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DROPOUT IN AN ONLINE TRAINING FOR IN-SERVICE TEACHERS

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Introduction

High dropout rates are a problem in online learning (Lee & Choi, 2011). Student dropout has been described and analyzed in the contexts of whole study programs (Grau-Valldosera & Minguillón, 2014) and single online courses (Lee & Choi, 2011). Determinants of learner attrition and persistence with online training have been shaped in various models with different levels of complexity (e.g., Lee & Choi, 2011). It appears to be a complex phenomenon depending on numerous factors (e.g., Lee & Choi, 2011). In addition to features of the online training course and the learning conditions, Lee and Choi (2011) strongly suggested that learner characteristics influence the decision to persist in an online course or to drop out. Therefore, we explored the extent that learners dropping out at various stages from an online training for in-service teachers differ from successful learners in domain-specific prior knowledge, motivation, learning skills, computer attitude and computer anxiety.

In the context of complex learning environments and online learning, the domain-specific prior knowledge is known to influence program usage, information processing and performance often in a straightforward way (Amadieu, Tricot, & Mariné, 2009). Studies from hypertext research reported prior knowledge having a positive impact on a diversity of performance measures (Amadieu et al., 2009; McDonald & Stevenson, 1998; Stiller, 2003; 2009; 2015). Students having higher prior knowledge can more easily study because of having less new information connected to prior knowledge. Consequently, learners might experience a lower level of work load and be less threatened by learning difficulties. Thus the level of prior knowledge might influence a learner's decision to drop out.

Intrinsic motivation refers to engaging in behaviours, because the acts are inherently interesting or enjoyable (Ryan & Deci, 2000). Intrinsic motivation is also connected to high-quality learning (Ryan & Deci, 2000). Motivation is one of the most frequently studied variables in relation to dropout, and it was shown to be correlated to course persistence and dropout (Castles, 2004; Grau-Valldosera & Minguillon, 2014; Hart, 2012; Hartnett, St. George, & Drone, 2011; Ivankova & Stick, 2007; Osborn, 2001; Park & Choi, 2009; Parker, 2003). Learners who are intrinsically motivated might have an advantage in preventing learning difficulties. Their greater involvement in deeper learning might contribute to reduced dropout rates.

Self-regulated learning is a key component of successful online learning (Barnard et al., 2009) comprising, according to Pintrich (1999), the use of cognitive and metacognitive learning

strategies and resource management strategies. Metacognitive strategies, time management and creating a supporting learning environment are considered to be particularly relevant for online learning (Lee, Choi, & Kim, 2013). Metacognitive strategies include the planning, monitoring and regulation of cognitive processes (Pintrich, 1999). Resource management strategies are self-management strategies that support learning in general and shield against external disturbances and other detrimental influences (Pintrich, 1999). The strategies of time management (i.e., assigning adequate time periods to learning) and learning environment strategies (i.e., creating a supportive learning environment) belong to this category. Higher levels of these learning skills might contribute to reducing dropout. It was shown that management skills are significant predictors of dropout (Lee, Choi, & Kim, 2013), especially managing time effectively and having comfortable conditions for studying (Castles, 2004; Hart, 2012; Holder, 2007; Ivankova & Stick, 2007; Osborn, 2001; Shin & Kim, 1999).

Computer attitude and anxiety might influence a learner's decision to drop out by affecting learning. Attitudes consist of affective, conative and cognitive components (Richter, Naumann, & Horz, 2010). Computer anxiety is considered to be a trait, which comprises both cognitive and affective components such as feelings of anxiety and worrisome thoughts (Richter et al., 2010). Negative computer attitudes and computer anxiety might disturb learning because of negative emotions and thoughts associated with the computer, such as disturbing thoughts about the computer malfunctioning or even crashing. The limited studies investigating the effects of computer attitudes on course dropout have found positive effects of positive attitudes on course usage and persistence (Bernard et al., 2004; Stiller & Köster, 2016). Only two studies have investigated computer anxiety and course dropout / persistence. Long et al. (2009) presented no differences in drop-out rates between employees of a U.S. Midwest-based landscaping company who completed an online course, and Stiller and Köster (2016) showed that dropout employees had a higher level of computer anxiety than successful learners.

