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Elements in Students Motivation in Technology Education

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Abstract

The aim of this article was to determine the elements motivating comprehensive school students to study technology. The study was carried out as a qualitative case study and the collecting of the material was performed with the help of individual theme interviews. The study group consisted of four 15-16 year old students, which represented four totally different cases in motivation towards technology education. In the choice of the test person main weight was given to the sex and to negative and positive attitude towards technology. The artifact to be made in the school lessons and the freedom of choice had the most significant effect on motivation. Other special elements in motivation: e.g., teacher, talent, interest, need, hobbies, school curriculum and parents had some effect on motivation among test participants, but proved to be less important in the formation of motivation in technology education in this study. The main difference between those who were interested in technology and those who had no further plans in technology education was in own personal need and in the array of other options. However, we must be cautions with the final conclusions as the research group was relatively small.

Keywords: motivation; technology education; gender in technology education

Keywords: Type your keywords here, separated by semicolons ;

1. Introduction

Since the formal beginnings of education (Dewey, 1913), motivation has been viewed as the primary determinant of student learning and school success. Research consistently reveals that motivation is critical not only to current academic functioning, but also to students beliefs in their future success as students and in their expectation of having positive school experiences (Shernoff, Csikszentmiahlyi, Schneider, & Shernoff, 2003). Furthermore, motivation is one lens with which to investigate factors that contribute to students´ interest, engagement and persistence in learning activities (Gilman & Anderman, 2006).

Motivation involves goals that provide impetus for and direction to action. Cognitive views of motivation are united in their emphasis on the importance of goals. Goals may not be well formulated and may change with experience, but the point is that individuals have something in mind that they are trying to attain or avoid. Motivation requires activity – physical or mental. Physical activity entails effort, persistence, and other overt actions. Mental activity includes such cognitive actions as planning, rehearsing, organizing, monitoring, making decisions, solving problems, and assessing progress. Finally motivated activity is instigated and sustained. Starting toward a goal is important and often difficult because it involves making a commitment to change and taking the first step. But motivational processes are critically important to sustain action. Many major goals are long-term such as to get good grades to be accepted into college or saving money for retirement (Pintrich & Schunk, 2002).

Most contemporary theories tend to emphasize one or more aspects that facilitate this process (Roeser, Strobel, & Quihuis, 2002). Gottfried (1990) used the term academic intrinsic motivation in a broad sense to depict a special kind of motivation for school learning. Academic intrinsic motivation involves the enjoyment of school learning and is characterized by a mastery orientation; involving curiosity, persistence and the learning of challenging, difficult and novel tasks.

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The aim of this research was to examine comprehensive school students´ motivation in technology education and to determine interaction of the elements motivating comprehensive school students to study technology education. In addition, we tried to find out if there was a difference between technology orientated and those students who had no further plans in technology education. The main research questions were:

1. What are the main elements motivating comprehensive school students to study technology education?
2. What is the main difference in motivation between those who were interested in technology education and those who had no interest to study technology further?

2. Methodology

The study was carried out as a qualitative case study and the collection of the data was performed using individual theme interviews which generated text. The interviews were first tape recorded and transcribed. Later the research data were analyzed using a content analysis methodology (Anttila, 1996; Baker, 1994). The analysis was carried out through determining out the interesting and essential elements motivating students in technology education. These findings were later classified by the themes selected from Eccles (2009) expectancy value model of motivated behavioral choice and finally reported in the conclusions.

Two boys and two girls took part in the study. All of them studied in Helsinki area. In the school curriculums there was nothing different compared with normal Finnish comprehensive schools. At the primary level (grades 1-6) pupils are 7 to 13 years old, at the secondary level (grades 7-9) pupils are 14 to 16 years old and in the upper secondary school pupils are 17 to 19 years old. In grades 1-7, craft and technology education is a compulsory subject, about 2-3 hours a week, even though in grades 1-2 subject contents are closer to hobby crafts. In grades 8-9 and in upper secondary school there is no compulsory technology education, but pupils can take elective studies for about 2-4 hours per week. Since the background of each test subject was somewhat different we named them characteristically as follows:

A boy in technology education - carpenter
A boy not in technology education – no practical talent
A girl in technology education – against stereotype
A girl not in technology education – textiles

3. Results

Since each participant had different experiences in technology education, in the following section we describe each test participant's educational history. The main elements accounting their motivation and further choices are presented in figures 1.-4.

