



The role of academic competences and learning processes in predicting Bachelor's and Master's thesis grades

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ABSTRACT

Writing an academic thesis is an important and complex task and the thesis grade should reflect students' academic competences. The present study aims, firstly, at exploring how Bachelor's and Master's students self-evaluate their academic competences and approaches to learning and whether their evaluations differ from each other. In addition, the study aims at investigating how academic competences and approaches to learning are related to the thesis grades of Bachelor's and Master's students. The data consisted of 1 019 Bachelor's and Master's students, all of whom completed an electronic questionnaire at the time of their graduation. The results imply that Bachelor's students already possess a considerable number of academic competences. It seems that students' organising skills should be supported, especially in the Bachelor phase. Finally, the present study raises the question of what the thesis grade actually measures if its relations to both learning processes and academic competences are questionable.

1. Introduction

In many countries, Bachelor's and Master's theses represent important final projects in university degrees and the thesis work is usually treated as the final assessment of a student's studies (Prins, de Kleijn, & van Tartwijk, 2016; Wisker, 2019). In addition, the thesis is a mandatory final step before graduation, and thus it can have consequences for further studies or for employment that requires higher education degrees (de Kleijn, Mainhard, Meijer, Pilot, & Brekelmans, 2012). Therefore, thesis work is usually designed to measure the students' ability to use their knowledge and skills and their capacity to work as a researcher (Ashwin, Abbas, & McLean, 2017; Man, Xu, Chau, O'Toole, & Shunmugam, 2020; Semeijn, Van der Velden, Heijke, van der Vleuten, & Boshuizen, 2006). Thus, preparing a thesis calls for diverse academic competences and deep learning processes (Wisker, 2019). Academic competences, such as critical thinking, collaboration and communication and problem-solving are important learning outcomes of higher education (López, Souto, & Noblejas, 2019; Tuononen, Parpala, & Lindblom-Ylänne, 2019a). In addition to being important learning outcomes, academic competences are needed throughout the period of studying and learning at the university (Tuononen, Parpala, & Lindblom-Ylänne, 2019b). Moreover, the process of writing the thesis

enables students to further develop their own academic competences (Wisker, 2019). Previous studies have criticised the reliability of thesis grades in measuring students' study success (Prins et al., 2016; Williams & Kemp, 2019.) Therefore, there is a need to examine how other factors related to the quality of student learning outcomes are related to thesis grades. Even though previous research has shown that conducting thesis work requires deeper learning processes and that thesis work should reflect students' academic competences, little is still known about the relations between these various factors (academic competences, learning processes, success in compiling a thesis). Furthermore, considerable research on theses has been conducted at the doctoral level but less at the Bachelor's or Master's levels in spite of the fact that there are a larger number of students at these levels (Agricola, Prins, van der Schaaf, & van Tartwijk, 2020; Man et al., 2020). Both Bachelor's and Master's theses play an important role in many higher education institutions and for their Bachelor's theses the students are already expected to possess several research skills (Agricola et al., 2020; Wisker, 2019). However, Bachelor's and Master's theses are conducted at very different phases of university studies and this raises the question as to how they differ in the light of academic competences and learning processes. The present study explores how academic competences and approaches to learning are related to the thesis grades of Bachelor's and

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Master's students. In addition, the study aims at answering the question as to whether higher grades in thesis work are related to the diverse academic competences and deeper learning processes in the different study phases.

1.1. Academic competences in relation to thesis grade

Academic competences are important in every discipline, and, thus, they can be considered to be generic competences (Tuononen, Parpala, & Lindblom-Ylänne, 2017); Strijbos, Engels, & Struyven, 2015). These kinds of competences are also referred to as generic skills, key skills, transferable skills, employability skills, core competences and generic attributes (Barrie, 2006; Lizzio, Wilson, & Simons, 2002; Strijbos et al., 2015; Suleman, 2018). However, in the present study, we use the concept of academic competences to emphasise that such competences are developed and used in an academic context and are important in academic work (Mah & Ifenthaler, 2017; Van Dierendonck & Van der Gaast, 2013). Furthermore, competence can be defined as the capacity to use specific combinations of knowledge, skills and attitudes in appropriate contexts (Baartman & Ruijs, 2011). Students are expected to develop diverse academic competences during their studies, and previous studies have also indicated that many of these competences do actually develop at university (Badcock, Pattison, & Harris, 2010; Keneley & Jackling, 2011; Monteiro, Almeida, & Garcia-Aracil, 2016). On the other hand, research also shows that university students develop theoretical knowledge rather than academic competences (Edvardsson Stiwné & Jungert, 2010; Monteiro et al., 2016; Tynjälä, Slotte, Niemi-nen, Lonka, & Olkinuora, 2006).

