

Education of the gifted and talented in Finland

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Abstract

The focus in this chapter is on the education of gifted and talented students in Finland. Firstly, we discuss historical and current developments in Finland's educational policy in relation to the gifted. We show how the egalitarian Finnish educational system has not invested in education for these students, which depends on the initiative of individual teachers. Secondly, we focus on the educational experiences of Finland's gifted and talented through empirical studies that identify family and inner drive as critical factors in talent development. Formal education seems to have a minimal role in these experiences. Thirdly, toward the end of the chapter we ponder further on the lack of understanding in the Finnish school context that gifted and talented students may be in need of support. We also introduce growth-mindset pedagogy as one possible route to addressing the needs of these students.

Keywords

Giftedness – Talented – Gifted education – Growth mindset pedagogy – Finland

Introduction

One of the core principles of the Finnish educational system has been equality, indicating that all students regardless of their background are given equal opportunities to develop as human beings. Equality in this context has been generally interpreted as supporting students with learning disabilities and difficulties, leaving the needs of the gifted and talented somewhat neglected. However, and for the first time, the most recent Finnish *National core curriculum for basic education 2014* (Finnish National Board of Education [FNBE], 2016) mentions “talented pupils”,

and acknowledges the importance of differentiated teaching with them in mind. This implies the strengthening recognition in pre- and in-service teacher education of the need among talented students for challenging learning tasks, and of the need among teachers to develop practices of differentiated teaching.

In this chapter, therefore, we give an overview of historical and current developments in Finnish educational policy related to the education of gifted and talented children. We also summarize empirical studies conducted in Finland that concern the educational experiences of gifted students in the domains of academia, the creative arts, sport, and vocational education. As these studies show, the lack of special education has obstructed the learning paths of these students, and even caused frustration and social exclusion. Studies also demonstrate how inner drive and support from parents and some individual teachers during their school career can be a game changer and guide gifted students towards realizing their talents. Finally, we introduce the notion of growth-mindset pedagogy (Rissanen, Kuusisto, Tuominen, & Tirri, 2019), which is a promising approach to addressing critical aspects in the education of the talented and the gifted in everyday classroom interaction. Mindset theory sheds light on why talented and gifted students may also be fragile and in need of support. A growth-mindset pedagogy could help them develop the ability to meet challenges and to cope with failure.

The history and current state of gifted education in Finland

Building a nation and a welfare state – Educational trends before the 1970s

Table 1 presents the main trends in the Finnish educational system and in gifted education. The roots of the educational system lie in the 16th and 17th centuries when Finnish was established as a literary language, early forms of schooling were in place, and the first university was established (Uljens & Nyman, 2013). Under the Lutheran reformation, the aim of education was to socialize people into religion by teaching reading skills to everyone: for example, the Lutheran Church considered literacy a prerequisite for marriage (Niemi & Sinnemäki, 2019). On the other hand, grammar schools and university education were available for children from families with financial resources, and for those who were considered academically gifted.

The educational system in Finland was sociocentric for a long time, meaning that education was the key element in building *a nation* from the

1800s until the Second World War, and *a welfare state* thereafter (Simola, 2014a). Education was aimed at cultivating individuals to fit into society and its structures. Elementary schooling was established in 1860, and the state gradually assumed responsibility for education. The parallel system stayed in place through the two world wars and the establishment of Finland as an independent state in 1917 until the 1970s. Elementary school taught the basics and students moved on to vocational education, whereas grammar schools taught academically gifted students who were able to progress to vocational school or academically-oriented upper-secondary school, and even university. Within this system, teacher education for grammar schools, in other words for subject teachers, has been university-based since the late 1800s. On the other hand, teachers for elementary schools graduated from vocational-level seminars, which became a popular path that allowed students from rural areas to climb the socioeconomic ladder, and this applied especially to gifted females (Simola, 2014b; Tirri, 2014).

Societal changes in the 1960s and influences from the Social Democratic Movement inspired bold educational reforms that ended parallel schooling and established nine-year basic education in a comprehensive school, which offered equal learning opportunities to every student (Simola, 2014a). Academic teacher education was now established for teachers in elementary schools (Tirri, 2014). Quite apart from the educational reforms and in the context of gifted education, participation in the International Mathematical Olympiad became a possibility for Finnish students in 1965, indicating a need for new enrichment programs for gifted students at upper-secondary school (Tirri, 2001).

Educating individuals – Trends since the 1970s

The educational paradigm shifted from sociocentrism to individualism in 1970s, meaning that, for the first time in Finnish history, the aim of education was not to socialize students into certain societal structures but to teach them to influence society to serve and meet the needs of individuals (Simola, Heikkinen, & Silvonen, 2014). Finnish educational policy strongly emphasized equality among individuals. In the 1970s this meant that the curriculum was centralized on the national level, and educational investments were made to equalize opportunities and to improve the health of the nation. Basic education was free of charge, including a warm meal, materials, transportation, and special education for students with learning challenges. In this atmosphere, all attempts to develop gifted education was considered elitist, and “a negative stand on

differentiated education for gifted children was officially taken in a committee report in 1970" (Tirri & Uusikylä, 1994, p. 69).

The decentralization of decision-making in the 1980s enabled municipalities to create their own curricula, and since then the Finnish National Board of Education has provided a National core curriculum as a general framework to guide education. As a consequence, municipalities (since the 1980s), principals and teachers (since the 1990s), and parents and other stakeholders (since the 2000s) have had more say in designing and organizing teaching. This trend is promising from the perspective of gifted and talented education as well, given the increased opportunities for specialized and individualized teaching (Tirri, 1997; Tirri & Kuusisto, 2013).

More emphasis has been put on individuality, freedom of choice and diversity since the 1990s (Tirri, 1997; Tirri & Kuusisto, 2013). Internationalization through membership of the European Union and the waves of refugees and immigrants led to the recognition of multiculturalism in Finnish society, including the indigenous Samí culture and historical minorities such as Swedish-speaking Finns, Jews, and Tatars. The Finnish Constitution (731/1999). and the Basic Education Act (628/1998) mention pupils' individual needs and abilities as the basis of education, and specifies the importance of being responsive to the age and requirements of students when arranging instruction. These ideas were also emphasized in the professional codes of ethics for teachers published in 1998 (Tirri & Kuusisto, 2013; 2019).

Public debate resurfaced in the 1990s concerning the need for special education for gifted children, resulting in an official educational policy acknowledging special programs for the gifted and granting 32 upper-secondary schools permission to offer a differentiated curriculum in certain subjects (Tirri & Uusikylä, 1994). In 1994, for example, Päivölä Institute established a mathematical track for academically gifted and talented upper-secondary students. The number of specialized schools and tracks have been increasing over the years (Tirri & Kuusisto, 2013), although the overall number is low given the total number of schools in Finland.

