

Thinking of Pupils in the Lessons of Home Economics and Technologies

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Abstract: The problem is related to developing pupils' thinking skills during the lessons of *Home Economics and Technologies* at primary school for school years 5-6. The present paper theoretically analyses the thinking qualities of primary school pupils. The aim of the research is to determine whether pupils have the qualities of thinking individual and what kinds of thinking are appropriate for pupils during the lessons of *Home Economics and Technologies*. The criteria for assessment of school pupils' thinking skills and abilities were developed. The research study was carried out at the Institute of Education and Home Economics, Latvia University of Agriculture. The survey was carried out at Jelgava Primary School No. 4 with the participation of 54 respondents – pupils of grade 5 and 6. Thinking – both creative, critical and logical – is a fundamental human activity, and it is very important in problem-solving and decision-making. In their self-evaluation, the pupils rated their human thinking skills as high. The pupils had sufficiently developed their creative and critical thinking skills, while their logical thinking ability was lower during the lessons of *Home Economics and Technologies*. The promotion of pupils' thinking is one of the most important tasks of the study process that develops new thinkers; then an idea is followed by action, which is significant for training in *Home Economics*. The paper's target audience is teachers and educational advisers.

Keywords: creative, critical and logical thinking, Home Economics, school pedagogy.

Introduction

In their pedagogical practice, the authors have faced a problem – pupils “get stuck” on some kind of task or problem, or a question and cannot solve it or find an answer. They do not seek for new, innovative and creative solutions to problems in the study process. The reason is the lack of flexibility and diversity in thinking. Every pupil is able to think, nevertheless they cannot apply their thinking in a sufficiently flexible way during their studies and in various life situations. *Home Economics and Technologies* is a study subject that is mainly based on the development of creative thinking, pedagogical practice reveals that pupils still often choose the easiest solution – the imitation of a teacher.

The aim of the research is to determine whether pupils have the qualities of a thinking individual and what kinds of thinking are appropriate for pupils during the lessons of *Home Economics and Technologies*.

Characteristics of thinking at primary school

Thinking (*denken* in German; *мышление* in Russian) may be explained as a process of the human psyche that allows exploring the reality and linking everything felt and understood earlier. By using their thinking, humans can discover associations and differences that exist among objective phenomena and processes (Žukovskis, 2015). However, I. Veidnis stresses that thinking is a kind of psychic activity, which ensures the stability of productive thinking as well as represents a degree of cognition that shapes the basis for scientific cognition and creativity in any area of human activity (Veidnis, 2011).

By means of thinking, humans comprehend associations and differences existing among phenomena and processes taking place around. The starting point of thinking is a problem situation that emerges when the ways of achieving a goal and solutions to the problem have to be found. In a problem situation, thinking involves a number of phases (Liepiņa, 2003):

- comprehension of questions, identification of the known and the unknown;
- putting forward a hypothesis;
- verifying the hypothesis;
- finding a solution, making a finding or a conclusion.

Thinking has the following essential peculiarities (Liepiņa, 2003):

- an ability to assess all the combinations of variables when seeking for a solution to the problem;
- an ability to predict how a variable influence another one;

- an ability to combine and separate variables in a hypothetic and deductive way.

Human thinking remains unchanged – it develops and progresses together with the individual. The specifics of a personality's thinking forms according to the age, gender, profession and other social and individual factors influencing the individual (Šteinberga, 2013).

Thinking involves both the critical and the creative aspect of the human psyche; these aspects are used in judging and creating ideas. Thinking as an activity is involved in any process of the human psyche, which helps define or tackle a problem, make a decision or seek for comprehension. Thinking is a conscious human activity, but also unknown psychic processes are involved in it (Fišers, 2005).

Critical thinking

At present at schools, a special focus is placed on critical thinking when designing study plans and programmes, as critical thinking helps build up decision-making and problem-solving skills. Such traits as openness, tendency to seek for the cause of a problem, curiosity, the wish to be well-informed and flexibility may be attributed to individuals thinking critically (Lai, 2011).

The understanding of critical thinking is based on the individual's ability to be aware of his/her opinion, to create new ideas, to analyse developments and to critically assess them. This is nonstandard thinking, which gives an ability to see and assess alternatives, to identify priorities, to establish facts, to determine the truth and the usefulness of phenomena and developments, to make necessary decisions and to correct mistakes made during the thinking (Kritiskās domāšanas..., 2012).

