JSSE

Journal of Social Science Education

2023, Vol. 22(2)

Edited by:
Jan Löfström
David Roselund
Birgit Weber

Article

Finnish matriculation examination's exam in Social Studies – an appropriate gatekeeper and competence support?

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Keywords: Upper secondary schooling, external exit examination, grading, history, social studies

- The Social Studies exam of the Finnish Matriculation Examination measure well students' attainment
- The topic is important in Finland, where the reform of higher education student admission is under reparation
- The unanimity between the two assessments: students' grades in the social studies exam of the matriculation examination were, on average, strongly related to their grades in the subject across their three years of upper secondary studies.
- The examination itself seems to offer the valid treatment of student selection to tertiary education

Abstract: The study set to investigate the Finnish matriculation examination with a focus on the subject of social studies. The goal was to examine how well the subject-specific exams of the examination measure students' attainment in the courses of the respective subjects across upper secondary studies.

The data was drawn from a longitudinal study of 6,172 Southern-Finland upper secondary students in 62 schools who passed their matriculation examination in spring 2017. Data on students' upper secondary school course choices and attainment was received from the schools and matriculation examination results from the Finnish Matriculation Examination Board.

Key finding of the study is the unanimity between the two assessments: students' grades in the subject-specific exams of the matriculation examination correlated strongly with their respective grades across the courses during their three years of upper secondary studies.

The findings give strong support for the matriculation examination as a curriculum-based exit exam and for its use in student admission to higher education.

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Suggested citation:
Ouakrim-Sovio, N.; Kupiainen, S.; Hanska, J. (2023). Finnish matriculation examination's exam in Social Studies – an appropriate gatekeeper and competence support? In: *Journal of Social Science Education 2023(2).* https://doi.org/10.11576/jsse-5942

Declaration of conflicts of interests: No potential conflict of interest was reported by the authors.

1 INTRODUCTION

The Finnish matriculation examination, the education system's only high stakes test, which acts as the exit exam from general upper secondary education, is currently under impassioned discussion. The over 160 years-old examination has gone through several reforms (see Kaarninen & Kaarninen, 2002; for the reforms of 1996–2016, Kupiainen et al., 2018) but only the recent reform of higher education student admission in 2018 solidified its role by prescribing that half of new students in all programs shall be chosen based on their matriculation examination results. The implementation of the reform in the institutions of tertiary education (research universities and universities of applied sciences) led to a much-contested awarding of different amounts of credit to the different subject-specific exams, based mainly on the number of courses covered by the exam. In this, the credit awarded for the most course-laden subject of advanced mathematics provides more than double the credit of, for example, social studies, even in fields like law where the proficiency provided by the latter might appear more vital.

In this paper, we will investigate more closely students' attainment in social studies during their upper secondary studies and their choice of and success in the respective exam in the matriculation examination, and at the relation between the two. As the passing of the matriculation examination is understood and defined in the Act on the matriculation examination (502/2019) to indicate students' readiness for tertiary education, we will also look at how well students' success in the social studies is related to their overall success in the examination.

Upper secondary exit exams are common in education systems worldwide with the aim to bridge the gap between school and university, marking the passing of the first and acting as a gatekeeper for the second (Noah & Eckstein, 1992). This double role of the exam is especially salient in countries where the share of the age cohort entering academic upper secondary studies and consequently passing the exam exceeds that of students accepted to higher education. If the results of the exam play a prominent role in student admission, the high stakes of the exam are especially acute, and set specific requirements for the comparability of the examination results (cf. Beguin, 2000) across the exams of the different subjects (if the examination is so constructed) and across years (if the use of the results so require). Both clauses and uses of the examination results are relevant in Finland, the focus of the present study (see also Kupiainen et al., 2016, 2018).

While an exit exam at the end of upper secondary education is an integral part of the education systems of most European countries, the form of the exam and the share of students sitting for it varies widely. Among the Nordic countries, upper secondary education ends in centrally organised matriculation examinations in Denmark, Finland, and Iceland. In Norway and Sweden, completion of upper secondary studies and qualification for tertiary education is based on just school-based exams and grades. Sweden also differs from the other Nordic countries with its structurally unified upper secondary level with the same schools offering both general and vocational education. In the other Nordic countries, the two tracks are organized in a dual parallel form. Despite

this, Sweden and Finland share the common feature with both tracks providing a qualification for higher education while in the other three countries, access to higher education is limited to the general or academic track (Orr et al., 2017a).

Elsewhere in Europe, the education systems vary from strictly stratified structures where students are allocated to tracks with different curricula and academic requirements (e.g., Austria, Germany, Hungary, the Netherlands, and Switzerland) to comprehensive structures, where all students follow the same curriculum for at least the first nine years (e.g., Estonia, France, Italy, Poland, Portugal, and Spain). Despite the structural differences, at least the general or academic track of upper secondary education usually ends with some form of an exit examination, taken into account in higher education student selection in countries where access is not free for all or selection is dealyed to during tertiary studies.

