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SECONDARY SCHOOL PUPILS' SELF-REGULATED LEARNING SKILLS

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Abstract. This article presents a research on 258 secondary school pupils' (10-15 years old, 5th-8th grades) self-regulated learning skills as self-efficacy, self-judgement, self-reaction and their interest for studying Mathematics.

Key words: self-regulated learning, self-efficacy, self-judgement, self-reaction

1. Introduction

Self-regulated learning (SRL) is an academically effective form of learning, through which the learner set goals and make plans before starting to learn; monitor and regulate his/her cognition, motivation and behavior during the learning process; and reflect on his/her learning process (Pintrich, 1995; Pintrich, 2000; Zimmerman, 2001).

The aim of this paper is to present a research made among 258 secondary school pupils (10-15 years old, 5th-8th grades) on their self-regulated learning skills as self-efficacy, self-judgement, self-reaction and their interest for studying Mathematics.

2. Theoretical background

Self-regulated learners are metacognitively, motivationally and behaviorally active participants in their own learning process (Zimmerman, 1986). Some important skills related with SRL are self-efficacity, self-efficacy, self-judgement, and self-reaction.

Students' interest in the content area of the task and ***their beliefs about the utility of the task*** are also important. In mathematics education students' interest in mathematics, their beliefs in the utility of the mathematical knowledge in their future career or in their everyday life determine in a fundamental way their problem-solving behavior. „Belief systems are one's mathematical world view, the perspective with which one approaches mathematics and mathematical task. One's beliefs about mathematics can determine how one chooses to approach a problem, which techniques will be used or avoided, how long and how hard one will work on it, and so on." (Schoenfeld, 1985, p. 45)

Self-efficacy is student's judgments about their ability to successfully complete a task, as well as students' confidence in his/her skills to perform the task (Pintrich et al., 1993). "People's beliefs in their efficacy influence the choices they make, their aspirations, how much effort they mobilize in a given endeavor, how long they persevere in the face of difficulties and setbacks, whether their thought patterns are self-hindering or self-aiding, the amount of stress they experience in coping with taxing environmental demands, and their vulnerability to depression." (Bandura, 1991, p. 257) Self-efficacy in mathematics can be measured using self-ratings of skills regarding specific mathematics problems (Schunk, 1981). Students, who feel a high level of self-efficacy, will concentrate more easily on the tasks, use efficient strategies, manage time efficiently, ask for help if neede (Pintrich & De Groot, 1990). But in some case extremely high self-efficacy is detrimental for learning: the student think, that she/he knows everything and doesn't need to put effort in learning. Slightly lower sense of self-efficacy led to greater mental effort, so to better leraning results (Salomon, 1984).

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Self-judgment is one's evaluation on his/her performance and recognition of the relationship between the achieved performance level and the quality of the learning process (Zimmerman, 2000). Thus self-regulated learners attribute their poor performance to lack of effort or time; or to the use of an inadequate strategy (Zimmerman, 1998). Self-judgement refers to comparing present performance with a standard. The importance of the used standard affects self-judgement.

Self-reaction involves feelings about the achieved results: satisfaction or dissatisfaction (Zimmerman, 2002). If the student believes that he/she is making a good progress, than he/she feels satisfaction, which inhances self-efficacy and sustains motivation (Schunk, 1996).

3. Research

The aim of the research is to study secondary school pupils' self-regulated skills, as self-efficacy, self-judgement, self-reaction; and pupils' interest for learning mathematics.

Research design

The research tool is a questionnaire with 18 items: 3 demographycal questions (age, grade, and sex of the respondents) and 15 items for inquiring pupils' self-regulated leatning skills. These 15 items are measured on a 5 point Likert scale from 1-strongly don't agree to 5-strongly agree.

Sample: 258 secondary school pupils (10-15 years old, 5^{th}-8^{th} grades), half of them boys and half of them girls.

Results

The 15 items are grouped in 4 clusters: students' interest for learning mathematics (5 items), self-efficacy (3 items), self-judgement (3 items), and self-reaction (4 items).

Students' interest for learning mathematics

In Table 1 the responses regarding pupils' interest for studying mathematics are recorded. To study if pupils who found mathematics useful in everyday life or in their future career are more likely to like Mathematics, we have calculated Pearson correlation coefficients (Table 2).

Table 1. Students' interest for learning mathematics

Affirmation	Strongly don't agree (%)	Don't agree (%)	Undecided (%)	Agree (%)	Strongly agree (%)
I like mathematics.	20.93	10.85	33.72	16.28	17.83
Mathematics is boring.	32.56	16.67	27.52	10.85	10.85
Mathematics doesn't have any connection with the real life.	36.43	13.57	22.09	6.59	20.16
There are links between Mathematics and everyday life.	31.18	7.36	28.29	15.89	35.27
I will use Mathematics in my life.	6.98	6.59	18.60	19.77	48.06

Table 2. Pearson correlation coefficients

	Mathematics doesn't have any connection with the real life.	There are links between Mathematics and everyday life.	I will use Mathematics in my life.
I like mathematics.	0.22	0.22	0.29

Self-efficacy

Pupils' responses for the items regarding self-efficacy are summarized in Table 3.

