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The preparing pupils for textile technology Olympiads

Teaching design and technology in basic education school context

ABSTRACT

This article presents how design and technology teachers teach pupils who successfully participate in Open Design and Technology Olympiads (textile technology). After interviewing twelve teachers and performing qualitative content analysis it is concluded that several personality traits are crucial for teachers, for pupils to succeed in the competition: competence, consistent work, and continuous development. An appreciation of school management is also important. In the teaching process, teachers should use self-made materials and varied sources, pay attention to creating ideas, experiment with materials and techniques, and think about products' usage, composition, and technical quality by using both regular and different forms of extracurricular lessons in an inspiring environment. Individual work with each pupil is vital. Teachers have different approaches to the process of idea generation.

Keywords:

Olympiads, design and technology education, textile design, talented students, creative process.

INTRODUCTION

As part of the transition to a competence-based approach in general education in Latvia from the school year 2020/2021, the subject 'home economics and technology' has been transformed into 'design and technology' (Republic of Latvia Cabinet Regulation No. 747 Adopted 27 November 2018 "Regulations regarding the state basic education standard and model basic education programmes", 2018). The competence-based approach influenced the choice of the subject as it is necessary to research design and technology teaching for future teachers still studying at university as well as pupils, including talented pupils. Researchers have studied teaching and learning problems in the preparation of professional designers (Dazkir et al., 2013; Sawyer, 2018), future teachers (Laamanen, 2012, Lahti et al., 2016; Karppinen et al., 2019; Pöllänen, 2009, 2019; van Dooren et al., 2014), and in general education schools (Aflatoony, Hawryshkewich, & Wakkary, 2018; Aflatoony, Wakkary, & Neustaedter, 2018;

Carroll et al., 2010; Syrjäläinen & Seitamaa-Hakkarainen, 2014). However, there has been little research in Latvia on the acquisition of the design process in general education and teacher studies, nor any studies on teaching talented pupils in design and technology in general education schools.

Olympiads are competitions in which talented pupils can participate and are organised at different levels: school, county, and national. Open Olympiads, organised by professionals in the field, are a separate category. National and Open Olympiads (in the context of home economics and technologies) improve pupils' knowledge and skills, develop their creativity, boost their self-confidence, and stimulate their interest in the subject. Moreover, Olympiads in textile technologies give teachers the opportunity to exchange experiences with other teachers, gain new ideas for their work, and thus further develop the subject (Urdziņa-Deruma, 2009).

An analysis of Olympiad results shows that pupils of the same teachers obtain better outcomes. Students who succeed in home economics/design and technology Olympiads create creative, compositionally uniform, colour-matched, technically high-quality and simultaneously applicable textile products (Urdziņa-Deruma, 2018). There is, therefore, a need to investigate how teachers teach pupils who successfully participate in the Olympiads, as the results could help other teachers and students improve their performance in the Olympiads and in design and technology in general. This study focuses on the preparation of basic education pupils (Forms 5-9) for the textile technology Olympiads.

THEORETICAL BASIS OF THE STUDY

This section analyses previous research on the teaching of design and technology. The focus is on how to teach creative product development, but it also clarifies the concept of talented pupils and provides specifics on working with talented pupils.

Teaching design and technology

Research on teaching the subject of design – for middle school (Carroll et al., 2010), prospective teachers (Karppinen et al., 2019; Laamanen, 2012; Lahti et al., 2016), and prospective designers and artists (Sawyer, 2018) – underlines the importance of action, since the design process can only be fully understood when dealing with it. Van Dooren et al. (2014) considered five generic components that comprise the design process: (1) experimenting or exploring and deciding, (2) the guiding theme or qualities, (3) domains, (4) frame of reference or library, and (5) laboratory or (visual) language: sketching and modelling. According to the authors, these elements are universal and constitute a complex, personal, creative, open design process. The main design process domains are (1) form and space, (2) material, (3) function, (4) physical context and (5) social, cultural, historical, and philosophical context (van Dooren et al., 2014). Both theoretical knowledge and practical experience in creating ideas are needed. The use of a guiding theme or quality not only gives the design its character and identity in the complex design process but also helps students make choices. Students must learn to see all the necessary components. Initially, they should look at the design ideas created by others; these create the basis for starting new ideas. Students must also study all kinds of past experiences and learn to work with them. Designers perform experiments, creating sketches and patterns, thus using visual language (van Dooren et al., 2014).

Design tasks should be open-ended and include more than one possible solution as well as situatedness related to the physical, social, cultural, and technological aspect(s) of a particular real or hypothetical situation. Tasks should include the need to explore the user's expectations and needs. In addition, they should be value-oriented and assessable, integrating skills and knowledge from different fields (Davis, 2017). Laamanen (2012) and Lahti et al. (2016) believe that more material experiments should be included in the range of methods. Sketching, for example, has quite often been seen as too challenging in design (Laamanen, 2012, p. 256). Some students are even demotivated by sketching in textiles (Wood-Griffiths et al., 2015, p. 139). Sketches can have many unclear elements, but in prototypes, some details may be clearer, and the materials' properties are better readable.

In the design process, creating and visualising ideas is crucial (Lahti et al., 2016). Lahti et al. also found that simple materials (glue, cardboard, wire, non-woven materials) are tools that support the

students' design process. These materials help to create and evaluate ideas and solutions in project groups and help to describe and communicate ideas to other members of the group. As such, the authors recommend that these materials are applied to other design settings to create a link between conceptual, material and embodied thinking.

A group of Canadian researchers (Aflatoony, Hawryshkewich, & Wakkary, 2018), while studying the learning of the design process in high schools, highlighted the relations with real-life, experience-building activities (research and game elements) and clearly described how the outcome of potential activity motivated pupils more. The authors see design thinking as a collaborative, problem-solving and human-centric approach. The researchers also emphasise the importance of raising awareness of the overall design process by moving the learning process in line with the stages of the design process. The group should cooperate and develop critical thinking, and the materials developed by teachers should include verbal and visual information. Special attention also ought to be given to designing sketches (Aflatoony, Hawryshkewich, & Wakkary, 2018). Involving designers and other professionals in the teaching of textiles would also stimulate students' interest; moreover, competition in design and technology "can provide both a source of inspiration and a way of developing classroom practice" (Wood-Griffiths et al., 2015, p. 148).