In their report on the impact of admission systems on higher education outcomes, Orr and colleagues (2017a) classify the European Union member states in terms of upper secondary education tracking on the one hand and higher education institutions' autonomy regarding student intake on the other. In Finland, higher education is open to everyone with an upper secondary certificate from either the general or the vocational track, with the final decision regarding student admission falling within the autonomy of the institutions of higher education. Since the 2018 student admission reform, about half of students are selected based on a program-specific entrance examination (which used to be the main form of selection) while the other half is accepted based on their matriculation examination results. For the latter, adopted to expedite students' access from secondary to tertiary education (e.g., MINEDU, no date), each university and study program has built their own scale to award credit for the different subject-specific exams of the matriculation examination. However, common to all is a shared principle of tying the credit to the amount of courses the exam is based on. Despite the reform being backed by well-reasoned argumentation and evidence regarding the drawbacks of the earlier entrance examination-based student selection (Sarvimäki & Pekkarinen, 2016; Kupiainen et al., 2018), the credit system built for its implementation has raised vocal criticism, even if mainly based on 'common sense' arguments at best. The central focus of criticism has been the role of advance mathematics, which brings more credit than other subjects do for almost all programs due to its largest course load. One of the subjects whose exam awards considerably less credit is social studies (equivalent to the subject called citizenship studies or civics in some other countries), the focus of this study. The main question for us is: Is this low credit justified in view of the overall competence shown by the students sitting for this exam.

In the literature on economics of education, a widely shared understanding prevails regarding the positive role of centralized exit exams in improving student performance (Bishop, 1998; Bishop, Mañe, & Bishop, 2001; Jürges, Schneider, & Büchel, 2003), apparently through a process where students transfer the extrinsic requirements of the school to their personal intrinsic motivation (cf. Ryan & Deci, 2000). More pedagogically

oriented literature, however, tends to stress the adverse effects exams can have on instruction by undermining the non-tested parts of the curriculum, and on weaker students' achievement and motivation under the pressure of testing (Amrein & Berliner, 2002; Reardon et al., 2009). The latter seems to be the reigning belief in Finland where Pasi Sahlberg (2011) even used the argument to explain Finnish students' success in the Organisation of Economic Cooperation and Development's (OECD) Programme for International Student Assessment (PISA) with the lack of national testing.

The key themes that previous research has linked to the exit exam are: a) an exit exams' significance in the transition to the next schooling level, b) students' school grades' connection to their performance in an exit exam, c) the positive effect of a centralized exam to students' general curriculum-based knowledge and skills, and d) the relation between students' success in an exit exam and their present and future socio-economic status, a factor that ties the existence of an exit exam to social equality. With these aspects in mind, we investigate in this paper the relation between upper secondary students' grades in the courses of a subject across their upper secondary studies and their performance in the respective exam in the matriculation examination at the end of their studies. Due to the large number of exams on offer in the matriculation examination (see below), we will focus just in the two subjects of social studies and history, taught mostly by the same teacher at lower secondary and often even at upper secondary schools, and will use other subjects only for comparison.

Maybe as a consequence of the PISA-schoc, centralized exit exams became an active point of discssion in Germany during the early 2000s, especially regarding the possible impact of such exams to help standardize or add teh comparability of school grades. With ist focus on the comparison of students' school grades and matriculation examination grades, our study feeds to this discussion. Exploring the shift from school-based to statewide exit examinations in Germany between 2007 and 2011, Maué (2016) found a significant difference in students' teacher-given grades related to gender, ethnicity, and family background. However, she also found that the correlation between teacher-given grades and state-wide achievement tests increased through time, possibly through a corrective effect of the statewide exams. But when achievement was controlled for, the course-based grades continued to differ according to students' home background. Likewise, Maag Merkl and Holmeier (2015) found that statewide exams adopted in the state of Bremen had a standardizing effect for school-based grading for mathematics at school level but that the effect could not be found at the student level.

In their comparative investigation of statewide exit exams in 16 OECD countries, Klein and van Ackeren (2011) summarize that statewide examinations are assumed to affect and regulate work at both school and classroom level by setting minimum standards (qualification), promoting quick implementation of new syllabi (innovation), helping to improve instruction (professionalization), and increasing commitment (motivation). They see statewide examinations to act as incentives both for educators to elaborate strategies to improve instruction, and for students to raise effort to meet the standards. However, as

Klein and van Ackeren (2011) also note, the examinations of the different German länder are noticeably dissimilar with regard to both their organizational structures and the standardization of procedures. Accordingly, the seemingly unambiguous term of 'statewide exit examination' describes diverging procedures both at the national level and in international comparisons. As they also note, this affects the impact such examinations most probably have on both schools and students.

With register data from Victoria, Australia, Justman and colleagues (2018) investigated students' matriculation examination choices in a study reminiscent of ours, following a cohort of students from grade 7 to the end of upper secondary education. They found that physics, information technology and specialist mathematics (assumingly comparable to the advanced mathematics of the Finnish curriculum), which open the door to well-paying careers in engineering and digital technologies, remain male-dominated while life sciences remain female-dominated even when counting for students' prior achievement and home background. Their findings suggest that female students require stronger prior signals of mathematical ability to choose physics, information technology or specialist mathematics, arguably reflecting greater caution on their part. This seems to explain the contradiction between female students outperforming their male counterparts in the STEM subjects and their lesser participation in the field in later studies. The same is true in Finland at both the lower secondary level national assessments (Kärnä et al., 2012) and in the matriculation examination (Kupiainen et al., 2018).

