

Fit between applicants' prior knowledge and university selection criteria: study of Finnish teacher education student admission in 2013–2015

Jenni Kunnari, Jouni Pursiainen, Esa Läärä, Jarmo Rusanen & Hanni Muukkonen

To cite this article: Jenni Kunnari, Jouni Pursiainen, Esa Läärä, Jarmo Rusanen & Hanni Muukkonen (2022): Fit between applicants' prior knowledge and university selection criteria: study of Finnish teacher education student admission in 2013–2015, Journal of Education for Teaching, DOI: [10.1080/02607476.2022.2072714](https://doi.org/10.1080/02607476.2022.2072714)

To link to this article: <https://doi.org/10.1080/02607476.2022.2072714>



© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



[View supplementary material](#)



Published online: 24 May 2022.



[Submit your article to this journal](#)



Article views: 254





[View related articles](#)



[View Crossmark data](#)

Fit between applicants' prior knowledge and university selection criteria: study of Finnish teacher education student admission in 2013–2015

Jenni Kunnari ^a, Jouni Pursiainen^b, Esa Läärä^c, Jarmo Rusanen^c and Hanni Muukkonen ^a

^aFaculty of Education, University of Oulu, Oulu, Finland; ^bFaculty of Technology, University of Oulu, Oulu, Finland; ^cFaculty of Science, University of Oulu, Oulu, Finland

ABSTRACT

Fluent transitions to higher education are a common concern, especially in highly selective Finnish teacher education (TE). This study examined the fit between the matriculation examination (ME) results and the selection criteria applied in TE. We studied the accepted applicants in Finland in 2013–2015 ($n = 5116$), and both the accepted and rejected applicants at the University of Oulu in 2015 ($n = 2170$). Among the accepted applicants, the ME typically consisted of mother tongue, advanced syllabus English, basic syllabus mathematics, psychology, and health education. The various selection criteria did not directly differentiate the applicants with respect to the ME. The two strongest predictors in the ME for acceptance to TE were the choice of and performance in advanced syllabus mathematics and psychology. The results are discussed in light of selection criteria and TE.

ARTICLE HISTORY

Received 8 September 2020
Accepted 4 January 2022

KEYWORDS


General upper secondary education; matriculation examination; admission process; selection criteria; teacher education

Introduction

Higher education selection criteria aim to differentiate the applicants who will most probably be successful in completing the education (Noble and Sawyer 2004). These criteria should represent the needs for competences and study skills of new students (Stemler 2012). The criteria also reflect expectations about future professionals' suitability for the field (Toom 2017). Universities with a high number of applicants evaluate the applicants' suitability with different selection criteria and are, hence, identified as selective (Heil, Reisel, and Attewell 2014). Importantly, the selection criteria guide the applicants' educational and occupational choices and help to evaluate which academic demands they are well prepared to meet (Linn 1990). Regarding the transition to higher education, a shared concern is the fit between the applicants' characteristics and their major in university (Soppe et al. 2019).

In this study, we investigated admission to teacher education (TE) in Finland. We addressed the fit between applicants' secondary education outcomes and selection criteria applied in TE. The tests taken and grades attained in the national matriculation

CONTACT Jenni Kunnari  jenni.kunnari@oulu.fi  Faculty of Education, University of Oulu, Oulu, Finland

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/02607476.2022.2072714>

© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

examination (ME) at the end of secondary education provide comparative information on applicants' educational choices that we consider as a representation of their prior knowledge (Dochy, Segers, and Buehl 1999). There is a need to study the selection criteria considering the ME to understand the admission process and the relation of prior knowledge to acceptance. This is especially important since the ME has been considered in various ways as a selection criterion, along with admission and aptitude tests. TE refers to those bachelor's and master's degree programmes that educate teachers mainly for primary schools (classes 1–9, age 6–15). Hence, this study does not cover subject teacher education, because they get their formal competence to teach by completing the master's degree in their subject studies and a separate set of pedagogical studies for teachers.

Higher education applicants' educational choices

Individual and contextual factors are known to influence young people's educational and occupational choices (Lent, Brown, and Hackett 1994). Students in secondary education usually choose or reject certain subjects based on their past performance (Palmer, Burke, and Aubusson 2017). According to the expectancy-value theory, the key determinants of choice are the value (attainment value, intrinsic value, utility value, and cost) and the expected probability of success (Eccles 1983). The utility value refers to how a task relates to the individual's future. Wigfield and Cambria (2010) pointed out that the reason to choose mathematics, for example, is related to a known requirement for a science degree. This highlights the utility value for young people making educational choices. Also, higher education students focus on subjects they have been successful in previously (van de Werfhorst, Sullivan, and Cheung 2003). Interest is known to correlate with choices and can be observed as a domain-specific interest in subjects (Hidi and Renninger 2006). Both students in secondary education (Holmegaard 2015) and new students in the university (Mikkonen et al. 2009) explain their educational choices by interest. In this study, we investigate the TE applicants' ME results as a representation of their interest and perceived utility regarding educational choices leading to preferred university studies.

