Summary of Ph.D. Thesis

Research on Cognitive and Affective Factors Influencing Learning, from the Aspect of Academic Underachievement, Involving 6th and 7th Former Pupils of Primary School

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Introduction

Our thesis is on the cognitive and affective factors influencing learning, from the aspect of academic underachievement.

The selection of the cognitive factors was based on metacognition. The role of metacognition in the effectiveness and regulation of learning is subject of more and more studies nowadays. The concept of metacognition is tied up with Flavell (1979), who defined it as the knowledge of one's own cognitive processes and the ability to regulate them.

According to Wall (2008), metacognitive thinking is an important part of learning. Bruner (2004) emphasizes that the teacher should support the children to become the more metacognitive, that is to say, they should be aware of their thinking processes at least as much as the subject matter learnt right at a time.

As metacognitive skills can be developed and taught, we find it very important that they get sufficient attention in the process of teaching-learning. Knowledge of one's own cognitive abilities and monitoring and control based on these should become an important part of learning.

Csaba Csíkos (2007) thinks that school development of metacognition can be approached most of all from the aspect of self-regulated learning. According to the definition of Schunk and Zimmerman (1994), self-regulated learning is a complex thinking, emotional, motivational and behavioural self-developing ability, that at all times directs learning abilities to achieve the personal goals (cited by Molnár, 2002). Self-regulated learning assumes advanced level of metacognitive strategies.

An important task of school is to prepare pupils for individual learning. Its important part is to develop the skills of basic and complex learning techniques. However, possessing these skills will not definitely mean that learning becomes more efficient, since pupils should also know when and how and for which material to use these techniques and strategies the most effectively (Balogh, 2006).

Affective factors related to learning have a great influence on school achievement. Nevertheless, affective factors get less attention compared to cognitive factors in teaching-learning process (Csapó, 2008). Erzsébet Golnhoffer (1998) reckons that the significance of cognitive conditions is based on assigning the boundaries of school successfulness, and that the important effect of affective factors is to influence how far the certain pupil can get within these boundaries.

When selecting affective factors, we focused on learning motivation and the role of school anxiety in learning.

Sociocognitive approach of motivation provides an appropriate framing of interpretation for pragmatic studies of motivational issues turning up at school and particularly in teacher-pupil interactions (e.g.: examining self-perception of ability and effort regarding teacher's feedback, or attributions in connection with teacher's assessment, success and failure, becoming self-regulated student etc.).

The new approach in connection with motivation focuses rather on the combination, interaction and integrated development of various motives. One or two dominant motive doesn't provide an advanced learning motivation system; this is rather a multi-component, optimally developed motivation system, that enables adaptive accomodation to the learning environment (Józsa, 2007).

"Learning motivation is an inner tension urging learning, that energizes, activates, directs and integrates learning behaviour" (Réthyné, 2003. p. 43.).

Anxiety has various forms and symptoms, through which it influences the effectiveness and success of learning, and thus affects academic achievement (Urbán, 2004).

Test anxiety shows up in situations when the pupil's achievement is publicly assessed. Accordingly, test anxiety may be evoked by an oral repetition, a test, competitive situations, exhibition of works, sports events etc. (Smith, 1993).

As any kind of anxiety at school may set back the pupil's academic development and the efficiency of learning, and may influence mental and physical health in a bad way, it is very important to recognize and treat anxiety in time.

There is a lot of uncertainty about the definition of the concept of underachievement. The fact that there is no one widely accepted and used definition of underachievement supports this uncertainty. We should rather consider underachievement as a collective concept, an "umbrella-concept", that is influenced by various factors and may appear in various situations (Plewis, 1991).

In the special literature we can find a lot of different definitions, and by comparing these, we can get to the following conclusion: "Essentially, every definition is based on the *differene between the possible* (that could be achieved by a particular pupil) *and the realized achievement* (that the pupil actually obtains). The problem merely offers itself from the fact that the extent and the nature of this difference is determined differently by every researcher and practical professional" (Gefferth, 1993, p. 188.).