Self-reported academic competences and grades have been found to have a positive relation with each other (Gulikers, Bastiaens, Kirshner, & Kester, 2006). Although some research exists on the relation between self-reported academic competences and grades, very little is still known as to how the thesis grade is related to academic competences. The present study is important because the thesis is usually the final assessment of the degree (Wisker, 2019) and the quality of the thesis is an important student outcome of the whole thesis project (de Kleijn et al., 2012). In addition, in the thesis process, students for the first time have to combine and utilise everything they have learnt during their university studies, including theories, academic competences and research skills, in order to complete their theses (Prins et al., 2016). Therefore, these are considered to evaluate both specific and generic types of knowledge and skills (Semeijn et al., 2006) and are supposed to show the competences of critical thinking, empirical research literacy, synthesis of knowledge and the assessment of information (Nouri, Larsson, & Saqr, 2019). Thesis writing requires a capacity for analysis and synthesis, problem-solving skills and information management (Feldt, Höst, & Lüders, 2009) as well as writing skills and reading comprehension (Ferrer, 2014). Furthermore, evidence shows that, during the thesis writing process, students developed scientific thinking and research skills, including diverse competences such as writing, time and project management (Wisker, 2019). A few studies have shown that academic competences are positively related to thesis grades. For example, analytical competence (Annen & Eggimann, 2006), citation skills (Petrić, 2007) and teamwork skills (Semeijn et al., 2006) have been related to higher thesis grades.

There is more research on the relation between self-reported academic competences and academic achievement measured by course grades or grade point average (Braun, Woodley, Richardson, & Leidner, 2012; Diseth, 2007; Gulikers et al., 2006; Liu, Ye, & Yeung, 2015; Richardson, 2003). Bitzer (2005), for example, found that students' positive perceptions of writing, problem solving and self-management skills were related to better academic achievement. On the other hand, Braun et al. (2012) found, in their review study, that correlations between self-reported academic competences and grades are somewhat low. This result may be due to the ways in which the competences have been examined. In many studies, a single scale has been used to measure

different competences, labelled as academic competences or generic skills (Richardson & Price, 2003; Van Dierendonck & Van der Gaast, 2013; Zeegers, 2004), although individual competences might have a different relation to academic achievement. Thus, the present study specifically explores how different academic competences are related to the thesis grades of Bachelor's and Master's students.

1.2. The relation between academic competences, learning processes and thesis grade

Academic competences are closely intertwined with students' learning processes (Tuononen et al., 2019b; Lizzio et al., 2002; Nelson Laird, Seifert, Pascarella, Mayhew, & Blauch, 2014). This refers to their approaches to learning, which in turn refers to their study processes and intentions (Entwistle & Peterson, 2004; Entwistle & Ramsden, 1983; Marton & Säljö, 1997). Three approaches to learning have been identified: a deep approach, a surface approach and organised studying. A deep approach to learning describes learning in which the student aims to understand and use deep study processes by concentrating on analysing knowledge, relating ideas to previous knowledge and using evidence (Entwistle & Peterson, 2004; Entwistle & Ramsden, 1983). A surface approach to learning refers to concentrating on memorising information, resulting in fragmented knowledge (Entwistle & Ramsden, 1983; Entwistle, 2009). Recently, the term 'an unreflective approach' has been used to describe the surface approach as it refers to an unreflective study process and the inability to form a coherent whole of the subject matter (Lindblom-Ylänne, Parpala, & Postareff, 2018). The third approach, organised studying, refers to students being systematic and includes good time-management skills, self-regulation and effort in studying (Entwistle & McCune, 2004).