Young people's educational choices are affected by their home country's education system. In Finland, young people choose academically or vocationally emphasised secondary education tracks at the age of 15, while analogous choices are made at the age of 13 in the United Kingdom, 12 in the Netherlands, and 10 in Germany (EC 2018). Contrary to the Dutch track model (Vulperhorst et al. 2017), Finnish young people do not specialise in 3–5 subjects but study the compulsory courses in all subjects and take optional courses in subjects of their own interest (see the Context section). Given this situation of rather broad and free possibilities, we wanted to examine the TE applicants' educational choices in secondary education.

Admission to universities

For admission to university studies, some institutions require that the applicants have studied a certain track (Vulperhorst et al. 2017) or have a certain level of accomplishment in secondary education (e.g. high school grade point average, HSGPA) (Stemler 2012). Some require a certain level of success in standardised tests (e.g. SAT or ACT) (Noble and Sawyer 2004). Others accept all applicants but evaluate and grant the study rights based

on success in the first year of study (Steenman, Bakker, and van Tartwijk 2016). Also, universities apply other selection criteria, such as motivation letters and references, to mention but two. These various selection criteria evaluate the applicant's knowledge and learning in different ways (Stemler 2012). Importantly, they function as an indicator for predicting students' academic performance during the education (Richardson, Abraham, and Bond 2012). Field-specific prior knowledge (Dochy, Segers, and Buehl 1999) and high success in the native language and mathematics in secondary education (Allen, Mattern, and Ndum 2019) have been identified to relate with high performance in universities across disciplines.

Secondary education outcomes measure already gained educational achievement (Noble and Sawyer 2004), while admission tests evaluate aptitude regarding one's potential for learning, abilities when completing the test, and achievement level (Stemler 2012). The validity of HSGPA has been questioned since it usually represents several subjects (Bowers 2011) and fades out differences in subject specific skills and knowledge (Ofqual 2012).

Less attention has been given to those young people who do not attain a study right. The rejected applicants and the differences between accepted and rejected applicants have been understudied (see e.g. McGraw and Fish 2018). A better understanding is needed on how the selection criteria differentiate students, especially in an educational system that applies highly selective admission, and how these differences arise from prior knowledge.

Research questions and objectives

Admission to Finnish TE is competitive, and approximately one-tenth of the applicants are accepted annually (Paronen and Lappi 2018). The high number of applicants imposes a requirement to set selection criteria such that they differentiate the applicants in a proper way (Hökkä and Eteläpelto 2014). By analysing the ME results and their interplay with selection criteria, it is possible to identify how educational choices and success relate with admission to highly selective TE. This study gives an insight into an educational system that has not previously emphasised prior knowledge in admission to universities. Also, this study takes part in an international discussion where the importance of secondary education outcomes has been identified for high performance in higher education. However, admittance based on prior knowledge is understudied. This study contributes to recent strands in research on transitions concentrating on the phase before entering higher education (Noyens et al. 2017).

First, we investigated prior knowledge among those who received and confirmed the right to study into TE in 2013–2015 (data 1). We evaluated what kind of prior knowledge TE gained with different ways to consider the applicants ME. We addressed the following research question:

What were the ME results of the accepted applicants and were there any differences based on applied selection criteria?

Second, we examined the accepted and rejected TE applicants to the University of Oulu (UO) in 2015 (data 2). We compared these groups as to the performance in the ME and analysed aspects in it that predicted the probability of attaining a study right in TE. The following research questions were addressed:

What were the ME results among accepted and rejected applicants?

To what extent did the ME results in different subjects predict the probability of acceptance to TE?

Methodology

Research context

Overview of the Finnish general upper secondary education and the matriculation examination

The main route to Finnish universities is through general upper secondary education, culminating in the ME (MEC 2020), which has an important guiding factor in students' decisions concerning future education (Kupiainen, Marjanen, and Ouakrim-Soivo 2018). According to the national curriculum (FNAE 2003), students take part in 75 courses in several subjects over 3 years (Table 1). Students take compulsory and optional courses in the mother tongue (Finnish, Swedish, or the Sami language) and advanced or basic syllabus mathematics. They also take, at least one advanced syllabus (usually English) and one basic syllabus language (usually intermediate Swedish or Finnish), and subjects in the group of humanities and natural sciences (FNAE 2003).

