

Learning strategies: An essential component of learning activity

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Learning strategies of 4 and 6 grade students were studied on the metacognitive level and the real action level. Among other instruments a questionnaire was administered containing different classes of learning strategies. As an example, text processing strategies on the metacognitive level are analyzed and correlated with other strategy classes.

Lernstrategien: Eine wesentliche Komponente der Lerntätigkeit

Lernstrategien auf der Metakognitions- und der realen Handlungsebene wurden bei Schülern 4. und 6. Klassen untersucht. Neben anderen Verfahren wurde ein Fragebogen eingesetzt, der Aussagen zu verschiedenen Klassen von Lernstrategien enthielt. Als Beispiel werden die Textverarbeitungsstrategien auf der Metakognitionsebene analysiert und mit anderen Strategieklassen in Beziehung gesetzt.

If the learner is viewed as an active, conscious subject of his/her own activity, it is a first range question, how he/she approaches learning tasks, which procedures are available for him/her practice. Learning strategies are one component interacting with others (cognitive, motivational ones etc.) in the complex regulation of learning activity (Mandl/Friedrich 1992, Lompscher 1992, Resnick 1989).

This activity is not simply given, but it is a result of development and formation. If we want to enable students to learn efficiently and more and more independently, we have to help them - as one condition among others - become aware of strategies they are using already and of other strategies eventually better corresponding with learning tasks and conditions. And, of course, we have to create conditions, under which learners could apply, compare, select and practice such strategies.

In 1992 we started a rather complex research project not finished yet. At first, we tried to get information about the developmental level of selected learning strategies and other components of learning activity in grade 4 and 6. About 300 students were given tasks of describing and guessing different concepts (scientific and every day ones), of building analogies and solving problems. The strategies revealed in these experiments will be correlated with performance data and with self reports of the learners about their learning strategies, learning motives and other data. I will confine myself here to the metacognitive aspect of learning strategies.

Aim

Most investigations in this field are carried out in higher grades at school or with university students. But the fundamentals of efficient and independent learning are laid in elementary school, a main task of which is learning to learn. If this "zone of proximal development" (Vygotsky) is not recognized and used in this age level, learners and teachers have much more difficulties in higher classes to form the necessary learning activity in the interdependency of goals, motives and actions, to overcome inefficient strategies and other problems. Therefore we were interested in detailed information, whether and in which degree children are aware of their learning strategies and which strategies do they prefer in different task classes. This may be one of the starting points for a systematic formation and further development of learning strategies in the future.

Method

Besides observations in the above mentioned experiments, partially video-recorded, and a teacher questionnaire about different aspects of their instructional experience, we administered a special student questionnaire elaborated for this investigation, but not yet standardized (Lompscher 1993). Considering existing questionnaires (e.g. Chipman et al 1985, Colley & Beech 1989, Weinstein et al 1988) and experience in this school level strategy classes and items were formulated and selected with the help of expert rating. The questionnaire consists of 6 classes of learning strategies: text processing, instructional communication, problem solving, organization, memory and cooperation strategies. Each strategy class is represented by 10 items in the form of statements of the learner about his/her approach to a learning task. So the children had not actively to reproduce strategy knowledge, but should assess given statements. Elementary school children do not yet reflect extensively upon their activity, especially upon their strategies, and elementary teachers usually do not enough to bring them to awareness. But, we suppose, children are - in principle - able to understand such statements, to remember corresponding learning situations, to compare the own behaviour in those situations with the statement and to assess the statement on this basis. We asked the children to select, whether the statement corresponds fully or mostly or seldom or never with their approach in such situations. As a rule, the children seriously and interestedly worked through the questionnaire, in some cases corrected their answer and in their whole behaviour showed high engagement. Only in a few cases we observed mechanic filling up, non-understanding or even refusal to respond.

Selected results

As an example, I will concentrate on one of the six strategy classes - text processing strategies.

