

Students' perceptions toward academic competencies: The case of German first-year students

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Students often enter higher education academically unprepared and with unrealistic perceptions and expectations regarding academic competencies for their studies. However, preparedness and realistic perceptions are important factors for student retention. With regard to a proposed model of five academic competencies (time management, learning skills, technology proficiency, self-monitoring, and research skills), incoming students' perceptions concerning academic staff support and students' self-reported confidence at a German university were examined. Using quantitative data, an initial exploratory study was conducted (N = 155), which revealed first-year students' perceptions of the role of academic staff in supporting their development, especially in research skills, as well as low self-reported confidence in this competence. Thus, a follow up study (N = 717) was conducted to confirm these findings as well as to provide an in-depth understanding of research skills. Understanding students' perceptions is crucial if higher education institutions are to meet students' needs and provide adequate support services in the challenging first year. Thus, in order to increase student retention, it is suggested that universities assist first-year students in developing academic competencies through personalised competence-based programs and with the help of emerging research fields and educational technologies such as learning analytics and digital badges.

Introduction

First-year students' perceptions and expectations as well as the way they cope with academic requirements have been identified as important factors for student retention (Thomas, 2002; Tinto, 1993; Yorke & Longden, 2008). Overall, student retention in higher education has been a global concern for years, as withdrawals from higher education remain at about 30% in the member countries of the Organisation for Economic Cooperation and Development (OECD, 2013). The first year of higher education is considered particularly crucial, as students often decide within this period to leave the institution, prior to degree completion (Brinkworth, McCann, Matthews & Nordström, 2009; Reason, Terenzini & Domingo, 2006). Thus, several studies have been conducted on students' first-year experience in higher education (e.g., Pascarella & Terenzini, 2005; Yorke & Longden, 2008). Nonetheless, first-year students' perceptions and expectations as well as their academic competencies for coping with academic requirements have not yet been researched in-depth.

Further, research on student retention has been conducted predominantly in English-speaking countries such as the United States, Australia, and the United Kingdom (e.g., Bean, 1982; Krause, Hartley, James & McInnis, 2005; Tinto, 1993). Recently, many universities in Germany have developed academic success initiatives and conducted

research on students' first-year experience (Bosse, 2015; Heublein, 2014; Heublein et al., 2017). In the face of changing demographics and the growing demand for academically trained specialists in the German economy, reducing the dropout rate is seen as an effective contribution towards responding to this labour market trend.

The presented study contributes to the exploration of first-year students' perceptions and self-reported confidence concerning academic competencies for higher education. The finding may enable higher education institutions to understand students' perceptions of guidance and self-assessed strengths and areas for improvement, which will help them meet their students' needs and provide necessary support services (Longden, 2006; Morison & Cowley, 2017; Voss, Gruber & Szmigin, 2007). Institutional support is crucial for student retention, as students reported that a lack of staff support was one factor in their decision to withdraw (Yorke, 2000).

First-year students' perceptions and preparedness concerning higher education

Students enter higher education institutions with a range of perceptions and expectations concerning university life, for example in terms of social aspects as well as in an institutional and educational context, including workload, access to academic staff, feedback, and support (e.g., Houser, 2004; Scutter, Palmer, Luzecky, Burke da Silva & Brinkworth, 2011). However, research shows a mismatch between first-year students' perceptions and reality (Cook & Leckey, 1999; Smith & Wertlieb, 2005). Furthermore, research indicates that many first-year students do not know what is expected of them at university and that they are often academically unprepared (Jansen & van der Meer, 2007; Mah & Ifenthaler, 2017; McCarthy & Kuh, 2006). Students' preparedness is particularly relevant with regard to generic skills such as academic competencies, which they are supposed to already possess when entering university (Barrie, 2007; Taylor & Bedford, 2004).