A handicraft teacher needs to develop themselves regularly by keeping up to date both with the latest teaching topics and methods and with the latest product trends. In addition, teachers need to produce their own teaching materials (Porko-Hudd, 2006).

A number of researchers have highlighted the importance of group work in learning the design process. For instance, Carroll et al. (2010) underlines the use of multidisciplinary groups in middle school with representatives familiar with different areas. Davis (2017) shows activities that prepare future designers for cooperation, such as the organisation of a group that monitors the cooperation of another group and then analyses the positive and negative aspects of the group's cooperation. Davis also makes recommendations for the group's time management, negotiations on the decision-making criteria, and documenting the decisions taken by the group so that they are clear at their next meeting. A different group member should be the group leader at each meeting, and Davis recommends that students from different groups be involved in one group for giving feedback (Davis, 2017). Setlhatlhanyo et al. (2019) show the opportunities for teamwork when creating a product, with prospective designers working with students of other study programmes, and Lahti et al. (2016) and Karppinen et al. (2019) show opportunities for teamwork for future teachers in the design process. Aflatoony, Hawryshkewich and Wakkary (2018) and Aflatoony, Wakkary and Neustaedter (2018) highlight the importance of group work in the process of learning design in high school and recommend: (1) devoting adequate time to the problem-setting process; (2) constructive discussions and feedback on proposed ideas within the group; (3) correctly documenting the process; (4) the students being active participants; and (5) not using computers and digital devices intensively during the course (Aflatoony, Wakkary, & Neustaedter, 2018).

Promoting the development of talented pupils

There are no universally accepted definitions of "gifted" or "talented" (Clark & Zimmerman, 2004; Davis et al., 2017; Sękowski et al., 2019). Instead, there are different approaches between countries, including European countries, both in the use of terms and in approaches to working with talented and gifted pupils:

In three Scandinavian countries (Sweden, Norway and Finland), no official term is used to refer to this group of students [gifted and talented], which reflects the educational policy of those states as focused on promoting equality and discerning the potential for the development of all students without grouping them into categories. (Sękowski et al., 2019, p. 511)

The most frequently used criterion in Latvia for including students in the "gifted" category is achievement, e.g. awards in competitions or competitive examinations (Sękowski et al., 2019). Latvian educational scholars define talent as possessing outstanding abilities or special gifts that can make a

significant contribution to culture, thereby earning public recognition for the possessor, or as a person with superior abilities (Skujiņa et al., 2000, p. 172). In Latvia, working with talented pupils belongs to the field of differentiation in the learning process. Differentiation is defined as the learning principle that makes it necessary and possible to adapt the learning process to the pupil's interests, abilities, talent and needs (Skujiņa et al., 2000, p. 37). According to Tomlinson et al., differentiation can be realised as a response to pupils' readiness (closest development area), interest and learning profile, all of which affect learning effectiveness: "The term learning profile refers to a student's preferred mode of learning that can be affected by a number of factors, including learning style, intelligence preference, gender, and culture" (Tomlinson et al., 2003, p. 129)

Juriševič and Žerak (2019) highlight the importance of a positive attitude towards the development of gifted pupils. Raising awareness of the special needs of gifted students and developing appropriate attitudes towards them and their education is the first step in ensuring high-quality conditions for the development of talent. Gifted students have defined needs and need support. Motivation is crucial for the development of talented individuals (Olszewski-Kubilius et al., 2015). The teacher can provide a positive learning environment by praising pupils or using other positive approaches (Stollman et al., 2019). Vialle and Quigley (2009) conclude that while the teacher's attitude towards the gifted student is critical, the teacher's personal-social qualities are valued more, but they are related to the teacher's intellectual qualities and teaching strategy.

There are two separate directions in differentiation theory: enrichment and acceleration. Enrichment is described as a horizontal extension of the curriculum in contrast to acceleration, which relates to learning the contents of a topic or completing school more quickly (e.g. by skipping a year). Enrichment includes both additional assignments and the use of cultural capabilities, such as tours to museums (Wardman & Hattie, 2019). In practice, different grouping options are used: tracing, which means creating groups according to the capacity level; grouping within a heterogeneous class; and clustering, which means that small groups of talented pupils are included in a class where there are students with different abilities (Wardman & Hattie, 2019). The importance of developing enriched programs for artistically talented students cannot be underestimated (Clark & Zimmerman, 2004, p. 17).

"High attaining pupils need work which requires them to think more deeply, engage in problem solving, develop creativity and use higher order thinking skills" (Owen-Jackson, 2015, p. 193). When teaching gifted students, teachers can use a high level of knowledge and passion for their subject, as well as open-ended tasks that require problem-solving. Teachers can make high demands and construct knowledge with students (Robinson & Campbell, 2010). Support for high-attaining students in design and technology could be given by task, resource, support, or response (Owen-Jackson, 2015, p. 195). Able, gifted and talented pupils should be encouraged to use all available learning tools, including ICT and multimedia (Bates & Munday, 2005, p. 67).

Stollman et al. (2019) have formulated various differentiation opportunities in the classroom. The teacher should set clear goals and/or try to create a context/starting position by directly or indirectly including the pupils in the previous knowledge lesson. The teacher should organise the evaluation of pupils prior to the lesson and adjust the lesson based on the results. They should also ensure that the individual takes primacy in the lesson and focus on each of them. Consequently, students must be given a role in the planning, evaluation and sharing of their achievements. A teacher should also use different forms of work organisation, such as face-to-face learning hours or working with individuals or small groups.

In order to promote the development of talented pupils, it is necessary to use different forms of out-of-hours work in a given subject (Robinson & Campbell, 2010). During consultations, the teacher can give more attention to each pupil, providing additional explanations and demonstrations and offering different resources. Targeted homework can also contribute to improving the knowledge and skills of pupils. Talented students may be advised to attend education programmes of interest and arts schools and participate in competitions, such as Open and National design and technology Olympiads, thereby improving their skills in generating ideas, creating designs and experimenting with more sophisticated techniques and their combinations. It is fundamental that students deal with real problems because they are challenging, engaging and conforming (Maker & Pease, 2019).