Table 3. Students' self-efficacy

Affirmation	Strongly don' agree (%)	Don't agree (%)	Undecided (%)	Agree (%)	Strongly agree (%)
I am not a good mathematician.	26.74	8.14	22.09	8.53	34.50
I have talent for mathematics.	23.63	17.05	25.19	19.38	13.18
Mathematics is far from me.	36.05	18.22	21.32	12.79	10.85

Self-judgement

Pupils' self-judgement level is recorded in table 4.

Table 4. Students' self-judgement

Affirmation	Strongly don' agree (%)	Don't agree (%)	Undecided (%)	Agree (%)	Strongly agree (%)
If I had more time for practice, I would be better in mathematics.	17.05	10.08	24.03	13.18	35.27
If I was more patient while solving mathematical problems, I would be better in mathematics.	16.28	9.30	22.48	13.95	37.60
No matter how much time I devote for studying mathematics, I can't improve my grades.	43.41	14.34	18.60	8.14	15.50

Self-reaction

The responses regarding pupils' self-reaction are shown in Table 5.

Table 5. Students' self-reaction

Affirmation	Strongly don' agree (%)	Don't agree (%)	Undecided (%)	Agree (%)	Strongly agree (%)
I am very angry, when I can't solve a problem.	29.07	13.57	22.48	6.98	26.36
I am very happy, when I got the correct solution of a problem.	1.94	2.71	10.85	10.85	73.64
I am always worried about my mathematics grades.	15.50	8.53	19.38	15.12	41.48
I am nervous before the mathematics lesson.	48.06	10.85	13.57	5.04	22.48

Discussion

Studying **pupils' interest for learning Mathematics** (Table 1), we observe that about one third of the pupils (34.15%) like mathematics, one third (31.78%) don't like, and one third (33.72%) is undecided. 21.70% of the pupils found Mathematics boring, this influences their motivation to learn this subject. 26.75% of the pupils think, that Mathematics doesn't have any connection with real life, 38.54% of the pupils consider that there are no links between Mathematics and everyday life. It is interesting, that

these two items are related with the same ides – relation between mathematics and real/everyday life -, but seems respondents considered “everyday life” more personal and close to them, as “real life”, thus a higher percentage of the pupils consider that mathematics is not connected with their life, as those consider that mathematics can be use in real life. A high percentage, 67.83% of the pupils think, that they will use Mathematics in their life.

Giving students interesting problems to solve increase their motivation for learning Mathematics. Usually the problems from the Romanian national tests are mathematically formulated; don’t have any relation with pupils’ real life (Marchis, 2009a). These problems are not challenging, to solve them pupils only need to apply only rules, formulas, or algorithms (Marchis, 2009b). Solving this kind of problems pupils don’t see how they could use the mathematical knowledge in their everyday life, and consider Mathematics only a theoretical academic subject.

To see if pupils’ attitude to Mathematics is related with their believes if Mathematics can be used in real life, if mathematics is connected with everuday life and if they will use Mathematics in their future life/career, we have calculated Pearson correlation coefficients (Table 2). Observing these correlation coefficients, we could conclude that there is a strong correlation between pupils’ attitude to mathematics and their believes about the usefulness of mathematics in real life and their future life.

Studying pupils’ **self-efficacy** (Table 3), we could observe that almost half of the pupils (43.03%) think, that they are not a good mathematician, 23.64% of the pupils consider that mathematics is far from them, and 32.56% of the pupils believe that they have talent for mathematics. In many case pupils who think, that they don’t have talent for mathematics give up to study mathematics in some point.

As regarding pupils’ **self-judgement** (Table 4), half of the pupils are constient if they put more effort in learning mathematics, their results would be better: 48.45% of the pupils think that if they had more time for practice, they would be better in mathematics; 51.55% consider that if they were more patient while solving mathematical problems, they would be better in mathematics. 57.75% of the respondents are constient that their mathematical grades are in strong correlation with their effort put in learning mathematics.

Pupils’ responses regarding **self-reaction** could be observed in Table 5. The failure of solving a problem cause anxiety for 33.34% of the pupils, the success in problem solving offers satisfaction for 84.49% of the students. A quite high percentage of the respondents perceive anxiety related with mathematics: 56.60% of the pupils are always worried about their mathematics grades, 27.52% are nervous before each mathematics lesson. The anxiety could be in the detriment of the good achievement in mathematics (Cooper & Robinson, 1991; Resnick, Viehe, & Siegel, 1982; Wigfield & Meece, 1988).

4. Conclusions

We could formulate the following conclusions:

- Only one third of the respondents like Mathematics. Pupils don’t like mathematics, because they don’t see the links between mathematics and their everyday.
- Almost half of the pupils think that they are not good mathematicians. Their self-efficacy believes is low.
- More than half of the respondents are constient that their mathematical grades are in strong correlation with their effort put in learning mathematics, so they have high self-judgement level.
- More than half of the pupils are worried about their mathematics grades; they feel a high level of anxiety, which could be in the detriment of their achievement.

Our recommendation for increasing pupils’ interest for learning mathematics is to solve interesting problems which are taken from everyday life. To increase pupils’ self-efficacity level pupils with

different mathematical skills should get different problems, to feel the satisfaction of the successful problem solving.

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