the solution of the example. This phase is not as clear-cut as the previous two in that despite in some cases the solution is provided by students, it is mainly, as observed in the data, the teachers that demonstrates the solution and explains processes involved. Resolving phase generally begins with teachers' utterances as an attempt to get the attention of the students. The end of this phase is marked by the end of solution. If the resolving involves a student attempting to demonstrate the solution then it is marked by end of student's demonstration or teacher's further explanation of the students' solution on the board.

I have timed these stages in every example for each analysed lesson [2]. This gave me three time intervals (presentation, engagement, resolving) for each example solving session. I then calculated the mean time spent for each phase of example solving. This gave me weighted average of each phase of a lesson. These calculations were made for each lesson. I made these calculations for each teacher and this gave me the time spent by a teacher for each phase of example solving across a series of lessons. Table 1 shows the findings from two PC and two SS teachers.

RESULTS

In a total of 11 lessons PC teachers used 109 examples. For none of these examples did students come to board and demonstrate a solution. In contrast, students were given opportunity to be involved in SS lessons at the resolving phase of the example solving. Half of the examples presented in SS classrooms solved by teachers and other half solved by students on the board. PC and SS also differed in the number of examples used per lesson. PC teachers used more examples then their counterparts (See Table-1). PC teachers solved 9.9 examples per lesson, while SS teacher has solved only 6. Out of 6 examples solved in SS classroom only half of them (3) solved by teachers as opposed to 9.9 problems solved by PC teachers per lesson.

2 In this paper I will focus on example solving and exclude results on content to keep the focus.

	Total	Time spent (per example)
PC	9.9	0:02:17
SS	6	0:04:32

Table-1. The (mean) number of examples solved by teachers and students per lesson and the time spent per example.

The analysis showed that the teachers also differed in the time they spent per example. PC teachers spent 2 minutes and 17 seconds for each example solving activity. SS teachers spent 4 minutes and 32 seconds for each example.

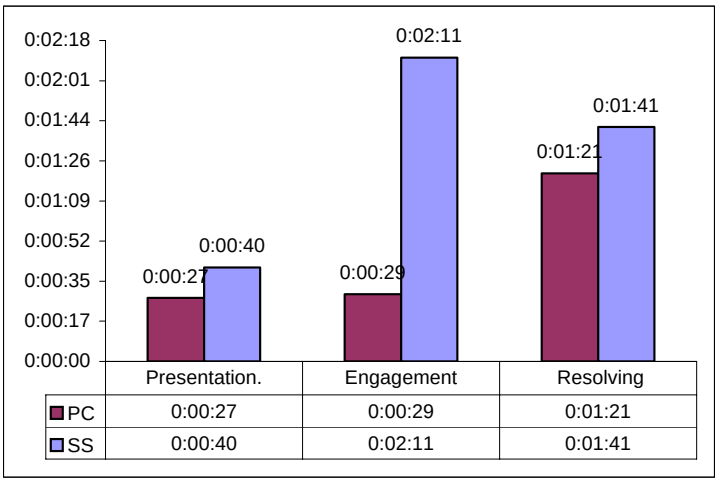

Diagram-1. The time teachers spent on each phase of the example solving.

Further analysis of the teachers' practices in terms of the time allocated for each phase of example solving session has produced some interesting results (see Diagram-1). The analysis shows a slight difference between SS and PC teachers' practices in terms of the time they spend on presenting the examples. (PC teachers were particularly quick at this phase). PC teachers presented an example in 27 seconds on average, whereas a SS teacher has done the same job in 40 seconds. Teachers' preferences on the engagement stage differed quite significantly. PC teachers, on average, gave only 29 seconds for students to tackle the example. In contrast, teachers from SS allocated 2 minutes and 11 seconds for their students to try to solve the example presented on average. This figure is almost equal to the average total time spent for an example in a PC classroom (See Table-1). In the resolving phase teachers of two types of schools differed slightly. On average, 1 minute 21 seconds and 1 minute 41 seconds allotted on this phase in PC and SS classrooms respectively.

The findings regarding the time allocation within example solving activities also demonstrated a difference between PC and SS teachers' practices. As can be seen in

Table-2, PC teachers spent 59 percent of the allocated time for example solving on resolving phase and they spent equal percentage of time in presentation and engagement phase. SS teachers, however, allocated more time to the engagement phase than other two.