Dedicated camps and tours can be organised for talented pupils. The National Centre for Education (2017) recommends that pupils from different classes work together at discussion clubs, festivals, exhibitions and other forums. Stollman et al. (2019) point out that in order for teachers to work more closely with talented pupils, additional lessons should be developed in the subject where 1) content gets enriched without repeating standard materials, 2) pupil autonomy exists, which means that pupils can make choices on the materials or tasks offered, 3) it is necessary to use higher thinking skills, and 4) the teacher gives differentiated instructions that take into account the characteristics of the pupils.

LATVIAN DESIGN AND TECHNOLOGY OLYMPIADS FOR TEXTILE TECHNOLOGIES

Republic of Latvia Cabinet Regulation No. 384 Adopted 5 June 2012 “Regulations regarding the organisation of the Olympiads of teaching subjects” (2012) lays down the procedure for organising the Olympiads in general education. The organisation of national subject Olympiads in Latvia is one of the duties of the National Centre for Education (NCE):

2.7. to coordinate the activities of the system of interest education and to implement support measures for the development of the personality, abilities and talents of learners; [...] 3.11. to organise national subject Olympiads, learners’ scientific research works and professional mastery competitions, to coordinate the course of these events and to promote learners’ participation in international Olympiads, exhibitions and competitions. (Republic of Latvia Cabinet Regulation No. 682 Adopted 30 June 2009 ‘Regulations regarding the National Centre for Education (NCE)’, 2009)

The Open Olympiads are organised by interested industry stakeholders in cooperation with the NCE. Previous Open Olympiads have been organised by the University of Latvia and the Union of Teachers of Home Economics and Technologies in collaboration with the NCE and the Education and Information Services of the City of Riga. Public or private schools can organise a school Olympiad. After the school Olympiad, pupils may be promoted to the Open or Regional Olympiads, and after the Regional Olympiad to the National Olympiad. In total, there have been 16 Open Olympiads for textile technologies for pupils in primary and lower secondary school (Grades 5-9; age 11-16) featuring creative, practical design tasks, during which the participant should create a textile product and take it from idea to finished product.

Olympiads always have a specific guiding theme, and students can study the proposed topic themselves or with their teacher and choose a specific source of inspiration. The inspirational materials selected must be documented and communicated to the Olympiad’s organisers, and then, using this inspiration, ideas and compositions must be designed. In addition, the openness of the task is demonstrated by the fact that each participant can choose the textile technique or technologies to be used and the subject/product to be prepared. Even if the object/product is specified, each participant can prepare it in a different way.

As a general rule, the Olympiads consist of two stages: in stage 1, the pupils create the products under a teacher’s guidance, while in stage 2, the product is produced by pupils within 4–5 hours at the university without the teacher’s advice. In 2020/21, only stage 1 took place; for the first time, stage 2 was cancelled due to the COVID-19 pandemic.

The figures below show examples of the most successful students’ works in different Open Olympiads. Figures 1 and 2 show the source of inspiration for a task in the second round of the 10th Olympiad and an example of a composition and textile work created by a pupil. Figure 3 shows a sketch and brooch inspired by Latvian folk costumes created by a pupil in the 15th Olympiad. Figure 4 shows a sketch and sleeping mask inspired by a photograph of vegetables from the 12th Olympiad.

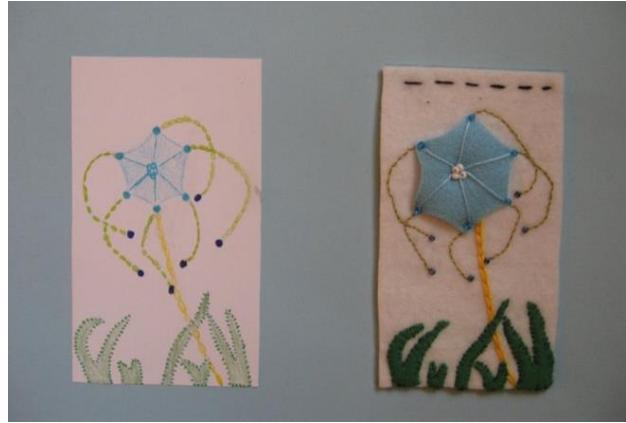


FIGURE 1 AND 2 . Source of inspiration in the 10th Olympiad “Seasons – Spring” (Figure 1). Work done by a 6th-grade pupil. Photos: Author (Figure 2).



FIGURE 3 AND 4. Sketch and brooch made by an 8th-grade pupil in the 15th Olympiad “Us – for Latvia’s 100th anniversary” (Figure 3). Sketch and sleeping mask made by an 8th-grade pupil in the 12th Olympiad “Autumn” (Figure 4). Photos: Author.

The 16th Open Design and Technology Olympiad was organised in the 2019/20 academic year; to participate in it, pupils had to study the composition of traditional Latvian mittens, gloves or socks according to the rules of the Olympiad. This Olympiad opened up the possibility of participating both individually and in pairs; previously, only individuals had been able to participate in Olympiads. The 16th Olympiad was the third consecutive Olympiad where the task was related to the study of local (Latvian) ethnographic cultural heritage. In the 14th Olympiad, pupils had to study the ethnographic compositions of skirts and, in the 15th Olympiad, the ethnographic compositions of wreaths (maidens’ headwear). These sources of inspiration are in line with the idea of Setlhatlhanyo et al. (2019) to use the heritage of one’s national culture as a source of inspiration.

Figures 5–8 provide some examples of the best works submitted during the 16th Olympiad. Inspired by the studied compositions of Latvian traditional mittens, gloves or socks, each pupil or pair

of pupils had to make a decision on the use of certain mittens, gloves or socks as a source of inspiration for the product to be produced – a pouch. Each participant made at least two creative compositions and, for one of them, created a product – a pouch of freely selected materials – with voluntarily selected techniques.



FIGURE 5 AND 6. Work by a secondary school 6th-grade pupil (Figure 5). Work by a state gymnasium 7th-grade pupil (Figure 6). Photos: Author.



FIGURE 7 AND 8. Work by an elementary school 9th-grade pupil (Figure 7). Work by a district secondary school 6th-grade pupil (Figure 8). Photos: Author.