2 FINNISH UPPER SECONDARY EDUCATION AND MATRICULATION EXAMINATION

The Finnish comprehensive school reform of the 1970s abolished an earlier parallel education system where less than half of the age cohort entered academically oriented grammar schools through an entrance examination after four years of primary education while the rest continued in a less demanding program aiming toward vocational education (e.g., Ollikainen, 2021; Pekkarinen et al., 2006). The reform extended the common-to-all education from four to nine years, moving the bifurcation point for general and vocational upper secondary education by five years. With this change, the earlier high stakes situation formed by the entrance examination for grammar school was replaced by the choice of upper secondary track. The choice is apparently free (each student can mark any five programs across the country), but acceptance is based on students' teacher-given grades in the form of grade point average (GPA) through a deferred acceptance (DA) algorithm (c.f., Abdulkadiroğlu, Angrist & Pathak, 2014; Virtanen, 2016).

The adoption of the comprehensive school led to an increase in the share of students entering the general or academic track of upper secondary education. However, the reform increased the heterogeneity of the academic track student body, leading to a need for concessions in the until then relatively stable matriculation examination. The first, in 1996, allowed students to divide their exams to three sessions (fall/spring) instead of the

earlier single exam at the end of upper secondary studies. Today the majority of students divide their examination to two or even three sessions (Kupiainen et al., 2023). Around the same time, the traditional entrance-year-based structure of general upper secondary education was replaced with a course-based structure similar to institutions of higher education. The school year was divided into five or six periods, and the syllabus of each subject was divided into individual courses around a topic or theme, comprising five hours a week during one period.

The compulsory syllabus (EDUFI, 2003, 2019) comprises eighteen subjects, most of which have begun already at the comprehensive school (EDUFI, 2014). In addition to the mandatory subjects, most schools offer studies in additional foreign languages, and many offer a variety of extra courses from ICT to specific sports. The upper secondary syllabus is built to last three-years, but students can extend their studies to a fourth year or cut the time shorter. In this article, references are made to the curriculum of 2003, which the students of the study followed through their upper secondary studies before taking their matriculation examination in spring 2017.

In the 2003 curriculum, the requirement for graduation was the passing of 75 courses, of which 47 or 51 were compulsory, depending on the choice between basic and advanced mathematics. The number of mandatory courses per subject varied from one (e.g., physics, chemistry, philosophy, and psychology) to the ten of advanced mathematics. In addition to the mandatory courses, the syllabus for each subject comprises national specialization courses, the number of which also varies, from the two of education to the seven of physics. Each subject-specific exam of the matriculation examination is built on the mandatory and specialization courses even if students can sit for an exam by having passed just the mandatory courses.

3 THE FINNISH MATRICULATION EXAMINATION AS A BISHOPIAN CBEEES

After the various reforms of the matriculation examination, of which the division of the earlier one shared exam for all natural and socio-humanistic science was the most critical regarding its structure (see Kupiainen et al., 2018), the examination is today a compilation of 39 exams in 25 subjects (the higher number of exams than subjects reflecting the different levels of syllabi in many subjects), organized two times a year. The examination period lasts for approximately three weeks with one six-hour exam per day. Since 2019, all exams are carried out on a digital platform. The exams mostly call for essay-type answers and many tasks are based on material provided on site. The majority of exams are taken in the last spring exam period of the three-year upper secondary school even if 80 per cent of students divide their exams to two periods and about 15 per cent to three. Today, only one in twenty students sit for all exams in the last spring session—the way everyone had to do twenty years ago.

The evaluation of the different exams is a combination of criterion-based and normative assessment to allow for comparisons across subjects and time (see Howie et al., 2008). The first step is done in schools where the teachers grade their students' exams

according to centrally prepared criteria and guidelines. After that, the teacher assessments are subjected to an evaluation of outside sensors using the same criteria but having a wider array of examinees' papers to evaluate. Digitalization has further secured the anonymity of the evaluation not only the examinee's name, gender and school are hidden from the sensor but also the examinees' handwriting has been eliminated. After this subject-specific phase, the Matriculation Examination Board's (FMEB) across-subjects committee decides on the implementation of an adopted Gaussian distribution curve on the exam-specific results in a process that takes into account the individual exams' differing examinee bodies (see YTL, 2022). Due to this corrective move, the share of the different grades from improbatur (fail) to laudatur (excellent) differs by subject, eflecting the overall ability level of the students sitting for them.

The results of the matriculation examination are reported on the pages of the FMEB for the subject-specific exams and across the whole body of matriculates. Lately, though, the results have been published in the form of ranking list of schools by the press and other media. The strong national antagonism for school ranking is exemplified in the FMEB only assenting to release the school-level results after a court order.

The common, even if not openly voiced, denominator for all the recent reforms has been to allow more choice both in the syllabus and in the matriculation examination to accommodate the increased heterogeneity of the student body. This development, which undoubtedly serves many students, has turned out to be problematic vis-à-vis the official roles and aims of the examination. According to the decree on the matriculation examination, the passing of the examination marks the student to have gained the academic competence necessary and sufficient for tertiary education, while simultaneously providing a tool for the universities in choosing new students. In addition, the results are expected to provide feedback to the schools regarding how well they have succeeded in implementing the curriculum and in reaching the goals of general upper secondary education. (Act on General Upper Secondary Education 714/2018; Act on Matriculation Examination 502/ 2019).

The reforms increasing exam choice have led to the derogation of the Finnish matriculation examination's compliance to John Bishop's (1998) construct of Curriculum-Based External Exit Exam System or CBEEES, which he suggests to be the most germane to advance student achievement). Yet, despite the development, the examination still follows the main tenets of the Bishop model in that (i) the examination results provide a bonus in entering university, (ii) the examination is centrally compiled and administered, (iii) there is a separate exam for each academic subject, based on the respective syllabi, (iv) a common scale is used in the final grading of each exam, and (v) the exam is taken by all academic track students, which in Finland means approximately 55 per cent of each age cohort.