Critical thinking is a complex process that involves acquiring information, processing the information and making a decision (Figure 1) (Projekta „Jelgavas...”, 2013).

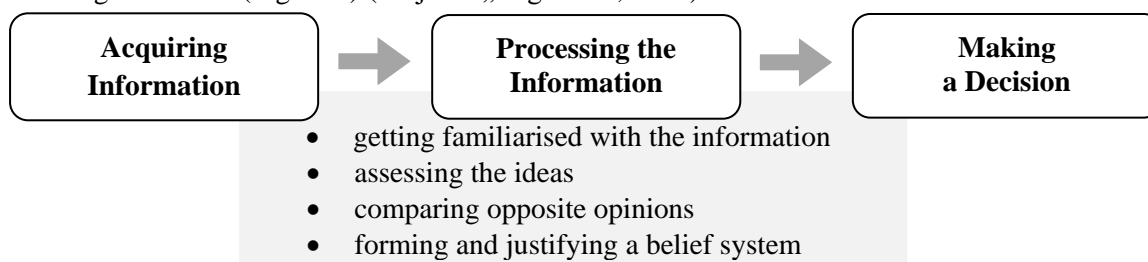


Figure 1. Critical thinking process (Projekta „Jelgavas...”, 2013).

R. Paul suggests a set of basic principles of critical thinking, in which he recommends the ways of building up thinking skills in daily study practice. Critical thinking may be classified into three kinds – affective (emotions and will), macro-abilities and micro-skills. These kinds are interdependent. The scientific purpose is to develop critical thinking in a broader sense by employing the methods that encourage pupils to become skilful thinkers who are able to judge and are free of prejudice (Fišers, 2005; Paul, Elder, 2006). In developing critical thinking, it is of great importance to clearly define questions. A problem has to be justified, the sources of information have to be known, the situation has to be analysed comprehensively, alternative solutions have to be searched for and a reasoned opinion or a position has to be chosen (Burgeva, Davidova, 2010).

Thinking is important in any life sphere of humans; therefore, particularly critical thinking is stressed as one of the key goals in education, as it helps build up decision-making and problem-solving skills in every process of human life. After learning critical thinking skills, pupils can critically assess their available information and results achieved and justify and defend their thoughts and opinions at any stage of their thinking.

Creative thinking

At school, the development of creative thinking in pupils is important. Creative thinking mainly involves imagination, the formation of mental associations and the interaction of one's subjective perception, fantasies and dreams. However, imagination in particular is strongly associated with the personality's subjective psychic perception and the development of the personality's thinking on the whole, which is accompanied by the formation of certain emotional attitudes (Svence, 1999).

Creative thinking is a kind of thinking that views a problem or a situation from another perspective; as a result, new and non-traditional solutions to the problem are sought. Creative thinking could be stimulated through an unstructured process (brainstorming) and a structured process (lateral thinking) (Creative thinking, 2016). However, creativity may not be always associated with a problem their disassociation is controversial. A problem emerges if there is a goal – the problem has to be solved, although there is a lack of finance to achieve the goal. To tackle a creative problem, creative solutions to the problem are necessary (Bebre, 2013).

R. Fisher believes that creative thinking is a comprehensive range of human attitudes and abilities that allows developing creative thoughts, ideas and images. A creative process partially employs intuition and incidentally explained coincidences that yield positive results. A teacher, a parent, a peer and a schoolmate could be a promoter of the creative process that helps pupils think creatively (Fišers, 2005).

A defused, defocused attention is typical of creative people, which ensures the perception of diverse information. Individuals with a wide range of attention can perceive and process different information (Bebre, 2013).

Compared with critical thinking, creative thinking is more cheerful, creative and freer as well as open to diverse ideas. Creative thinking skills involve (Coughlan, 2008):

- searching for as many answers as possible, instead of only one;
- making many and diverse, maybe even crazy assumptions;
- not criticising ideas in the beginning of a job – dealing with any idea as if the idea contains a small part of the result to be achieved;
- daring to toy with and dream of diverse ideas and theories or suggestions;
- dealing with as many ideas and suggestions as possible, while being aware that they, potentially, will not be useful;
- making mistakes;
- learning from what was done and from what has not been done yet.