METHOD

The following research questions (RQs) were asked in order to study the conditions of the teaching and learning process of design and technology teachers who are successful in working with talented pupils in grades 5–9 while preparing them for design and technology Olympiads:

- Which teacher personality traits are important for students' success? (RQ1)
- How are talented pupils in design and technology selected and motivated? (RQ2)
- How is the teaching and learning process for talented pupils organised in order to achieve outstanding results? (RQ3)

The method chosen to get answers to these research questions was a semi-structured interview, which allowed the researcher to respond to interviewees' answers and ask additional questions (Pipere, 2016a). All interviews were conducted in Latvian; the quotes included in this article are translations. The

following questions were raised in the interview to find out the characteristics of the teaching and learning process when working with talented pupils:

- How does an educator justify the causes of his/her success?
- How are talented pupils in design and technology selected and motivated?
- What kind of methodical support is used?
- What work forms are used?
- How does the educator organise the process of creative activity in the acquisition of design and technology?
- Following van Dooren et al. (2014), how much creative activity focuses on (1) experimenting or exploring and deciding, (2) guiding subject or quality, (3) components (domains), (4) sources to be used, and (5) visual language?
- Who funds the purchase of materials?
- What role does the environment play in working with talented pupils?
- Do educators familiarise themselves with the experiences of other educators, share their experiences, and take advantage of continuing training opportunities, and if so, how?
- Do school administrators and parents appreciate the educator's work with talented pupils?

Fourteen educators whose pupils scored 24.5–26 points (out of a maximum of 26) in the 16th Open Design and Technology Olympiad were invited to take part in the interview, 12 of whom agreed. As there were occasional restrictions caused by the Covid-19 pandemic and respondents were in different cities at the time of the study, the interviews were done both face-to-face and remotely. The interviews were recorded with a dictaphone or Microsoft Teams, adapting to the needs and capabilities of the interviewees. The duration of the interviews ranged from 30:04 to 1:04:06, and the total duration of the recordings was 9:09:18.

After the interviews were transcribed, a qualitative content analysis was conducted (Pipere, 2016b). A hermeneutic research technique was used, which means that there was an attempt to extract meaning from texts using methods that account for the context in which the text was produced (Willis, 2008). The researcher listened to the interviews several times, as suggested by Cropley and Raščevska (Kropļijs & Raščevska, 2010). The researcher analysed the responses using qualitative content analysis, searched for content units and combined them into categories, then calculated the proportion of each category.

Based on the qualitative content analysis, the answers were coded and summarised into tables according to the following topics: justification for the teacher's success; teachers continuing training; teachers' assessment of success according to the subjects of the study; selection of talented pupils in design and technology; motivating talented pupils; demonstrating methodological materials and products produced by teachers; using a variety of sources; purchasing materials; forms of learning organisation with talented pupils; designing/creating an operational process; individual and group work; and environmental relevance. The study respected the principles and ethical aspects of data protection, including the obtaining of informed consent from all respondents (Mihailovs et al., 2016)

INTERVIEW RESPONDENTS

The respondents were 12 design and technology teachers whose pupils scored 24.5–26 points in the 16th Open Design and Technology Olympiad (see Table 1). Seven teachers prepared more than one pupil who got 24.5–26 points. Four teachers' pupils in both age groups (Grades 6-7 and Grades 8-9) scored 24.5–26 points. Among the interviewees were teachers of all 13 pupils who received the maximum score (25.5–26 points). All the respondents were women. The respondents work in schools located in Latvia's capital, Riga (5), large cities (2), regional cities (2), or rural areas (2); all regions are represented overall. One teacher works in two different schools in two different regions (one in a rural area and one in a regional city). Their length of service as home economics/design and technology teachers is 15–31 years ($M = 26.3$; $SD = 5.2$).

The respondents have been involved in Olympiads for 8–27 years ($M = 19.3$; $SD = 6.6$), and their pupils have won awards in 5–20 of those years ($M = 14.1$; $SD = 7.5$). Two of the teachers interviewed have been involved in the Latvian National Olympiads since the first one. Teachers also participate in other competitions with their pupils, such as the “I Live by the Sea” International Contest, the Baltic States competition “My Raised Baltic Road”, the national Latvian silk painting contest, and others.

Four teachers work in two schools at the same time. All work with arts and crafts; ten do so regularly, while the other two said they do not have enough time for this (Table 1). Almost all teachers (11) pointed out that they are teacher enthusiasts. The other teacher admitted that she is not a teacher enthusiast but an arts enthusiast. Several teachers mentioned that they also run creative workshops.

TABLE 1. Information about the interview respondents.

Respondent No.	NUMBER OF SCHOOLS INVOLVED WITH	TEACHING EXPERIENCE IN YEARS	PARTICIPATION EXPERIENCE IN OLYMPIADS IN YEARS	AWARD-WINNING EXPERIENCE IN YEARS	PARTICIPATION IN OTHER COMPETITIONS	TEACHER'S WORK WITH ARTS AND CRAFTS	INTERVIEW DURATION
R1	2	31	20	20	+	++	1:04:06
R2	1	15	8	5	-	++	42:42
R3	2	29	20	16	+	++	34:39
R4	2	26	20	10	+	+	50: 41
R5	1	23	22	22	+	++	43:31
R6	1	25	10	7	+	+	51:33
R7	1	36	27	20	+	++	39:24
R8	1	25	10	7	+	++	30:04
R9	1	23	20	10	+	++	36:02
R10	1	28	27	5	+	++	54:55
R11	2	30	23	22	+	++	1:01:51
R12	1	25	25	25	+	++	40:34
M	1.3	26.3	19.3	14.1			45:46
Min	1	15	8	5	-	+	30:04
Max	2	36	27	25	+	++	1:04:06
SD	0.5	5.2	6.6	7.5			
Total							9:09:18

Note: + = Does little arts and crafts because there is a lack of time due to their high workload; ++ = Does a lot of arts and crafts; M = Mean; SD = Standard deviation; Min = Minimum; Max = Maximum.

RESULTS OF INTERVIEWS

This section considers the results obtained from the interview analysis based on the three research questions: Which teacher personality traits are important for students' success? (RQ1); How are talented pupils in design and technology selected and motivated? (RQ2); How is the teaching and

learning process for talented pupils organised in order to achieve outstanding results? (RQ3). The content classifiers were first identified by analysing the content of the interviews, then all content classifiers relevant to the topic were counted, and finally, the weighted percentage of each category was calculated (see Tables 2–6).