A boy in technology education – carpenter

The first test subject was a 15-year-old boy who spent all his school years in a university training school. In this study, he represented a boy who has studied technical craft in both primary and secondary school. He lives with his mother and stepfather. His mother is a nurse and stepfather works in the army. He plays indoor hockey and is interested in fishing, for which he makes his own flies.

His motivation in technology education developed steadily throughout his school years. The first remarkable ascent was found when technical craft classes started in primary school, and, for the first time, he received sound instruction. Later the motivation increased when he could concentrate more on his own area of interest and he noted that his skills were developing. After finishing comprehensive school, he thinks that his activity in technology will decrease a little, but that his attitude towards technology in general will remain positive. He hopes that he can keep technical craft as a hobby.

He became familiar with technology education in comprehensive school. Thus the school was the first identifiable factor to affect his attitude. He also responded positively to technology education; already at a lower level of comprehensive school, technology education became his favorite subject. In his opinion, technical handicrafts are a comfortable counterbalance to academic subjects. While working with his hands, he can relax and forget any unpleasant matters. In his opinion, evaluation and good grades are not important in technology education, and so it is easier to derive internal satisfaction from the work.

He is gifted with his hands and so his interest and his own needs are the most important factors in his motivation. For its part whole school curriculum has shaped his attitude. According to him there must be a sufficient supply of materials and the tools must be in good condition in classrooms where technology is taught. The teacher / pupil interaction also has been a significant factor. The teacher did not cause stress and the pupils dared to ask questions that even seemed to them stupid. However, the final product was what motivated him

most. The freedom of choice in the planning increased motivation whenever the product has been personal and something he could use himself.

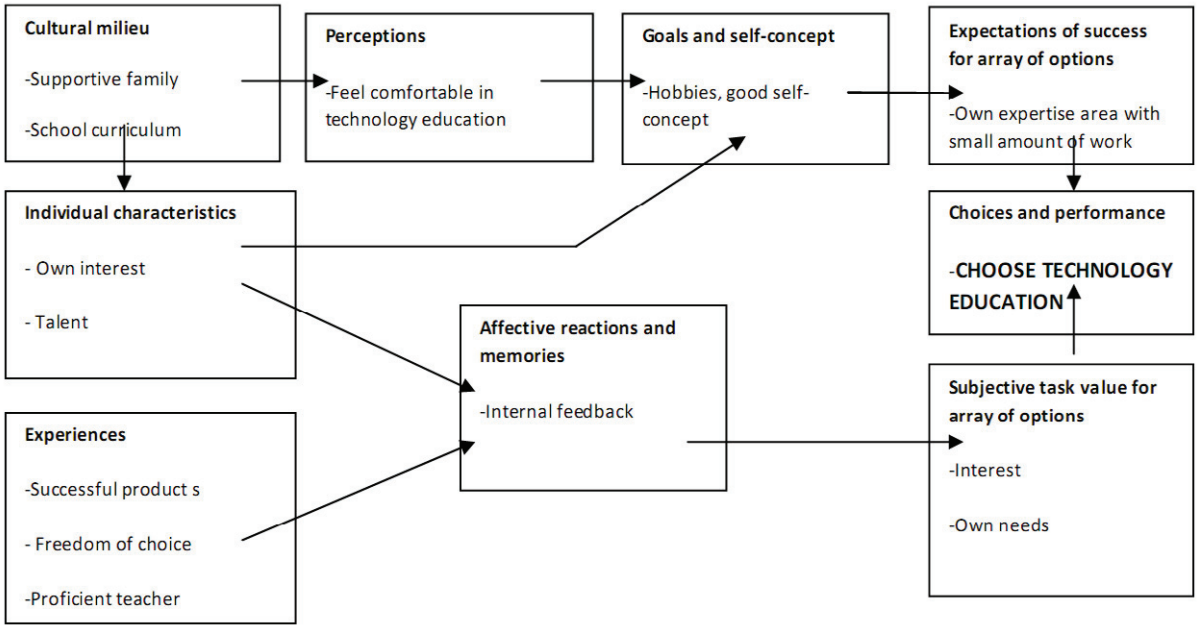

Figure 1. Elements behind the motivation of a boy in technology education - carpenter

A boy not in technology education – no practical talent

The second test subject was a 16-year-old boy who spent his school years in the same university training school as did test subject 1. In this study, he represented a boy who has not chosen any technology education classes in secondary school. His parents are divorced, and he lives now with his mother and older brother. Both parents are lawyers, and he is willing pursue the same career. He has played tennis for seven years, but he has never had any craft- or technology-related hobbies.