TABLE 1 Educational trends and gifted education in Finland

BEFORE THE 1970s: BUILDING A NATION AND A WELFARE STATE

Sociocentrism: Individuals are educated to fit into society**Parallel school system**

Elementary school compulsory for every child in 1921- (est. in 1860)
followed by vocational education

Grammar school for the *academically gifted* (established in the 1600s)
followed by vocational education or
academic education at upper-secondary school and university
(first university established in 1640)

Educational reforms in the 1960s

Comprehensive school and academic teacher education

Enrichment programs

Finnish students in the International Mathematical Olympiad in 1965

SINCE THE 1970s: EDUCATING INDIVIDUALS**Individualism: Society is to be changed to serve individuals' needs****Educational system:**

Kindergarten and preschool (age 1-5, 6, respectively)

Basic education (nine-year comprehensive school for all, age 7-15)

Secondary education (academic or vocational)

Higher education

Since the 1970s: Equal opportunities for all

Free education, materials, meals, transportation, special education for
students with learning challenges

A negative stand on differentiated education for gifted children

Since the 1980s: The decentralization of decision-making

Municipalities (1980s-), schools and teachers (1990s-), parents
(2000s-) involved in curriculum development

Since the 1990s: Acknowledgement of diversity

Multiculturalism, EU, refugees, indigenous and historical minorities

Specified schools established in different domains, e.g. Päivölä Institute
for mathematically gifted upper-secondary students

Since the 2000s: The ideology of inclusion

No discrimination at any level, all pupils study together

Support and enrichment brought to the classroom

Since the 2010s: Differentiated teaching, also for the gifted and talented

Differentiated teaching defined as the pedagogical basis of all teaching

Talented students mentioned in the National core curriculum of 2014

Collaboration between universities and upper secondary schools

All in all, changes during the 1990s facilitated acceleration and flexibly scheduled studies (especially at upper-secondary school) for gifted and talented students (Tirri, 1997), and gave teachers more options in differentiating their teaching. Teachers in elementary schools favored differentiation in regular classes, but they were more negative toward the idea of separate schools and classes than their colleagues in secondary schools (Tirri & Uusikylä, 1994). It was reported in another study that Finnish teachers preferred to keep gifted students in normal classes (Ojanen & Freeman, 1994). Interestingly, similar results were reported over 20 years later: teachers continued to support differentiated teaching, but their attitudes toward acceleration and separating gifted students into their own groups were negative. Further and more worryingly, they were quite skeptical about being able to address the needs of gifted students in their teaching (Laine, Hotulainen, & Tirri, 2019).

Finland signed UNESCO's Salamanca statement (1994) on inclusive education in 1994. However, it was not until almost a decade later, in the 2000s, that inclusive principles appeared on the agenda in the Finnish educational system. Inclusion was understood as ensuring equality and organizing education for students with special educational needs i.e. students with learning disabilities and difficulties (Halinen & Järvinen, 2008). Thus, the understanding of inclusion followed a narrow definition: taking the perspective of some specific groups of students (Aiscow et al., 2006; Armstrong et al, 2011; Tirri & Laine, 2017), among which the gifted and talented were not included at this stage.

Differentiated teaching, for the gifted and talented, too - Gifted education since the 2010s

In 2011 the Finnish National Board of Education published a document entitled "Amendments and Additions to the National Core Curriculum for Basic Education". Some of the changes concerned the section on support for learning and schooling, and support related to the teaching arrangements. One of the main ones was the highlighting of differentiated teaching, which was identified as "the central way to acknowledge the needs of the class and students' differences" (FNBE, 2011, p. 9). Even though the document did not address gifted and talented students specifically, it was applicable to them in that differentiation was seen as a way of offering 1) proper challenges and fostering feelings of success and 2) encouraging students to develop and learn according to their individual strengths (FNBE, 2011).

Gifted and talented students were finally addressed explicitly in the *National core curriculum for basic education 2014*, which mentioned “talented pupils” [in Finnish *taitavat oppijat*] and “those [who are] advancing faster” [in Finnish *nopeammin etenevät*] (FNBE, 2014, 2016). The curriculum also gave some specific examples of how to differentiate teaching for these students. Thus, inclusion was now understood from a broad perspective, that is non-discriminatory education for all students (Ainscow et al., 2006). All students regardless of their cultural, religious or socioeconomic backgrounds, disabilities, learning difficulties or giftedness profiles were expected to study together in the same classroom, in which teachers could cater for individual needs by means of co-teaching and multi-professional collaboration (Mäkinen, 2013). From the perspective of gifted and talented students this could have been promising. However, it was revealed in the PISA (Program for International Student Assessment) studies during the 2010s that the achievement outcomes of Finnish students had begun to decline (Kupari et al., 2013; Leino et al., 2019). The decline was evident at both ends of the spectrum: there were more and more students on the lowest levels and fewer on the two highest levels (Hautamäki et al., 2015). Among the high-achieving students, the decline was in all the measured subjects. There may have been many reasons for this strong deterioration (Hautamäki et al., 2015), but in any case the results indicate that schools have not been able to give adequate support to high achievers.

In sum, Finland lacks a formal definition of giftedness or talent, and there are no formal identification criteria. Still, teachers are responsible for identifying the differing needs of students, which they address via differentiated teaching. In this respect, the Finnish educational system follows the so-called differentiation paradigm in gifted education (Laine, 2016a; see also Dai & Chen, 2013). This paradigm stems from the values of equality and inclusiveness, meaning that support for gifted and talented students is organized within the regular classes and mainly in general comprehensive schools. However, it is widely understood that gifted students do not receive sufficient attention at school (Laine, 2016b; Laine et al., 2019). Indeed, the whole topic is rather sensitive in Finland, provoking strong emotions and debate (Laine, 2016b).

Meeting the needs of gifted and talented students and fulfilling the promises of differentiated teaching depends on individual teachers, which could lead to inequality in delivering quality education to the gifted (Laine, 2016a). Finnish teacher education is internationally valued and respected, and Finnish teachers are highly educated. However, they are not currently given any formal and mandatory education about the gifted

and their needs: how the topic is handled depends totally on the university. This is an evident weakness and could have far-reaching consequences. Teacher education should thus cover the successful inclusion of students who are different, such as the gifted, in the goal of producing teachers who can reflect on their values, beliefs and attitudes. This, in turn, would influence their pedagogical thinking and teaching practice in an inclusive school system (Tirri & Laine, 2017).