Teachers' personality traits (RQ1)

Teachers' personal qualities were identified by analysing their thoughts on why their pupils regularly receive awards in Olympiads. Teachers' statements about what and how much pupils learn in further training courses and through self-study were analysed, as were their views on the importance of support from school management and parents.

Justification for teachers' success

Most teachers believe their success is based on teachers' competencies, including seeing talent, motivating pupils, explaining the task, and teaching pupils to match colours. Two teachers believe that it is paramount to teach pupils how to accomplish the tasks assigned in the short run. The work of the teacher is crucial. Teachers' competencies, skills and work together account for 50% of the share of all categories. It is also important to have the pupils' input and the teacher's interest, including the fact that they like what they do. Cooperation between the teacher and the pupil is essential. In addition, teachers must follow new trends, including in materials, fashion and techniques. The other answers varied, e.g. success is based on the teacher's and pupil's talent or the requirement that students have learned the necessary skills in the past (Table 2).

TABLE 2. Teachers' most common views on what is at the heart of their success.

No.	CONTENT CLASSIFIER	CATEGORY	PERCENTAGE
1.	<i>Capability to see these talents among pupils (R1)</i> <i>Skills to motivate pupils (R2)</i>	Teacher's competencies, skills (13)	13/43 = 30.2%
2.	<i>Teacher works three times a week and during school breaks (R3)</i> <i>Teacher must work (R5)</i> <i>I spend a lot of my time and energy (R6)</i>	Teacher's work (9)	9/43 = 20.9%
3.	<i>Pupil's work (R2)</i> <i>Great work by the pupils (R3)</i>	Pupil's work (4)	4/43 = 9.3%
4.	<i>I like what I do, I like doing creative work myself, I like the fact that the girls come to me, they come on their own (R3)</i>	Teacher's own interest (4)	4/43 = 9,3%

Continuing training opportunities for teachers

Teachers complement their teaching experience with organised continuing education and informal conversations with colleagues. Eleven teachers pointed out that they have learned from the experiences of other teachers in an informal way when talking to them. As shown in Table 1, 10 out of 12 respondents regularly do arts and crafts themselves. One of the teachers said they have consulted a professional seamster. Six teachers pointed out that the new techniques they learned on courses have been very useful. Five pointed out that they develop new techniques while self-training. This means that teachers appreciate skills in different techniques. Three teachers pointed out the value of the tradition when, in the past, the leaders of methodological associations travelled annually through schools in a district to familiarise themselves with other teachers' activities. Three teachers have learned about working with talented pupils and the experiences of other teachers in lectures and seminars. In general, however, there is a feeling that more useful courses are needed where teachers can learn new techniques and specific methods of working with talented pupils.

Five teachers have formally shared their experiences with talented pupils: two with other design and technology teachers, two at conferences, and one at a regional-level conference for local teachers. In addition, five have discussed their experiences with other design and technology teachers.

Assessments of teachers' success

In most cases (10 teachers), schools' management teams evaluate teachers' success, and more than half (7) are also evaluated by the parents of talented pupils. One of the teachers was proud to say that she has received a number of major awards and even visited the Latvian President due to her regular success in working with talented pupils. Another teacher said that their school's management has supported them in every way, including with materials, and generally been very positive for all creative subjects.

One respondent said that it is disappointing that their school leadership considers it very simple to obtain a prized place in design and technology Olympiads. She did not receive support from her school management and pointed out that if they did appreciate the teacher, the teacher would feel more secure; moreover, if the teacher's work is appreciated, the teacher would receive the necessary recognition. The teacher also did not hide the fact that this was one of the main reasons they left their school. Another said that the winners of the Open Olympiads are not compared to the winners of the National Olympiads and are not covered by the possibility of winning monetary awards. Four teachers could not answer the question about whether their pupils' parents appreciate the work teachers do.

Selection and motivation of talented pupils for design and technology Olympiads (RQ2)

This section analyses the selection and motivation of pupils to participate in the design and technology Olympiads.

Selection of talented pupils for design and technology Olympiads

The overriding aspect of pupils' selection for Olympiads is their willingness to participate with interest (10 content units, 19.2%). Other salient aspects for teachers are student skills and knowledge (5), talent (5), multilaterality (5), diligence (4), creativity (4), work skills (3), motivation (3), targeting purposefulness (in action) (3), and teaching pupils with no success in other subjects (2).

Several teachers stress that if a pupil does not have a desire to learn, then they will not achieve the desired results. They also pointed out that pupils who are not particularly inclined to do design and technology but who are willing to do it can often achieve good results. Some teachers cited concrete examples in the interviews and admitted that they were gratified that they had not stopped certain pupils from participating in the Olympiad.

In Latvia, teachers can organise subject Olympiads at the school level. In three cases, students were selected for Open Olympiads based on the results of the school Olympiad, two teachers invited pupils who were studying in art schools in parallel, and two teachers emphasised that they had invited a group of pupils to participate in the Olympiad.

In most cases, teachers selected pupils for Olympiads, but there are individual cases where younger students saw that older students were preparing for an Olympiad and expressed their desire to participate. Two teachers said they specifically address pupils who have failed in other subjects. It may be concluded that teachers look at the creative process as a process that can be learned (Table 3).

TABLE 3. The most common criteria for selecting talented pupils in design and technology.

No.	CONTENT CLASSIFIER	CATEGORY	PERCENTAGE
1.	<i>The pupil's interest in what he/she does (R5) An interest in crafts – about a quarter of them apply for themselves; they are not always the most talented (R7)</i>	Interest (10)	10/52 = 19.2%
2.	<i>They all need to be able to draw well (R5) Technical capability and working culture (R6)</i>	Skills and knowledge (5)	5/52 = 9.6%
3.	<i>There are those who are good at it (R3) There must be an innate sense of composition (R5)</i>	Talent (5)	5/52 = 9.6%
4.	<i>Multilaterality (R1) Pupils who are able in all subjects (R2)</i>	Multilaterality (5)	5/52 = 9.6%

Motivating talented pupils

The primary principle used to motivate pupils is a positive emotional background (11 content units, 40.7%) to create a friendly, positive atmosphere in which they are praised and encouraged. Five teachers pointed out the motivation of a prize, which can be obtained if pupils participate in and win Olympiads. Five teachers pointed out that pupils are motivated by the opportunity to see the results of others' works; it is important that pupils see both what others are doing as well as works created by others. Two teachers pointed out that pupils are motivated by the fact that they realise they can do the work themselves and no one else will do it for them (Table 4).