Presentation of the research

In our thesis, we present a research that addressed to study cognitive and affective factors of learning among 6th and 7th former (age of 12-13) primary school pupils. We were particularly interested in the difference of underachievers, average achievers and overachievers regarding certain factors. Furthermore, we wanted to know, which factors will significantly differentiate between average pupils and pupils with realtively poor achievement.

Pilot study

In the pilot study of the research, a questionnaire was developed to measure cognitive and affective factors of learning. We conducted a factor analysis on the questionnaire items and identified factors of the above mentioned domains.

Major study

In the major study, we revised, refined and extended the questionnaire by the results of the pilot study. As the result of principal component analysis, we identified the following factors of the CALF questionnaire: school anxiety, predictors of underachievement, visual learning techniques, metacognitive knowledge and self-reflection. With the help of the questionnaire, we tried to gain deeper insight to cognitive and affective characteristics of learning and the problem of underachievement along independent variables (age, gender, schools, intelligence and grade point average).

Aims

Main aim of our study was to decide whether the Cognitive and Affective Learning Factors (CALF) questionnare we developed is an appropriate method to measure the above detailed cognitive and affective factors of learning, and to identify students showing symptoms of underachievement.

Hypotheses

The following hypothesis statements were formulated and tested in this study:

1. It is possible to measure cognitive and affective factors of learning with the help of the CALF questionnaire we developed.
2. There will be significant differences between the groups of underachiever, average achiever and overachiever students as defined by the grade point average and intelligence, regarding the factors of CALF questionnaire.
3. In our opinion, factors of CALF questionnaire will show correlation to grade point average.
4. We expect to find a correlation between grade point average and mental capacities (OTIS I. result).
5. According to the special literature, we will probably find significant gender differences regarding the following factors of CALF questionnaire: school anxiety, predictors of underachievement and visual learning techniques.
6. In our opinion, high standard education enhances the level of visual learning techniques, metacognitive knowledge and self-reflection. Therefore we expect to find significant differences between the schools involved in our study regarding these factors.
7. We will find significant differences between the groups defined by the grade point average (pupils with high achievement, average pupils, pupils with poor achievement) regarding the factors of CALF questionnaire.

   7. a. Pupils with poor achievement will show more anxiety and are more endangered of academic underachievement than average pupils and pupils with high achievement.

   7. b. Pupils with high achievement will obtain significantly higher score on the following factors of CALF questionnaire: visual learning techniques, metacognitive knowledge, self-reflection, and motivation.
8. We will find significant differences between the groups defined by the scores of OTIS I. test regarding the factors of CALF questionnaire.
   8. *a. Pupils with low OTIS score will show more anxiety than pupils with average and high OTIS score.*
   8. *b. Pupils with low OTIS score will have high average score on the factor predictors of underachievement.*

8. *c. We don't expect significant differences between the three OTIS groups regarding learning motivation, visual learning techniques, metacognitive knowledge and self-reflection.*
9. We will find significant correlation between school attendance of parents and grade point average, regarding the school attendance of both the mother and the father.
10. We will find significant correlation between school attendance of parents and factors of CALF questionnaire.

Sample

482 pupils were involved in the major study. As to genders, the distribution of the sample was nearly equal: 252 girls and 230 boys. Regarding the distribution of school grades, 244 6th former students and 238 7th former pupils were involved in the study. The average age of the subjects were 12,84 years (SD=0,72).

Methods

To measure mental capacities, we used the OTIS I. test, that measures particularly the level, flexibility and availability of mental abilities.

To measure cognitive and affective factors of learning and to diagnose underachievement, we used the Cognitive and Affective Learning Factors (CALF) questionnaire we developed.

Some additional variables were asked in the form of a questionnaire: age, gender, residence (village or city), school attendance of parents (primary school, secondary school, higher education degree), scholastic records.