The tests are implemented biannually by the Matriculation Examination Board and students take part in them across three sequential times. The tests assess whether students have attained the required knowledge and skills according to the curriculum, and whether they have reached an adequate level of maturity (Britschgi 2014). Students need to take at least four tests, among which only the mother tongue is compulsory; in addition, the students choose between subjects in which they have passed compulsory and optional courses. On average, students take four to six tests (MEB 2021). Students taking advanced syllabus mathematics in the ME tend to take more than the minimum required number of tests (Kupiainen, Marjanen, and Ouakrim-Soivo 2018). The assessment is based on seven grades (listed from highest to lowest): *laudatur* (L), *eximia cum laude approbatur* (E), *magna cum laude approbatur* (M), *cum laude approbatur* (C), *lubenter approbatur* (B), *approbatur* (A) and *improbatur* (I) (failed test) (MEB 2017).

The admission process to Finnish teacher education

The admission test (joint or study programme specific) has evaluated the applicant's academic study skills and the ability to memorise, understand, and apply knowledge based on academic articles in the field of education, psychology, and sociology (Malinen, Väisänen, and Savolainen 2012). Those successful in the admission test were invited to an aptitude test, individual or group interviews, where a professional teacher educator evaluated the applicant's suitability, motivation, and commitment to TE and the work of a teacher (Pollari, Salo, and Koski 2018). Overall, there was a lot of variation in how the universities carried out the admission process, but a unifying factor was that the aptitude test was mandatory for TE, while for other educational sciences, it was not always included.

In the examined timeframe, the selection criteria were mainly constructed based on admission and aptitude tests, while the ME was considered to a varying degree, if at all (see the Qualitative categorisation section). This study has examined the applicants based on the ME and the register data available for our examination included neither

Table 1. Subjects possible to study in general upper secondary education and to take in the matriculation examination based on the curriculum of 2003–2015 (FNAE 2003).

Subject group	Subjects	Level of studies	Number of compulsory courses*1	Number of optional courses*1
Mother tongue	Finnish, Swedish, Sami Language Second language (L2, Finnish or Swedish ^{*2})		6	3
Mathematics		Advanced syllabus	10	3
Languages	Intermediate Swedish or Finnish ^{*3} , English, French, German, Spanish, Russian, Portuguese, Italian	Basic syllabus	6	2
		Advanced syllabus ^{*4}	6	2
Subjects in humanities and natural sciences	Physics, Chemistry, Biology, Geography, Ethics, Religion (Evangelical Lutheran or Orthodox), Philosophy, Psychology, Health Education, History, Social Studies	Basic syllabus ^{*5}	5	2
			1–4	1–7

*1 One course lasts 38 hours.

*2 For those whose mother tongue is other than Finnish or Swedish.

*3 Second national language, compulsory to study in general upper secondary education.

*4 Started in primary school.

*5 Started in lower secondary school (includes an intermediate language started in the 7th grade, at age 13. May also include a language started in general upper secondary education).

the admission nor aptitude test scores. Hence, this study does not provide a full account of the admission process and only addresses prior knowledge and the outcome of selection.

In this study, TE refers to the following degree programmes: class teacher, crafts teacher, special needs teacher, home economics teacher, music teacher, special needs pedagogy, adult education, guidance counsellor in primary and upper secondary education, early childhood education (only bachelor's degree), and educational sciences.

Data sources

The register data consists of all the applicants accepted nationally to TE nationwide in 2013–2015 (data 1), and both the accepted and rejected applicants to the University of Oulu (UO) in 2015 (data 2). These data were combined with the ME results: Data 1 was merged by CSC – IT Center for Science Ltd, and data 2 by UO. Permission to use the material was received from the universities acting as data controllers and from the Matriculation Examination Board.

The observational units in data 1 and 2 include the applicants who received a study place and were registered for attendance or non-attendance (Universities Act 558/2009). It is not relevant for this study whether the students started their studies immediately or after the year they were entitled to enrol for non-attendance. In addition, data 2 also included rejected applicants.

Data 1

Data 1 cover 5284 people who were accepted and received a study place in TE in 2013–2015. Students with no ME data in the register or whose degree programme was not known were excluded. Duplicates were removed from the data, while students who had been accepted to various degree programmes in 2013–2015 were included in each of them. After these restrictions and exclusions, the study population included 5116 applicants accepted to TE, 84% of whom were women.

Data 2

Data 2 include all the applicants to TE at UO in 2015, altogether 3265 applicants. Applicants whose ME results were not included in the register data were excluded, leaving the size of the study population at 2700 applicants. The data also included applicants whose applications were cancelled: they had been accepted to other study places with higher priority, so they were excluded. After these restrictions and exclusions, the study population contained 209 accepted and 1961 rejected applicants. There was no information on gender in the data.

Analysis

Qualitative categorisation

To answer the first research question, we examined the selection criteria applied in TE nationally in 2013–2015. We formed three categories, A, B and C, according to how the ME was considered for admission to the degree programmes.