Research objectives and expectations

An online training in media pedagogy for in-service teachers was used to explore course dropout. We examined whether student dropout is influenced by prior knowledge, intrinsic motivation, learning strategies, computer attitude, and computer anxiety by simply comparing the identified group of dropout learners and the group of persistent learners in respect of the learner characteristics. We assumed that dropout is more likely when a learner has a lower level of prior knowledge, intrinsic motivation as well as learning skills, more negative attitudes towards computers, and a higher level of computer anxiety.

Method

Participants

The data was collected from the students who registered for the online training "Media Pedagogy for Teachers". The training addressed teachers of primary schools (*Grundschule*), secondary general schools (*Hauptschule*), intermediate schools (*Realschule*) and grammar

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schools (*Gymnasium*) in the German Federal State of Bavaria (see Federal Ministry of Education and Research, 2016 for details on German classification of schools). Students were recruited by promoting the training offline via flyers at these type of schools throughout Bavaria. Participants are described in the results section.

Description of the online training

The online modular training was based on instructional texts without a fixed schedule. Each module was modelled on the Nine Events of Instruction (Gagné et al., 1992). We paid attention to providing a motivational, stimulating learning environment, a high level of self-instruction, and an effective and efficient information presentation. The content consisted of authentic problems, using multiple contexts and multiple perspectives for learning. Given the lack of a social context (i.e., the need to cooperate and communicate with other learners), participants had a high level of flexibility in terms of time management. Support for students was provided via email, online chat by using text, and phone

The training consisted of eight modules (e.g., "Everyday life of children and adolescents" and "Generation SMS – the use of mobile phones by children and adolescents"). Students who completed at least one module successfully could request a training certificate listing all completed modules. A successful completion of any module was calculated with a workload of 60 to 90 minutes. In addition, an introductory module informed students about content, technical requirements, course organization, and self-management for successful online learning. Registration and participation was free.

The starting point of the course was a Moodle portal. The students could freely decide how many of the modules they wanted to study and in which sequence. Each training module had a linear structure represented by six screen pages: module profile, case example, test of domain-specific prior knowledge, instructional unit, module evaluation, and final module test. The module profile gave an overview of the content and the teaching objectives. The case example represented a real life problem with the purpose of fostering student curiosity and the learning of relevant content. A test of prior-knowledge was used for activating prior knowledge and for providing feedback about the student's current level. The instructional unit comprised an instructional text and optional supporting material. The final module tests consisted of 15 multiple-choice items that evaluated factual knowledge learned in the training, the result of which was provided as feedback to the student. Learners were required to answer at least 50% of the items correctly to have successfully completed a module, otherwise a module was completed but failed.

Procedure and means of measurements

The training was offered from October 2009 to July 2010, which was during the regular German school year. Everybody who was interested in the course could register. After registration, the students' login directed them to the introductory module. Before starting the training, the participants were asked to provide demographic information and to respond to various items that assessed learner characteristics. After completing the first questionnaire, the

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eight course modules were accessible. A prior-knowledge test was presented before each module, and after completing the module, participants completed a final module test.

After providing socio-demographic characteristics, participants' motivation to participate in the online training was assessed with the Interest/Enjoyment scale of the Intrinsic Motivation Inventory (Ryan, 1982). Subsequently, their attitude towards computers was examined, which focuses on the personal experience with using the computer as a means for learning and working. The negative component, in the sense of the computer being regarded as an uncontrollable machine, was measured (Richter et al., 2010). A high score expresses a low negative attitude. Computer anxiety was then measured by assessing cognitive and affective components (Richter et al., 2010). Additionally, the three exemplary persistent strategies of self-regulated learning were assessed (Griese et al., 2015): meta-cognitive learning strategies (planning, monitoring, and regulating), time management, and learning environment. The domain specific prior-knowledge test at the beginning of each module was assessed with a 5-item multiple choice test (score range 0-5). Each item comprised four answers of which at least one was correct.