Talent development in Finland – Lessons from empirical studies

We will now shift the perspective and take a closer look at studies that investigated gifted and talented people educated within the Finnish egalitarian system described above.¹ Various critical factors for talent development have been identified in these empirical studies, which we summarize below.

In fact, there were relatively few empirical studies on this topic until the Academy of Finland funded a research project entitled “Actualizing Finnish giftedness” in 1999–2007, led by Kirsi Tirri. Studies conducted by Tirri and her colleagues investigated the development of *academic giftedness in mathematics and science*, focusing on Finnish Olympians studying math, chemistry and physics who competed during 1965–1999 (e.g. Tirri, 2001, 2002; Tirri & Campbell, 2002; see also Nokelainen, Tirri, & Merenti-Välimäki, 2007; Nokelainen & Tirri, 2010; Tirri & Kuusisto, 2018; for international comparative studies see e.g. Nokelainen, Tirri, Campbell, 2002, 2004; Nokelainen, Tirri, Campbell, & Walberg, 2007; Campbell, Cho, & Tirri, 2017), and Finnish Academy professors in the field of science (Koro-Ljungberg, 2002; Koro-Ljungberg & Tirri, 2002; Tirri & Koro-Ljungberg, 2002).

Other Finnish studies have explored *creative talents*. Inkeri Ruokonen (2005; Ruokonen, Kiilu, Muldma, Vikat & Ruismäki, 2011) and her colleagues examined the development of musical talent among children aged 6-8 and university students in Finland and Estonia, for example, and Joey Chua (2015) studied the development of talent among Finnish and Singaporean professional dancers. Studies on talent development in *sports* have investigated Finnish Olympic gold medalists (Rahkamo, 2016) and young aspiring elite athletes (Aarresola, 2016). Further, Petri Nokelainen (2010; 2018) and his colleagues have examined the development of *vocational excellence* among Finnish participants in WorldSkills Competitions (e.g. Korpelainen, Nokelainen, & Ruohotie, 2009; Nokelainen, Korpelainen, & Ruohotie, 2009; Pylväs, 2018; Pylväs &

Nokelainen, 2017; see also the international comparative report of Nokelainen, Smith, Ali Rahimi, Stasz, & James, 2012).

Table 2 summarizes findings from Finnish empirical studies, and highlights critical factors in Finnish talent development that relate to *individual, contextual and coincidental factors in early childhood, school years, and college years and adulthood*.

Individual factors in Finnish talent development

Natural abilities - gifts

Individual factors refer to *natural abilities* or gifts that are usually evident in early childhood. Science Olympians had typically learned to read at the age of three or four, for example (Tirri, 2001). In the case of creative arts and sports, such as dance, early potential could be detected in the right bodily proportions, flexibility, the ability to remember movements and to concentrate (Chua, 2015). In the vocational domain, WorldSkills competitors also showed natural abilities in early childhood, even though in many cases student giftedness was identified by their teacher at vocational school (Korpelainen et al., 2009; Nokelainen, 2010).

TABLE 2 A summary of the critical factors of talent development identified in Finnish empirical studies

CRITICAL FACTORS	Early childhood (age 0-6)	School years (age 7-18)	College years and adulthood
INDIVIDUAL FACTORS			
Natural abilities	Early potential -early reading -physicality		
Inner drive	Early interest	Persistence to practice	Ethics of empowerment
CONTEXTUAL FACTORS			
Family	Supporting home atmosphere Early recognition	Parent in financing and transporting	Choice of partner
School		Teacher's encouragement Recognition	
Peers		Peers as a positive and negative influence	International collaboration
Enrichment programs	Hobbies	Coaching, competitions, summer programs, internships	Mentoring, coaching training, studying, working abroad
Society	Moral atmosphere in Finland and attitudes towards the gifted and talented		
COINCIDENTAL FACTORS	Encountering good teachers, mentors and contacts One's own health and the health of close ones		

Inner drive

Finnish studies indicate that *inner drive* is even more important than natural ability in talent development. It refers to motivation and persistence to practice, and could also be described as intrinsic motivation (Chua, 2015; Korpelainen et al., 2009), intrinsic characteristics or self-regulatory abilities (Pylväs & Nokelainen, 2017). Research participants studied in early childhood already showed an interest in mathematics and conducting scientific experiments, and in music, dance, or sports (e.g. Aarresola, 2016; Chua, 2015; Ruokonen, 2005; Rahkamo, 2016; Tirri, 2001). Moreover, Olympic athletes who did not differ from other children in terms of natural abilities when they started their sports activities in local clubs, demonstrated resilience as children in practicing longer and more than others (Rahkamo, 2016). It has also been reported that gifted children aged 6-8 realize the importance of effort and practicing, and their inner drive also shows in their positive view of the self and trust in their own learning process (Ruokonen, 2005). Inner drive manifests also in dedication and the power to make choices during school years (age 7-18) (Aarresola, 2016). Science Olympians even call themselves “self-made”, indicating a focus on one’s own interests, efforts and visions. Koro-Ljunberg and Tirri (2002) recognized the ethics of empowerment among highly successful scientists, indicating independence of thought, a belief in their own internal voices, and goals as leading principles in their work. A similar mentality was identified among Olympic athletes (Rahkamo, 2016). Inner drive has been found to indicate competitiveness in Finnish empirical studies, which is not surprising given that most of the research is closely connected to success in competitions: Olympiads in science (e.g. Tirri, 2001, Tirri & Campbell, 2002), the Olympic Games in sports (e.g. Rahkamo, 2016), and WorldSkills competitions in vocational excellence (e.g. Korpelainen et al., 2009; Nokelainen, 2010; Pylväs & Nokelainen, 2017).

Contextual factors in the development of Finnish talent

Contextual factors refer to family, school, peers, enrichment programs and society that support or hinder talent development. For example, Rahkamo (2016) concludes that Finnish Olympic winners in sports would not have been able to rise to the top alone.