An overview over the preferences (that means: the item corresponds fully or mostly with the own approach) concerning text processing strategies is shown in fig. 1. Two statements (8 and 3) were supported by more or about 75 % of the sample, the next four (10, 2, 7 and 9) by about two thirds. These statements are:

- Item 8: I try to reproduce the text as precise as possible.
- 3: I read and try to find out what is important.
- 10: I try to shortly summarize what is most important.
- 2: I read the text several times.
- 7: I think over what I know already and what is new for me.
- 9: I try to reproduce the content by my own words.

These are doubtless essential aspects of text processing, although might be understood and used in a very elementary or even false mode, e. g. the repetitive reading without any modification of goal and process or the reproduction of verbal passages without actual understanding. But even in this case the beginning awareness of and differentiation between such strategies can serve as a starting point for the formation of efficient strategies. This is true for the other items, too. The items 6, 4 and 5 were refused by the majority of the sample. These were the following statements:

- Item 6: I think over an example concerning the content of the text.
- 4: I underline what I think is important.
- 5: I make notices.

These are unusual or unknown strategies for most elementary school children. In many cases they do not yet need them reading their textbooks. About half of the sample finds it sufficient to read a text once (item 1).

As a rule, the children did not prefer or refuse the items by chance. Corresponding observations are supported by a correlation matrix (table 1). (All computations were performed with the help of Dr. Schnaitmann, Padagogische Hochschule Ludwigsburg.) 6 items show significant correlations (...= 0,05 or 0,01) with 5 or 4 other items of this strategy class. So, item 7 (thinking over what is known, what is new) is significantly correlated with item 3 (finding out what is important), 6 (thinking over an example), 8 (reproducing text precisely), 9 (reproducing by own words) and 10 (summarizing what is important). These are all statements aiming at a more or less differentiated processing of a text. This is true for items 3, 6, 8, 9 and 10, too. In contrary, reading once or several times are correlated only with each other, underlining with thinking over an example, and notice-making has no significant correlations at all. These are statements not so relevant yet for the students as text processing techniques or they are more superficial ones (so, reading once or several times "as such" does not make sense - it depends on the concrete text, its difficulty etc.).