Presentation of the results

We found the following results when comparing the groups of underachiever, average achiever and overachiever students as defined by the grade point average and intelligence:

- As to visual learning techniques, metacognitve knowledge and self-reflection, the group of underachivers lagged behind the groups of average achievers and overachievers. The group of overachievers reached the highest average point regarding the factors mentioned above.
- Enhancing learning motivation, becoming more effective in applying visual learning techniques, knowing more about their own cognitive abilities and their own learning, and being able to self-monitoring can significantly improve learning performance.
- We found strong significant correlation between grade point average and mental capacities (OTIS I. result).
- When comparing gender groups, we found significant differences beetween girls and boys. Based on the results, we can establish that girls are more anxious and they use visual learning techniques more often than boys, while there are more underachievers among boys.
- Comparing the three schools we examined, we found that school Z significantly differed from the other two groups regarding visual learning techniques, metacognitive knowledge and self-reflection factors. In our opinion, different level of education could be in the background of this result.
- In the case of the groups defined by the grade point average (pupils with high achievement, average pupils, pupils with poor achievement) applying post hoc test comparisons we got the following results:
    - *Pupils with poor achievement showed more anxiety and are more endangered of school underachievement than average pupils and pupils with high achievement.*
    - *Pupils with high achievement obtained significantly higher score on the following factors of CALF questionnaire: visual learning techniques, metacognitive knowledge and learning motivation and the difference was significant.*
    - *Regarding the self-reflection factor we did not find significant difference between the three groups. We think that this could be because of the imperfection of the factor, we need to revise it.*
- We got the following results when comparing the groups defined by the scores of OTIS I. test:
    - *Pupils with low OTIS score showed more anxiety than pupils with average and high OTIS score (pupil with good mental ability).*

- *Pupils with low OTIS score have high average score on the factor predictors of underachievement too.*
- *We did not find significant difference comparing the three OTIS groups regarding metacognitive knowledge and self-reflection factors.*

- We found significant correlation between school attendance of parents and grade point average, regarding the school attendance of both the mother and the father.
- We found significant correlations between school attendance of the father and the following factors of CALF questionnaire: we got a negative correlation in the case of school anxiety and predictors of underachievement, and there was a positive correlation regarding the factors learning motivation and metacognitive knowledge.
- As to the result of examining the correlation between school attendance of the mother and the factors of the CALF questionnaire, we found significant correlation in point of predictors of underachievement and metacognitive knowledge factors.

Summary and suggestions for future work

Academic underachievement is a very complex problem. In our research we approached the subject from the aspect of cognitive and affective learning factors, in particular: metacognition, visual learning technics, learning motivation and school anxiety.

The Cognitive and Affective Learning Factors (CALF) questionnaire developed by us was proved to be a useful method to measure the cognitive and affective learning aspects of different groups of pupils. We do not say that this is the only categorization that is worth studying in regard to learning, but it allows the exploration of important cognitive and affective factors of learning.

An other important attribute that the factor “predictors of underachievement” of the CALF questionnaire provides a possibility to separate underachievers from average achievers and overachievers.

One of the main results of our research is that it calls attention to metacognitive knowledge, the importance of regulation and control processes based on that, and the fact that the effectiveness of applying visual learning techniques contribute to learning performance.

Summarizing we could establish that modelling the metacognitive elements of learning process and directing pupils' attention to their own and the others' learning process can improve learning efficiency.

According to Veenman et al. (2006), little is known about the role of the teacher as a model, that is giving the example for pupils and providing them with feedback.

Researchers report about their finding, that when they inteviewed teachers about sufficient knowledge about metacognition and its applying in their lessons especially in the last case they cannot answer (Veenman, Van Hout-Wolters és Afflerbach, 2006).

We think we should get verz similar findings interviewing Hungarian teachers about how they apply metacognition and its various elements in their everyday teaching and learning process.

According to Csaba Csíkos (2007), improving metacognition could be only a tool to make learning more effective.

It is a very important question, how to prepare teachers to approach to their pupils and their learning more "metacognitively" (based on knowledge, regulation and control mechanism).

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