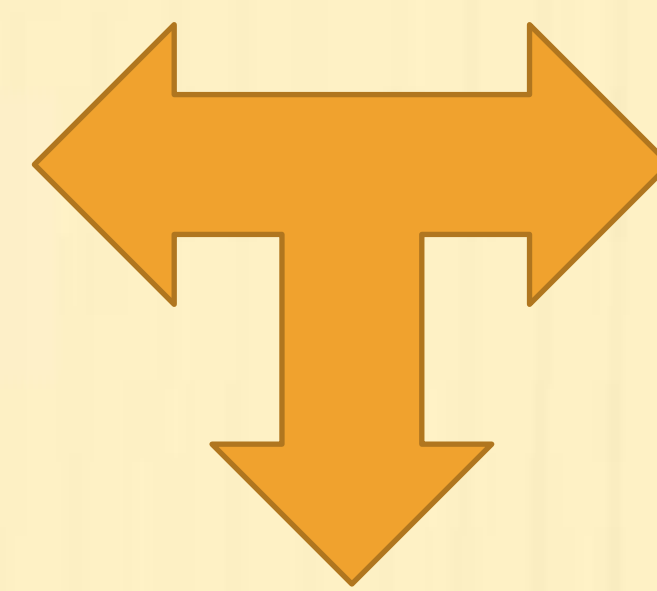


DEFINING FROM SOCIOCULTURAL APPROACH¹

Gloria Sánchez-Matamoros; Isabel Escudero; José M. Gavilán
Universidad de Sevilla. Dpto. de Didáctica de las Matemáticas

The **context** on which we focus on our research is the mathematical process of defining, and the result of it, the definition.



The **aim** of our research is the study of students' mathematical learning of no-compulsory levels from a sociocultural approach (Sfard, 2008)

In this part of the project we try to characterize the changes in the mathematical discourse. We analyse it on the basis of the four properties identified by Sfard, (2008): **Mathematical words, Visual mediators, Endorsed narratives and Routines.**

The **data** for our study consists mainly of the transcriptions of the verbal dialogues the small group of students maintained when they solved a mathematical task in the classroom.

The **process of analysis** to characterize the change in the discourse comprises two levels:

i) **Level 1:** Identification of theoretical tools. We develop this identification in three phases:
Phase 1: identification of mathematical words and visual mediators.
Phase 2: identification of narratives
Phase 3: identification of routines.

ii) **Level 2:** Identification of relationships between the identified theoretical tools, which allow us to notice changes in the discourse.

Example of a process of change in the discourse through our scheme of analysis

Narrative:
"Defining is labelling or naming"
(l. 530-534)

Routine:
"Identify the characteristics of the figures"
(l. 549-550; 578-579)

Narrative:
"Defining is giving a list of characteristics"

Analysis of a protocol corresponding to Group 4.

527.A1. (reading question 6)... define each of the figures. Figure 1: **Regular polygon** of ...
528.**four equal sides**
529.A2. **Regular polygon of four equal sides**
530.A1. That is to say, a square
531.A2. But exactly ...
532.A4. square, rectangle
533.laughing
534.A2. I think the **name** is what is being asked for here and nothing else
535.A1, A3, A4: No,
536.A2. That wouldn't be defining
537.A4. No, it would be naming
538.A2: But watch out, because they ask for another **definition** here
539.A3: [reading] Could you give another definition? Gee!
540.laughing
541.A1: Ah, well! We'll leave it in a superficial way here and that's the end of it.
542.A2: No, here [referring to the answers to Q7] we'll answer **Regular Polygon, Regular Polygon, Regular Polygon...**
[It is written in as the agreed upon answer for Q7]
543.laughing
544.A1: And here [referring to the answers to Q6] we'll say a **4-sided regular polygon**... [It is written in three times as the agreed upon answer for Q6]
545.A2: I'm going to ask [the teacher] if it refers to the **square**.
546.We might be bursting our brains for nothing
547.A1: OK, go ahead!
548.Teacher: In different ways...
549.A1: Right! Regular polygon of four equal sides. That is to say you define the square.
550.**Regular polygon of four equal sides** and that means the **90 degree angles** are formed
551.A3: But that is not a definition
552.A1: What do you mean it isn't? a regular polygon of four equal sides
553.A3: But the thing about the **angles**. And that means that...?
554.A1: No. No but
555.A3: Let's wait and see what Jose says
556.A1: **Regular polygon of four equal sides.**
.../...
578.A1: Well, that's it then, **regular polygons of four equal sides**
579.A2. **Of four sides** that form **ninety degree angles**
580.A1. If they have four equal sides they already ...
581.A2: But we're already talking about characteristics
582.A3: **Regular polygon of four equal sides**
583.A1: Of course, that means that they already form the ninety.

Among the **first results**, we can mention that in the process of change shown here the transition from the narrative "**defining is labelling or naming**" to the narrative "**defining is giving a list of features**" has been identified in approximately 40% of the analyzed groups. In the totality of these groups, this transition has been made through the "**identify characteristics of the figures**" routine.

¹This research has been supported by the Ministerio de Educación y Ciencia (Spain) through grant PSI2008-02289.