Abb.1: Bevorzugung der Items von LS 1
Vergleich 4. - 6. Klassen

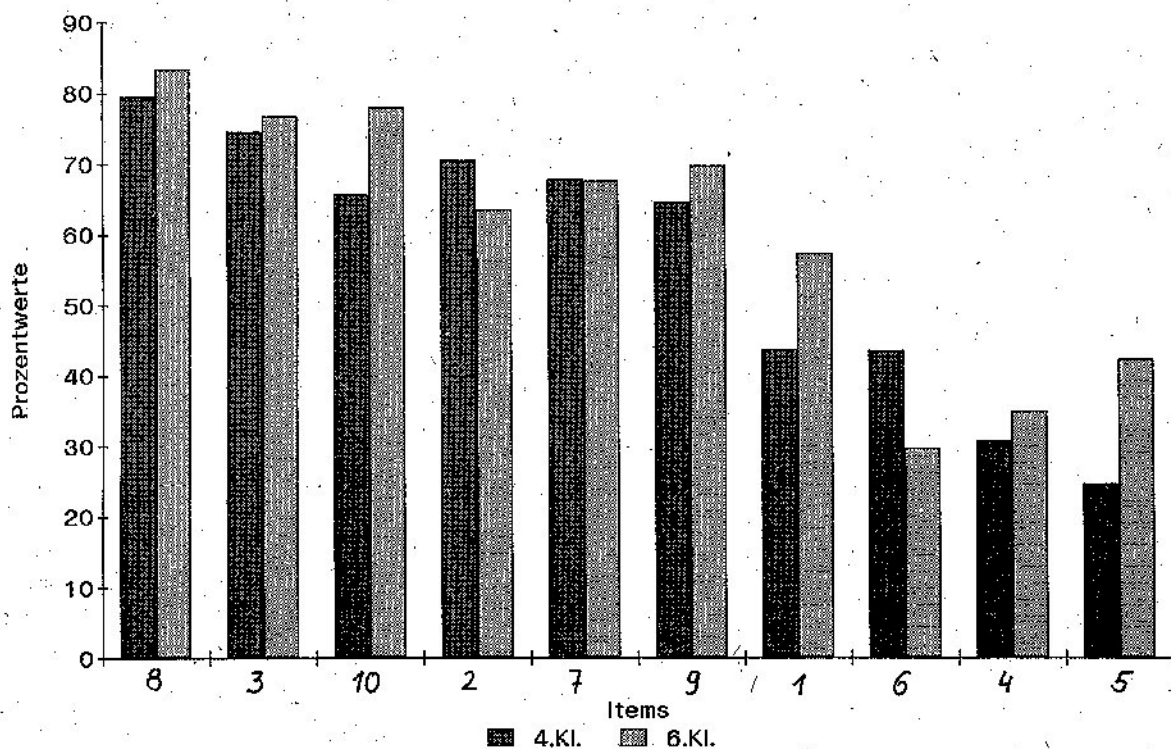


Table 1: Correlations between text processing strategies

Items Range order	Questionnaire order									
	1	2	3	4	5	6	7	8	9	10
8	-	-	0,01	-	-	0,01	0,01	x	0,05	0,01
3	-	-	x	-	-	0,01	0,05	0,01	0,05	0,01
10	-	-	0,01	-	-	0,05	0,05	0,01	-	x
2	-	x	-	-	-	-	-	-	0,05	-
7	-	-	0,05	-	-	0,01	x	0,01	0,05	0,05
9	-	0,05	0,05	-	-	-	0,05	0,05	x	-
1	x	0,01	-	-	-	-	-	-	-	-
6	-	-	0,01	0,05	-	x	0,01	0,01	-	0,05
4	-	-	-	x	-	0,05	-	-	-	-
5	-	-	-	-	x	-	-	-	-	-

But even, when the children gave contradictive answers to related items, we cannot define this as pure chance. It may be supposed, that they did not decide abstractly which answer to choose, but reminded concrete learning tasks and situations and their corresponding behaviour, which might be different in accordance with the different situations or tasks. As is wellknown, the consistency of children's behaviour and statements is not very high in general. In this connection I shortly mention correlations of text processing strategies with the other strategy classes (table 2). Without going into detail of quality and direction of these correlations, the number of correlations show a different narrowness between the strategy classes. Text processing strategies - on the metacognitive level - have the closest correlations with memory and instructional communication strategies, whereas strategies of cooperation and organization of the own learning activity show much less correlations. Again, items 8, 10, 7, 9 and 6 have a great part in these correlations.

Table 2: Number of correlations with other strategy classes

Item	Comm.	Probl.	Organ.	Mem.	Coop	
8	5	4	1	9	2	21
3	2	1	2	1	-	6
10	4	2	1	5	1	13
2	1	-	2	3	1	7
7	6	3	-	1	3	13
9	3	2	-	2	3	10
1	-	-	-	1	-	1
6	3	4	1	4	2	14
4	1	1	1	2	-	5
5	3	2	1	1	1	8
	27	19	9	30	12	

Differences between subarnuos

The general direction of the students' preference or refusal of strategies is the same in 4th and 6th grades (see fig. 1). This is true in a certain degree even in 8th grades mentioned in Rh6neck's paper. But concerning some strategies there are significant differences in our sample between 4th and 6th grades as well as between girls and boys (table 3). F. g., in the case of item 10 (summarizing what is important) the difference between grade 4 and 6 is due above all to the difference between boys, whereas item 1 (reading once) and item 4 (underlining) are significantly more often supported and item 6 (thinking over an example) is more often refused by the girls in grade 6 than in grade 4 (fig. 2 and 3). Notice-making (item 5) is in grade 6 compared with grade 4 - significantly more supported by girls and boys. In grade 4 we found more differences between boys and girls than in grade 6, but the differences between grade 4 and grade 6 are more often due to differences between girls than between boys. In most of the other strategy classes we found similar tendencies. They may be interpreted as an expression of the dynamic development in this stage, especially in girls.