Family

A *supportive family atmosphere* in early childhood and the early recognition of giftedness by parents have been consistently identified as the most important contextual factors in talent development (e.g. Aarresola, 2016; Campbell, Cho, & Tirri, 2017; Nokelainen et al., 2009). Parental investment in financing their children's hobbies and coaching opportunities in early childhood and during their school years, as well as providing transportation, have made it possible for the gifted to develop, especially in the fields of dance, music, and sports (e.g. Chua, 2015; Ruokonen, 2005; Aarresola, 2016). Hobbies and enrichment programs for children appear to be generally limited in the field of science (see Tirri & Kuusisto, 2013), but even so, parental interest and support have been identified as critical factors. For example, male science Olympians who had experienced parental encouragement and family discussion about math and science since early childhood acknowledged the positive effect on their talent development. On the other hand, female Olympians had not had similar encouragement from their parents. They were introduced to music and art activities in their childhood, and later in college their parents advised them to choose a career that was more typical for females – such as teaching mathematics as opposed to engineering (Tirri & Koro-Ljungberg, 2002). These experiences illustrate cultural and gender-biased parental expectations, especially in the field of science. Studies show how parents' own interests and background (e.g. Aarresola, 2016), and their vocation (Korpelainen et al., 2009) typically influence their children's development and interests.

In adulthood, family support may depend on partner choice (Rahkamo, 2016; Tirri & Koro-Ljungberg, 2002). The partners of male scientists took care of the home and children, giving Olympians the opportunity to concentrate on their own careers, whereas it was crucial for females to choose a partner who was willing and able to share household chores and childcaring responsibilities. Combining a career and a family life in general is challenging, and requires compromise especially among female scientists (Tirri & Koro-Ljungberg, 2002).

School

Studies on the gifted and the talented mention the role of *teachers* as positive catalysts who teach the basics (Ruokonen, 2005; Tirri, 2001). Even though teachers in Finland are not educated systematically to recognize and support gifted students (Tirri & Kuusisto, 2013), their encouragement as individuals has been particularly helpful to female scientists and gifted students from middle and low SES backgrounds (Tirri, 2001; Tirri & Campbell, 2002), and has sparked interest in certain vocational paths (Nokelainen, 2010). Teachers are strong gatekeepers in terms of recognizing giftedness and then encouraging students and advising them about acceleration possibilities and enrichment programs in and beyond school hours (e.g. Nokelainen, 2010). However, support from teachers has relied heavily on their individual interests, and in general, gifted students have not been given specific support or challenging learning experiences (Hotulainen & Schofield, 2003; see also Laine, Hotulainen, & Tirri, 2019).

Peers

Finnish studies on the gifted and talented give a rather ambiguous picture of the role of *peers* in talent development. On the one hand, peers are influential friends with whom hobbies are shared, and this may mark the beginning of a career in sports (e.g. Rahkamo, 2016), but on the other hand they may cause distress in the form of envy, harassment and bullying (e.g. Ruokonen, 2005). These problems are challenging in any domain, but they have been specifically pinpointed by the academically gifted. For example, one third of Finnish Olympians reported experiencing hostility from peers (Tirri, 2001). Female scientists have reported suffering from loneliness and a lack of social contacts in their school years, although their situation improved in upper-secondary school where they were able to find similarly minded peers. Male scientists, in turn, seem to enjoy peer support and interesting hobbies earlier in their school career than females do. Enrichment programs and competitions also provide significant opportunities to socialize with national and international peers, and to create extensive networks (e.g. Kuusisto & Tirri, 2015; Nokelainen et al., 2009; Pylväs, 2018; Tirri, Kuusisto, & Aksela, 2013). Furthermore, it has been reported that international collaboration in adulthood plays a vital role in talent development in terms of perspectives, strategies and resources (e.g. Chua, 2015; Rahkamo, 2016; Tirri, 2001). All in all, learning and cultivating social and affective skills seem to be worthy of special attention in supporting the holistic education of the gifted within the Finnish school system (Tirri & Kuusisto, 2013).

Enrichment programs

Enrichment programs in the form of hobbies in early childhood and later coaching, competitions, summer programs, and internships build environments for purposeful and deliberate practicing and training. Workplace learning and coaching for competitions have been identified as major contextual and domain-specific conditions for fostering the development of vocational talent (Pylväs & Nokelainen, 2017). Olympic winners have also identified their coaches as the most significant influencers in their careers, and all five multiple gold-medalists who were interviewed had diligently followed the advice of their coaches (Rahkamo, 2016). Neither coaching nor mentoring has featured strongly in academia, even though some scientists acknowledge the influential role of mentors in their academic careers (Tirri, 2001). Some science Olympians become coaches and mentors themselves, encouraging new generations of Olympians (Tirri, 2001).

It has also been shown in Finnish empirical studies that training, studying or working abroad during college years and in adulthood provides the contextual conditions for talent development, especially among professional dancers (Chua, 2015), athletes (Rahkamo, 2016), and academically talented scientists (Tirri, 2001; Tirri & Koro-Ljungberg, 2002). Even in situations in which their partners had assignments abroad, female scientists utilized the opportunity to enhance their own careers by establishing collaboration at local universities (Tirri & Koro-Ljungberg, 2002).

Society

Society constitutes the ultimate context for talent development. The moral atmosphere in Finland, for example, has allowed Finnish female scientists to make bold choices in fields that typically reflect masculine qualities (Tirri & Koro-Ljungberg, 2002). Nevertheless, as the debate on education for the gifted and talented has shown, giftedness as a notion evokes strong emotions. On the one hand, talented athletes and musicians are treated like celebrities, and the Finnish government supports sport clubs and music institutions. On the other hand, however, in the spirit of Finnish egalitarianism, all forms of differentiated educational tracks and streaming by ability were abandoned in basic education after the comprehensive school reform (Aro, Rinne, & Kivirauma, 2002). Moreover, special education has been aimed specifically at students with learning disabilities and challenges, leaving the academically gifted and talented in particular to cope alone, to work as teaching assistants, or to become underachievers.

Coincidental factors

Coincidental factors refer to issues that influence talent development but that cannot be predicted or influenced. With regard to developing musical talents, university students credited chance for having and finding good teachers, mentors and contacts (Ruokonen et al., 2011). Health issues have also been mentioned: injuries, unexpected accidents and death are not in the control of the people involved, but still have a potentially profound effect on talent development (Aarresola, 2016; Chua, 2015; Tirri & Koro-Ljungberg, 2001).

In sum, empirical studies on the educational experiences of gifted and talented Finnish students highlight the role of inner drive as an individual factor in talent development, and family as a contextual factor. These could be called domain-invariant factors in that they play a role in all the domains studied - academic, creative, sport and vocational. Domain-specific factors could also be identified. In sports and the arts, for example, the role of coaches appears to be crucial, and it is also worth noting that Finnish society thus far offers opportunities for hobbies and professional coaching. On the other hand, similar enrichment programs and coaching designed to develop academic talents are not equally available, or even acknowledged. In the case of vocational excellence, coaching opportunities are offered within the formal educational system in vocational schools, indicating later recognition and starting ages compared to sports and the arts. Moreover, some gender differences were identified in the studies in question. For example, although in theory Finnish society as a whole offers opportunities to female scientists, on a personal level they might face challenges within the family (no parental encouragement and pressure to find a partner to share familial responsibilities) and in their careers.

