

**Adult development research
meets university admissions:
Finnish university applicants'
critical thinking skills in relation
to admission criteria**

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Background of the research

Background

Finnish higher education policy has desired to streamline universities' student selection by using more both **upper secondary school matriculation** exam grades and **source-based writing tests** as admission criteria (e.g., Ministry of Education 2011).

Critical thinking skills

- Flores et al. (2012) synthesize various definitions suggesting that critical thinking is
"application of knowledge after careful and measured examination of all information and viewpoints to make decisions that are non-egocentric in nature" (p. 226 - 227)
- Most commonly used individual critical thinking skills are, for example,
 - interpretation,
 - analyzation,
 - evaluation, and
 - reasoning(see e.g., Ennis 1993; Facione 1990; Fisher 2007).

Adult development models and critical thinking assessment

- Developmental framework helps critical thinking assessment by providing description for skill progression (Kuhn 1999)
- Epistemological understanding is argued to be important in critical thinking:
 - Absolutistic stance enables elementary critical thinking (Kuhn 1999)
 - Effects to how open-ended problems are solved (King & Kitchener 1994; 2004)
- The increase of integrative thinking is the core cognitive component in various adult development models (Kallio 2011).

Steps for Better Thinking assessment model (Wolcott 2006)

- The model has four hierarchical steps describing problem solving performance:
 - **Step 1:** Identifies the problem and relevant information and uncertainties related to the problem (low cognitive complexity).
 - **Step 2:** Explores interpretations and connections between information, viewpoints etc. related to the problem (moderate cognitive complexity).
 - **Step 3:** Prioritizes between alternative solutions and implement conclusions (high cognitive complexity).
 - **Step 4:** Envisions process of monitoring limitations of chosen solution and producing more reliable solutions in future (highest cognitive complexity).
- The model is based on Reflective Judgment Model (King & Kitchener 1994) and Dynamic Skill Theory (Fischer & Bidell 2007)

Matriculation and entrance examinations in Finland

- The matriculation examinations evaluate the knowledge of upper secondary school curriculum at least in four tests:
 - Mother tongue (mandatory), three other from these: second national language, a foreign language, the mathematics, and one in the general studies battery of tests (sciences and humanities)
 - Passed tests are assessed by scale: 2 (approbatur) – 7 (laudatur) (see <http://www.ylioppilastutkinto.fi/en/>)
- The majority of Finnish educational faculties use a jointly organized entrance examination:
 - Applicants have ca. six week time to read source texts (6 to 8 scholarly articles, combined length ~ 150 – 170 p.) before the multiple-choice test exam. (see <http://www.helsinki.fi/vakava/english/examination.htm>)

Aim and research questions

Aim of the research

To investigate the relationship between university applicants' critical thinking skills and matriculation examinations and currently used entrance examinations in the field of educational sciences.

Research questions

1. What is the level of critical thinking skills of Finnish applicants for educational sciences?
2. What is the relationship between applicants' critical thinking skills and success in the matriculation and entrance examinations?

Participants

- Voluntary applicants (n=75) for a Faculty of Education in one Finnish university
- Age ranged from 18 to 47 years (M=23 SD=6,3 years)
- 65 women (87 %) and 10 men (13 %)

Data collection

- Critical thinking skills were measured in an online environment by using open-ended source-based essay writing task.
- The source texts consisted of three shortened articles which discussed class size effects on teaching and learning (overall length 9 pages).
 - Articles were purposefully chosen so that they included conflicting viewpoints on the issue
- Task assignment was: *"Based on the source articles, present and justify your own viewpoint on whether class sizes should be reduced or not?"*
- The data consists of 75 essays varying from 34 to 380 words in length (M=179, SD=88)