4 SOCIAL STUDIES IN THE NATIONAL CORE CURRICULUM AND THE MATRICULATION EXAMINATION

Unlike most academic subjects of the secondary school syllabus, social studies has its roots in several disciplines. Accordingly, there is no commonly agreed core for social studies as a distinct form of knowledge as there is for its 'sister subject' history, in which the teacher can easily explain to students where historical knowledge is derived from and how its validity can be assessed. Yet, social studies largely has its roots in the history subject from which it has gradually detached at least in the Nordic countries (Löfström & Grammes, 2019). John White (2018) points out that social studies as a subject should be conceived more broadly than it commonly is in subject-based curricula, especially as it offers concepts that refer in diverse ways beyond simple occurrences and contexts and offer tools for generalization due to the nature of the phenomena it addresses.

In Denmark, Estonia, Finland, Sweden, and Norway, the national curriculum creates a framework for education providers (municipalities and/or schools) to develop their own curriculum. This relative independent profiling of schools within the national framework is seen to foster the schools' ownership of their curriculum and to increase teacher cooperation. The description of the contents of the courses of the different subjects in the Finnish core curriculum have become less detailed in the past curriculum reforms, also in social studies (Löfström, 2019). The goal behind the reforms has been a wish to direct teaching from (just) factual and conceptual subject-specific knowledge toward deeper knowledge and skills. Accordingly, even the goals and assessment criteria for social studies in the 2014 core curriculum for basic education (EDUFI, 2014) are rather based on a Krathwohl-Anderson-type of taxonomy of reasoning within the subject instead of listing contents, which the student should master.

Since 2014, social studies have been taught in Finland as a school subject already at the primary grades with a minimum of two annual teaching hours (total for grades 4–6) and at lower secondary school with a minimum of three teaching hours during the grades 7 to 9. Municipalities or schools can decide how they will distribute the teaching within the respective grade frames of 4–6 and 7–9. In years 7–9 the common practise is that social studies are taught only at grade 9, three hours per week (in grades 7 and 8, the same lesson hours are dedicated to history). As described above, upper secondary students design their personal study plans according to the general guidelines regarding the mandatory and specialization courses, also in social studies. In the core curriculum of 2003 (followed by the students of the present study), social studies comprised two mandatory courses, 'Politics and society' and 'Economics', and two specialization courses, 'Citizens and law' and 'European identity and the European Union'. Furthermore, unlike in history, in which the 2003 curriculum caused a clear break or reform in teaching orientation (see Löfström, Virta, & van den Berg, 2010; Author, 2020), no similar break took place in social studies.

Due to the wide freedom for students' choices of subject-specific exams in the matriculation, the share of students sitting for the individual exams varies greatly by subject. Lately, approximately 25 per cent of students have chosen the history and/or

social studies exam in their examination. In the autumn 2022 session, the total number of students who registered for the matriculation exams was 41,856 with 9,704 or roughly 23 percent for the exam in either history and/or social studies.

5 PRESENT STUDY

5.1 Research questions

To study the relation of students' success in the social studies exam in the matriculation examination and their performance in the respective courses during their upper secondary studies and in the examination as a whole, three research-question were set:

RQ1. What is the relation between students' social studies course grades and their success in the social studies exam in the matriculation examination?

RQ2. How do the students who include the social studies exam in their matriculation examination differ from those who choose do not include it?

RQ3. How well does students' success in the social studies exam reflect their overall examination results and school attainment, and how does the social studies exam compare to the other exams in this respect?

5.2 Data

The data is drawn from a longitudinal study of the approximately 13 500 students of the 14 municipalities of the Helsinki metropolitan region, who entered lower secondary education in autumn 2011 and upper secondary in autumn 2014. The region represents 28 per cent of the total population of mainland Finland and includes varied municipalities from the capital with its 658,457 inhabitants to a mainly rural municipality of scarcely over 5,000 inhabitants (Statistics Finland, 2022). Within the dual structure of the Finnish upper secondary education, 8 109 of the students were accepted to one of the metropolitan area's 67 academic track schools. Of them, the present study regards the 6 172 students (43.4 % boys) in 62 upper secondary schools (data missed from five schools) who passed their matriculation examination in spring 2017 after three years of academic track upper secondary studies. The sample represents 87.1 per cent of the students who entered the metropolitan academic track schools in 2014. Dropout from the academic track is small (under 4 %) and students are allowed to extend their studies to four years, meaning that the rest ten per cent of the targeted students are expected to have graduated in autumn 2017 or spring 2018.

Of the 39 exams of the matriculation examination, we will focus on the 27 exams taken by at least 50 students each in the current sample of 6 172 matriculates. Students' course grades were provided by the schools and the matriculation examination grades by the Finnish Matriculation Board. The research project providing the data for the present study has the approval of the Ethical Board of the National Institute for Health and Welfare.

5.3 Measurements

In accordance with the upper secondary syllabus, the number of courses covered by the different exams in the matriculation examination vary from three in health education to 13 in advanced mathematics. All exams offer choice for the student regarding the specific topic and level of difficulty of the tasks (e.g., 12 questions out of which the student has to answer to 8) with two more demanding integrative tasks providing more credit. Each exam is graded with a seven-point scale with a discontinuity between failed (0 = improbatur and 2 = approbatur) but linearity between 2–7 (approbatur to laudatur). The school grades follow a continuous seven-point scale from 4 (failed) to 10 (excellent). In the analyses, we will use both the grades for individual courses and grade means for the mandatory courses (all students) and mandatory plus specialization courses (students who include the respective exam in their matriculation examination).