Logical thinking

Logical thinking is a process of thinking in which an individual uses logical concepts and design, which have very convincing judgements and the purpose of which is to get reasoned conclusions from the available space (Логическое мышление..., 2016).

Logical thinking is an important basic skill. It is based on the sequence of thoughts. The process of thinking requires accepting ideas, facts and findings and integrating them in the problem solution chain. Thinking logically means thinking step by step (Milková, Hůlková, 2013).

Logical thinking is a process, by means of which individuals comprehend concepts and judgements and dynamically reflect the objective reality and a rational understanding of the developments, which is also referred to as theoretical thoughts. The structure and performance of such a kind of thinking, if regularly analysing the emergence and development of it, forms understanding. Only through logical thinking individuals can get an understanding of the nature of particular objects and comprehend the objective world. Logical thinking is a component of the cognition process, in which the reality of the process is reflected using concepts, judgements and arguments. Logical thinking is analytical; every element is considered step by step and each step has to be accurate (Loġiskā domāšana, 2015). In order for the process of logical thinking to take place step by step, it is possible to employ the methods of deduction and induction, which helps get a logical and reasoned answer.

Deduction is based on the principle of logic and consistency a logical conclusion is derived from generalised information. Deduction ensures that a finding is credible and knowledge obtained in a such a way is credible and reliable (ИВИН, 1998). The deduction method is based on reasoning. It starts with generalised information or a hypothesis and gives an opportunity to achieve the goal by means of particular logical conclusions. It moves from general (theory) to specific (Bradford, 2015). According to W.M.K. Trochim's theory, an examination based on the deduction method is as follows: based on theoretical findings, a hypothesis is put forward, then observations are done and the hypothesis is proved or rejected (Trochim, 2006). Whereas induction is a method being opposite to deduction. It moves from specific observations to generalisations (Bradford, 2015). An examination based on the induction

method according to W.M.K. Trochim's theory is as follows: first of all observations are done, associations are identified based on them, and an initial hypothesis is put forward, which is proved by means of theoretical findings (Trochim, 2006). In learning and teaching, induction may not be separated from deduction, and the study process has to move in both directions. Depending on the task of teaching, the teaching has to move from general to specific or vice versa. Logical thinking develops slowly – in the result of experience, mistakes and trials. Our schools traditionally focus on developing logical thinking, which involves memorising mechanically and learning the operations of thinking: to compare, specify, abstract, analyse and synthesise (Svence, 1999). In addition, pupils develop an ability to concentrate and mathematical thinking, which results in an ability to see similarities (Myers, 2000).

Methodology

The research study was carried out at the Institute of Education and Home Economics, Latvia University of Agriculture. In the beginning, pedagogical observations were done to study and define the problem. A survey on the thinking skills and abilities of primary school pupils was conducted by the authors. Given the findings obtained in the theoretical research, criteria for assessing pupils' thinking skills and abilities were developed; the criteria were rated on a scale from 1 to 5, where 1 meant "no", while 5 "yes". The purpose of the questionnaire survey was to find out whether pupils have the qualities of a thinking individual and whether they have logical, critical and creative thinking skills, which are important in the lessons of *Home Economics and Technologies*. The criteria for assessment of school pupils' thinking skills and abilities were developed. The survey's methodology was based on a methodology developed by V. Tomsons (Tomsons, 2009). The survey was carried out at Jelgava Primary School No 4 from February to April 2016. The sample population was 54 pupils (23 males and 31 females) in grade 5 and 6; 46 % or 25 respondents were grade-five pupils, while 54 % of the respondents were grade-six pupils. The margin of error was 5 %, as it was preferred to have replies as accurate and correct as possible. The confidence level was 95 %, which ensured a greater probability that the survey's results would be the same if conducting a similar survey. The survey may not be generalised, as it has to give initial insight into a potential or non-existent problem in pupils' thinking. The survey data were processed calculating percentages, the mode, the median and performing a χ^2 test.

Results and discussion

A summary of the respondents' replies is presented in Table 1 and Table 2. In the first table below the results are summarized of the survey where was asked the question: "Are you thinking individual? Rate yourself according to the criteria for a thinking individual on a scale from 1 to 5, where 1 means "no" and 5 means "yes"" (Table 1).