We defined category A to include the degree programmes whose selection criteria specified three other subjects besides the mother tongue (for example, advanced or basic syllabus mathematics, one subject from the group of humanities and natural sciences, and

one language) for scoring. Category B included the degree programmes in which the selection criteria specified that, in addition to the mother tongue, the three best subjects were to be scored. Category C included the degree programmes whose selection criteria did not take the ME into account at all. All the study programmes in data 2 were included in group C.

Statistical analysis

The distributions of the basic features are summarised with descriptive statistics. The examination concentrates on the compulsory mother tongue, advanced syllabus English, choice of mathematics (advanced, basic, or no mathematics), psychology, and health education. These subjects were the tests taken most often and therefore chosen for closer examination. We describe the performance in these tests by the mean and standard deviation of the grades. For this purpose, we transformed the grades into numerical values according to the following standard practice: I = 0, A = 2, B = 3, C = 4, M = 5, E = 6, and L = 7 (MEB 2017).

To answer the third research question, binary logistic regression (Niu 2020) was applied. Logistic modelling was applied to predict the probability that an applicant was granted the right to study in TE based on the binary outcome, 0 = rejected, 1 = accepted, and five categorical covariates. Subjects other than mathematics were encoded into four categories. The first category comprises grades I, A, and B (low achievers), the second comprises grades C and M (average achievers), with the third category covering grades E and L (high achievers). The fourth category referred to those who did not take the subject in question. Mathematics was decoded into seven categories. Low achievers in basic syllabus mathematics were put in category one, average achievers in category two, and highest achievers in the third category. Low achievers in advanced syllabus mathematics were included in category four, average achievers in category five, and the highest achievers in category six. The applicants who took neither advanced nor basic syllabus mathematics were put in category seven. The reference category was 'average achievers' for tests other than mathematics, where it was 'average achievers in basic syllabus mathematics'.

Results

Tests taken and grades attained in the ME among accepted and rejected applicants to TE

First, research questions one and two are answered: (1) What were the ME results of the accepted applicants and were there any differences based on applied selection criteria? and (2) What were the tests taken and grades attained in the ME by the accepted and rejected applicants?

The profile of tests taken in the ME was relatively similar among accepted applicants in data 1 and 2 (Table 2). The compulsory test in the mother tongue was taken by all and advanced syllabus English on average by 92–95% in both data. The percentages of the three alternatives for mathematics (22–53%), psychology (41–49%), and health education (44–49%) were similar across both data. When comparing the accepted and rejected applicants in data 2, those accepted had higher percentages of advanced syllabus

Table 2. The most taken tests and grades attained in the ME among accepted applicants (data 1) and accepted and rejected applicants (data 2).

Subject	Accepted TE applicants in Finland in 2013-2015		TE applicants at the University of Oulu in 2015			
	Total 100% (n)	Average success ^{*1}	Accepted % (n)	Average success ^{*1}	Rejected % (n)	Average success ^{*1}
Mother tongue	100 (5116)	4.8	100 (209)	4.9	100 (1961)	4.2
Advanced syllabus English	95 (4861)	4.1	94 (196)	4.1	92 (1799)	3.7
Advanced syllabus mathematics	28 (1421)	4.7	34 (72)	4.2	24 (476)	3.7
Basic syllabus mathematics	49 (2487)	4.0	41 (85)	4.6	53 (1044)	4.0
No mathematics	23 (1208)		25 (52)		22 (441)	
Health education	46 (2353)	5.1	44 (91)	5.1	49 (964)	4.4
Psychology	46 (2333)	4.9	49 (103)	5.0	41 (806)	4.2

^{*1}Based on numerical scoring of the grades from lowest to highest: I = 0, A = 2, B = 3, C = 4, M = 5, E = 6, L = 7 (MEB 2017).

mathematics (34% vs. 24%) and psychology (49% vs. 41%). Some variations of those taking advanced and basic syllabus mathematics were observed across the selection criteria categories (data 1, supplementary material 1). Other tests in humanities and natural sciences were taken at most by 20% throughout both data, intermediate Finnish or Swedish by 65%, advanced syllabus languages by 4–12%, and basic syllabus languages by 20%. Hence, we concentrate on the tests reported in Table 2.

The accepted applicants in data 1 and 2 performed on average at the same level (Table 2). The mean grades were highest in mother tongue, psychology, and health education. Those among the accepted who took the test in advanced syllabus mathematics in data 1 performed well in it. It is worth noting, that the averages were remarkably similar across the selection criteria categories (A–C) (supplementary material 2). The rejected applicants had lower average grades throughout when compared to those accepted. This was true even when the selection was fully based on the admission and aptitude tests. The standard deviations ranging from 1.0 to 1.4 indicate that there was considerable variation for each ME test in both data.