He did not have any interest in technology education in early childhood because he was not familiar with it at all. The first remarkable ascent came when craft classes started in primary school, and for the first time he learned some valuable technical skills. Later the motivation increased again when he could concentrate more on his own interests. In secondary school, he encountered some difficulties in his work because his skills were limited and the motivation decreased. After finishing school, academic theoretician thinks that he will not have any activities in technology because he will be concentrating on his academic career.

According to him, technology education is not a significant matter in his life. Indeed, he considers it to be merely the hobby of a small minority of people. At home academic values are also appreciated to a considerably higher degree than vocational education. His thoughts regarding technology education reflect those values and attitudes that come from home. He places value neither on the crafts nor on vocational education in the field of technology. In his opinion, university is much more respected than vocational school.

During his first school years, however, he liked craft and technology education. Then the product and the freedom of choice were some of his most significant sources of motivation. When he proceeded to more difficult and challenging work, skills and talent were no longer enough and his general interest gradually came to an end.

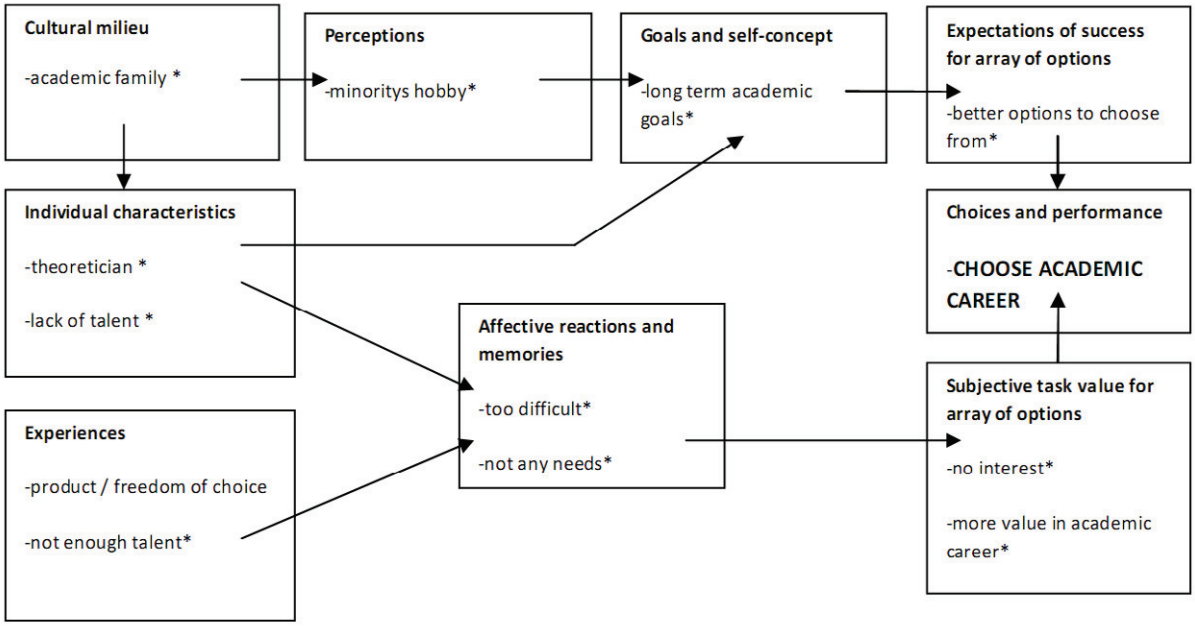

Figure 2. Elements behind the motivation of a boy not in technology education – no practical talent (* negative effect)

A girl in technology education – against stereotype

The next participant was a 15-year-old girl. In this study, she represented a girl who has chosen technical craft and technology education lessons in secondary school. Her parents are divorced and she now lives with her mother and older brother. Her mother works in the library and her father is a production manager. She has none specific hobbies, but she plays guitar in her leisure time.