Generic skills are often also labelled as 21st century skills or soft skills (Binkley et al., 2012). They are important determinants of student retention in higher education but have received limited attention in previous research (Lombardi, Seburn & Conley, 2011). There are a few studies on students' generic skills and their performance in higher education, for example the 'Assessment of Higher Education Learning Outcomes' (AHELO) (Tremblay, Lalancette & Roseveare, 2012) carried out by the OECD and, with a focus on Germany, the research program 'Modeling and Measuring Competencies in Higher Education' (KoKoHs) (Zlatkin-Troitschanskaia, Pant, Kuhn, Toepper & Lautenbach, 2016). Studies by Jansen and van der Meer (2007) and Byrne and Flood (2005) revealed a self-reported high confidence of preparedness for studies among first-year students with regard to aspects of time management, self-monitoring, and learning skills. With a focus on subject-specific knowledge, several standardised tests exist that assess first-year students' prior knowledge, such as the 'American College Testing Program' (ACT) (ACT, 2008) and the 'Scholastic Aptitude Test' (SAT) (Hannon & McNaughton-Cassill, 2011). University support services mostly provide students with the subject-specific knowledge they might

need for their first year of studies, for example in science, technology, engineering, and mathematics (STEM) (Tinto, 2012). However, institutional support to enhance both subject-specific knowledge and generic skills may be particularly important for first-year students. Thus, an in-depth understanding of generic skills such as academic competencies is necessary to provide adequate support services.

Conceptual model of academic competencies

Studies have identified several factors which influence student retention in higher education, including students' socio-demographic characteristics, choice of studies, cognitive capacity, motivation, personal situation, and academic and social integration (Bean & Eaton, 2000; Kantanis, 2000; Tinto, 1993). With a focus on students' academic unpreparedness in generic skills, an in-depth literature review was conducted to identify important generic skills for higher education studies (e.g., Leggett, Kinnear, Boyce & Bennett, 2004; Reid & Moore, 2008; Taylor & Bedford, 2004). Consistent generic skills for higher education studies were identified which were taken as a basis to develop a conceptual model of academic competencies. The proposed model consists of five academic competencies for successful degree completion: time management, learning skills, self-monitoring, technology proficiency, and research skills (Mah & Ifenthaler, 2017). With this regard, the model concentrates on generic skills and follows a competence-based approach that refers to the individual's ability to cope adequately with demanding tasks in different situations, with a focus on successful problem solving (Weinert, 2001).

With its focus on academic competencies, the model aims to serve as a complement to established models on student retention (e.g., Bean & Eaton, 2000; Heublein, 2014; Tinto, 1993). *Time management* comprises strategies for organising study tasks effectively, setting long-term goals, independently organising the workload, and keeping up with academic requirements (Van der Meer, Jansen & Torenbeek, 2010). Research indicates that students feel inadequately prepared for this transition challenge and have difficulty keeping up with academic requirements and understanding the level of independent study as well as academic staff expectations and demands (Reid & Moore, 2008; van der Meer et al., 2010).

Learning skills refers to strategies for effective, situational, and intentional learning. They encompass the ability to select, organise, elaborate, and remember information, the ability to relate new information to old information, to adapt the learning environment to individual needs, and to use learning techniques adequately to cope with different tasks and demands (Boyatzis & Kolb, 1991; Weinstein & Underwood, 1985). Research shows that academic staff often view first-year students' inadequate learning skills as problematic, however, and expect them to be independent learners right from the start (Kantanis, 2000; Waters, 2003). *Technology proficiency* refers to using digital tools for academic research, critical thinking, and writing (JISC, 2013), including skills such as basic computer operations, email, Internet, word processing programs, and presentation programs (Ogwu & Ogwu, 2012). On the basis of the digital natives myth (Prensky, 2001), higher education institutions often take students' technology proficiency for granted, which is seen as an

important prerequisite for academic education (Margaryan, Littlejohn & Vojt, 2011). However, students are often unprepared to transfer their skills for personal digital use to an educational context (Lai & Hong, 2015). *Self-monitoring* comprises ‘the ability to reflect on what worked and what needed improvement in any particular academic task’ (Conley, 2007, p. 16), for instance students’ interests, strengths and areas for improvement. As a form of metacognition, it is related to similar concepts such as self-regulation, self-directed learning, and self-reflection, but focuses instead on intrapersonal processes (Healy, 2009).

Research skills includes facets such as academic writing, communication, and methodological knowledge, as well as skills in statistical and qualitative analysis, information seeking, and problem solving (Gilmore & Feldon, 2010; Meerah et al., 2012). Although conducting research is the main emphasis of the doctoral level of higher education (Ministry of Science Technology and Innovation, 2005), the undergraduate level also requires understanding and knowledge about literature reviews and research as well as the ability to gather and interpret data. This is true particularly with regard to academic writing, in which many students are unprepared to meet universities’ requirements (Goldfinch & Hughes, 2007; Wingate, 2006).