5.4 Statistical methods

The results will be presented at the descriptive level and using ANOVA for group-level comparisons with the analyses performed with IBM SPSS 20. As the share of students sitting for the different exams in the 62 schools of the data varies, multi-level analysis has been found unfounded. Likewise, lack of consistent step-by-step variables does not allow for the use of meaningful linear regression analysis.

6 RESULTS

Before the results for the three research questions, we present in Table 1 basic descriptives for students' school grades and matriculation examination grades for the different subjects with more than 500 examinees.

Table 1. Students' grades for the mandatory and specialisation courses and the matriculation examination in subjects with more than 500 examinees except for the natural and socio-humanistic sciences, which are presented in full to provide a comparison for social studies.

	Mandatory courses			**Specialisation courses**			**Matriculation examination**		
	Mean	Std. D.	N	Mean	Std. D.	N	Mean	Std. D.	N
Finnish	7,72	0,904	5644	7,51	1,063	5150	4,37	1,334	5220
Swedish	7,68	0,977	639	7,63	1,148	548	4,29	1,378	605
Math Advanced	7,39	1,388	3073	7,44	1,589	2437	4,88	1,322	2402
Math Basic	7,10	1,316	4275	6,81	1,588	2358	4,26	1,424	2518
B-level Swedish	6,84	1,364	4925	7,24	1,452	1841	4,65	1,336	2138
A-level Finnish	7,79	1,003	617	7,90	0,964	184	5,07	1,179	568
A-level English	7,76	1,192	6528	7,59	1,337	5285	4,75	1,336	6036
Biology	7,62	1,310	5425	7,73	1,378	2770	4,77	1,385	1416
Geology	7,73	1,181	6487	7,80	1,267	1539	4,63	1,372	726
Physics	7,75	1,378	6436	7,22	1,399	2579	4,86	1,339	1214
Chemistry	7,70	1,475	6404	7,65	1,401	2320	4,83	1,414	1235
History	*7,72*	*1,150*	*6515*	*7,89*	*1,328*	*1868*	*4,58*	*1,377*	*1181*
Social studies	*7,73*	*1,193*	*6510*	*7,79*	*1,274*	*2596*	*4,59*	*1,375*	*1672*
Philosophy	7,84	1,333	6401	7,66	1,376	1076	4,98	1,355	239
Psycology	8,04	1,255	6477	7,87	1,233	2946	4,70	1,358	1272
Religion	7,91	1,094	5580	8,06	1,298	820	4,50	1,360	344
Ethics	8,13	1,107	699	8,60	1,071	62	4,53	1,324	53
Health studies	7,88	1,227	6471	7,78	1,202	2512	4,18	1,490	1505

As can be seen from Table 1, the number of students who study the non-mandatory courses in the different subjects and of those who sit for the different exams, as well as the level of course grades by subject vary considerably. Moreover, it can be seen that social studies collect a clearly higher number of examinees than its 'sister subject' history at least among the students of the current study.

RQ1. What is the relation between students' social studies course grades and their success in the social studies exam in the matriculation examination?

Before focusing on social studies, we will explore shortly the relation between students' course grades and their success in the respective exams in the matriculation examination across the different exams. As expected, students' course grade means in all subjects were relatively strongly related to the grade they attained in the respective exam, with the correlation highest (r = .809) for A-level English, the exam sat nationally by the greatest number of examinees due to the two mother tongues dividing the share of examinees of this only mandatory exam to two. However, the high correlations are not limited to individual subjects but reflect an overall high correlation between (and within) students' school grades and their success in the matriculation examination (r = .774).

To explore the relation between students' attainment in social studies and their success in the respective exam of the matriculation examination, we present in Table 2 data on the 1,684 students who included the social studies exam into their matriculation examination.

Table 2. Students' grades in the four social studies courses according to their grade in the matriculation examination's exam in social studies *

Matriculation grade	**Grades by courses**									
	Course 1		**Course 2**		**Course 3**		**Course 4**		**Mean**	
	Mean	Std.D.	Mean	Std.D.	Mean	Std.D.	Mean	Std.D.	Mean	Std.D.
Approbatur	6.97	1.177	6.87	1.059	6.64	1.160	6.48	1.81	6.74	1.302
Lubenter approbatur	7.58	1.197	7.38	1.220	7.33	1.176	7.10	1.652	7.35	1.311
Cum laude approbatur	7.93	1.169	7.78	1.071	7.73	1.138	7.81	1.123	7.81	1.125
Magna cum laude approbatur	8.31	1.066	8.29	1.031	8.18	1.182	8.29	1.262	8.27	1.135
Eximia	8.79	0.987	8.74	0.954	8.74	1.078	8.83	1.079	8.78	1.025
Laudatur	9.22	1.250	8.96	1.855	9.24	0.892	9.31	1.103	9.18	1.275
Mean	8.18		8.07		8.04		8.07		8.09	
Between-grade difference										
p	<.001		<.001		<.001		<.001		<.001	
η^2	0.214		0.216		0.267		0.261		0.240	

* For course attainment, the grades run from 4 (fail) to 10 (excellent, for the exam from approbatur (2) to laudatur (7).