TABLE 4. The most common ways of motivating talented pupils.

No.	CONTENT CLASSIFIER	CATEGORY	PERCENTAGE
1.	<i>Positive atmosphere, friendly relationship (R5) Let them listen to music in their headphones (R3)</i>	Positive emotional background (11)	11/27 = 40.7%
2.	<i>In regional Olympiads, children receive money awards (R4) I present interesting materials, international books (R11)</i>	Award as a motivator (5)	5/27 = 18.5%
3.	<i>I show works from previous years that are practical, usable and beautiful (R8)</i>	Quality works and operational process (5)	5/27 = 18.5%

Organising teaching for pupils to achieve outstanding results (RQ3)

This section describes the responses relating to the third research question about how teachers teach pupils to prepare them for the Olympiads.

Methodological materials used by educators

All teachers interviewed demonstrated their finished products, and eight teachers demonstrated the process of designing the products so their pupils could understand how they were made. One teacher even publishes both her created works and those of her pupils in a journal and shows them to her pupils. Teachers' thoughts suggest the effectiveness of demonstrating their products. Nearly all teachers of talented pupils have specifically developed a variety of visual and tangible methodological tools – their folders include sketches, images, techniques, materials, and colour samples. Fewer teachers (6) use their own prepared digital materials – PowerPoint presentations and photo galleries – that summarise the textile products produced by pupils (Table 5).

TABLE 5. Common examples of methodological materials and products produced by educators.

No.	CONTENT CLASSIFIER	CATEGORY	PERCENTAGE
1.	<i>If I find something myself, I certainly show the schoolgirls; I also show them finished works. It is very strong material that inspires pupils to create new works. If my works are published, I certainly show them to schoolgirls. Two publications also publish student Olympiad works, and the schoolgirls and their parents were pleased. (R1)</i>	Showcasing my works (12)	12/29 = 41.4%
2.	<i>I have prepared special folders, and the pupils have the opportunity to see what techniques we can work on. The Olympiad works of all pupils have been collected. You can pick up these materials in your hands and look at them. (R1) There is a folder containing pupils' sketches and works from previous years. (R4)</i>	Prepared visual, touchable, methodological materials (11)	11/29 = 37.9%

All teachers consider it necessary to use and explore a variety of resources, of which the most used are the Internet (11), books (9) and journals (7). Several teachers mentioned Pinterest as one of their Internet resources. One teacher pointed out that pupils were encouraged to explore traditional cultural heritage at home. Another teacher uses a lot of works of art. One teacher pointed out that older books are used very little because they are ageing.

Purchase of materials

Ten teachers mentioned that their materials are purchased by their school or municipality, but only three schools provide full supplies for talented pupils; the materials provided by other schools represent only a small proportion of the materials used. One of the teachers said: "The municipalities allow you to buy what you need, which I am very grateful for. ... I can't buy very much myself, but I have a lot of different shades, for example, of moulin thread" (R3).

More than half of the teachers (7) give their materials to their students; six specifically stressed that it is important that students work with high-quality materials. As such, two teachers always buy materials themselves. One of them regularly studies the latest materials and looks for interesting materials. In seven cases, pupils use their own materials. Two teachers pointed out that there are people who donate different types of materials.

Forms of educational organisation with talented pupils

Teachers mostly use different forms of face-to-face work with talented pupils: teaching hours (9), organised holidays (9), counselling (6), gathering lessons (4), spare time (5), or even by inviting pupils to their homes (3). Three teachers pointed out that working with talented pupils was based on voluntary work.

Nine teachers ask for homework. Ten teachers organise their work in such a way that pupils have the opportunity to try a similar task as they might encounter at school or at a county or intercounty Olympiad. Four forms are used by only one of the teachers: breaks, individual hours, creative afternoons (especially for working with talented pupils throughout the school year), and optional lessons.

Nearly all teachers attend exhibitions with pupils (11), including at artists', artisans' or designers' workshops (7) and museums (7). One teacher has been working regularly with a museum for ten years. Closer cooperation with museums has been established for teachers working in urban schools outside Riga, which is perhaps due to the possibility of reaching the museum without transport. Teachers organise meetings and on-site schools with artists, designers and artisans. One teacher emphasised that she regularly invites local artists to the school (Table 6). Only four teachers mentioned using an electronic form of communication when working with pupils. All teachers noted that talented pupils are like assistants in the classroom.

TABLE 6. The most common forms of learning organisation with talented pupils.

No.	CONTENT CLASSIFIER	CATEGORY	PERCENTAGE
1.	<i>Visiting exhibitions, for example, with pupils who got award-winning places; we attended a French lace exhibition this autumn (R1) Usually we travel to exhibitions competition closings within the framework of the arts and crafts club (R3)</i>	Exhibition tours (11)	11/94 = 11.7%
2.	<i>I actually played out an Olympiad task (R2) The pupils try an Olympiad task, but it's in collaboration with me. (R3)</i>	Trying out Olympiad tasks directly (10)	10/94 = 10.6%
3.	<i>She also works in class if she does the task more quickly (R3) I also work in lessons if the topic is the same (R4)</i>	Work in the classroom (9)	9/94 = 9.6%
4.	<i>Work during school breaks, work every day for 4–5 hours with tea breaks (R1) Working during school breaks for 1–2 days, pupils realise that more can be done at this time than coming after lessons (R3)</i>	During school breaks (9)	9/94 = 9.6%
5.	<i>They start at school, and they continue working from home (R1) Pretty much at home, especially those girls who are very busy (R4)</i>	Homework (9)	9/94 = 9.6%

Creative work process in design

Respondents are united in the belief that working with talented pupils does not follow a codified curriculum; instead, each teacher has a system. All teachers think that learning visual language is essential: two pointed out that composition is the main theme, and one specifically highlighted learning colour matching: *“It is important that pupils know compositions and colour sets, that they can see colours and lines in nature and in their surrounding environments”* (R8). One of the teachers stresses that she is very fortunate because she regularly works with a professional teacher of visual art.