Table 1

Pupil self-ratings of the behaviour of a thinking individual according to the criteria developed by the authors (%)

No	Criteria	Replies				
		1 (no)	2 (rather no)	3 (don't know)	4 (rather yes)	5 (yes)
1	think comprehensively	4	4	31	50	11
2	assume risk	4	17	26	33	20
3	ask questions	2	13	24	35	26
4	seek for associations (similarities) and differences	9	19	26	26	20
5	solve problems	9	9	20	31	30
6	clearly express one's thoughts	11	13	26	35	15
7	enhance one's thinking	4	11	20	30	35
8	take into account the opinions of others	6	4	20	39	31

For analysis, the authors counted up replies "1 (no)" and "2 (rather no)" and then replies "4 (rather yes)" and "5 (yes)". The analysis of the survey data (Table 1) revealed that 61 % of the respondents admitted

they had a skill to think comprehensively, while 31 % had a neutral opinion (don't know), and only 8 % admitted they had no thinking skills. The average rating derived from the data was 4 (Me=4, Mo=4), which was "rather yes"; this showed the pupils' ability to reflect on an assignment was quite high.

Fifty-three percent of the respondents admitted they could assume risk, while 26 % had a neutral opinion (don't know), and only 21 % admitted that they had no tendency to take any risk. The average rating by the pupils was 4 (Me=4, Mo=4), which was a very good rating meaning the pupils could assume the risk.

Sixty-one percent of the respondents admitted they were used to ask questions, while 24 % had a neutral opinion (don't know), and only 15 % admitted that they were not used to ask questions. The average rating by the pupils was 4 (Me=4, Mo=4), which meant they were used to ask questions about interesting issues.

Forty-six percent of the respondents admitted they sought for similarities and associations, while 26 % had a neutral opinion (don't know), and only 28 % admitted that they were not used to seek for them. The average rating by the pupils was 3 (Me=3, Mo=3.4), which was a neutral rating; this allowed concluding that the respondents were not used to apply their knowledge in acquiring a new knowledge. However, based on χ^2 calculations ($\chi^2=2.48 < \chi^2_{0.05;4}=9.49$), it can be concluded that the respondents' gender influenced the replies given, whereas the pupils' school year made no influence ($\chi^2=43.71 < \chi^2_{0.05;4}=9.49$).

Eighteen percent of the respondents believed that their problem-solving ability was low; 20 % gave a neutral reply, while 61 % admitted they were able to solve problems. The average rating by the pupils was 4 (Me=4, Mo=4), which was a high rating indicating the respondents could solve their problems.

Twenty-four percent of the respondents admitted they had problems to express their thoughts orally, while 26 % had a neutral opinion (don't know), and 50 % admitted it was not a problem for them to express their thoughts orally. The average rating by the pupils was 3.5 (Me=3.5, Mo=4), which was a neutral rating that indicated that the pupils had to enhance their ability to express their thoughts orally.

Fifteen percent of the respondents admitted they did not enhance their thinking, while 20 % had a neutral opinion (don't know), and 65 % specified they needed to perfect their thinking. The average rating by the pupils was 4 (Me=4, Mo=5), which allowed concluding the pupils were used to enhance their thinking.

Ten percent of the respondents did not take into account the opinions of others, while 20 % had a neutral opinion (don't know), and 70 % admitted they took into consideration the opinions of other people. The average rating by the pupils was 4 (Me=4, Mo=4), which indicated that the surveyed pupils took into consideration the opinions of other people, and it is one of the key features of the behaviour of a thinking individual.

An analysis of the first set of questions revealed that the respondents rated themselves on average at Me=4, which indicated the respondents had the features of a thinking individual. The chi-square (χ^2) calculations showed that assumptions that the pupils' thinking was influenced by their school year or gender had to be refused, as the assumptions were not proven by any question asked.

In the table 2 the results are summarized of the survey where was asked the question: "Do you have the following abilities? Rate your thinking skills on a scale from 1 to 5, where 1 means "no" and 5 means "yes"" (Table 2).

The authors counted up replies "1 (no)" and "2 (rather no)" and then replies "4 (rather yes)" and "5 (yes)". An analysis of the survey data (Table 2) – the first four criteria (No. 1, 2, 3, and 4) – gave insight into the pupils' **ratings of their critical thinking abilities**. Of them, 65 % admitted they could critically assess information and find the most important facts, while 28 % had a neutral opinion (don't know), and only 7 % admitted they had no skill to critically assess information and to find the most important facts in it. The average rating by the pupils was 4 (Me=4, Mo=5), which indicated the pupils were able to assess information and find the most important facts in it.