Previous studies have found a bidirectional relation between academic competences and student learning processes (Tuononen et al., 2019b; Guo, Yang, & Shi, 2017). This means, on the one hand, that the deep approach to learning requires the use of many academic competences, such as analytical skills and the ability to relate previous knowledge to new information (Tuononen et al., 2019b; Lizzio et al., 2002). On the other hand, deep study processes can promote the development of academic competences. For example, a deep approach to learning is needed in order to develop academic competences, such as critical thinking (Nelson Laird et al., 2014).

Furthermore, there is ample evidence of students' approaches to learning being related to academic achievement (Herrmann, Bager-Elsborg, & McCune, 2017; Rytönen, Parpala, Lindblom-Ylänne, Virtanen, & Postareff, 2012; Öhrstedt & Lindfors, 2018). The deep approach to learning is usually positively related to academic achievement while the surface approach is negatively related (Gerritsen-van Leeuwenkamp, Joosten-ten Brinke, & Kester, 2019; Herrmann, Bager-Elsborg, & Parpala, 2017a; Sharp, Hemmings, Kay, & Sharp, 2017). Organised studying is usually positively related to different indicators of academic achievement such as grade point average (Herrmann et al., 2017a), final year marks (Sharp et al., 2017) and course grades (Öhrstedt & Lindfors, 2018). However, Yonker (2011) found no relationship between the deep approach and the scores of factual and applied performance. Surprisingly, there are only a few studies exploring the thesis grade and its relation to academic competences or learning processes (Annen & Eggimann, 2006; Petrić, 2007; Semeijn et al., 2006). Therefore, research which takes into account both factors (academic competences and learning processes) and their relation to thesis grades is needed to deepen our understanding of their role in students' thesis grades at Bachelor's and Master's degree levels.

2. Aims of the present study

The aim of this research is twofold: 1) to explore how Bachelor's and Master's students, who write their thesis at different phases of their studies but have similar requirements for research skills during the

writing process, evaluate their academic competences and approaches to learning and whether their evaluations differ from each other; 2) to investigate the relation between academic competences, approaches to learning and thesis grades of Bachelor's and Master's students.

The research questions are:

- 1 How do Bachelor's and Master's students evaluate their academic competences and approaches to learning and do their evaluations differ from each other?
- 2 How are academic competences and approaches to learning related to the thesis grades of Bachelor's and Master's students?

3. Methods

3.1. Participants

The present study was conducted at a research-intensive university in Finland. A total of 1 019 students completed an electronic questionnaire at the time of their graduation. The participants were students who had completed either Bachelor's ($n = 435$, 43 %) or Master's degrees ($n = 584$, 57 %). The participants in both groups represented different disciplines, most of them being from non-professional fields such as the humanities and social sciences. Of the Bachelor's students, 75 % ($n = 325$) were female and 25 % ($n = 106$) male, whereas of the Master's students, 78 % ($n = 456$) were female and 22 % ($n = 126$) male. The percentage of female students at the university was 65 %. Thus, female students were overrepresented in the data. Half of the Bachelor's students were less than 26 years old, 35 % were 26–32 years of age and 15 % were over 32 years of age. Of the Master's students, 23 % were younger than 26 years, 60 % were 26–32 years of age, and 17 % were more than 32 years of age.