As can be seen, students' grade in the social studies exam was, on average, strongly and linearly related to their success in the four courses on which the exam is based. The strength of the relation differed a little by course as can be seen from the effect size (η^2 or eta^2), which indicates the magnitude of the difference between the groups of students attaining the different matriculation exam grades. The η^2 indicator is to be read as the percentage of the variation between the exam grade groups explained (anteriorly) by their matriculation examination grade (η^2 = 2.14 meaning 21.4% explained).

To evaluate the results regarding the relation between the exam grades and course attainments in social studies presented in Table 2, we present the respective data for Finnish (n = 5,215) and History (n = 1,188) in Tables 3 and 4, respectively. From among the large number of exams, we chose Finnish as the compulsory exam with the largest number of examinees with Swedish being the mother tongue of just about five per cent of the population (infoFinland, 2022). Moreover, taking into consideration the essay-type answers called for in the social studies exam (and others), a comparison with the Finnish exam felt natural. History was chosen as a subject often sat by the same students as social studies, in addition to which it has an interesting position in being often included in the examination of the relatively small number of boys who leave the exams in the STEM subjects out of their examination.

Table 3. Students' grades in the nine Finnish as mother tongue courses according to their grade in the matriculation examination's exam in Finnish *

Matriculation grade	**Grades by courses**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Approbatur	7.13	7.00	6.38	6.50	7.25	6.25	9.00	5.43	6.33	7.13
Lubenter approbatur	6.91	6.75	6.62	6.67	6.54	6.36	7.31	5.93	6.12	6.91
Cum laude approbatur	7.35	7.19	7.16	7.18	7.02	6.84	7.98	6.45	6.63	7.35
Magna cum laude approbatur	7.79	7.62	7.63	7.61	7.47	7.32	8.00	6.99	7.04	7.79
Eximia	8.20	8.09	8.11	8.12	8.02	7.86	8.31	7.59	7.76	8.20
Laudatur	8.67	8.59	8.59	8.53	8.47	8.35	8.58	8.01	8.19	8.67
Mean	9.18	9.19	9.19	9.12	9.11	8.91	9.28	8.85	9.01	9.18
Between-grade difference										
p	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
η2	0.346	0.269	0.370	0.339	0.342	0.340	0.074	0.204	0.166	0.346

* For course attainment, the grades run from 4 (fail) to 10 (excellent, for the exam from approbatur (2) to laudatur (7). Due to the number of courses, we restrict the information to the mean.

Table 4. Students' grades in the six history courses according to their grade in the matriculation examination's exam in history *

Matriculation grade	Grades by courses						
	1	2	3	4	5	6	Mean
	Mean	Mean	Mean	Mean	Mean	Mean	
Approbatur	7.31	7.10	7.13	6.82	6.53	7.10	7.00
Lubenter approbatur	7.66	7.70	7.52	7.25	7.10	7.22	7.41
Cum laude approbatur	8.00	7.97	8.03	7.85	7.79	7.91	7.93
Magna cum laude approbatur	8.34	8.27	8.55	8.40	8.15	8.22	8.32
Eximia	8.90	8.86	8.91	8.89	8.67	8.92	8.86
Laudatur	9.34	9.36	9.52	9.48	9.40	9.44	9.42
Mean	8.27	8.23	8.31	8.15	7.99	8.12	8.18
Between-grade difference							
p	<.001	<.001	<.001	<.001	<.001	<.001	
η2	0.222	0.221	0.288	0.311	0.245	0.160	0.241

* For course attainment, the grades run from 4 (fail) to 10 (excellent, for the exam from approbatur (2) to laudatur (7). Due to the number of courses, we restrict the information to the mean.

Comparing Tables 2, 3 and 4, it can be seen that the relation between the two types of grades in Social studies and History resemble each another closely (effect sizes mostly between η^2 = 0.20–0.25). The Finnish exam, instead, differentiates between the groups more strongly with the exam grade explaining for most courses more than a third of the variance in students' course attainment across their upper secondary years. As only a few of the courses in Finnish are strictly related to the content of the Finnish exam (the only exam with two separate tasks on separate days, of which the final grade is the mean), the result seems to validate the status of the exam in mother tongue as the only mandatory exam of the examination and as a general indicator for students' overall attainment and thus the (by definition) (LAKI) readiness for tertiary studies. The same was true in an earlier study for part of the 13 courses in advanced mathematics (Author 2020) while in some (e.g., basic mathematics, geography, philosophy and religion) the explained variation stayed mostly around or under 20 per cent.

RQ2. How do the students who include the social studies exam in their matriculation examination differ from those who does not include it?

To answer the second research question, we formed three groups: 1) students who sat for the social studies exam, 2) students who had passed the four courses covered by the exam but did not sit for it, and 3) students who only passed the mandatory courses and did not sit for the exam.

Of the 6,020 students for whom the data includes both course and examination data, 1,672 sat for the social studies exam. Of these students, only 33 (0.1%) had not passed all

the four courses covered by the exam. Instead, 32.4 per cent of the students who had passed all the courses covered by the exam did not sit for it. Students who passed all the four courses had had slightly better grades in social studies at their final report card from basic education than those who only passed the two mandatory courses (mean 8.75 vs. 8.68, $p<.001$, $\eta^2 = 0.003$). However, the difference in the basic school grade in social studies among the 1980 students who passed all the four social studies courses and either sat or did not sit for the exam, was much bigger (mean 8.87 vs. 8.54, respectively, $p<.001$, $\eta^2 = 0.150$). The difference in their upper secondary course grades in social studies was even bigger (mean 8.14 vs. 7.44, respectively, $p<.001$, $\eta^2 = 0.298$). The means, however, are not comparable due to the use of the same grading of 4–10 at both basic and upper secondary education while students at the latter represent the better achieving part of the basic school students.