Our summary also highlights the minimally adopted role of teachers and schools in recognizing, encouraging, and offering learning opportunities to gifted and talented students. According to the empirical evidence, talent development in Finland relies mainly on the individual's inner drive and familial support, thereby possibly leaving the potential of gifted students lacking these advantages untapped. For example, low-SES, immigrant, and single-parent families do not necessarily have the financial or time resources to provide organized coaching for their children. Furthermore, the inner drive of gifted students may remain underdeveloped if they do not have motivating and challenging learning opportunities that help them to build up resilience and persistence in learning. The Finnish educational system aims to offer equal opportunities

to all students, but at the same time it seems to fall short in terms of providing learning opportunities for the talented. Consequently, given the lack of a formal educational agenda and the high dependency on the teacher for support, gifted and talented students are not treated equally in the Finnish school system.

Towards a growth mindset pedagogy in gifted education

This third section introduces growth-mindset pedagogy as one possible approach to improving the education of Finland's gifted and talented students. The pedagogical focus is on their particular educational needs, such as cultivating an inner drive, normalizing effort and challenges in learning, and learning to cope with failure. According to the theory of implicit beliefs concerning the nature of basic human qualities related to learning (Dweck, 2000, 2006), teachers and students may have a fixed mindset (entity theory), believing that their basic qualities are stable and unchangeable, or a growth mindset (incremental theory), believing that such qualities are changeable and can be developed. An extensive body of research demonstrates the impact of mindset on motivation, learning and achievement, as well as on adjustment and emotional well-being in school (see e.g. King, McInerney, & Watkins, 2012; Zhang, Kuusisto, & Tirri, 2017). Mindsets are relatively stable, but they have been successfully changed by means of short interventions (Yeager et al., 2019). More recently, however, research has focused on how students' mindsets develop in their every-day interactions with teachers, and the impact of teachers' mindsets on their pedagogical thinking and practices. It seems to be more typical of Finnish teachers to have a growth rather than a fixed mindset, at least when measured quantitatively on Dweck's scale (Laine et al., 2016): the results from qualitative studies are more ambiguous (Laine et al., 2016). Interestingly, although Finnish teachers seem to think of the academic competence of poorly achieving students as malleable, they tend to hold more fixed views concerning competence stability among high achievers (Rissanen, Kuusisto, Hanhimäki, & Tirri, 2018a, 2018b; Rissanen et al., 2019). Given their views on the stability of giftedness among high achievers, teachers may also be more likely to practice growth-mindset pedagogy in teaching low-achievers, and to put less effort into supporting the learning processes of high achievers (Rissanen et al., 2019).

Growth-mindset pedagogy is process-focused. It is associated with the teacher's own growth mindset and is likely to cultivate growth mindsets

in students. Based on teachers' process-focused (instead of trait-focused) interpretations of students' learning, behavior and achievement, its core principles include: 1) supporting students' individual learning processes, 2) promoting mastery orientation, 3) persistence, and 4) supporting process-focused thinking in students. In general, growth-oriented teachers who believe in the ability of students to learn refrain from practices of consolidation and protection from challenges. They rather put effort into understanding the learning barriers of individual students and helping to surmount them, they use honest feedback, and they help students to overcome their helpless-type responses. It seems that the Finnish educational system leans toward growth-mindset pedagogy. The *National core curriculum for basic education 2014* (FNBE, 2016), for instance, emphasizes aims such as learning-to-learn and creating a mastery-oriented atmosphere. Furthermore, learning (as opposed to achievement) goals and formative assessment are enabled by the minor role given to standardized testing (Rissanen et al., 2019).

However, it is typical in the Finnish educational climate to promote equality by investing effort in supporting the learning of low achievers. Socialization into the system implies that Finnish teachers tend to implement growth-mindset pedagogy by supporting the development of a growth mindset and process-focused thinking among low achievers, but do not similarly support high achievers to cope with learning-related difficulties, setbacks and disappointments. Their ethical professional focus seems to be on supporting students with difficulties (Rissanen et al., 2019; Tirri & Kuusisto, 2013). However, research on mindsets shows why gifted students should also be seen as potentially fragile: they may succeed with ease during comprehensive education, but if they develop fixed mindsets they could then experience emotional distress, turn away from challenges or even become dropouts in later stages when "things get difficult" (see Blackwell, Trzesniewski, & Dweck., 2007). In a nutshell, if gifted students learn to attribute success to their talent instead of to their effort and learning processes, they are likely to experience failure as indicative of having reached the limits of their talent, which in turn could predict a tendency to give up and to turn away from challenges, or at least increased stress levels. If they are to develop resilience, well-being and inner drive in learning, they also need to experience growth-mindset pedagogy. They should be faced with such challenges during their years of basic education so that they could learn to understand the importance of effort and learning strategies. It is also helpful to experience failure, which would normalize experiences of difficulties in learning and facilitate the development of skills (e.g. emotion regulation) that would help them

to cope with setbacks. These are learning-to-learn skills that gifted students also need if they are to reach their full potential in the future, even if they succeed with ease during their basic education. Thus, Finnish teachers should be educated to recognize gifted students as learners with special needs who would benefit from growth-mindset pedagogy.

To conclude, we have given an overview of the history and the current state of education for gifted and talented students in Finland. We have also summarized empirical studies focusing on these students to identify the critical factors in talent development and how the gifted and talented experience the Finnish schooling system and its apparent lack of targeted education.

In sum, we have presented growth-mindset pedagogy as a potential developmental path that would support the Finnish educational system, more specifically its teachers and teacher educators, in meeting the needs of all students equally – including the gifted and talented. The focus in growth-mindset pedagogy on malleability beliefs implies that everyone is capable of developing and learning – and also that giftedness and talent are not fixed qualities that make the student concerned less dependent on teacher support. The Finnish reluctance to attend to the needs of gifted students, linked to egalitarian educational ideals, may derive from a dislike of ranking, as well as the pre-conception that well-performing students are also well-off. In an attempt to clarify these ideas we have illustrated how growth-mindset-based pedagogical thinking switches the focus from ranking and achievement while emphasizing the need intentionally to support the development of a growth mindset and related learning-to-learn skills among gifted students. In particular, growth mindset pedagogy gives educators the tools to support emotional learning processes and to foster the kind of resilience that gifted students need as much as other students do.