In Finland, as in most countries following the Bologna Declaration, the Bachelor's degree (180 credits) is normally completed in three years and the Master's degree (120 credits) in two years. Most Finnish students intend to continue studying for their Master's degree immediately after completing their Bachelor's. However, there are two exceptions when students only complete the Bachelor's degree: Kindergarten Teacher Education and the Bachelor of Science in Pharmacy. In addition, in the medical fields (Medicine and Veterinary Medicine), the higher academic degree is the Licentiate degree, and it can be completed in six years of full-time study. In Finland, all university degrees are research-based, meaning that all students write a Bachelor's and Master's thesis, even when they graduate in a profession, such as medicine, pharmacy, law and education. Regarding the participants in the present study, the extent of the Bachelor's thesis counted for 10 and the Master's thesis 40 study credits. Compared to the Bachelor's thesis, the Master's thesis requires a more exploratory approach. The Bachelor's thesis is evaluated by a supervisor and the Master's thesis by a supervisor and at least one external examiner. The thesis evaluation process and assessment criteria vary slightly in different Faculties. In the present study, most of the participants were from the Faculty of Arts and the Faculty of Social Sciences, and the assessment criteria of the Master's thesis were the same in these Faculties. The key areas that are assessed are: 1) the aims of the thesis and definition of the topic, 2) the theoretical background, its utilisation and evaluation, 3) the methods and data, 4) the results and their evaluation, 5) the innovativeness, and 6) the structure of the work, linguistic fluency, and scientific style. The Bachelor's thesis is usually evaluated with the same areas of evaluation as the Master's thesis, although the Bachelor's thesis can also be purely theoretical. The Bachelor's theses are graded on a scale of 0–5, while the Master's thesis are graded in Latin: *approbatur*, *lubenter approbatur*, *non sine laude approbatur*, *cum laude approbatur*, *magna cum laude approbatur*, *eximia cum laude approbatur* and *laudatur*.

3.2. Survey

The survey HowULearn (previously named 'Learn Questionnaire') (Parpala & Lindblom-Ylänne, 2012) was used to measure students' evaluations of their academic competences and approaches to learning. The HowULearn questionnaire has been widely used and validated in both Finnish and international contexts (Karagiannopoulou, Naka, Kamtsios, Savvidou, & Michalis, 2014; Ruohoniemi, Forni, Mikkonen, & Parpala, 2017; Rytönen et al., 2012; Herrmann et al., 2017a; Sakurai, Parpala, & Pyhältö, 2016) HowULearn questionnaire included seven items in which students are asked to make a self-evaluation regarding the extent to which various academic competences had been developed by their university studies, such as critical thinking, applying knowledge, collaboration and communication skills and developing new ideas (e.g., 'I have learned to look at things critically', 'I have learned to apply theoretical knowledge in practice and 'Studies have developed my collaboration and communication skills'). The analysis was carried out using single items measuring different academic competences. A 5-point Likert scale (1 = totally disagree, 5 = totally agree) was used to measure the academic competences. The approaches to learning were measured by 12 items in which students were asked to describe their studying in general. The part of HowULearn that focuses on students' approaches to learning has been modified from the Approaches to Learning and Studying Inventory (ALSI, Entwistle & McCune, 2004) and the Learning and Teaching Questionnaire (LSQ, Entwistle, McCune, & Hounsell, 2003). In addition, two items were modified and added from the Revised Learning Process Questionnaire (R-LPQ9, Kember, Biggs, & Leung, 2004). The scales in the HowULearn that measure approaches to learning are *deep approach*, *unreflective approach* (prev. surface approach) and *organised studying*, each with four items, making a total of 12 items. A 5-point Likert scale (1 = totally disagree, 5 = totally agree) was used to measure both academic competences and approaches to learning. Scales and examples of the items used in the present study and Cronbach's alphas are presented in Table 1.

Study success was measured by the grade of the Bachelor's or Master's thesis and the grades were collected from the Student Register. As described above, the Bachelor's theses were graded on a scale of 0–5 while the Master's theses were graded in Latin but recorded on a scale of 1–7, with 7 indicating an excellent grade.

3.2.1. Analysis

Firstly, the Bachelor's and Master's students' evaluations of academic competences and approaches to learning and any possible differences in these evaluations were analysed using analysis of variance (ANOVA). Factors measuring approaches to learning (deep, unreflective and organised studying) were created and their validity was tested in our previous study in which the same data had been used (Tuononen, Parpala, Mattsson, & Lindblom-Ylänne, 2016). The relations between academic competences, approaches to learning and thesis grades were first explored using Pearson's correlations. Finally, the relation between

Table 1
Factors and example of items measuring approaches to learning.

