Examples of junior secondary school students' attitudes toward mathematical problems

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I was observing and analysing the behaviour of students who were solving mathematical problems. I noticed that apart from a skilful application of methods, patterns and strategies there are also other components which during the process of problem solving may influence the final result and make it either a success or a failure. If a teacher's estimation of students' work is based solely on observable activities (in my research on solution in a written form) it may happen that this teacher will never reveal the true reason of students' failures and therefor will not be able to undertake suitable re-educational actions. If a teacher's task is not only grading but first of all re-education the reason why students behave in some particular way should not be disregarded.

Area of my research situate themselves on the border line between didactics and psychology. In psychology there exists the term *attitude*, which describes the type of phenomenon close to the one I try to investigate. For that reason the object of my interest is *a students' attitude toward mathematical problems*.

I focused on two possible types of conclusions that may be drawn from my observations:
1) The behavioural-cognitive component of *students' attitudes toward mathematical problems*,
2) The emotional-motivational component of *students' attitudes toward mathematical problems*.

With such a research perspective in mind I drew two types of conclusions regarding the cognitive and the motivational sphere of students' behaviour. As a result of the analysis of students' cognitive behaviour the list of phenomena was created, the phenomena which for the observer may be a source of information about basic differences in the course of action performed by various students' during specific phases of the problem-solving process.
Similarly, the investigation of students' motivational sphere resulted in creating a list of certain types of motivations which induce students to studying and which therefore may influence students' actions.

Obviously, I am aware of the hypothetical character of the diagnosis concerning students' motivations. It was based on students' remarks made during and after completing the process of solving problems as well as on the answers given to open questions formulated in interviews constructed for this study. I am also aware that when asked about something a student does not necessarily give a fair answer. This is why the questions I asked during the interviews were very general and did not include questions like 'Do you like solving mathematical problems?'. The main objective was creating the atmosphere of an unreserved discussion enabling students to talk about themselves, their classmates, their families.

CONCLUSIONS

- Formulating diagnoses concerning the emotional-motivational sphere is a very difficult task, which, at the same time, is necessary for putting into practice the aims of teaching mathematics of a level which is higher than mere practising basing mathematical skills and knowledge.
- One may doubt the existence of a invariable mental structure known as *a students' attitude toward mathematical problems*. The character of their cognitive behaviours may rapidly change in time as influenced by changes in the emotional sphere (which was backed up by my investigations).