She has been interested in technology education since early childhood. The first ascent in motivation was found when technology education classes started in primary school, and she learned something valuable about craft education. Later, there was some descent because the new teacher was too domineering and demanding. Yet especially in secondary school the motivation again increased because she liked to work with machines, and there were more materials and interesting projects to choose from. The highest point in her motivation curve came when she had completed building her electric guitar and took it home. After finishing secondary school, she thinks that her activity in technology will decrease, but that her attitude towards technology in general will remain positive.

She considers technology education important because it is necessary counterbalance to the theoretical subjects. Her first role model was her grandfather, and she has been interested in technology education since childhood. She works willingly with large machines and hard materials and does not like to fiddle with small details.

In technology education the atmosphere of the classes in technical work is usually relaxed, and the group is smaller than in other subjects. The effect of the school curriculum has also been important because the school has offered sufficient number of alternatives. Wood-, metal-, and electrical work all belong to the curriculum. In making the electric guitar, for instance, several different skills and materials were combined. She remembers the work of making the guitar as the most agreeable project of all. The impressive and valuable product that she has made for her own use motivates her significantly, but also increases her interest in other products.

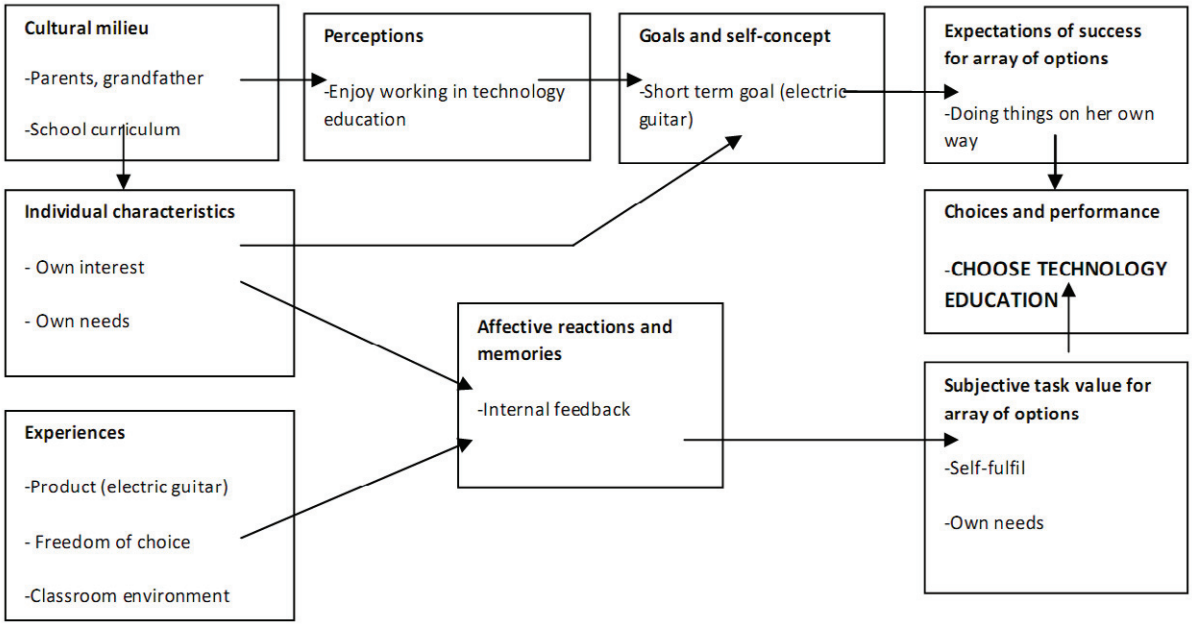

Figure 3. Elements behind the motivation of a girl in technology education – against stereotype

A girl not in technology education – textiles

The last participant was a 15-year-old girl whose first school years were spent in a normal primary school, but who later moved to university training school. In this study, she represented a girl who had chosen any classes in technology education but was highly interested in textile craft. In her family there are parents, one younger brother and one older sister. The mother is a pharmacist and the father is an engineer. Earlier she had several sport hobbies, but nowadays she spends quite a lot of her leisure time doing textile work at home.