In Table 5, we present the mathematics exam choice for students who passed all the four social studies courses and either sat or did not sit for the exam. All students have to study at least the mandatory courses in either basic or advanced mathematics (6 vs. 10 courses, respectively) but the inclusion of mathematics in the matriculation examination is not mandatory. The comparison is especially relevant in the Finnish context now as since the 2018 reform of higher education student admission, students' matriculation grade in advanced mathematics brings more credit than the grades of most other exams independent of the field of study.

Table 5. Share and number of students sitting for the social studies vs. mathematics exam.

	No Social studies exam		Social studies exam		
	N	%	N	%	Total
No math exam	223	40 %	338	60 %	561
Basic math exam	385	32 %	805	68 %	1190
Advanced math exam	177	26 %	496	74 %	673
Total	785	32 %	1639	68 %	2424

As can be seen from Table 5, among the students who passed all the courses the matriculation exam is based on, the students who sat for the exam were over-represented among the students who did not include any mathematics exam in their examination but also among those sitting for the exam in advanced rather than basic mathematics. The result can be seen as somewhat surprising as social studies could have been an expected choice for students considering studies in a field such as history or law where basic mathematics might be a sufficient or even more appropriate choice due to its differing syllabus.

RQ3. How well does students' success in the social studies exam reflect their overall examination results and school attainment, and how does the social studies exam compare to the other exams in this respect?

To answer the last research question, we will look at the relation of students' grades in the different subject-specific exams to their success in the other exams they sat for in their matriculation examination. Even if the students do sit for different exams, the passing of the matriculation is considered to imply students' general readiness for tertiary education even if actual entrance to higher education happens throuh selection with about half of students are accepted based on their matriculation examination results and the other half through a faculty of study program-specific entrance examination. For the comparison presented in Table 6 for the natural and socio-humanistic subjects, however, it is to be kept in mind that the exams the students sit for differ by subject and total number. However, the mandatory exam in Finnish/Swedish and the A-level English included in almost all students' examination as well as the two-level grading of the exams (criterion-based and normative, with an extra algorithm for added comparability) are considered to guarantee adequate fairness for the claim of readiness for tertiary education and for comparisons.

Table 6. Students' grades mean in the other exams they have included in their matriculation examination according to the grade they have attained in the exams of the different natural and socio-humanistic sciences. The subject is presented in the order from the lowest mean of health education to the highest of physics. The scale of grades runs from A (2) = approbatur to L (7) = laudatur.

	Health edu-cation	Ethics	Psyco-logy	Geo-graph y	Philo-sophy	Histor y	Social studies	Religio n	Biolog y	Che-mistry	Physic s
A	3.37	3.82	3.53	3.44	3.56	3.44	3.39	3.46	3.51	3.65	3.77
B	3.59	3.97	3.88	3.81	3.83	3.73	3.82	3.73	3.90	4.16	4.10
C	4.01	4.42	4.21	4.05	4.27	4.21	4.29	4.30	4.37	4.60	4.61
M	4.35	4.39	4.62	4.61	4.81	4.69	4.82	4.67	4.92	5.09	5.09
E	4.76	5.33	5.16	5.03	5.18	5.30	5.29	5.46	5.37	5.62	5.73
L	5.28	5.47	5.70	5.72	5.90	5.90	5.94	5.94	5.98	6.15	6.20
Mea n	4.09	4.52	4.57	4.46	4.77	4.55	4.62	4.55	4.79	5.03	5.08
p	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
eta2	0.346	0.276	0.367	0.404	0.414	0.480	0.469	0.482	0.496	0.540	0.517

As can be seen from Table 6, each exam succeeds in measuring with high linearity not only the examinees' success in the respective subject-specific exam (see Tables 2, 3 and 4 for social studies, Finnish and history) but also their overall success. However, as can also be seen, the subjects differ clearly in the level of the overall attainment that the same grade in the different subjects represent. The same accuracy in prediction but also difference in the level of overall attainment was true also for the other subjects not presented in Table 6. The attainment level was especially high for students receiving high grades in A-level French, German and Swedish, but in these the result largely reflects the selective body of students studying these subjects, based on parents' choice at the primary level (see Kantasalmi & Kupiainen, 2021). As was to be expected, the difference was especially large between students receiving the same grade in the exams of basic vs. advanced mathematics (Kupiainen & Ouakrim-Soivio, 2019). Apparently, the algorithm adopted to correct the impact of the varying competence level of the students sitting for the different exams does not succeed to fully correct it. Yet, a matriculation examination passed with accepted grades is still regarded to imply readiness for higher education, just as is a certificate form vocational education.

7 DISCUSSION

In the reported study, we set to investigate Finnish students' attainment in social studies across their three years of general upper secondary education, and the relation of this success to their including the respective exam in their matriculation examination and their success in it. The topic is currently of special importance in Finland, where the reform of higher education student admission is under reparation, partially as seen to set school subjects to compete against each other for students due to the differing credit they bring in the selection for the coveted places in tertiary education. Furthermore, the study sheds light to the ability of a single exam at the end of upper secondary education to measure students' knowledge and skills acquired during three – or in some subjects even twelve – years of schooling.