References

- Aarresola, O. (2016). *Nuorten urheilupolut: Tutkimus kilpaurheiluun sosiaalistumisen normeista, pääomista ja toimijuudesta* [Youth sports paths: A study of norms, capital and agency in socialisation into competitive sports] (Doctoral dissertation). Jyväskylä: University of Jyväskylä. Retrieved from <http://urn.fi/URN:ISBN:978-951-39-6791-8>

- Ainscow, M., Booth, T., Dyson, A., Farrell, P., Frankham, J., Gallannaugh, F., Howes, A., & Smith, R. (2006). *Improving schools, developing inclusion*. London: Routledge.
- Armstrong, D., Armstrong, A.C., & Spandagou, I. (2011). Inclusion: by choice or by chance? *International Journal of Inclusive Education*, *15*(1), 29–39.
- Aro, M., Rinne, R., & Kivirauma, J. (2002). Northern youth under the siege of educational policy change: comparing youth's educational opinions in Finland, Sweden, Spain, Portugal, and Australia. *Scandinavian Journal of Educational Research*, *46*(3), 305–323. doi: 10.1080/0031383022000005698
- Basic Education Act. (628/1998). Retrieved from <http://www.finlex.fi/en/laki/kaannokset/1998/en19980628.pdf>
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development*, *78*, 246–263.
- Campbell, J. R., Cho, S. & Tirri, K. (2017). Mathematics and science Olympiad studies: The outcomes of Olympiads and contributing factors to talent development of Olympians. *International Journal for Talent Development and Creativity*, *5*(1-2), 48-60.
- Chua, J. (2015). *Dance talent development* (Doctoral dissertation). Helsinki: University of Helsinki. Retrieved from <http://urn.fi/URN:ISBN:978-951-51-0198-3>
- Dai, D. Y., & Chen, F. (2013). Three paradigm of gifted education: in search of conceptual clarity in research and practice. *Gifted Child Quarterly*, *57*(3), 151–168. doi: 10.1177/0016986213490020
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York, NY: Random House Publishing Group.
- Dweck, C. (2000). *Self-theories: Their role in motivation, personality, and development. Essays in social psychology*. New York, NY: Psychology Press, Taylor & Francis Group.
- Finnish Constitution. (1999/731). Retrieved from <http://www.finlex.fi/fi/laki/kaannokset/1999/en19990731.pdf>
- Finnish National Agency of Education. (2014). *Perusopetuksen opetussuunnitelman perusteet 2014 [National core curriculum for basic education 2014]*. Helsinki: Finnish National Agency of Education.
- Finnish National Agency of Education. (2016). *National core curriculum for basic education 2014*. Helsinki: Finnish National Agency of Education.
- Halinen, I., & Järvinen, R. (2008). Towards inclusive education: the case of Finland. *Prospects*, *38*(1), 77–97. doi: 10.1007/s11125-008-9061-2
- Hautamäki, J., Kupiainen, S., Kuusela, J., Rautopuro, J., Scheinin, P., & Välijärvi, J. (2015). Oppimistulosten kehitys [The development of learning outcomes]. In N. Ouakrim-Soivio, A. Rinkinen, & T. Karjalainen (Eds.), *Tulevaisuuden*

- peruskoulu* [Comprehensive school of the future] (pp. 34–39). Retrieved from <http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2015/liitteet/okm8.pdf?lang=en>
- Hotulainen, R., & Schofield, N. J., (2003). Identified pre-school potential giftedness and its relation to academic achievement and self-concept at the end of Finnish comprehensive school. *High Ability Studies*, *14*(1), 55-70. doi: 10.1080/13032000093508
- King, R., McInerney, D., & Watkins, D. (2012). How you think about your intelligence determines how you feel in school: The role of theories of intelligence on academic emotions. *Learning and Individual Differences*, *22*, 814–819
- Koro-Ljungberg, M. (2001). *Naming the multiple: Segments of scientific giftedness* (Doctoral dissertation). Helsinki: University of Helsinki. Retrieved from <http://urn.fi/URN:ISBN:951-45-9844-X>
- Koro-Ljungberg, M., & Tirri, K. (2002). Beliefs and values of successful scientists. *Journal of Beliefs and Values*, *23*(2), 141-155. DOI: 10.1080/1361767022000010806
- Korpelainen, K., Nokelainen, P., & Ruohotie, P. (2009). Ammatillisen huippuosaamisen mallintaminen Huippuosaajaksi kasvaminen ja kasvun edellytykset: laadullisen aineiston yhteenveto. *Ammattikasvatuksen aikakauskirja* [Journal of Professional and Vocational Education], *11* (1), 33-47.
- Kupari, P., Välijärvi, J., Andersson, L., Arffman, I., Nissinen, K., Puhakka, E., & Vettenranta, J. (2013). PISA12 ensituloksia [PISA 2012 preliminary results]. Helsinki, Finland: Ministry of Education. Retrieved from <http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2013/liitteet/okm20.pdf?lang=en>
- Kuusisto, E., & Tirri, K. (2015). Disagreements in working as a team: A case study of gifted science students. *Revista de educacion*, *368*, 250-272. doi: 10.4438/1988-592X-RE-2015-368-287
- Kuusisto, E., Laine, S., & Tirri, K. (2017). How do school children and adolescents perceive the nature of talent development? A case study from Finland. *Education Research International*, 2017. doi: 10.1155/2017/4162957
- Laine, S. (2016a). Finnish elementary school teachers' perspectives on gifted education. (Doctoral dissertation). Helsinki: University of Helsinki. Retrieved from <https://helda.helsinki.fi/handle/10138/168133>
- Laine, S. (2016b, April). The public discussion of gifted education. Paper presented at the annual meetings of the American Educational Research Association, Washington DC.
- Laine, S., & Tirri, K. (2016). How Finnish elementary school teachers meet the needs of their gifted students. *High Ability Studies*, *27*(2), 149-164. doi:10.1080/13598139.2015.1108185