Her motivation to study technology has been strong since nursery school. The first remarkable ascent was found at the secondary school level there were more materials to choose from. But anyway working was in general more challenging in textile work. Thus her motivation increased. Later on there were even signs of intrinsic motivation, when internal feedback turned out to be an important factor. After finishing comprehensive school, the aesthetic textile artist thinks that her activity in technology may decrease even more because later she will have to concentrate on academic subjects. However, she believes her attitude towards textiles in general will remain positive, and she may even consider textile work for her profession.

She had studied textiles especially profoundly. Already in nursery school she reacted positively to handicrafts. Now at the secondary school level textile work has become a real hobby to her. She sees herself as a skilful worker, a self-image that further motivates her.

None of her friends has any interest in handicrafts but her grandparents have had a great significance; their influence was positive from childhood. At home she was encouraged to do handicrafts and she even sees the handicraft as a possible profession in the future. In her opinion, the most important factor in handicraft is the opportunity to exercise independent choices in regard to working and the finished product. Furthermore, the classroom has to be large enough so that there will be room for all the pupils. Also materials and tools have a great significance on her motivation. In her opinion, a good teacher should not talk too much but the interaction is important. If it is easy to approach the teacher, a discussion will be more easily created between a teacher and the pupil.

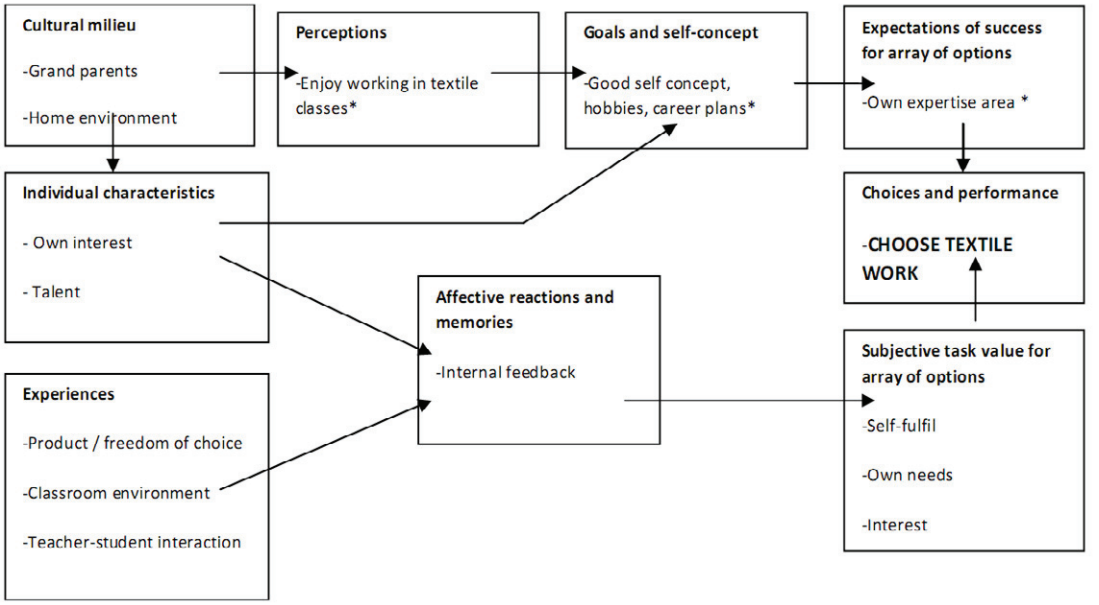

Figure 4. Elements behind the motivation of a girl not in technology education – textiles

4. Conclusions

Of all the elements in motivation, the freedom of choice and the artefact to be made seemed to have the most remarkable effect on motivation among all test participants. That is what happens when there is freedom of choice in materials, techniques, and in products to be made. The feeling of autonomy is especially important for older students who want and need more autonomy in their decisions. Some research in other life contexts such as education in general has also shown that high levels of autonomous motivation toward education lead to high academic performance (Burton, Lydon, D´Alessandro, & Koestner, 2006; Gottfried, Fleming, & Gottfried, 1994).