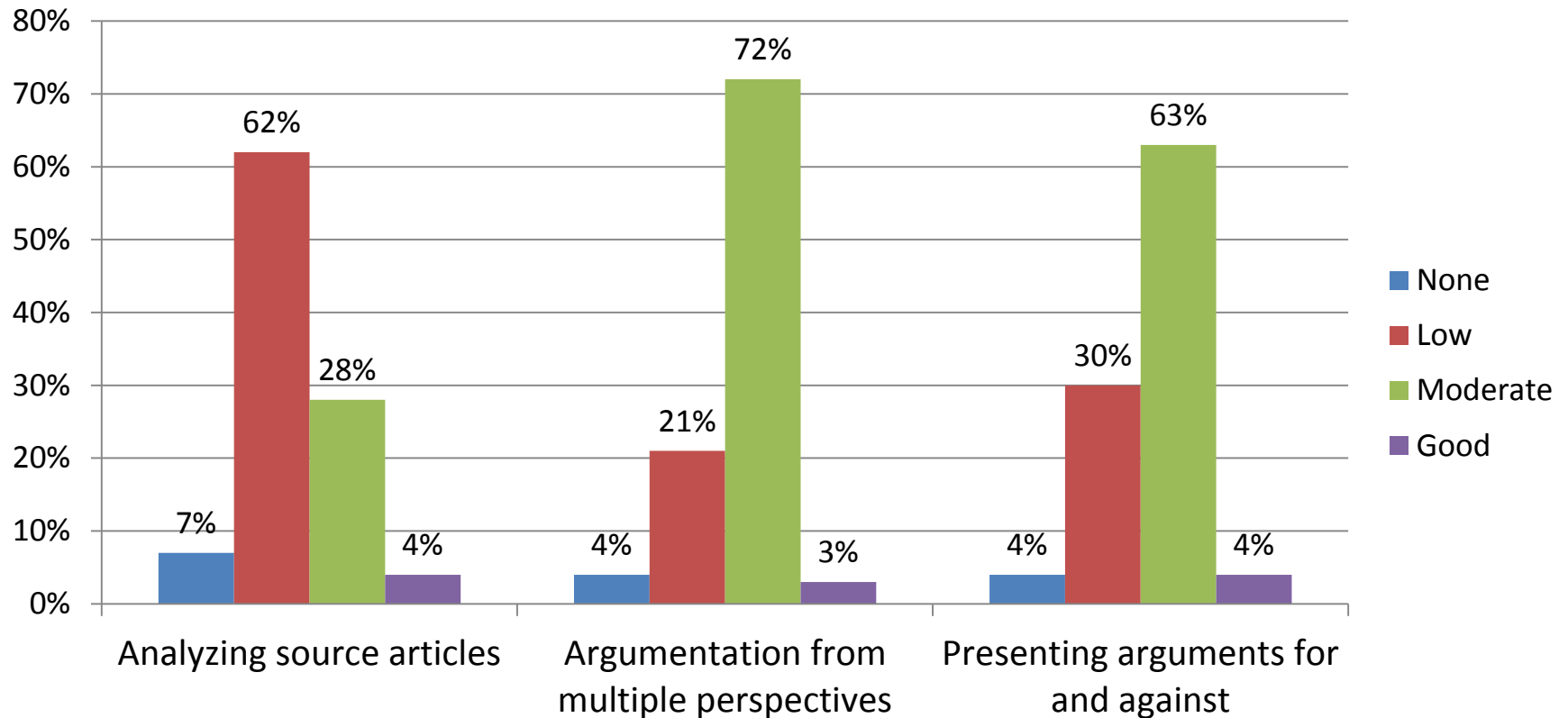
Data analysis: critical thinking variables

Variable	0 None	1 Low	2 Moderate	3 Good
Analyzing source articles	No analysis	Source articles are analyzed separately	Source articles are analyzed in relation to each other	Source articles are analyzed in a relation to each other and as a part of a system/theory
Argumentation from multiple perspectives	No relevant perspectives used	Argumentation from one relevant perspective	Argumentation from multiple relevant perspectives	Argumentation from various perspectives presented as a part of an integrated system
Presenting arguments for and against	No relevant reasons	Arguments presented either for or against	Arguments presented both for and against	Arguments for and against are presented as a part of an integrated system

Matriculation and entrance examination variables

- Variable *sum of the matriculation exam grades* was calculated from the four best mandatory matriculation exam grades to describe the overall academic achievement in upper secondary school.
 - Minimum of grade sum is 8 points and maximum is 28 points (M=18,6, SD=3,86)
- Variable *entrance examination score* was formed by rounding the individual test scores (minimum points were -147,25 and maximum 199) to the closest whole number and used as such. (M=107,5, SD=40,1)

Applicants' critical thinking skills



M=1,29, SD=0,65,

M=1,74, SD=0,57,

M=1,68, SD=0,59

Matriculation examination grades association to the critical thinking skills

	Sum of matriculation exam grades					
	Below average (n=36)		Above average (n=31)		Mann-Whitney U	P-value
	M	SD	M	SD		
Analyzing source articles	1,14	0,59	1,48	0,68	416	.04*
Argumentation from multiple viewpoints	1,67	0,63	1,94	0,36	454,5	.06
Presenting arguments for and against	1,69	0,62	1,74	0,51	554	.95

Entrance examination scores association to the critical thinking skills

	Entrance exam scores					
	Below average (n=28)		Above average (n=39)		Mann-Whitney U	P-value
	M	SD	M	SD		
Analyzing source articles	1,04	0,64	1,49	0,64	372,5	.012*
Argumentation from multiple viewpoints	1,64	0,62	1,85	0,54	465	.176
Presenting arguments for and against	1,43	0,63	1,92	0,48	330	.001**

Matriculation and entrance examinations correlation to the critical thinking skills

	Matriculation exam. grades	Entrance exam. score	Analyzing source articles	Argumentation from multiple perspectives	Presenting arguments for and against
Matriculation exam. grades	-				
Entrance exam. score	.38** (n=63)	-			
Analyzing source articles	.40** (n=67)	.31* (n=67)	-		
Argumentation from multiple perspectives	.24* (n=67)	.30* (n=67)	.43 (n=76)	-	
Presenting arguments for and against	.10 (n=67)	.37** (n=67)	.49** (n=76)	.52** (n=76)	-

Conclusions

- Most applicants have skills to think critically from multiple viewpoints but analysis skills are low
 - Teaching of analysis skills should be in the focus from the beginning of their university studies
- Matriculation examinations seem to measure mostly analytic skills, whereas entrance examinations seem to measure both analytic and argumentation skills.
- Entrance examinations should be developed so that they more explicitly evaluate applicants' skills in analyzing contradictory information.

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