Study 1

Research questions and hypotheses

Taking the presented conceptual model of academic competencies as a basis, this research aimed to explore first-year students’ perceptions of academic competencies, with a focus on support from academic staff (RQ1) and their self-reported competencies (RQ2) with relevance to higher education. The following research questions and hypotheses are addressed in Study 1:

- RQ1: What are first-year students’ perceptions of academic competencies with regard to support from their academic staff? Research shows that students expect regular access to academic staff and that a lack of staff support may influence students’ decision to leave the institution prior to degree completion (Crisp, Palmer, Turnbull, Nettelbeck & Ward, 2009; Yorke, 2000). Furthermore, many first-year students experience research skills as challenging and academic staff assess their competence as rather low at the beginning of higher education studies (Blair, 2017; Yorke & Longden, 2008). Hence, it is hypothesised that first-years students expect the highest degree of support for the academic competence research skills (Hypothesis 1).
- RQ2: How do first-year students self-report their academic competencies? Research has found that students lack academic preparedness for the transition to higher education (Thomas, 2002; Tinto, 1993). Nonetheless, studies show that first-year students self-report high confidence for their studies (Byrne & Flood, 2005; Jansen & van der Meer, 2007). It is assumed that the five competencies will receive different ratings, especially research skills, as many incoming students are unprepared for this requirement (Goldfinch & Hughes, 2007; Wingate, 2006) (Hypothesis 2).

Method

Sample and data collection

The sample for this exploratory study consists of 155 first-year students with a mean age of 21.0 years ($SD = 4.2$). Most of the participants were enrolled in the Faculty of Arts (36.0%), followed by the Faculty of Science (25.9%), the Faculty of Human Sciences (18.8%), the Faculty of Economics and Social Sciences (16.8%), and the Faculty of Law (2.5%). Data collection occurred in the early weeks of the 2014/2015 winter semester at a German university. The questionnaire was mainly completed online but was also administered in a paper version.

Instrument and data analysis

With regard to the proposed model of academic competencies, a questionnaire was developed to measure first-semester students' perceptions and expectations (19 items), their self-reported competencies (21 items), and socio-demographic information (26 items). Most of the items were derived from the literature (e.g., Ipsos MORI 2008; Jansen, André & Suhre, 2013; Meerah et al., 2012), modified and translated into German, and some items were newly developed to suit the focus of the study (Table 1).

Table 1: Sample items and descriptive statistics for the five academic competencies with regard to first-year students' perceptions and self-reported confidence, Study 1

Academic competencies	Sample items	Descriptive statistics	
		<i>M</i>	<i>SD</i>
<i>Perceptions</i>			
1. Time management	I will be told each week what to do.	3.46	.90
2. Learning skills	I will be taught how to find and select information for assignments.	3.48	1.44
3. Technology proficiency	I will be taught how to use the university's systems (e.g. accessing library online, registering for courses, <i>Moodle</i> , <i>PULS</i> , etc.).	2.51	1.01
4. Self-monitoring	I will be taught methods on how to reflect my learning progress (e.g. in a journal, blog, e-portfolio).	3.95	1.61
5. Research skills	I will be taught how to write academic essays and short reports.	3.28	1.01
		4.09	1.31
<i>Confidence</i>			
1. Time management	I am good at planning and organising my study.	4.56	.49
2. Learning skills	I am confident in identifying the main ideas or main points in a text.	4.69	.74
3. Technology proficiency	I am able to find information efficiently using a search engine (e.g. <i>Google</i>).	4.95	.66
4. Self-monitoring	I can evaluate my own my learning outcomes.	4.69	.79
5. Research skills	I can independently write essays/ short reports.	4.69	.77
		3.77	.93
<i>Note.</i> $N = 155$. Perceptions: Scale ranges from 1 = strong disagreement to 6 = strong agreement; Cronbach's alpha varied between .51 and .77. Confidence: Scale ranges from 1 = needs strong improvement to 6 = very good; Cronbach's alpha varied between .41 and .85.			