Sixty-six percent of the respondents admitted they could critically assess their performance, while 19 % had a neutral opinion (don't know), and only 15 % admitted they could not critically assess their

performance. The average rating by the pupils was 4 (Me=4, Mo=5), which was a high overall rating that allowed concluding the pupils were competent to rate themselves.

Sixty-eight percent of the respondents admitted they verified the results after finishing an important job, while 15 % had a neutral opinion (don't know), and 17 % admitted they did not verify their work results when completing an important task. The average rating by the pupils was 4 (Me=5, Mo=4), which indicated the pupils did not check their work results to analyse their mistakes made.

Table 2

Pupil self-ratings of their thinking skills according to the criteria developed by the authors (%)

Kind of thinking	No	Criteria	Replies				
			1 (no)	2 (rather no)	3 (don't know)	4 (rather yes)	5 (yes)
Critical thinking	1	Can you critically assess information –to find the most important facts?	2	5	28	30	35
	2	Can you critically assess your performance?	6	9	19	22	44
	3	After finishing an important job, do you verify the results?	11	6	15	22	46
	4	Can you justify the strengths and weaknesses of your work?	6	7	19	37	31
Logical thinking	5	Is it easy for you to set a goal?	13	12	20	31	24
	6	Is it easy for you to handle complicated situations?	9	11	33	30	17
	7	Is it easy for you to define a problem?	13	20	26	31	9
	8	When acquiring a new knowledge, do you seek for its similarities with the knowledge you have?	13	20	26	31	9
Creative thinking	9	Is it easy for you to create new, original ideas?	11	7	30	19	33
	10	Can you realise and enhance your ideas?	6	13	26	29	26
	11	Do you seek for creative solutions to your problems?	11	9	33	22	24
	12	Is it easy for you to accept the new and the unclear ideas?	7	7	26	30	30

Sixty-eight percent of the respondents could justify the strengths and weaknesses of their job, while 19 % had a neutral opinion (don't know), and 13 % admitted they could not justify the strengths and weaknesses of their work. The pupils rated themselves on average at 4 (Me=4, Mo=4), which allowed concluding the pupils were able to justify the strengths and weaknesses of their work done.

The analysis of the data on the first four criteria revealed that the pupils rated their critical thinking abilities on average at Me=4, which was a high overall rating that proved the pupils had critical thinking abilities. The chi-square (χ^2) calculations revealed that the pupils' school year and gender did not make any influence on the results, but the observations showed that male pupils rated their critical thinking abilities lower than female pupils did.

The next criteria (No. 5, 6, 7 and 8) were designed with the purpose of identifying **whether the pupils had logical thinking abilities**. One could find that 55 % successfully set new goals for themselves, while 20 % had a neutral opinion (don't know); 25 % admitted they could not set a goal for themselves. The average rating by the pupils was 4 (Me=4, Mo=4), which indicated they, in general, had an ability to set new goals for themselves.

Only 47 % of the respondents admitted they were competent to handle complicated situations, while a large proportion, 33 %, had no opinion (don't know) about their ability to cope with complicated

situations; 20 % admitted they had no skill in handling complicated situations. The average rating by the pupils was 3 (Me=3, Mo=3), which was a neutral overall rating; it indicated the lack of abilities regarding handling complicated situations.

Forty percent of the respondents could define various problems, while 26 % had a neutral opinion (don't know), however, 33 % admitted they were not able to define a problem. The average rating by the pupils was 3 (Me=3, Mo=4), which indicated their ability to define problems was low because the difference in the numbers of replies "yes" (40 %) and "no" (33 %) was small.

Thirty-three percent of the respondents believed they did not seek for similarities between a new knowledge and the knowledge they had; 26 % gave neutral replies, while 40 % admitted they sought for similarities in knowledge. The average rating by the pupils was 4 (Me=4, Mo=4), which indicated the respondents sought for similarities between a new knowledge and the knowledge they already possessed.

An analysis of the pupils' self-ratings of the four criteria (No. 5, 6, 7 and 8) revealed that they rated themselves on average at Me=3/4, which could indicate their insufficient logical thinking skills, although logical thinking in particular is the kind of thinking that is classically developed at schools. Memorising mechanically and the development of thinking operations are the basic elements of logical thinking.