Factor	Example item	Number of items	Cronbach's alpha
<i>Approaches to learning</i>			
Deep approach	I've carefully looked at evidence to reach my own conclusion about what I am studying.	4	.76
Unreflective approach	Much of what I have learned seems nothing more than many unrelated bits and pieces in my mind.	4	.65
Organised studying	On the whole, I've been quite systematic and organised in my studying.	4	.68

both academic competences and approaches to learning to the thesis grades was analysed using linear regression analysis (forward method) in order to explore which factor had the strongest relationship. Only those variables that had significant correlations to thesis grades were added to the regression analyses. The correlational and regression analyses were conducted separately for the Bachelor's and Master's data. The analyses were carried out using SPSS 25.

4. Results

4.1. Bachelor's and Master's students' evaluations of academic competences and approaches to learning

Our first aim was to explore Bachelor's and Master's students' self-evaluations of academic competences and approaches to learning and to see whether these evaluations differed from each other. The results showed both Bachelor's and Master's students scored relatively highly on different academic competences, varying from 3.41 to 4.39, meaning that they perceived that they had satisfactorily learned various academic competences during their studies. Master's students scored statistically significantly higher than the Bachelor's students on two of the academic competences, *analysing and structuring information* and *making arguments and looking for solutions*. In addition, the results showed that the Master's students also scored significantly higher on *organised studying* than the Bachelor's students. The results of ANOVA are presented in Table 2.

4.2. The relation between academic competences, approaches to learning and thesis grades of Bachelor's and Master's students

Our second aim was to explore the relations between the academic competences, approaches to learning and thesis grades of Bachelor's and Master's students. The results showed that some of the academic competences correlated statistically significantly with thesis grades (Table 3). Furthermore, the relations were mostly similar for Bachelor's and Master's students, although some differences were found. The results showed that three of the seven self-evaluated academic competences were related to Bachelor's thesis grades. More precisely, *analysing and structuring information*, *seeing different perspectives* and *critical thinking* had a significant relation to Bachelor's thesis grades. In terms of Master's thesis grades, a total of four competences had significant relations. In addition to the same three competences mentioned above that were related to Bachelor's thesis grades, *making arguments and looking for solutions* was also significantly related to the Master's thesis grade.

The results concerning the relation between approaches to learning

Table 2
Mean scores and standard deviations of academic competences and approaches to learning of Bachelor's and Master's graduates.

Academic competences and approaches to learning (scale 1–5)	Bachelor's students (n = 435)		Master's students (n = 584)		t	p
	Mean	SD	Mean	SD		
<i>Academic competences</i>						
1. Applying knowledge	3.65	.95	3.75	.97	-1.73	0.084
2. Communication and collaboration	3.41	1.06	3.44	1.09	-0.35	0.721
3. Analysing and structuring of information	4.22	.75	4.33	.71	-2.42	0.016*
4. Seeing different perspectives	4.30	.79	4.39	.71	-1.90	0.058
5. Critical thinking	4.30	.78	4.38	.75	1.54	0.124
6. Making arguments and looking for solutions	4.20	.77	4.30	.72	2.08	0.038*
7. Developing new ideas	3.59	.94	3.63	.97	-0.58	0.560
<i>Approaches to learning</i>						
8. Deep approach	3.83	.69	3.81	.66	0.34	0.734
9. Unreflective approach	2.26	.69	2.18	.62	1.82	0.070
10. Organised studying	3.43	.79	3.63	.72	-3.43	0.001*

Table 3

Correlations between academic competences, approaches to learning and Bachelor's and Master's thesis grades.

Academic competences and approaches to learning	Bachelor's thesis grade	Master's thesis grade
1. Applying knowledge	.042	.024
2. Communication and collaboration	-.068	.057
3. Analysing and structuring information	.184**	.173**
4. Seeing different perspectives	.123*	.092*
5. Critical thinking	.114*	.138**
6. Making arguments and looking for solutions	.096	.147**
7. Developing new ideas	.057	.039
<i>Approaches to learning</i>		
8. Deep approach	.120*	.092*
9. Unreflective approach	-.049	-.109*
10. Organised studying	.162**	.064

* p < .05.

** p < .001.

and thesis grades revealed that a *deep approach* correlated significantly with both Bachelor's and Master's thesis grades. An *unreflective approach* correlated negatively and significantly to the Master's but not to Bachelor's thesis grades. *Organised studying* correlated positively and significantly to the Bachelor's but not to the Master's thesis grades.