Two exploratory factor analyses were conducted on all items with orthogonal rotation (varimax) to identify clusters of variables for both parts of the questionnaire. For the first part (perceptions), the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity verified the sampling adequacy for the analysis, $KMO = .74$, $\chi^2(153) = 761.72$, $p < .001$. Five factors in the data had eigenvalues over Kaiser's criterion of 1 and in combination explained 58.7% of the variance and the scree plot showed inflexions, which would justify a five-factor model.

For the second part of the questionnaire (confidence), the Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, $KMO = .82$, $\chi^2(153) = 1123.92$, $p < .001$. Kaiser's criterion of 1 and the scree plot justify a five-factor model (58.8% variance). Initial data checks showed that the distributions of ratings and scores satisfied the assumptions underlying the analysis procedures. All effects were assessed at the 0.05 level and effect sizes were reported using Cohen's d measures (small effect $d < .50$, medium effect $d \leq .80$, strong effect $d > .80$).

Results

Descriptive statistics show that participants expected the lowest amount of support for learning skills and the highest degree of support from their academic staff for the competency research skills (Table 1). With a focus on the highest degree of expected support, four dependent t -tests were computed to determine whether research skills varied as a function of the other academic competencies of the conceptual model of academic competencies. Results of the analysis revealed significant differences for time management, $t(154) = 4.35$, $p < .05$, $d = .44$; learning skills, $t(154) = 16.60$, $p < .001$, $d = 1.36$; and self-monitoring, $t(154) = 8.00$, $p < .001$, $d = 0.69$. No significant difference was found for technology proficiency, $t(154) = 1.00$, $p > .05$. Accordingly, Hypothesis 1 is accepted with regard to participants' significantly higher expectation of support from their academic staff in research skill development, in comparison to time management, learning skills, and self-monitoring.

With regard to Hypothesis 2, descriptive statistics revealed that participants self-reported their competence levels as high for the competencies learning skills, technology proficiency, time management, and self-monitoring, but as rather low for research skills (Table 1). Dependent t -tests showed that participants self-rated their confidence in research skills significantly lower in comparison to time management, $t(154) = 10.96$, $p < .001$, $d = 1.09$; learning skills, $t(154) = 16.51$, $p < .001$, $d = 1.46$; technology proficiency, $t(154) = 14.60$, $p < .001$, $d = 1.33$; and self-monitoring, $t(154) = 11.38$, $p < .001$, $d = 1.08$. These results confirm Hypothesis 2, that first-year students report different confidence levels in their skills with respect to the five academic competencies. Moreover, participants self-rate their skills significantly lower with regard to research skills than to the other four academic competencies.

Discussion of Study 1 and introduction to Study 2

Study 1 explored first-year students' expectations regarding academic staff support and their self-reported confidence concerning a proposed model of academic competencies. Results show that participants expect different degrees of support from their academic staff with respect to the five academic competencies (Table 1). They expect the lowest amount of support for the competency learning skills, and the highest amount of support for the competency research skills. With regard to first-year students' self-reported competencies, results show that overall, participants assess their skill levels in all five academic competencies of the conceptual model as already very high at the beginning of their university studies (Table 1). The highest self-reported competency was learning skills, and the lowest self-reported competency was research skills.

Thus, the findings of Study 1 indicate that research skills are a crucial academic competency for first-year students. In order to gain in-depth insight into research skills, a second study was conducted. Hence, Study 2 focuses on different aspects of research skills, including academic writing, developing research questions, and designing experimental studies. The exploration of research skills also includes the relationship between students' perceptions and self-reported confidence in this competence.

Research questions

In order to explore different aspects of research skills, the following research questions are addressed in Study 2:

- RQ3: What are first-year students' perceptions with regard to different aspects of research skills?
- RQ4: How do first-year students self-rate their competencies in different aspects of research skills?
- RQ5: Is there a relation between first-year students' perceptions and their self-rated confidence with regard to different aspects of research skills?

Method

Sample and data collection

Data for Study 2 was collected within the context of a complete quality assurance online questionnaire conducted at the same university as in Study 1 at the end of the winter semester 2014/2015. The total sample consists of 717 first-year students and their mean age was 22.0 years ($SD = 4.8$). Answering of the questionnaire items was voluntary. Due to missing data in the sample, the sample sizes for analyses vary between 476 and 717. Most of the 717 participants were enrolled in the Faculty of Arts (32.4%), followed by Faculty of Science (26.6%), Faculty of Human Sciences (19.0%), Faculty of Economics and Social Sciences (15.6%), and Faculty of Law (6.4 %).