In both data, tests were most typically taken in five (45%) or six (34%) subjects. Much fewer students had only taken the mandatory four tests (14%) or more than six tests (8%). In data 1 and 2, those accepted who took the test in advanced syllabus mathematics took 5.8 tests on average, while those who took basic syllabus mathematics took 5.4 tests on average. For those who did not take any mathematics test, this average was 5.0. In data 2, among rejected applicants, the trends were similar: advanced syllabus mathematics (5.5 tests on average), basic syllabus mathematics (5.2), and no mathematics test (5.0). The standard deviations for the number of tests taken by choice of mathematics ranged from 0.7 to 1.1.

Predicted probability of obtaining the right to study in TE by tests taken and grades attained

The third research question examined to what extent the ME results in different subjects predicted the probability of acceptance to TE. The estimation results from fitting a binary logistics regression model to predict the probability of acceptance among the applicants at UO are presented in supplementary material 3. The estimated regression coefficients

Table 3. Predicted probability (%) of being accepted to teacher education at the University of Oulu in 2015 by performance in psychology in selected combinations of tests taken in other subjects with high or average performance throughout, based on the fitted logistic regression model.

Psychology	High success in the other subjects* ¹ and advanced syllabus mathematics	High success in the other subjects* ¹ and basic syllabus mathematics	Average success in the other subjects* ¹ and basic syllabus mathematics
High	45	27	16
Average	41	24	14
Low	19	10	5
No psychology	32	18	10

*¹Mother tongue, advanced syllabus English, and health education.

and odds ratios indicate that performance in advanced syllabus mathematics was the strongest single predictor of acceptance, followed by that in psychology and mother tongue. The highest difference in coefficients was found between high performance in advanced syllabus mathematics and average performance in basic syllabus mathematics, with the advanced syllabus coefficient being 1.05 and OR 2.85. On the other hand, the corresponding difference between high and average performance in psychology was 0.17 and OR 1.19.

To obtain a more concrete interpretation of the modelling results, fitted values for the probability of acceptance were computed for selected combinations of grades in different tests based on the estimated regression coefficients presented in the supplementary material 3. Mother tongue, advanced syllabus English, and health education were considered by default. Two perspectives were considered, psychology (Table 3) and mathematics (advanced and basic syllabus) (Table 4). For each combination of the examined subjects, the probability of acceptance was computed for those achieving high or average grades throughout.

The contrasts in the predicted probabilities for different ME results clearly show the high achiever's probability of acceptance to TE, and the results confirm the descriptive results presented in Table 2. It is noteworthy that there is a high probability of acceptance to TE even though the applicants had taken advanced syllabus mathematics test by highest grades without taking psychology (Table 3).

Table 4. Predicted probability (%) of being accepted to teacher education at the University of Oulu in 2015 by performance in mathematics in selected combinations of tests taken in other subjects with high or average performance throughout, based on the fitted logistic regression model.

Mathematics	High success in the other* ¹ subjects	Average success in the other* ¹ subjects
Basic syllabus		
High	27	18
Average	22	14
Low	17	10
Advanced syllabus		
High	45	32
Average	32	21
Low	23	14
No mathematics	26	17

*¹Mother tongue, advanced syllabus English, health education, and psychology.

Taking a test in advanced syllabus mathematics predicted overall a greater probability of acceptance than taking basic syllabus mathematics or no mathematics (Table 4). For those applicants who had taken all their other examined tests with high grades but advanced syllabus mathematics with average grades, or vice versa, advanced syllabus mathematics with high grades and all the other examined tests with average grades, the probability of being accepted was 32%. The contrast of not taking a test in mathematics with high success in advanced or basic syllabus mathematics is greater than the contrast between not accomplishing the test in psychology with high achievers in psychology.

Limitations of the study

Since our study concentrated on the ME, we cannot assess the contribution of national- or degree-programme-specific admission tests and aptitude tests to admission to TE. Regarding the withdrawn applicants to UO (data 2), we did not have information on whether they could have been accepted to the university in question. In addition, applicants with missing data on the ME may indicate different educational and occupational backgrounds. Therefore, we were not able to evaluate all applicants' process of obtaining a right to study. Data on prior alternative education or occupation would provide important insight into the selection of students to TE.

Some degree programmes may belong to several of the qualitative categorisations (A-C) due to differences between years. The degree programmes were eventually included in the group where the most cases belonged. In this study, we did not examine the differences between the years.