Finally, regression analyses were conducted to determine which academic competences and approaches to learning had the strongest relationship with Bachelor's and Master's thesis grades. Only those variables that correlated significantly to thesis grades were included in the analyses. The regression model for the Bachelor's thesis grades differed from the Master's thesis grades. *Analysing and structuring information* ($\beta = .12$) and *organised studying* ($\beta = .08$) were related to the Bachelor's thesis grades ($F(1, 730) = 9.38$; $p < .0001$), whereas *analysing and structuring information* ($\beta = .10$) and *making arguments and looking for solutions* ($\beta = .10$) were significantly related ($F(1,551) = 9.01$; $p < .0001$) to the Master's thesis grades. However, in both models, the association was weak (multiple R = .03). A summary of the regression analyses is presented in Table 4.

5. Discussion

The aim of the present study was to examine how Bachelor's and Master's students evaluate their academic competences and approaches to learning. The results showed that both groups evaluated that they had learned different academic competences quite well during their Bachelor's or Master's studies. The results further revealed that the Master's students scored statistically significantly higher than the Bachelor's students on two of the academic competences: *analysing and structuring information* and *making arguments and looking for solutions*. Similarly, previous studies have shown that the more advanced students score higher on different competences than students at earlier stages of their studies (Badcock et al., 2010; Kember, Hong, Yau, & Ho, 2017; Zeegers, 2004). More precisely, previous studies found that final-year students scored higher than first-year students on all of the measured competences, such as analytical skills, critical thinking, collaboration,

Table 4

Summary of regression analyses: the strongest relations of academic competences and approaches to learning to Bachelor's and Master's thesis grades.

Explanatory variables	Bachelor's thesis grade (n = 730)			Master's thesis grade (n = 551)		
	Beta	t	p	Beta	t	p
Analysing and structuring information	0.12	3.17	0.002**	0.10	2.02	0.038*
Making arguments and looking for solutions	-	-	-	0.10	2.08	0.044*
Organised studying	0.08	2.10	0.036*	-	-	-

communication and problem solving (Kember et al., 2017; Zeegers, 2004). Regarding the approaches to learning, the results showed that Master's students had higher scores only on *organised studying*, and there were no differences between them in the *deep approach* or *unreflective approach*. These results are in line with the results regarding competences that show that Bachelor's and Master's students did not differ much in their evaluations of academic competences. However, previous studies have shown contradictory results on the development of approaches to learning, and thus it appears that the development during studies is not straightforward (Asikainen & Gijbels, 2017; Lietz & Matthews, 2010; Vanthournout, Coertjens, Gijbels, Donche, & Van Petegem, 2013). Nevertheless, there has been evidence that a deep approach to learning increased during studies and organised studying remained the same (Asikainen, Parpala, Lindblom-Ylänne, Vanthournout, & Coertjens, 2014), which is the opposite result to the present study. However, this study explored the development from the first to the third years of study (Asikainen et al., 2014) and this may have had an effect on the results. It is possible that the development of the deep approach is not very strong in the later phases of university studies.

The second aim of the study was to explore how academic competences and approaches to learning are related to the thesis grades of Bachelor's and Master's students. The study showed that self-evaluated academic competences were positively and statistically significantly related to thesis grades, and these relations were mostly similar for Bachelor's and Master's students. More precisely, the competences of *analysing and structuring information*, *seeing different perspectives* and *critical thinking* correlated to both Bachelor's and Master's theses. In addition, *making arguments and looking for solutions* correlated to the Master's thesis grade. All of these above mentioned academic competences are important when writing the thesis (Feldt et al., 2009). On the other hand, collaboration and communications skills were not related to thesis grades, which was no surprise because they are not needed in individual thesis work. However, the present study may indicate that, in the Bachelor's thesis phase, making arguments and looking for solutions are not as important as they are in the Master's thesis phase. In addition, many competences were evaluated as actually developing during the thesis writing, such as finding information, critical thinking, writing, as well as time and project management (Lundgren & Robertsson, 2013; Wisker, 2019). When focusing on the approaches to learning, the results imply that a *deep approach* to learning had a similar role in the various phases of writing the thesis but *organised studying* and an *unreflective approach* play a different kind of role. An *unreflective approach* correlated negatively to the Master's thesis grade but not to the Bachelor's thesis, which may indicate that, at the Bachelor's stage, the students' inability to see the bigger picture and relate ideas is not as important as it is at the Master's stage. Moreover, *organised studying* was related positively to the Bachelor's thesis grade but not to the Master's, indicating that, during the Bachelor's thesis writing phase, students need better organising skills than in the Master's. This may be due to the fact that when students are writing their Bachelor's thesis they are also usually simultaneously doing other courses, which thus requires more time and effort management. However, it should be noted that the correlations were rather low, although they were statistically significant.