Instrument and data analysis

For Study 2, the same items for the competence research skills were used as in Study 1. The items were ranked on a five-point Likert scale to meet university guidelines for the standardised quality assurance questionnaire. To analyse the research questions, descriptive statistics were applied and dependent t-tests and correlation analyses computed.

Table 2: Descriptive statistics for research skills, Study 2

Items	M	SD	Frequencies in percentages				
			1	2	3	4	5
<i>Perceptions</i>	2.63	.81					
I will be taught how to do academic research.	3.73	1.09	4.3	9.5	22.0	37.0	27.2
I will be taught how to write academic essays and short reports.	3.60	1.18	7.1	10.9	22.5	33.9	25.7
I will be actively involved in research projects.	2.23	1.14	33.9	27.6	23.5	11.3	3.7
I will conduct many research projects on my own.	1.83	0.95	46.7	29.9	18.8	3.0	1.6
I will often deal with academic research questions (e.g., in class, literature).	3.73	1.09	4.3	9.5	22.0	37.0	27.2
<i>Confidence</i>	2.73	.85					
I can independently write academic essays and short reports.	3.15	1.16	9.9	19.0	29.3	29.3	12.4
I can independently develop a research question.	3.14	1.08	8.1	19.3	32.1	32.1	8.5
I can do research on academic research questions.	3.67	0.98	3.5	6.4	29.5	40.2	20.3
I can design an experimental study.	2.40	1.04	23.2	29.9	33.9	9.8	3.1
I can interpret the results of a research study.	3.12	0.96	5.4	19.1	39.5	30.4	5.6
I can orally communicate the results of research projects.	3.25	0.98	5.2	15.2	36.5	35.2	7.9

Note. N = 717. Scale ranges from 1 = strong disagreement to 5 = strong agreement; Perceptions: Cronbach's alpha = .75; Confidence: Cronbach's alpha = .88.

Results

Table 2 presents descriptive statistics for first-year students' perceptions of different aspects of research skills. With a focus on first-year students' perceptions of support by their academic staff (RQ3), the majority of participants strongly/ somewhat strongly expected to be taught how to conduct academic research (64.2%) and how to write academic reports (59.6%) by their academic staff. With a focus on first-year students' perceptions of involvement in research skills, the majority of the participants strongly/ somewhat strongly disagreed that they would conduct research projects on their own (76.6%) and that they would be actively involved in research projects (61.5%) in their first

year. However, only 13.8% did not/ somewhat did not expect to deal with academic research questions. Hence, participants showed higher expectations in dealing with academic questions than in being involved in research projects and conducting them. Besides, participants reported high perceptions of support by their academic staff in developing research skills.

Table 3: Zero-order correlations for first-year students' perceptions and self-rated confidence in research skills, Study 2

Variable (paraphrased) ^a	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Perceptions	-												
2. Taught doing research	.74**	-											
3. Taught writing essays	.63**	.67**	-										
4. Involvement research projects	.68**	.33**	.22**	-									
5. Conducting research projects	.64**	.24**	.20**	.67**	-								
6. Dealing with research questions	.61**	.53**	.33**	.29**	.26**	-							
7. Confidence	.25**	.22**	.13**	.19**	.17**	.29**	-						
8. Writing essays	.20**	.21**	.15**	.08	.10*	.25**	.73**	-					
9. Developing research questions	.26**	.25**	.15**	.11*	.13**	.27**	.77**	.67**	-				
10. Doing research	.16**	.18**	.08	.09	.03	.27**	.72**	.61**	.58**	-			
11. Designing experimental studies	.25**	.17**	.10*	.24**	.24**	.21**	.73**	.48**	.55**	.41**	-		
12. Interpreting results	.17**	.16**	.04	.16**	.14**	.24**	.74**	.39**	.51**	.52**	.58**	-	
13. Communicating results	.18**	.16**	.10*	.15**	.12*	.25**	.75**	.42**	.52**	.52**	.56**	.79**	-

Note. ** $p < .01$; * $p < .05$; $p > .05$.

a. Original phrasing of the items: 1. Perception scale; 2. I will be taught how to do academic research; 3. I will be taught how to write academic essays and short reports; 4. I will be actively involved in research projects; 5. I will conduct many research projects on my own; 6. I will often deal with academic research questions; 7. Confidence scale; 8. I can independently write academic essays and short reports; 9. I can independently develop a research question; 10. I can do research on academic research questions; 11. I can design an experimental study; 12. I can interpret the results of a research study; 13. I can orally communicate the results of research projects.