	Presentation	Engagement	Resolving	Total
PC (%)	20	21	59	100
SS (%)	15	48	37	100

Table-2. The distribution of the time spent in each phase of the example in SS and PC.

To take the analysis further I will demonstrate the differences in the teachers' activities in engagement phase. Ayten is veteran SS teacher who used the engagement stage to deal with students individually. She made extensive use of the engagement phase (1) to monitor students' activities (2) to help students overcome obstacles in their solutions and (3) to encourage them. During the interview she stated that:

> When I am solving examples I write 4-5 examples on the board, as you observed I solve 1-2 of them and then I let the students deal with the rest. When they are solving I walk between desks. I am monitoring their notebooks to check who did what and to what extend they progressed. If they come to a certain stage in the solution [and stuck], I tell them 'after that, you may think of it like so and so' or 'come on try a bit more' and I try to motivate them by doing so. There are student activities in classes but in general it isn't very much. There is involvements but not as much as I wanted, which is 40 students raising their hands to solve the examples

Conversely, Şaban, an experienced, PC teacher did not seem to do any of these three activities in the engagement phase. Much of his time in the engagement phase, he stood at the board and waited for students to come up with the answer to the example at hand. He did not seem to be interested in the individual needs of his students. During the interview, to the question "Do you allocate time for students to solve the problems?" he simply said "No, no" and then he stated that:

> I have to make good use of time. I have to use the time given to me. If I deal with each student I could barely solve 10 questions in a 40 minute lesson, because you will present the example and then wait for them to solve, and this take 1 minute then I will solve, which takes 2 minutes. Then I will wait till they copy it down in their notebooks. This makes 3 minutes. My purpose is to prepare [them for examination].I teach them the practical ways. Whether students actually use it, or not, whether student learns it or not it is not too much of a concern to me

CONCLUSION

In considering the findings of this study it needs to be taken into account that although, from a student outcomes point of view, increased time spent on task does not guarantee an increase in student learning, but from teacher practice point of view, this is an indication for teachers' classroom practices regarding the opportunity they

provide for the students to learn mathematics. It also indicates what teachers value in their work settings.

Teachers' practices have similar structural features in teachers own accounts, but there are different teacher privileging patterns in SS and PC classrooms. Although, at a surface level in both types of schools teachers' practices consist of similar elements, the analysis indicates different teacher privileging patterns in SS and PC classrooms. PC teachers privilege "resolving" phase of the example solving, SS teachers, however, privilege "engagement". They also differed in the speed of their instruction. PC teachers' practices involved consecutively ordered example solving sessions each taking a short length of time. On the other hand, SS teachers solve relatively fewer examples and allocate relatively more time for students to engage in the example. They also encouraged students to come to board and demonstrate the solution, which seems to result in more time for students to elaborate the examples presented.

These differences in teacher practices seem to be the indication of differences in the teachers' approaches towards their job and their perception of what teachers do. Berliner (1990) states, "it would seem impossible to have a personal philosophy of instruction that does not include duration as one of its characteristics".

Again, at a surface level in both types of schools teachers' practices consist of engagement phase in example solving but further analysis indicates that there are differences in the way the time at engagement phase made use of by teachers. Unlike their colleagues in PC, SS teachers used engagement phase to support each student individually, which seems to attach a high level of significance to the opportunity to interact with each student on a one-to-one basis.

In conclusion, teachers' practices may seem to be similar on the surface. They may even use same words (content, example solving) to express their perception of their classroom activities. However, there can be significant variation in the structure of the lessons as well as the way elements of practice has been made use of.

REFERENCES

Berliner, D. (1990). What's all the fuss about instructional time?, in: M. Ben-Peretz & R. Bromme (Eds) *The nature of time in schools.* New York: Teachers College Press.

Kendal, M. & Stacey, K. (2001). The Impact Of Teacher Privileging On Learning Differentiation With Technology, *International Journal of Computers in Mathematics Learning*, 6(2), pp. 143 - 165.

Peladeau, N., Forget, J. & Gagné, F. (2003). Effect of paced and unpaced practice on skill application and retention: how much is enough?, *American Educational Research Journal*, 43, pp. 769-801.

Tomlinson, P.D. (1989) Having it both ways: Hierarchical Focussing as Research Interview Method, *British Educational Research Journal*, 15, pp. 155-176.

Yin, R. (1994). *Case study research: Design and methods (2nd ed.).*Beverly Hills, CA: Sage Publishing.