Next, the relationship between the academic competences and approaches to learning was analysed by using regression analyses in order to see which of the competences and approaches to learning had the strongest relationship to thesis grades in the different study phases. The results of the regression analyses showed that *analysing and structuring information* and *organised studying* were significantly related to Bachelor's thesis grades, whereas *analysing and structuring information* and *making arguments and looking for solutions* were related to Master's thesis grades. The results are in line with the notion that writing either thesis requires the analysing of information, whereas it is especially when writing the Master's thesis that students need argumentation skills in order to justify their choices and discuss the results. In addition, it might be that in the assessment of Master's theses more emphasis is put on

argumentation than it is in Bachelor's theses.

Regarding the approaches to learning, only *organised studying* was related to thesis grades and then only to Bachelor's theses. It was interesting that *organised studying* was not related to the Master's thesis grade, in spite of the fact that it is a bigger process to handle. On the other hand, as already mentioned, the Bachelor's thesis is the first major work to be done during their studies and students might be taking many other courses at the same time, whereas the Master's thesis work is often the final task of the degree. Furthermore, it was somewhat surprising that a *deep approach* did not explain the thesis grade in spite of the fact that it correlated positively and significantly to both Bachelor's and Master's thesis grades. On the basis of the previous research, we expected that a deep approach to learning would be related to learning outcomes and high quality learning (Lizzio et al., 2002; Sharp et al., 2017). However, the academic competences that were related to thesis grades (*analysing and structuring information* and *making arguments and looking for solutions*) are the academic competences that are closely interrelated to the deep approach to learning (Tuononen et al., 2019b; Yin, Wang, & Han, 2016), and the present study indicates that these academic competences had stronger relations to thesis grades than the *deep approach* to learning. This implies that relating ideas and searching for evidence are important factors in the deep approach and even more important than the students' intention to understand the phenomena, which is the other factor in students' deep approach to learning (Herrmann et al., 2017a; Parpala, Lindblom-Ylänne, Komulainen, & Entwistle, 2013). Nevertheless, the results of the present study raise the question as to what the thesis grade measures if it is not strongly related to deep level learning processes. Moreover, it should be noted that many of the self-evaluated competences were not predictive of success in thesis work.

It was rather surprising that there were not more differences found in the evaluations of academic competences between the Bachelor's and Master's students. There may be several reasons for this. Firstly, many earlier studies have compared first-year and third-year students and found differences between their evaluations of academic competences (Kember et al., 2017; Zeegers, 2004). In the present study, Bachelor's students had already been studying for at least three years and Master's students for five or more. Thus, students already have several years of experience of university studies and have therefore been able to develop various competences during their Bachelor's studies. Secondly, in Finland, it is possible to continue to Master's studies before actually completing the Bachelor's degree. This means that some of the Bachelor's students might have already taken some Master's level courses, and, therefore, no further differences would be found. Thirdly, there might be individual differences in the evaluations of academic competences. For example, evidence shows that not all students developed critical thinking during their studies (Arum & Roksa, 2011). In addition, Master's students may be more critical of their academic competences because they are transferring to working life and feeling uncertain as to whether they have sufficient competences for their future (Tuononen et al., 2017).