The chi-square (χ^2) calculations rejected an assumption that the pupils' gender or school year could influence the validity of results. However, it has to be mentioned that compared with male pupils, female pupils tended to rate themselves higher when giving replies to some of the above-mentioned questions.

The last four criteria (No. 9, 10, 11 and 12) were developed to establish **whether the pupils had creative thinking abilities**. Fifty-two percent of them admitted they could create new and original ideas, 30 % had a neutral opinion (don't know), while 18 % admitted they could not create anything new and original. The average rating by the pupils was 4 (Me=4, Mo=5), which indicated the pupils were quite talented in creativity and innovation.

Fifty-five percent of the respondents admitted they were able to realise and enhance their ideas, 26 % had a neutral opinion (don't know), while 19 % admitted they were not able to realise and enhance their ideas. The average rating by the pupils was 4 (Me=4, Mo=5), which indicated the pupils had quite high abilities to realise and enhance their own ideas.

Forty-six percent of the respondents could solve their problems in various ways, 33 % had a neutral opinion (don't know), while 20 % admitted they were not able to find solutions to their problems. The average rating by the pupils was 3 (Me=3, Mo=3), which indicated the pupils lacked an ability to be aware of how to seek for various solutions to problems or they were not convinced of their abilities.

Sixty percent of the respondents admitted they were open to the new and the unknown, 26 % had a neutral opinion (don't know), while 14 % revealed they had a problem to accept anything new and unclear. The average rating by the pupils was 4 (Me=4, Mo=4.5), which indicated the pupils had a high ability to accept anything new and unclear for themselves. The χ^2 calculations revealed that the replies given to this question were influenced both by the pupils' school year ($\chi^2=1.50 < \chi^2_{0.05;4}=9.49$) and by their gender ($\chi^2=0.61 < \chi^2_{0.05;4}=9.49$).

The analysis of the respondents' replies regarding the last four criteria (No. 9, 10, 11 and 12) for creative thinking allowed concluding that the pupils had very good creative thinking abilities. The average rating by the pupils was 4 (Me=4), which was a high rating among the pupils. Of all the kinds of thinking examined in the empirical study, creative thinking in the pupils surveyed in the lessons of *Home Economics and Technology* was developed the best. In this case too, if performing a Chi-square (χ^2) test, one can reject an assumption that creative thinking depends on gender or school year.

Conclusions

- Thinking may be characterised as an individual process taking place in the human mind, which focuses on solving problems and finding associations among objects and phenomena. The key task of thinking involves finding solutions to problems and making decisions. The process of thinking develops and improves in line with the development of an individual; therefore, it is possible to

develop one's thinking persistently throughout the entire lifetime. It is of great importance to develop such kinds of thinking as creative, critical and logical thinking to study the subject of *Home Economics and Technologies*. Creative thinking allows viewing a problem from a new perspective, finding creative solutions to problems and making mistakes. However, critical thinking allows critically assessing a problem and solutions to the problem; it is a kind of thinking that focuses on comprehending the nature of the issues. Logical thinking is a process based on comprehending a problem and solving the problem in a sequential and logical way.

- Pupils of school grade 5 and 6 are in a period of transition towards puberty; at this age, they actively seek for their position in the world and wish to build up various skills and abilities. At this age, the key changes in terms of cognitive development are associated with the formation of stable thinking in them; their thinking becomes flexible and logical, while in general their thinking is based on their memory for what they learnt during the previous age periods.
- The data acquired in the empirical study on the thinking of pupils and its specifics showed that the pupils had well-developed thinking skills and they had a behaviour of a thinking individual. According to the pupils' self-evaluation, critical thinking of the pupils was developed the best, their creative thinking was quite well-developed, while their logical thinking gets the least in the lessons of Home Economics and Technologies. By the authors opinion the creative thinking is most essential for doing practical creative works in lessons of Home Economics and Technologies.
- The authors stress the necessity to develop thinking of pupils in their research because teachers often forget that it is not enough for pupils to learn some concrete theme what is needed; but also the methodology of teaching has to be multifaceted, creative assignments have to be given to the pupils, so that they can develop comprehensively at school. The promotion of pupils' thinking is one of the most important tasks of the study process that develops new thinkers, then the action is followed after the idea, which is significant for training in *Home Economics and Technologies*.

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