Table 3: Significant differences between grade 4 and 6 and between girls (f) and boys (m)

Item	4/6	4f/6f	4m/6m	4f/m	6f/m	4f/6m	6f/4m
8	-	-	-	-	0,05	0,01	-
3	-	-	-	0,01	-	-	-
10	0,01	-	0,01	-	-	0,05	0,05
2	-	-	-	-	-	0,01	-
7	-	-	-	0,01	-	-	-
9	-	-	-	-	-	-	-
1	0,01	0,01	-	0,05	-	0,01	-
6	0,01	0,05	-	-	0,05	-	-
4	-	0,01	-	0,05	-	-	0,01
5	0,01	0,01	0,01	0,01	-	0,01	-

Abb.2: Bevorzugung der Items von LS 1
Vergleich Mädchen-Jungen (w-m), 4.Kl.

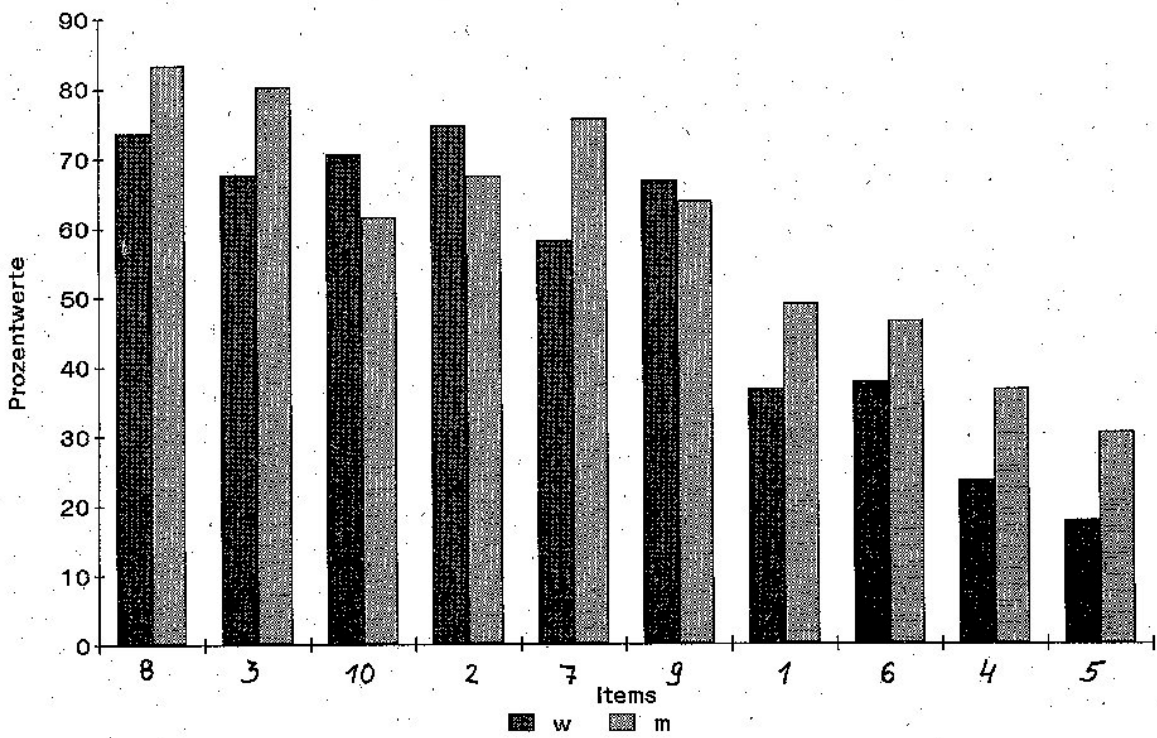
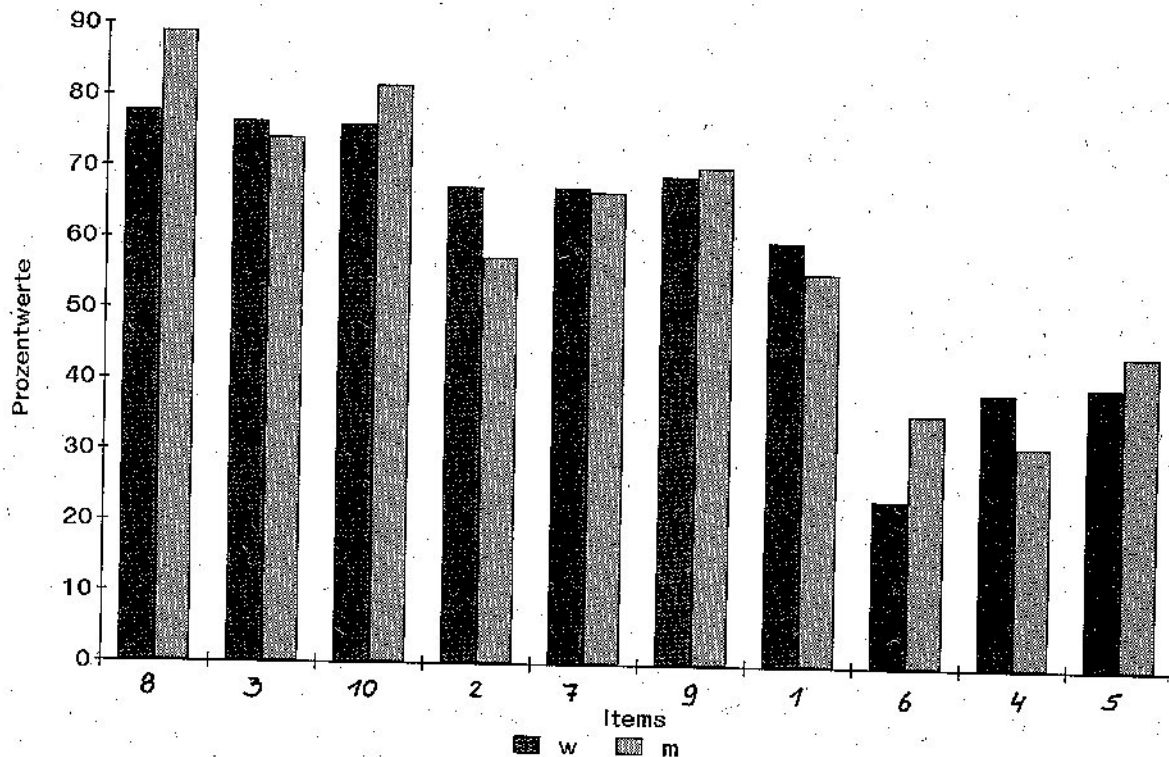


Abb.3: Bevorzugung der Items von LS1
Vergleich Mädchen-Jungen (w-m), 6.Kl.



Another aspect for subgroups is the academic performance expressed by school marks in different subjects - a rather global, but often used criterion. It could not be expected to find very close correlations between the verbal statements about preference or refusal of certain text processing strategies and real learning success or academic performance. But in some cases - 4 out of 10 strategies - significant correlations were found. This may be another point in favor of the significance of strategic metacognition for learning, yet supported by similar findings in the other strategy classes. Of course, this is not interpreted as a direct causal relation, but as one factor in a complex network. Cognitive and metacognitive components interact with other factors, e. g. with attitudes towards school, learning activity, learning domain, teacher etc. The greater portion of six-graders, who supported item 1 (reading once) and refused item 6 (thinking over an example) may be due to that fact. Special instruments were administered in order to get information about motivational and emotional aspects and their interdependence with the cognitive and metacognitive ones, but these results are not analyzed yet.