- Laine, S., Hotulainen, R., & Tirri, K. (2019). Finnish Elementary School Teachers' Attitudes Toward Gifted Education. *Roeper Review*, 41(2), 76-87. doi: 10.1080/02783193.2019.1592794
- Laine, S., Kuusisto, E., & Tirri, K. (2016). Finnish teachers' conceptions of giftedness. *Journal for the Education of the Gifted*, 39(2), 151-167. doi: 10.1177/0162353216640936
- Leino, K., Ahonen, A. K., Hienonen, N., Hiltunen, J., Lintuvuori, M., Lähteinen, S., Lämsä, J., Nissinen, K., Nissinen, V., Puhakka, E., Pulkkinen, J., Rautopuro, J., Sirén, M., Vainikainen, M.-P., & Vettenranta, J. (2019). *PISA 18 ensituloksia: Suomi parhaiden joukossa* [PISA first results: Finland among the best]. (Opetus- ja kulttuuriministeriön julkaisuja; No. 2019:40). Opetus- ja kulttuuriministeriö. <http://urn.fi/URN:ISBN:978-952-263-678-2>
- Mäkinen, M. (2013). Becoming engaged in inclusive practices: Narrative reflections on teaching as descriptors of teachers' work engagement. *Teaching and Teacher Education*, 35, 51-61. <http://dx.doi.org/10.1016/j.tate.2013.05.005>
- Nokelainen, P. (2010). Mistä on ammatilliset huippuosaajat tehty? [What are vocational experts made of?]. *Ammattikasvatuksen aikakauskirja* [Journal of Professional and Vocational Education], 12(2), 4-12.
- Nokelainen, P. (2018). Modeling the characteristics of vocational excellence: A case study with Finnish WorldSkills Competition competitors. *Talent Development & Excellence*, 10(1), 15-30.
- Nokelainen, P., & Tirri, K. (2010). Role of motivation in the moral and religious judgment of mathematically gifted adolescents. *High Ability Studies*, 21(2), 101-116. doi: 10.1080/13598139.2010.525343
- Nokelainen, P., Korpelainen, K., & Ruohotie, P. (2009). Ammatillisen huippuosaamisen kehittymiseen vaikuttavat tekijät: Tapausesimerkinä suomalaiset ammatitaidon maailmanmestaruuskilpailuihin osallistuvat ja valmentautuvat nuoret. *Ammattikasvatuksen aikakauskirja* [Journal of Professional and Vocational Education], 11(2), 41-53.
- Nokelainen, P., Smith, H., Rahimi, M., Stasz, C. & James, S. (2012) *What contributes to vocational excellence? Characteristics and experiences of competitors and experts in WorldSkills London 2011*. Madrid: WorldSkills Foundation.
- Nokelainen, P., Tirri, K., & Campbell, J. R. (2004). Cross-cultural predictors of mathematical talent and academic productivity, *High Ability Studies*, 15(2), 229-242. doi: 10.1080/1359813042000314790
- Nokelainen, P., Tirri, K., Campbell, J. R. & Walberg, H. (2007). Factors that contribute to or hinder academic productivity: Comparing two groups of most and least successful Olympians. *Educational Research and Evaluation*, 13(6) 483-500. doi: 10.1080/13803610701785931

- Nokelainen, P., Tirri, K., Merenti-Välimäki, H.-L. (2007). Investigating the influence of attribution styles on the development of mathematical talent. *Gifted Child Quarterly*, 51(1), 64-81.
- Ojanen, S., & Freeman, J. (1994). The attitudes and experiences of head teachers, class teachers, and highly-able pupils towards the education of the highly able in Finland and Britain. (Research Report of the Faculty of Education No. 54.). Joensuu, Finland: University of Joensuu.
- Pylväs, L. (2018). *Development of vocational expertise and excellence in formal and informal learning environments* (Doctoral dissertation). Tampere: University of Tampere. Retrieved from <http://urn.fi/URN:ISBN:978-952-03-0664-9>
- Pylväs, L., & Nokelainen, P. (2017). Finnish WorldSkills achievers' vocational talent development and school-to-work pathways. *International Journal for Research in Vocational Education and Training*, 4(2), 95-116. doi: 10.13152/IJRVED.4.2.1
- Rahkamo, S. (2016). *The road to exceptional expertise and success: A study of the collective creativity of five multiple Olympic gold medalists* (Doctoral dissertation). Helsinki: Aalto University. Retrieved from <http://urn.fi/URN:ISBN:978-952-60-7177-0>
- Rissanen, I., Kuusisto, E., Hanhimäki, E., & Tirri, K. (2018a). Teachers' implicit meaning systems and their implications for pedagogical thinking and practice: A case study from Finland. *Scandinavian Journal of Educational Research*, 62, 487–500.
- Rissanen, I., Kuusisto, E., Hanhimäki, E., & Tirri, K. (2018b). The implications of teachers' implicit theories for moral education: A case study from Finland. *Journal of Moral Education*, 47, 63–77.
- Rissanen, I., Kuusisto, E., Tuominen, M., & Tirri, K. (2019). In search of a growth mindset pedagogy: A case study of one teacher's classroom practices in a Finnish elementary school. *Teaching and Teacher Education*, 77, 204–213. doi: 10.1016/j.tate.2018.10.00225.
- Ruokonen, I. (2005). *Estonian and Finnish gifted children in their learning environments* (Doctoral dissertation). Helsinki: University of Helsinki.
- Ruokonen, I., Kiilub, K., Muldmac, M., Vikatc, M., & Ruismäki, H. (2011). "They have always supported my choices.": Creative catalysts in university students' learning environments. *Procedia - Social and Behavioral Sciences*, 29, 412–421.
- Simola, H. (2014a). Educational science, the state and teachers - Setting up the corporate regulation of teacher education in Finland. In H. Simola, *The Finnish education mystery – Historical and sociological essays on schooling in Finland* (pp. 69–94). Routledge.
- Simola, H. (2014b). The Finnish miracle of PISA - Historical and sociological remarks on teaching and teacher education In H. Simola, *The Finnish education*