All teachers pointed out that context is crucial, particularly in terms of who will use the product, what the product will be used for, and where the product will be used. One mentioned:

When we start creating works on any new topic, we certainly think about colours, where we will use it, and whether it will be a gift to a particular person. ... After finishing the work, I would also photograph it so I can see that the subject has found its place. (R1)

Almost all teachers believe that the guiding theme is important. One said: *“The topic gives direction; there is a chance to think about a [specific] topic more than a general one about everything. All the topics have been interesting”* (R11). Ten teachers think that experimentation is vital. One answered: *“Experimentation: the more, the better. Not the same result with different materials, try a lot of things”* (R6). Each teacher has a custom-designed process of working with their pupils and directing them to learn, from the idea to the final product. These approaches differ in relation to the idea-producing process, the importance of producing sketches, and how to guide the sketching process. Ten teachers place great emphasis on the creation of sketches; three of them highlighted that there are always sketches at the beginning:

We start with sketching; the more, the better, I encourage. The absolute minimum is three. There is no point in producing the same. I do so in a way where they pass sketches around in circles and create sketches of ideas on the ground. The systems are different. ... Composition is very important. (R11)

Seven teachers directed pupils to draw black-and-white sketches first, then colourful ones. One teacher asks for colourful sketches right away: *“I offer to participate, then together we make 1–2 colourful compositions, think of materials, bring it all together”* (R8). In contrast, another said they teach pupils more about how to visualise the design:

Everything is in the head, usually looking for ideas, using a technique that has already been learned, not making a lot of designs, but visualising more in the head. I mean, if the child knows how to think, then, next time, he will start thinking for himself. (R7)

Teachers point out that the first ideas are not always the most successful, but there are individual pupils who want to realise their first idea at any cost: “Before reaching the final result of compositions, there are countless variations; some produce even five sketches, others stick with one sketch. There are also those who want the first option at any cost” (R6). Three teachers believe it is more productive to work with materials straight away, while five others sometimes use this method: “When working with materials, it is easier for children to be creative” (R8). Nine teachers sometimes take the approach where they first make a model using cheaper materials before making the actual product. For example, several teachers mentioned creating a paper prototype before making a pouch or purse. Three teachers pointed out that it is vital that the pupil is very fond of the product they produce. As one teacher said when talking about creating products, any work that pupils start should be completed. Another teacher talked about thinking together about how to fix errors: “We think about how to fix errors. How to make the defect an effect” (R7). Eleven teachers said in their interviews that they analyse pupils’ work: “We analyse other pupils’ works, errors. We discuss pupils’ ideas” (R5). The teachers’ interviews highlight both the importance of materials and the importance of technical skills. One of the respondents mentioned: “A teacher can only teach the techniques they know best; I’m closer to embroidery, so I pay more attention to it” (R4). In general, teachers often used the word “we” in their interviews – “we read”, “we study”, “we create”, “we think”, etc. – which shows how they work together with their pupils. The teachers stressed that working with talented pupils is working in collaboration. They also talked about the sense of satisfaction gained from working with talented pupils. The teachers also talked about difficulties in their interviews. Four pointed out that designing is the most difficult part, three that they have no time to work with their pupils, and two that they do not have the time for practical activities. All the teachers interviewed are concerned that there will no longer be high-level pupils in the future since, as of the 2020/21 academic year, the subject has a smaller number of hours allotted to it and all pupils cover all topics (both textiles and woodworking). This means that textile topics are expected to receive significantly fewer hours every year than before and, as such, pupils will no longer have the same level of skill:

The time allotted until 2020 was optimal for working with pupils and for them to advance; the pupils felt stable. ... I have doubts for the future; even if the pupil is talented, their skills will not be at that level. (R10)

Let us hope for success, common sense, teachers’ honour and everything else in implementing the new competencies and understanding. ... If we are able to implement these plans ... implement those things that are not included here and implement some methods that I think are important, then we will probably not lose our Latvianness, our work skills and quality, and everything else; if we do not do it wisely, I have doubts about the future, the results of the Olympiad and work, and everything else. It’s such a deep question of reflection. It’s all put on the teacher’s shoulders now, how much he can do and how he can do it. (R6)

Individual and group work

Nine teachers prefer working individually with pupils, indicating that each pupil has their own ideas that they want to implement and that the pupil is responsible for their own work. Several teachers pointed out from time to time that working with talented pupils is based on individual work: “We work individually with every one of the pupils applying for participation in the Olympiad; we invest a huge amount of work with them” (R2). Two teachers also pointed out that more ideas can be created in pair work. One teacher said that the idea-making process sometimes uses the groupwork method to arrive at more diverse ideas: “If there is a complete lack of ideas, we use the method of giving each other a started sketch and the next person carries it on” (R11). Five teachers pointed out that some tasks could

be performed in pairs or groups. Two teachers are of the opinion that this approach should be developed in the process of producing products. Teachers believe that a pupil should be allowed to choose whether they want to work in a group or individually: “The pupil should be allowed to choose; if they work better on an individual basis, then they should be allowed to. It is important that children think in the same direction” (R11).

Learning environment for textile craft practice

All teachers teach pupils in the design and technology classroom. Almost all teachers think the classroom environment is paramount and that the space should be inspiring. One pointed out that she has made improvements herself by repainting the room and furniture. The teachers noted that it is essential for the room to have the necessary equipment, tools and materials to make everything necessary available. One mentioned: “This year we have a very spacious room, very well equipped. I feel that the room is of great importance. When I come into my office, I want to do something” (R4). One of the teachers also pointed out that the school’s overall environment should be particularly aesthetically designed, with a uniform and regular design incorporated throughout the school to maintain elegance.

DISCUSSION

In response to the first research question, all interviewed teachers who succeed in working with talented pupils have common characteristics: everyone is an enthusiast who is engaged in crafts, demonstrates their crafts to pupils, and complements their teaching both with organised continuing education courses and informal conversations with other design and technology teachers. Some work with other specialists. Several teachers said that they were delighted to learn new techniques, which they then use to teach their pupils. Open Design and Technology Olympiads are only one of the forums in which they invite their students to participate.