Discussion

First, the results for the research questions one and two are discussed combining data 1 and 2. Approximately half of the accepted applicants had chosen basic syllabus mathematics and just a quarter the advanced syllabus mathematics. About a quarter took neither of them. On the average, advanced syllabus mathematics was connected to a higher number of tests in the ME in comparison with the 'no mathematics' choice. Psychology and health education were the most taken tests in the group of humanities and natural sciences. The highest average grades were attained in mother tongue, psychology, and health education. The applicants accepted nationwide (data 1) reached on average the highest grades in advanced syllabus mathematics, while the applicants accepted locally (data 2) in basic syllabus mathematics. This study shows that there were only minor differences between applicants ME results in selection criteria categories A-C (data 1). The accepted and rejected applicants were mainly evaluated based on admission and aptitude tests; however, those accepted performed on average with higher grades in the ME than those rejected (data 2).

Second, binary logistic regression was used to analyse acceptance to TE for data 2. The analysis of accepted and rejected applicants showed that performance in advanced syllabus mathematics, together with high grades also in the other examined subjects, predicted greatly enhanced chances to be accepted to TE.

High success in advanced syllabus mathematics, together with a higher number of tests taken in the ME might be a sign of the applicant's general competence, since advanced syllabus mathematics is considered a demanding subject. The share of those not taking the test in mathematics underlines the fact that it was not included in the

selection criteria. Psychology and health education being the most taken tests from the group of humanities and natural sciences is indicative of an interest in learning, development, and growth and of an identified utility value (Wigfield and Cambria 2010) regarding post-secondary education. Hence, it is possible to identify a fit between students' ME results and the selection criteria applied in TE (Soppe et al. 2019). In line with Ofqual (2012), we conclude that the ME might include information, such as field-specific prior knowledge, that should be considered in admission to universities since it is known to predict performance in universities (Dochy, Segers, and Buehl 1999).

The Finnish TE functions as a good example of selective admission, since most years there are more applicants than available study rights (Paronen and Lappi 2018). Even though the selection criteria consisted mainly of admission and aptitude tests, we identified different success levels in the ME among the accepted and rejected. We also identified field-specific prior knowledge relating with the topics covered in admission tests and in TE. It is important to point out that the admission test and secondary education outcomes evaluate skills and knowledge from different aspects (Stemler 2012). However, field-specific prior knowledge in psychology and health education might have been beneficial for the applicants in accomplishing the admission tests successfully.

Conclusions

We have shown that the ME results appear in student admission to TE in a rather uniform way, even though the ME was used as selection criteria in many different ways or not at all. We were interested in the ME due to a government initiative that was launched in 2016 and directed the Finnish universities to emphasise the ME in admission since 2020. The aim is to ease the applicant's preparation for admission tests, to speed up the transition to university, and to provide a lightweight and unified way to select students for different disciplines (PMO 2016). According to the guidelines for applicants, after the reform, the ME tests included in scoring are the applicant's mother tongue, mathematics (advanced or basic syllabus), one subject in the group of humanities and natural sciences, and one language. The aptitude test will maintain its central position in the admission process, and the admission test will function as an alternative path. The change from evaluating applicants based on admission tests to evaluating the ME imposes demands on understanding better the aspects of smooth and successful transitions. The results of this study are not applicable to evaluate the entire Finnish education system. However, these results could be applied when defining the TE selection criteria and when planning the curriculum.

The question remains how the secondary education students' educational choices might be influenced by the new selection criteria and change the tests to be taken in the ME. The results of this study emphasised mother tongue, mathematics, as well as interest in subjects covered in TE as possible criteria for admission to TE. This could be applicable also in international contexts where the interest in TE is lower. There is a further need to examine the relationship between the ME and success in the aptitude test and their interplay in being accepted to TE. This is especially important due to high selectivity based on the high number of applicants and the restricted number of places in TE.

Research consent approval from the national Matriculation Examination Board (dnro 5/032/2016) and via the University of Oulu. Approval of ethical committee was not required since the study is not intrusive according to the Finnish National Board on Research Integrity, TENK. The study utilised the register material for which individual data subject consent is not requested.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Ministry of Education and Culture, Finland: Opiskelijavalintojen uudistaminen project [OKM/197/523/2016] and AnalyticsAI-Distance guidance project [OKM/183/523/2020].