With regard to confidence (RQ4), participants reported the highest confidence in doing research on academic research questions ($M = 3.67$, $SD = 0.98$). Dependent t -tests revealed that participants' confidence in this aspect differed significantly when compared to the other aspects of research skills, which are academic writing, $t(480) = 11.95$, $p < .001$, $d = .48$, developing research questions, $t(480) = 12.36$, $p < .001$, $d = .52$, designing experimental studies, $t(476) = 25.19$, $p < .001$, $d = 1.26$, interpreting study results, $t(479) = 12.83$, $p < .001$, $d = .57$, and communicating research results, $t(478) = 9.47$, $p < .001$, $d = .43$. In contrast, participants reported the lowest confidence in designing experimental

studies ($M = 2.40$, $SD = 1.04$). Dependent t -tests revealed significant differences for this self-report with regard to academic writing, $t(476) = 14.65$, $p < .001$, $d = .68$, developing research questions, $t(476) = 16.24$, $p < .001$, $d = .70$, doing research on academic questions, $t(476) = 25.19$, $p < .001$, $d = 1.26$, interpreting study results, $t(476) = 16.91$, $p < .001$, $d = .72$, and communicating research results, $t(475) = 19.52$, $p < .001$, $d = .85$.

With regard to RQ5, Table 3 shows the zero-order correlations between first-year students' perceptions and self-reported confidence in research skills overall (see 1. Perceptions scale and 7. Confidence scale) as well as in different aspects of research skills (8-13). Overall, participants' perceptions (1) were positively related with their self-reported confidence in research skills (item 7) ($r = .25$, $p < .01$). With a focus on the different aspects of research skills (items 8-13), the strongest positive correlation regarding students' perceptions (items 2-6) was found for students' perception to deal with academic research questions (item 6) and their self-reported competence to independently develop a research question (item 9) ($r = .27$, $p < .01$) and doing research on academic questions (item 10) ($r = .27$, $p < .01$). Hence, findings indicate that participants with low perceptions of research skills reported low self-confidence, while participants with high perceptions reported high self-confidence in research skills.

General discussion and conclusion

Coping with academic requirements is seen as an important factor in student retention in higher education (Thomas, 2002). Moreover, students' perceptions for their first year can affect student success (Crisp et al., 2009; Keup, 2007). However, research on academic competencies focusing on first-year student perceptions and confidence is limited. Thus, the purpose of this study was to gain insight into incoming students' perceptions of academic staff support and involvement as well as their self-reported confidence with regard to a proposed model of academic competencies. Furthermore, this study aimed to provide empirical evidence describing the first-year experience in Germany, where research is still rare.

Study 1 found that first-year students expect little support on self-monitoring and learning skills, but a lot of support on research skills. Students' little expectation of support in self-monitoring may be related to its focus on intrapersonal processes (Lombardi et al., 2011), and learning skills may be related to their school preparation which is in line with students' high self-perceived confidence in learning skills (Byrne & Flood, 2005). The high expectation of support in research skills was expected since research skills are often not taught in school (Wingate, 2006). Overall, studies reveal that academic staff often regard generic skills as a prerequisite for entering higher education studies and feel responsible for teaching discipline-specific skills (Barrie, 2007; Mah & Ifenthaler, 2017). In general, students' self-reported high confidence is in line with research that analyses students' self-perceived preparedness for higher education (Jansen & van der Meer, 2007). Their high confidence may be based on their school experience, however, this school preparation may not be adequate enough to meet the requirements for higher education studies (Cook & Leckey, 1999). Participants showed the lowest confidence in research skills and studies

revealed first-year students' unpreparedness in academic writing (Goldfinch & Hughes, 2007).