Prior knowledge was scored as percent correct and a mean was calculated across the number of tests completed (from 1 to 8 possible scores). Means were calculated for all other scales. A high score of all measures expresses a higher level of the feature in focus except for computer attitude which indicates a low negative attitude.

Table 1: Means and standard deviations as well as the potential score range of the used measurements are shown

	Number of items used for assessment	Number of assessments an individual score is based on	M	SD	Range	Cronbach's alpha
Interest / Enjoyment	7	1	4.00	.62	1-5	.84
Computer attitude	9	1	4.23	.59	1-5	.80
Computer anxiety	8	1	1.77	.63	1-5	.82
Metacognitive strategies	11	1	3.43	.61	1-5	.81
Time management	4	1	2.47	.90	1-5	.83
Learning environment	6	1	3.99	.68	1-5	.80
Prior knowledge	5	1 to 8	48.71	16.34	0-100	.27 to .65[(1)]

[(1)] Range; Cronbach's alpha was calculated per each module

Results

Registrants included 318 in-service teachers who answered the first questionnaire (see Table 2), and one record contained missing data. More female (56%) than male teachers (44%) enrolled in the training. The mean age of teachers was 39.6 years (SD = 9.7, range from 21 to 70 years, n = 317). Most teachers worked in an intermediate school (41%) and a specialised upper secondary school or a grammar school (24%), followed by primary school and secondary general school (10% each), and other school types (15%). The following groups

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of dropout and persistent learners could be identified: (a) dropout group of absent students (no prior knowledge tests were completed), (b) dropout group of viewing students (completed at least one prior knowledge test but no final module tests), and (c) persisting group of studying students (completed at least one final test). According to these three groups of registered teachers (see Table 2), the sample resulted in 50% dropout students (absent and viewing students) and 50% studying students. Almost 30% of studying students completed only 1-2 modules, and almost half completed the full eight modules.

Table 2: Demographic characteristics of the registered in-service teachers, dropout and persistent groups

		No. (%) of registered students	No. (%) of absent students	No. (%) of viewing students	No. (%) of dropout students	No. (%) of studying students
	Total	318 (100.0)	63 (19.8)	96 (30.2)	159 (50.0)	159 (50.0)
Sex	Female	179 (56.3)	31 (49.2)	40 (41.7)	71 (44.7)	108 (67.9)
	Male	139 (43.7)	32 (50.8)	56 (58.3)	88 (55.3)	51 (32.1)
Type of school	Primary school	32 (10.1)	5 (7.9)	7 (7.3)	12 (7.5)	20 (12.6)
	Secondary general school	33 (10.4)	7 (11.1)	12 (12.5)	19 (11.9)	14 (8.8)
	Intermediate school	130 (40.9)	21 (33.3)	40 (41.7)	61 (38.4)	69 (43.4)
	specialised upper secondary school / grammar school	76 (23.9)	19 (30.2)	18 (18.8)	37 (23.3)	39 (24.5)
	Other than listed	47 (14.8)	11 (17.5)	19 (19.8)	30 (18.9)	17 (10.7)
No. of successfully completed modules	0	167 (52.5)	63 (100.0)	96 (100.0)	159 (100.0)	8 (5.0)
	1	27 (8.5)				27 (17.0)
	2	19 (6.0)				19 (11.9)
	3	13 (4.1)				13 (8.2)
	4	6 (1.9)				6 (3.8)
	5	12 (3.8)				12 (7.5)
	6	3 (0.9)				3 (1.9)
	7	3 (0.9)				3 (1.9)
	8	68 (21.4)				68 (42.7)

The dropout group (absent and viewing students combined) and the studying group were compared in reference to sex, age, type of school, and the learner characteristics of interest. Effect sizes d were computed as the difference between the means of the persistent and the dropout groups divided by the standard deviations of the sample (see Table 1). Effect size d for Chi-square tests were calculated from the Chi-square values (see Elis, 2010). Group differences were found for sex ($\lambda^2 = 17.50$, df = 1, $p < .001$, d = 48) and age (see Table 3), but not for type of school ($\lambda^2 = 6.90$, df = 6, ns, d = .13; calculation of d was computed using $\lambda^2 = 1.38$, df = 1 after merging the intermediate school and specialised upper secondary school / grammar school into one group and the other three school types into another group). The studying students were on average more than four years younger than the other groups, and the viewing students were the oldest in the sample. Finally, no differences were found between

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the groups in motivation, computer attitude and anxiety and time management, but use of meta-cognitive learning strategies and creating an adequate learning environment was lower for dropout students than for studying students. In addition, prior knowledge scores were lower for the viewing students than for the studying students. Generally, only small effects were found.