In the strategy questionnaire we asked the students, to what degree they are satisfied with how they learn from texts and what they could do in order to further improve it. About 77 % in grade 4 as well as in grade 6 were fully or mostly satisfied with their learning process and success in this field, the others seldom or never. The own ideas of the children how to improve their learning from texts are characterized by statements such as "read texts several times", "read more frequently, practice", "read precisely, slowly etc.", "ask teacher or peers". Only a few statements were directed towards more differentiated text processing, e.g. "read difficult words several times", "read slowly passages difficult to understand", "make notices or try to imagine or to tell about the content" etc. In some classes several students gave the same answers - maybe, under the influence of what they often heard from their teacher. A certain degree of awareness about shortcomings or failures can serve as a starting point for

efforts of improvement. A more or less differentiated assessment and support for self-assessment is needed in this direction.

Metacognitive and real action level of learning strategies

Statements about strategies and their real application are different processes, of course. The questionnaire data were or will be correlated with performance data in different task situations. For instance, the students had to complete concepts in analogy tasks of the form

animals: living beings stones : ?

21 such tasks with different every day and scientific concepts of ecological and other content and especially selected semantic relations between them were given (Krassa 1993). Without going into details of this investigation here it could be asked, whether there are correlations between the revelation and formation of concept relations in analogy form and text processing, which is - in another form - directed towards concepts and their relations, too. The connection is a very mediated one, especially when we compare the real cognitive activity in one case and the metacognitive statements in the other. Nevertheless, significant correlations between the solution of the analogy tasks and some statements about text processing strategies - reproducing text precisely or by own words, summarizing what is important and notice-making - could be found. They may characterize a more or less intensive cognitive activity, which is - though in different forms - necessary for operating with concepts at all.

Some items of other strategy classes showed significant correlations with the analogy data as well. Interestingly, most such correlations were found with strategies of instructional communication and of cooperation (6 items out of 10 in each strategy class). This may be interpreted as an indication, that social situations stimulate awareness of children's strategies more intensively than "pure" cognitive tasks.

Discussion

1. Metacognitive statements about learning strategies are not identical with real learning actions and learning results. But they represent one of the psychic conditions of learning activity interacting with others. A growing awareness in this regard is one starting point for the development and formation of learning activity. One fruitful approach in this direction is the so-called teaching strategy of ascending from abstract to concrete characterized at former EARLI conferences and elsewhere (Lompscher 1989 a, b 1990).

2. 4 and 6 grade students show a relatively differentiated, though partially contradictive and incomplete awareness of their learning strategies. Under favorable conditions they are - to a certain degree - able to reflect upon strategy statements in relation to their own learning experience. This is an important presupposition for the conscious formation of learning activity and self-improvement in this regard.

3. The outcomes concerning the preference or refusal of strategies, differences between subgroups and interrelations with other components of learning activity depend on the concrete conditions in schools and classes, learning experience and situations etc. Their informational value has to be examined in further investigations.

4. The questionnaire has principally proved as an instrument for getting information about the extent and level of strategy knowledge and reflexion in relation with other instruments. It has

to be revised and standardized in the further research work. At the same time it has a didactical aspect as well. Teachers can use the questionnaire (or parts of it) and its outcomes in order to stimulate strategy reflexion and formation, to discuss with their students statements and experience, to lead them to relevant conclusions and to organize joint effort for putting them into practice.

5. The analysis of learning strategies in different task situations - on metacognitive and real action level as well - and of their interrelations with other factors of learning activity has to be continued not only as an aim in itself, but also and even above all as a step forward towards creating differentiated conditions for an intensive and systematic formation of an efficient and independent learning activity.

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