The most striking finding of the study was how well the single exams succeed in gauging students' competence in the respective subject across the different courses. On the other hand, this should not come as a full surprise as the Finnish matriculation examination conforms to John Bishop's ideal of a CBEEES (Bishop, 1998) with each exam built on the syllabus of the respective subject. However, while this was true for all subjects, there were differences in the degree to which this was true. Likewise, there were differences in the extent to which the same grade attained in the different subject-specific exams' predicted students' overall attainment in the examination. This result repeated an earlier finding (Kupiainen et al., 2018), which was the basis for a corrective algorithm in the grading of the matriculation examination's exams (YTL, 2022) and partially for the way the different exams bring credit in higher education student selection after the 2018 reform.

Overall, the results of the study support the matriculation examination as a tool to

secure students' fair treatment at the high stakes transition between upper secondary and tertiary education. Moreover, through the exam tasks and the preliminary assessment criteria and guidelines, teachers get invaluable support for the interpreting of the curriculum. A good example was the first task of the spring 2022 exam for social studies, tapping into the (mandatory) course 'Politics and society'. Students were led into the subject by the rubric "Municipalities are said to have considerable power in Finland". Two follow-up questions were: " Describe the role of the municipal council, the municipal government, and the municipal boards' in the municipal decision-making system", and " Specify what tasks the municipality has and appraise how important the services provided by the municipality are from the point of view of its citizens".

Accordingly, the feedback teachers get through the matriculation examination process reinforces the competence goals set in the national core curriculum (NCC). In addition, while the goals of the NCC focus more on developing students' ability to process, analyse and use information instead of just memorizing individual facts, the matriculation examination tasks offer teachers examples of how these more general goals can be imbedded in factual knowledge acquisition. Besides, the past examination tasks, publisized promptly after each exam, offer a possibility for students to enrich their digital or printed learning materials with examples of what kind of information processing and internalisation of the content the curriculum aims at. Through this cycle of the more general learning goals and the content of the different subject-specific courses, the matriculation examination's exams and tasks tap to students' competence in logical reasoning and knowledge processing in different contexts, abilities needed in tertiary education.

While the higher education student admission reform of 2018 has been criticized especially regarding the emphasis it puts on advance mathematics, a surprising proposal by the Minister of Science and Culture Mikko Honkonen in Sptember 2022 to renounce the matriculation examination (see Yle, 2022) was received with controversial comments. His concern for the stress the increased stakes of the examination cause for students is understood by many, but many, including the Union of General Upper Secondary Students (Lukiolaisten liitto, 2022a), strongly opposed the inference he makes. The proposal is seen to endanger the equality offered by the common-to-all matriculation examination as compared to non-commensurate teacher given grades or faculty or study program-specific entrance examinations. The latter are seen to limit students' possibilities by forcing them to focus on just one option to maximize their chances (Sarvimäki & Pekkarinen, 2016). Besides, the entrance exanminations have already raised a growing market for commercial preparation courses for those who can afford this private form of education in a country with a principal of free education at all levels. Reflecting the topicality of the issue, there are currently two studies going on regarding the reform. One on the impact of the reform on upper secondary schools and students (VN, 2022) while the other centered on the credits awarded for the different exams in the different study programs (UNIFI, 2023).

It can be seen as a limitation that the study relies just on two sets of register data but even if the context of the study is in a wider assessment with a much richer data, the focus of this sub-study was just on the juxtaposition of these two data. The study has been a unique pathfinder in this as only in 2022 there opened a possibility to perform the same after the student identification number (OID) adopted earlier in basic education was extended to cover also upper secondary school and matriculation examination grades.

Overall, the results of the study can be interpreted as giving support to the use of the matriculation examination in selecting students to higher education, even if there were clear differences in how the exams of the different subjects predict students' overall success in the examination. Yet, even if the study showed a high correlation or linearity between students' school-based course grades and their grade in the respective matriculation exam, the differences found in teacher-given grades across schools do not support their use in tertiary student selection as it would endanger students' equal treatment in the process. Accordingly, it can be concluded that despite the problems related to the comparability of the matriculation examination grades across subjects, the examination itself offers added value and supports the fair treatment of applicants in tertiary student selection. Furthermore, without the matriculation examination there would be a need to develop some other form of evaluation to secure the quality and equality of Finnish upper secondary education to guarantee the reaching of the goals set for it. As the current study shows, the matriculation examination seems to be a surprisingly good tool for that.

In addition to the ongoing study on the impact of the 2018 student admission reform on students' study choices and success we want to add some notions of a need for further research. The first would be a more detailed study of the individual social studies exam tasks and their relation to the goals and content descriptions of the NCC (for the subject of philosophy, see Perälä & Salmenkivi, 2022). An extension of this would be to investigate the way the tasks tapping into the different learning goals and contents relate to students' success in the respective and the other exams. Another issue that has not been yet studied at a general level is the impact of the digitalisation of the examination on the quality of students' answers. Moreover, it would be of interest to replicate this study in other countries with similar (or different) exit exam systems.

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ACKNOWLEDGEMENTS

The study was supported by the Academy of Finland project "Redefining adolescent learning: A multi-level longitudinal cohort study of adolescent learning, health, and well-being in educational transitions in Finland" (288208) as well as by the participating municipalities for whom the results have served to evaluate the effectiveness of their education. For this purpose, permission to conduct data collections in the schools was obtained from the respective municipal Education Departments. Ethical approval for the study was obtained from the Ethical Committee of the Finnish National Institute of Health and Welfare.

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