- mystery – Historical and sociological essays on schooling in Finland* (pp. 207–223). Routledge.
- Simola, H., Heikkinen, S., & Silvonen, J. (2014). The birth of the modern Finnish teacher - A Foucauldian exercise. In H. Simola, *The Finnish education mystery – Historical and sociological essays on schooling in Finland* (pp. 95–114). Routledge.
- Tallent-Runnels, M., Tirri, K., & Adams, A. (2000). A cross-cultural study of teachers' attitudes toward gifted children and programs for gifted children. *Gifted and Talented International*, 15(2), 103-115.
- Thuneberg, H., & Hotulainen, R. (2006). Contributions of data mining for psycho-educational research: What self-organizing maps tell us about the well-being of gifted learners. *High Ability Studies*, 17(1), 87-100, doi: 10.1080/13598130600947150
- Tirri, K. (1997). How Finland meets the needs of gifted and talented. *High Ability Studies*, 8, 213–222.
- Tirri, K. (2001) Finland Olympiad Studies: what factors contribute to the development of academic talent in Finland?. *Educating Able Children*, 5(2), pp. 56–66.
- Tirri, K. (2014). The last 40 years in Finnish teacher education. *Journal of Education for Teaching*, 40, 1–10. doi:10.1080/02607476.2014.956545
- Tirri, K., & Campbell, J. (2002). Actualizing mathematical giftedness in adulthood. *Educating Able Children*, 6(1), 14-20.
- Tirri, K. & Koro-Ljungberg, M. (2002). Critical incidents in the lives of gifted female Finnish scientists. *Journal of Secondary Gifted Education*, 13(4), 151–163.
- Tirri, K., & Kuusisto, E. (2013). How Finland serves gifted and talented pupils. *Journal for the Education of the Gifted*, 36(1), 84–96. doi: 10.1177/0162353212468066
- Tirri, K., & Kuusisto, E. (2017). What factors contribute to the development of gifted female scientists? Insights from two case studies. In K. S. Taber, M. Sumida, & L. McClure (Eds.), *Teaching Gifted Learners in STEM Subjects: Developing talent in science, technology, engineering and mathematics* (pp. 80–88). New York, NY: Routledge.
- Tirri, K., & Kuusisto, E. (2019). Opettajan ammattietiikkaa oppimassa [Learning teachers' professional ethics]. Helsinki: Gaudeamus.
- Tirri, K., Kuusisto, E., & Aksela, M. (2013). What kind of learning is interactive and meaningful to gifted science students?: A case study from the Millennium Youth Camp. In K. Tirri, & E. Kuusisto (Eds.), *Interaction in educational domains* (pp. 131-145). Rotterdam: Sense Publishers.
- Tirri, K., & Laine, S. (2017). Teacher education in inclusive education. In D. J. Clandinin, & J. Husu (Eds.), *The SAGE Handbook of research on teacher*

- education* (Vol. 2, pp. 761–776). Los Angeles: SAGE Reference.
<https://doi.org/10.4135/9781526402042.n44>
- Tirri, K., & Nokelainen, P. (2007). Comparison of academically average and gifted students' self-rated ethical sensitivity. *Educational Research and Evaluation, 13*(6), 587-601. doi: 10.1080/13803610701786053
- Tirri, K., & Nokelainen, P. (2010). The Influence of Self-Perception of Abilities and Attribution Styles on Academic Choices: Implications for Gifted Education. *Roeper Review, 33*(1), 26-32. doi: 10.1080/02783193.2011.530204
- Tirri, K., & Nokelainen, P. (2011). *Measuring multiple intelligences and moral sensitivities*. Rotterdam: SensePublishers.
- Tirri, K., & Nokelainen, P. (2012). Ethical Thinking Skills of Mathematically Gifted Finnish Young Adults. *Talent Development and Excellence, 4*(2), 143–155.
- Tirri, K., Nokelainen, P., & Mahkonen, M. (2009). How morality and religiosity relate to intelligence? A case study of mathematically talented adolescence. *Journal of Empirical Theology, 22*, 70-87.
- Tirri, K., & Pehkonen, L. (2002). The moral reasoning and scientific argumentation of gifted adolescents. *The Journal of Secondary Gifted Education, XIII*(3), 120–129.
- Tirri, K., Tallent-Runnels, M., Adams, A., Yuen, M., & Lau, P. (2002). Cross-cultural predictors of teachers' attitudes toward gifted education: Finland, Hong Kong, and the United States. *Journal for the Education of the Gifted, 26*, 112-131.
- Tirri, K., Tallent-Runnels, M. K., & Nokelainen, P. (2005). A cross-cultural study of pre-adolescents' moral, religious and spiritual questions, *British Journal of Religious Education, 27*(3), 207-214. doi: 10.1080/01416200500141181
- Tirri, K., Tolppanen, S., Aksela, M., & Kuusisto, E. (2012). A cross-cultural study of gifted students' scientific, societal and moral questions in science. *Educational Research International, 1*-10. doi:10.1155/2012/673645
- Tirri, K. & Ubani, M. (2005). How do gifted girls perceive the meaning of life? *Gifted Education International, 19*, 366-247.
- Tirri, K., & Uusikylä, K. (1994). How teachers perceive differentiation of education among the gifted and talented. *Gifted and Talented International, 9*, 69-73.
- Uljens, M., & Nyman, C. (2013). Educational Leadership in Finland or Building a nation with Bildung. In L. Moos (Ed.), *Transnational influence on values and practices in Nordic Educational Leadership: Is there a Nordic Model?* (pp. 31–48), Studies in Educational Leadership 19. Dordrecht: Springer. doi: 10.1007/978-94-007-6226-8_3
- UNESCO. (1994). *The Salamanca statement and framework for action on special needs education*. <https://unesdoc.unesco.org/ark:/48223/pf0000098427>
- Yeager, D.S., Hanselman, P., Walton, G.M. et al. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature 573*, 364–369. <https://doi.org/10.1038/s41586-019-1466-y>

Zhang, J. F., Kuusisto, E., & Tirri, K. (2017). How teachers' and students' mindsets in learning have been studied: Research findings on mindset and Academic Achievement. *Psychology*, 8, 1363–1377.
<https://doi.org/10.4236/psych.2017.89089>

Notes

- ¹ In addition to the critical factors in the development of Finnish talent that are discussed in this chapter, Finnish studies on the gifted and talented have examined the following issues:
- morality and spirituality among the gifted and talented* (e.g. Nokelainen, Mahkonen, & Tirri, 2009; Nokelainen & Tirri, 2010; Pehkonen & Tirri, 2003; Tirri & Nokelainen, 2012; Tirri & Pehkonen, 2002; Tirri, Tallent-Runnels, & Nokelainen, 2005; Tirri, Tolppanen, Aksela, Kuusisto, 2012; Tirri & Ubani, 2004),
 - gifted education*, especially the perceptions, attitudes and practices of teachers (e.g. Laine, 2017; Laine, Hotulainen, & Tirri, 2019; Laine & Tirri, 2019; Laine, Kuusisto, & Tirri, 2016; Tirri & Uusikylä, 1994; see also international comparative studies Tallent-Runnels, Tirri, & Adams, 2000; Tirri, Tallent-Runnels, Adams, Yuen, & Lau, 2002),
 - perceptions of giftedness* in general in Finnish newspapers and among Finnish school children and adolescents (e.g. Laine, 2010; Kuusisto, Laine, & Tirri, 2017), and
 - instrument development* for investigating multiple intelligences (Tirri & Nokelainen, 2011), and for identifying giftedness and studying well-being among the gifted and talented (e.g. Hotulainen & Schonfield, 2003; Thuneberg & Hotulainen, 2004).