The follow-up study was based on the findings in Study 1 and focused solely on research skills, as a means of validating the initial results as well as gaining an in-depth understanding of this competency. Overall, the results of Study 2 reinforce the assumption that first-year students enter university with high expectations concerning support from academic staff, which is in line with research findings on this topic (Brinkworth et al., 2009; Scutter et al., 2011). Further, Study 2 reinforces the finding about first-year students' rather low confidence in their research skills, which indicates that they are not adequately prepared for this academic requirement when entering higher education. This result is consistent with studies that emphasise the development of research skills as challenging for students in higher education (Blair, 2017; Yorke & Longden, 2008). Moreover, findings indicate that first-year students' perceptions of research skills were positively related to their self-reported confidence, which is in line with results on incoming students' expectations of higher education studies and their self-reported readiness for these requirements (Jansen & van der Meer, 2007).

Implications

It is important to provide first-year students with academic support at the beginning of their studies (Tinto, 2012; Yorke, 2000). Thus, it is suggested that universities support incoming students in developing academic competencies and especially research skills, as early as possible. For instance, concepts and approaches of embedding academic skills have been developed and require further exploration, such as articulated learning and service learning (Gökmenoğlu, 2017; Warner & Picard, 2013). Academic competencies are prerequisites for success at higher education institutions and should be supported through personalised programs and adaptive services. Personalised programs and adaptive services offer the opportunity to meet learners' individual needs, for example with regard to traditional and non-traditional students (Wyatt, 2011).

Recently, higher education institutions have gained interest in educational technologies, which have the potential to enhance student retention. With a focus on personalised learning to improve academic competencies, three ideas are presented which consider the potential of educational technology and emerging research fields in educational science: online tutorials, learning analytics, and digital badges.

First, universities could offer personalised, competence-based programs to prepare students for the university's academic demands (Burnette, 2016). In competency-based online learning environments, adaptable learning programs generate personalised content and learning activities (Hill, 2012).

Second, in order to focus constantly on learning processes in real-time, learning analytics uses static and dynamic information about learners and learning environments to assess, elicit, and analyse them for modelling, prediction, and optimisation (Ifenthaler & Widanapathirana, 2014). Learning analytics can predict who are potentially at risk of

failing courses and suggest academic support that may improve students' chances of being successful in courses (Arnold & Pistilli, 2012). Feedback and support services with regard to academic competencies could be included in order to contribute to student retention.

Third, digital badges as symbols of learning achievements, skills and competencies may contribute to student retention in higher education, for example by motivating students and by showing transparent academic requirements (Gibson, Ostashevski, Flintoff, Grant & Knight, 2013; Ifenthaler, Bellin-Mularski & Mah, 2016). If academic requirements are transparent, first-year students will know what is expected of them and thus develop the academic competencies needed for higher education right from the beginning. Hence, higher education institutions could define digital badges that students need to achieve and thus show transparency in their academic requirements. With this regard, digital badges as representation of competencies may also contribute to students' self-reported confidence, which is positively related to their perceptions. Moreover, digital badges may serve as an indicator for students who need academic support. Thus, digital badges may serve as a platform for communication between staff and students about demands and adaptive support services in order to contribute to student retention.

Furthermore, findings presented here could be included in a model that aims to connect academic competencies, digital badges, and learning analytics (Mah, 2016). For example, students' research skills can be assessed and then represented as a digital badge, which can be used as a variable for learning analytics algorithms to predict student success and to suggest personalised support services.

Limitations and further research

The two studies presented have obvious limitations that require consideration. There is a potential for respondent bias, because respondents from Study 1 might have also participated in Study 2. Besides, the sample size in Study 2 varies for the different analyses since the answering of the questionnaire items was voluntary. In addition, data collection occurred at one German university, thus prohibiting a wider generalisation of results. Therefore, future studies should collect data from various institutions, allowing more general conclusions to be drawn. Moreover, it is necessary to further discuss and validate the proposed conceptual model of academic competencies as well as to modify the questionnaire to increase reliability of the scales. Furthermore, research has indicated that students may have different confidence levels (Atherton, 2017), and that students may lack the competence for accurate self-assessment (Kruger & Dunning, 1999). Future research should include instruments for analysing whether students make realistic assessments of their skills, for comparing students' and academic staff assessments, and for testing competencies.

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