In relation to the second research question concerning teachers’ selection of students to prepare for the Olympiad, the most important criterion is their interest in taking part. The interview results indicate that the students’ motivation are emphasised above their talent in the selections of participants. However, the results also show that it is not only pupils who must be engaged and motivated but teachers as well. This study shows that teachers having a positive attitude towards talented pupils is paramount, which corresponds with previous researchers’ ideas (Stollman et al., 2019; Vialle & Quigley, 2009).

In response to the third research question, teachers generally use curriculum enrichment to work with talented students to prepare them for the Olympiads. We can conclude that the success of teachers is ensured by regular and a wide variety of work. When working with talented pupils, teachers use training hours, out-of-hours and counselling sessions, education groups, breaks, vacations, and others. Relatively few teachers use electronic means (WhatsApp and e-mail) to communicate. Ten teachers have either tried to organise an Olympiad at their school or tried to find the possibility for pupils to participate in a municipally organised Olympiad. They also specially develop tasks for pupils so that they can try the second stage of the Olympiad when they have to produce a textile product (from the idea to the finished product) within 4–5 hours.

The teachers working in cities, except Riga, have developed close cooperations with local museums. For example, one said that they were celebrating ten years of collaborative experience the year in which the interview took place. Nearly all teachers take pupils to exhibitions or invite artists/ designers to their school.

Most teachers design and supplement purposeful methodological materials, both in a tangible format, which includes the works and samples of pupils from previous years, and in an electronic format. It was confirmed that sources of inspiration are essential in the design process (Dazkir et al., 2013; Laamanen, 2012; Pöllänen & Urdziņa-Deruma, 2017; Setlhatlhanyo et al., 2019).

As the analysis of the interview results above shows, teachers working with talented students stress (1) experimenting or exploring and deciding, (2) the guiding theme or qualities, (3) domains, (4) the frame of reference or library, and (5) laboratory or (visual) language: sketching and modelling. This

corresponds with the theory of van Dooren et al. (2014) on the five generic components of the design process. In particular, teachers highlighted visual language, compositions, colour coherence, encouraging pupils to think about product functionality in line with the needs of the user, assessing the need for a guiding topic, and using both printed and digital resources as sources. All the teachers have a system for working with talented pupils, but no teacher has written a special programme.

Mostly, teachers use the approach of studying the rules of the Olympiad with pupils, producing a lot of black-and-white sketches, then colourful ones, then thinking about material and technique. However, there are different approaches that start with making colourful sketches or visualising in the head and working with materials. Nine teachers indicated that they also first make a model using cheaper material before making the actual product. This idea coincides with the view of Laamanen (2012) and Lahti et al. (2016) that it is easier to think by working with materials at once.

Despite the fact that many studies (for instance, Aflatoony, Hawryshkewich and Wakkary, 2018; Aflatoony, Wakkary and Neustaedter, 2018; Carroll et al., 2010) emphasise the importance of group work in learning design and technology, teachers are reluctant to work in groups to prepare students for the Olympiads. This may be because the previous 15 Olympiads only featured individual tasks.

This study has highlighted a number of problems:

(1) Financial divergence

Materials with which talented pupils work. There are sharp differences in the means by how materials are purchased. Some teachers buy materials for their pupils with their personal money; there are also cases where all materials are purchased only with school/municipal funds and others where pupils mostly use their own materials, as well as various combinations.

Pay for working with talented pupils. There was no unanimity in the interviews about whether teachers are paid for working with talented pupils. Some teachers' work with talented pupils is voluntary.

Awards for talented pupils. Differences also appear with regard to awards for pupils. Some local governments give out monetary awards for the grades or places pupils obtain at the Olympiads, but others do not. Teachers who work in schools where the relevant municipalities give out awards also motivate pupils with the possibility of obtaining such awards.

(2) Differences in support from school management

Most of the teachers interviewed feel valued by their school's management staff. However, one did not feel valued, and one no longer feels valued.

One of this study's limitations is that only women took part. This is because in Latvia, until the education reform in 2020, it was traditional for girls to study textiles and for women to teach textiles. Another limitation is that the results were obtained using a single method (interviews). More detailed and specific data could have been obtained through observation and video recording in ethnographic research or diaries written by teachers and pupils. In addition, the learning and teaching process should be analysed from the pupils' point of view.

CONCLUSION

This study shows that a number of factors make the teaching and learning process with talented pupils particularly productive. Responses to the first research question concerning teachers' essential personality traits show a need for a competent educator, who is an enthusiast of his/her profession, is engaged in artwork, builds himself/herself with different techniques, and learns new techniques in formal and informal continuing education. Teachers should also explore the experiences of other teachers in working with talented pupils, mainly informally. Support from school management and parents is important.

Responses to the second research question concerning the selection and motivation of talented pupils show that in order to be successful, a pupil must be interested and willing to work creatively with

materials and techniques, talent is not so crucial. The educator should be able to see pupils' potential and interest and create positive emotional cooperation.

Responses to the third research question concerning the teaching and learning process show that teachers invest heavily in working with pupils and regularly use different forms of education. Teachers work with pupils not only during school hours and official out-of-school hours but also outside official working hours. Teachers have different approaches to the process of idea generation and sketching. In most cases, teachers direct pupils to create numerous ideas and sketches, and then, together with the educator, they are successfully analysed and selected.

The teacher's individual work with each pupil is essential for the quality of their preparation for the Olympiad. In order to work successfully, pupils must have advanced skills in techniques and access to high-quality materials. Teachers pay particular attention to the practical application, composition and technical quality of the products made by pupils. Overall, a holistic craft process should be implemented. Most of the teachers interviewed design, supplement and use purposeful methodological materials. The teachers also assessed the need to introduce pupils to artworks and design works. In addition, teachers want the learning environment to be inspiring; if necessary, they make it as such themselves.

This study's results should be shared with educators who are working or are preparing to work with talented students to prepare them for Olympiads. The results could give them ideas about how to improve their teaching. In the future, teachers' work with talented pupils could be studied by observing lessons with talented pupils as well as by targeting talented pupils who are successful. It is important to study pupils' learning experiences in design and technology, teaching and learning in the design and technology subject when the teacher is working with the whole class, and successful experiences of their work with talented pupils in groups. It is also vital to explore ways of not losing the positive experience of pupils making design products following the reforms to the design and technology subject, which generally has fewer teaching hours than previously.

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