ORCID

Jenni Kunnari  <http://orcid.org/0000-0002-4411-657X>

Hanni Muukkonen  <http://orcid.org/0000-0002-1086-1352>

References

- Allen, J., K. Mattern, and E. Ndum. 2019. "An Empirically Derived Index of High School Academic Rigor." *Educational Measurement: Issues and Practice* 38 (1): 6–15. doi:10.1111/emip.12236.
- Bowers, A. J. 2011. "What's in a Grade? The Multidimensional Nature of What Teacher-Assigned Grades Assess in High School." *Educational Research and Evaluation* 17 (3): 141–159. doi:10.1080/13803611.2011.597112.
- Britschgi, V. 2014. "The Finnish Matriculation Examination." April 9. https://www.ylioppilastutkinto.fi/images/sivuston_tiedostot/Kehittaminen/YTL_presentation_English.pdf
- Dochy, F., M. Segers, and M. M. Buehl. 1999. "The Relation between Assessment Practices and Outcomes of Studies: The Case of Research on Prior Knowledge." *Review of Educational Research* 69 (2): 145–186. doi:10.3102/00346543069002145.
- EC (European Commission). 2018. "The Structure of the European Education Systems 2018/19 Schematic Diagrams." *Eurydice Facts and Figures*. https://eacea.ec.europa.eu/national-policies/eurydice/sites/eurydice/files/the_structure_of_the_european_education_systems_2018_19.pdf
- Eccles, J. S. 1983. "Expectancies, Values, and Academic Behaviors." In *Achievement and Achievement Motivation*, edited by J.T. Spence, 75–146. San Francisco, CA: Freeman.
- FNAE (Finnish National Agency for Education). 2003. "Lukion opetussuunnitelman perusteet 2003 [National Core Curriculum for upper Secondary Education]." https://www.oph.fi/sites/default/files/documents/47345_lukion_opetussuunnitelman_perusteet_2003.pdf
- Heil, S., L. Reisel, and P. Attewell. 2014. "College Selectivity and Degree Completion." *American Educational Research Journal* 51 (5): 913–935. doi:10.3102/0002831214544298.
- Hidi, S., and K. A. Renninger. 2006. "The Four-phase Model of Interest Development." *Educational Psychologist* 41 (2): 111–127. doi:10.1207/s15326985Sep4102_4.
- Hökkä, P., and A. Eteläpelto. 2014. "Seeking New Perspectives on the Development of Teacher Education: A Study of the Finnish Context." *Journal of Teacher Education* 65 (1): 39–52. doi:10.1177/0022487113504220.

- Holmegaard, H. T. 2015. "Performing A Choice-Narrative: A Qualitative Study of the Patterns in STEM Students' Higher Education Choices." *International Journal of Science Education* 37 (9): 1454–1477. doi:10.1080/09500693.2015.1042940.
- Kupiainen, S., J. Marjanen, and N. Ouakrim-Soivo. 2018. *Ylioppilas valintojen pyörteissä. Lukio-opinnot, ylioppilastutkinto ja korkeakoulujen opiskelijavalinta* [Secondary school graduates in the turbulence of choices. Secondary school education, matriculation examination, and university student admission]. Helsinki: Suomen ainedidaktisen tutkimusseuran julkaisuja. Ainedidaktisia tutkimuksia 14.
- Lent, R. W., S. D. Brown, and G. Hackett. 1994. "Toward a Unifying Social Cognitive Theory of Career and Academic Interest, Choice, and Performance [Monograph]." *Journal of Vocational Behavior* 45 (1): 79–122. doi:10.1006/jvbe.1994.1027.
- Linn, R. L. 1990. "Admissions Testing: Recommended Uses, Validity, Differential Prediction, and Coaching." *Applied Measurement in Education* 3 (4): 297–318. doi:10.1207/s15324818ame0304_1.
- Malinen, O., P. Väisänen, and H. Savolainen. 2012. "Teacher Education in Finland: A Review of A National Effort for Preparing Teachers for the Future." *The Curriculum Journal* 23 (4): 567–584. doi:10.1080/09585176.2012.731011.
- McGraw, A., and T. Fish. 2018. "Selection and Rejection in Teacher Education: Qualities of Character Crucial in Selecting and Developing Teacher Education Students." *Asia-Pacific Journal of Teacher Education* 46 (2): 120–132. doi:10.1080/1359866X.2017.1355048.
- MEB (Matriculation Examination Board). 2017. "Ylioppilastutkintolautakunnan yleiset määräykset ja ohjeet [General order and instructions by the Matriculation examination Board]." https://www.ylioppilastutkinto.fi/images/sivuston_tiedostot/Ohjeet/Yleiset/maaraykset_ja_ohjeet_2017_fi.pdf
- MEB (Matriculation Examination Board). 2021. "Kokeiden määrä tutkinnossa 2011–2020" [Number of tests in degree in 2011–2020]. <https://www.ylioppilastutkinto.fi/ext/stat/FS2020A2011T4020.pdf>
- MEC (Ministry of Education and Culture). 2020. "Education System in Finland." <https://minedu.fi/documents/1410845/15514014/Education+system+in+Finland/7c5a920b-47a5-c3ce-cbca-818ff3a5f848/Education+system+in+Finland.pdf>
- Mikkonen, J., A. Heikkilä, M. Ruohoniemi, and S. Lindblom-Ylänne. 2009. "'I Study because I'm Interested': University Students' Explanations for Their Disciplinary Choices." *Scandinavian Journal of Educational Research* 53: 229–244. doi:10.1080/00313830902917261.
- Niu, L. 2020. "A Review of the Application of Logistic Regression in Educational Research: Common Issues, Implications, and Suggestions." *Educational Review* 72 (1): 41–67. doi:10.1080/00131911.2018.1483892.
- Noble, J., and R. Sawyer. 2004. "Predicting Different Levels of Academic Success in College Using High School GPA and ACT Composite Score". *ACT Research Report Series 2002-4*.
- Noyens, D., V. Donche, L. Coertjens, and P. Van Petegem. 2017. "Transitions to Higher Education: Moving beyond Quantity." In *Higher Education Transitions: Theory and Research*, edited by Eva Kyndt, Vincent Donch, Keith Trigwell, and Ylänne SariLindblom, 3–12. London: Routledge.
- Ofqual (Office of Qualifications and Examinations Regulation). 2012. "International Comparisons in Senior Secondary Assessment." Belfast: Ofqual. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/372211/2012-06-12-international-comparisons-in-senior-secondary-assessment.pdf
- Palmer, T.-A., P. F. Burke, and P. Aubusson. 2017. "Why School Students Choose and Reject Science: A Study of the Factors that Students Consider When Selecting Subjects." *Journal of Science Education* 39 (6): 645–663. doi:10.1080/09500693.2017.1299949.
- Paronen, P., and O. Lappi. 2018. "Finnish Teachers and Principals in Figures. Finnish National Agency for Education." *Reports and Surveys* 2018:4. https://www.oph.fi/sites/default/files/documents/finnish_teachers_and_principals_in_figures_0.pdf
- PMO (Prime Minister's Office). 2016. "Action Plan for the Implementation of the Key Project and Reforms Defined in the Strategic Government Programme 1/2016." <https://vnk.fi/documents/10616/1986338/Action+plan+for+the+implementation+Strategic+Government+Programme+EN.pdf/12f723ba-6f6b-4e6c-a636-4ad4175d7c4e/Action+plan+for+the+implementation+Strategic+Government+Programme+EN.pdf?version=1.0>