5.1. Practical implications

The present study showed that some academic competences are important in successful thesis work in both Bachelor's and Master's degrees. Thus, emphasising the role of academic competences for academic achievement could motivate students to develop these competences. Evidence shows that not all the students perceive the development of these skills as a goal for their university studies (Gedye, Fender, & Chalkley, 2004) or they put little effort into learning such competences during their studies (Tuononen et al., 2019b). Furthermore, it is important that academic competences are included explicitly in thesis assessment criteria, as well as for other assignments, because assessment strongly guides students' learning (Biggs & Tang, 2007). One example of a way that academic competences could be emphasised is by

providing a rubric for research papers which would be designed for teachers and students to use in order for them to be more aware of the assessment criteria. It would also include assessment criteria for the structure and reporting of research papers (Prins et al., 2016). This would support students not only in their learning but also in recognising their competences, which has been shown to be difficult for them (Tuononen et al., 2017). In addition, it would enhance teachers' awareness of assessment criteria, which would help teachers and examiners in their assessment and thereby increase its reliability and validity (Räsänen, Tuononen, Postareff, Hailikari, & Virtanen, 2016).

The study also indicates that it is necessary to have competence in analysing and structuring information when writing Bachelor's and Master's theses. This resembles students' deep approach to learning, which includes their ability to relate ideas and search for evidence (Entwistle, 2009). Furthermore, the study highlights the role of organised studying during the Bachelor's degree. Interestingly, organised studying was related to Bachelor's thesis grades but, at the same time, Bachelor's students had lower scores on it than Master's students. Thus, the study suggests that, in supervising the writing of the Bachelor's thesis, students' time and effort management skills should be supported and supervised more carefully so that the students would improve these important skills. Moreover, the present study highlights the point that different factors are important at different stages of their degrees while writing their theses. Thus, the supervisors should be aware of student needs, which may differ from each other, and take those needs into account in their supervision in order to support the students effectively. For example, Bachelor's students may need more support in organising skills whereas Master's students might have a negative experience if their writing process is overly externally regulated and organised (Agricola et al., 2020).

The present study also has interesting results at the societal level. In Finland, most Bachelor's graduates continue directly to the Master's degree. However, there has been discussion that university students should enter working life earlier, preferably soon after gaining their Bachelor's degree. The present study indicates that Bachelor's students already possess a considerable amount of academic competences that are valuable in working life. Thus, there is need for more discussion on how university graduates with a Bachelor's degree could be utilised more in the labour market. Currently, it is only Bachelor's degrees from the Universities of Applied Sciences that are well acknowledged in the labour market, as opposed to the same degrees from the traditional universities.

5.2. Limitations of the study

The present study was cross-sectional and explored how academic competences and approaches to learning were related to Bachelor's and Master's thesis grades. One of its limitations is that the study is based on the students' self-evaluations of academic competences and approaches to learning. In addition, academic competences were measured using single items, which may decrease the reliability of the measurement. Similar problems in the measurements of academic competences have been acknowledged in previous studies (Braun et al., 2012), and thus there is a need for development of robust instruments measuring different academic competences. However, approaches to learning were measured by three scales, and the Cronbach's alphas were satisfactory. Moreover, the scales measuring approaches to learning have been validated and used in many studies and contexts (Herrmann et al., 2017; Karagiannopoulou et al., 2014; Sakurai et al., 2016). Another limitation relates to thesis grades. Although the thesis grade is usually the final assessment of the degree and thesis writing requires diverse knowledge and academic competences, the grade is only one indicator of students' academic achievement. Problems in the reliability of thesis grade have been identified in many studies and it has been shown that assessment may vary between evaluators (Williams & Kemp, 2019; Prins et al., 2016). In addition, assessment of theses is difficult because there are no

standardised criteria for theses, such as model answers, and thus, detailed rubrics may not be appropriate for thesis assessment (Williams & Kemp, 2019).

6. Conclusions

The present study highlights that there is no clear relation between the diverse academic competences, deeper learning processes and higher thesis grades among Bachelor's and Master's students. Therefore, in the future, there is a need for profound and critical research exploring the role of thesis grades as an indicator of study success. Moreover, academic competences and learning processes should have a more significant role in the evaluation of the quality of students' learning. This would also require the students to be aware of their academic competences and learning processes and to acknowledge their importance in the thesis work.

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