Table 3: Means and standard deviations of the student groups, Welch test results (one-sided) and effect sizes d are shown

	Absent students M (SD)	Viewing students M (SD)	Dropout students M (SD)	Studying students M (SD)	Welch-t	df	p	d
Age	40.7 (11.0)	42.6 (9.1)	41.8 (9.9)	37.4 (9.0)	-4.14	311.71	.001	-.45
Intrinsic motivation	4.05 (.63)	3.92 (.65)	3.97 (.65)	4.03 (.58)	.83	312.84	ns	.10
Computer attitude	4.17 (.53)	4.28 (.58)	4.24 (.56)	4.22 (.61)	-.31	313.78	ns	-.03
Computer anxiety	1.78 (.60)	1.69 (.62)	1.73 (.61)	1.81 (.65)	1.18	314.78	ns	.13
Metacog. strategies	3.34 (.70)	3.36 (.64)	3.35 (.66)	3.50 (.55)	2.18	304.94	.015	.25
Time management	2.56 (.93)	2.36 (.86)	2.44 (.89)	2.51 (.90)	.69	315.96	ns	.08
Learning environment	3.89 (.63)	3.92 (.78)	3.91 (.72)	4.07 (62)	2.19	308.49	.015	.24
Prior knowledge	--	44.14 (17.95)	--	51.47 (14.67)	3.38	170.42	.001	.45

Discussion

The dropout groups of absent and viewing students appeared to be somewhat older and tended to be more male than female. They also possessed less prior knowledge, metacognitive skills and skills to arrange an adequate learning environment. No differences were found in intrinsic motivation, computer attitude, and computer anxiety between dropouts and students who persisted in studying. No explanation for the age and sex differences emerged in this study. In contrast to the literature, successful learners in this study appear to be younger than dropout students (cf. Yukselturk & Bulut, 2007). Our results pertaining to learning skills, however, are in line with former research on learning performance (Amadieu et al., 2009; McDonald & Stevenson, 1998; Stiller, 2003; 2009) and learning management skills (metacognitive strategies and strategies concerning the learning environment; Castles, 2004; Osborn, 2001; Shin & Kim, 1999), but we did not find that time management was essential in contradiction to other studies (Hart, 2012; Holder, 2007; Ivankova & Stick, 2007; Lee & Choi, 2011; Osborn, 2001; Shin & Kim, 1999).

Overall, computer attitude and computer anxiety were not indicative of dropping out. This result is not consistent with evidence from other studies (Hauser et al., 2012; Saadé & Kira, 2009; Stiller & Köster, 2016). One reason for the null finding could be that these student characteristics interact with the type of learning materials used, module performance tasks,

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and computer mediated communication. When learning, communicating and performing involves a more intensive use of the computer as was the case with Hauser et al. (2012), Saade and Kira (2009) and Stiller and Köster (2016). These studies all included a more intensive use of computers combined with partially a more complex computer mediated communication and more complex learning activities. Thus, negative computer attitudes and computer anxiety might then be more disturbing when studying. In the present study, studying was mainly reduced to reading a paper-based script (we assumed that most teachers printed the pdf files and studied them) or on-screen texts and assessing learning performance via recognition tests (i.e., multiple choice tests about factual knowledge). This method combined with negative computer attitudes or computer anxiety might not lead to higher levels of disturbances while learning, thus not being relevant for a learner's decision to drop out.

In general, the act of dropping out remains a complex phenomenon. Our results suggest that various learner characteristics are connected to dropping out. Although readers should be careful in generalizing the results, learning management skills seem to be a good starting point to set up interventions against dropping out. Other features, such as age and sex, could inform educators as to whom an effective intervention should be offered when a threat of dropping out is detected.

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