Talent, students´ own needs, interests, and technology-related hobbies were definitely important elements in technology education among students who had further plans in technology education. Instead, these elements may have had a negative effect in motivation among those who had no interest in technology. According to Byman (2002), students usually choose and prefer subjects and tasks in which they are good and can show their competence. It seems that if we ask students to do too difficult tasks in technology education with limited competence, the motivation is based only on extrinsic forms.

Social relations – for example teacher, teacher–student interaction, classroom atmosphere, and parents were also found to be important elements but not as essential as successful products and those elements in need for autonomy. It seems, that classroom atmosphere and teacher-student interaction were more important in making the whole environment suitable than in directly influencing motivation. Reeve, Bolt, & Cai (1999) have shown that teachers who support students´ freedom of choice and autonomy in decisions create more intrinsic motivation than those who are willing to control their students. Autonomy support is evident when an authority figure respects and takes the subordinate's perspective promotes choices and encourages decision-making (Ratelle, Larose, Guay, & Senecal, 2005).

Furthermore, school curriculum and the entire classroom environment with available tools and machines appeared to be important for motivation among all test participants. According to the test participants, the classroom in technology education should have enough space for everybody, enough materials, and tools in good order. Deci & Ryan (1985) argue that informal learning environments which offer optimal challenge, plenty of different stimuli, and a chance to feel autonomy achieves effective motivation. According to Stipek (1996), it is even more important to pay attention to provide an optimal and suitable learning environment than to concentrate on students' personal problems in terms of motivation.

Suitable learning environment and atmosphere are seen as typical features of a positive affect. Positive affect for its part facilitates flexible thinking and problem solving, and enhances performance, even where the tasks to be done are complex, difficult and important (Isen & Reeve, 2005). Furthermore, Isen & Reeve (2005) indicate that positive affect does foster intrinsic motivation, and enjoyment and performance of enjoyable tasks, but not at the expense of responsible work behavior in uninteresting tasks that must be done.

The main difference between those who were interested in technology and those who had no further plans in technology education was in own personal need and in the array of other options. In Finnish schools it appears to be the case that some students value neither crafts nor vocational education. Common opinion is that, the university is definitely a better and more respected place to in where to study than vocational school. Usually, these views of technology education reflect those values and attitudes that come from home, and these attitudes are adopted already at an early age (Autio, Hietanoro, & Ruismäki, 2009). The fact that many girls prefer textiles instead of technology if there is the option available needs further research. Even though, this corroborates Eccles (2007) findings.

5. Discussion

Although an academic career is usually more valued than practical work, there should be a better balance between practical and academic subjects, at least in the lower grades and even at the high school level. On the other hand, motivation in technology education can be significantly improved by developing special programs (Mammes, 2004), where teachers are aware of the differing interests of both genders and consider ways of making the environment and the subject attractive to all (Silverman & Pritchard, 1996). When teachers try to find ways to promote student's motivation during relatively uninteresting learning activities, they can successfully do so by promoting the value of the task. One way teachers can help students value what they may deem uninteresting is by providing a rationale that identifies the lesson's otherwise hidden value, helps students understand why the lesson is genuinely worth their effort (Jang, 2008).

Furthermore, Ryan & Deci (2000) argued that extrinsic motivation can be changed into intrinsic motivation if a project is interesting enough and the teacher supports students´ feeling of autonomy. In addition, according to Hidi & McLaren (1990), individual interest develops slowly and tends to have long-lasting effects on a person's knowledge and values, whereas situational interest is an emotional state that is evoked suddenly by something in the immediate environment and may have only a short-term effect on an individual's knowledge and values. This phenomenon seemed also to be true in this study. Most of the students valued only the product at first, but later on internal feedback turned out to be one of the key elements in their motivation.

It is not surprising that both boys and girls are attracted to technology education because they enjoy working with their hands and like the independence and chance for creativity provided by these classes (Silverman & Pritchard, 1996). Students who typically enroll in technology education are attracted to the types of projects they will be engaged in (Weber & Custer, 2005). It seems that several other school subjects have more motivational problems than technology education. Additional studies, based on time sampling methods suggest that these negative perceptions are not limited to one or two of the hardest class subjects, but are pervasive across the entire school curriculum (Shernoff et al., 2003). We can assume that all subjects could use more practical methods, which give the students more independence, autonomy and the chance to use their own creativity.

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