- Pollari, P., O. Salo, and K. Koski. 2018. "In Teachers We Trust - the Finnish Way to Teach and Learn." *i.e.: Inquiry in Education* 10 (1): 1–17. <https://files.eric.ed.gov/fulltext/EJ1180628.pdf>
- Richardson, M., C. Abraham, and R. Bond. 2012. "Psychological Correlates of University Students' Academic Performance: A Systematic Review and Meta-analysis." *Psychological Bulletin* 138 (2): 253–287. doi:10.1037/a0026838.
- Soppe, K. F. B., T. Wubbels, H. J. Leplaa, I. Klugkist, and L. D. N. V. Wijngaards-de Meij. 2019. "Do They Match? Prospective Students' Experiences with Choosing University Programmes." *European Journal of Higher Education* 9 (4): 359–376. doi:10.1080/21568235.2019.1650088.
- Steenman, S. C., W. E. Bakker, and J. W. F van Tartwijk. 2016. "Predicting Different Grades in Different Ways for Selective Admission: Disentangling the First-Year Grade Point Average." *Studies in Higher Education* 41 (8): 1408–1423. doi:10.1080/03075079.2014.970631.
- Stemler, S. 2012. "What Should University Admissions Tests Predict?" *Educational Psychologist* 47 (1): 5–17. doi:10.1080/00461520.2011.611444.
- Toom, A. 2017. "Teachers' Professional and Pedagogical Competencies: A Complex Divide between Teacher Work, Teacher Knowledge and Teacher Education". In *The SAGE Handbook of Research on Teacher Education*, edited by Jean Clandin and Jukka Husu, 803–819. doi:10.4135/9781526402042.n46.
- Universities Act 558/2009. <https://www.finlex.fi/en/laki/kaannokset/2009/en20090559.pdf>
- van de Werfhorst, H. G., A. Sullivan, and S. Y. Cheung. 2003. "Social Class, Ability and Choice of Subject in Secondary and Tertiary Education in Britain." *British Educational Research Journal* 29 (1): 41–62. doi:10.1080/0141192032000057366.
- Vulperhorst, J., C. Lutz, R. de Kleijn, and J. van Tartwijk. 2017. "Disentangling the Predictive Validity of High School Grades for Academic Success in University." *Assessment & Evaluation in Higher Education* 43 (3): 399–414. doi:10.1080/02602938.2017.1353586.
- Wigfield, A., and J. Cambria. 2010. "Students' Achievement Values, Goal Orientations, and Interest: Definitions, Development, and Relations to Achievement Outcomes." *Developmental Review* 30 (1): 1–35. doi:10.1016/j.dr.2009.12.001.