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How to Get the Ball Rolling: The Influence of Self-Leadership on Students' Intention to Use an Integrated Self-Leadership Behaviour Change Support System

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HOW TO GET THE BALL ROLLING: THE INFLUENCE OF SELF-LEADERSHIP ON STUDENTS' INTENTION TO USE AN INTEGRATED SELF-LEADERSHIP BEHAVIOUR CHANGE SUPPORT SYSTEM

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Abstract

Self-leadership (SL) is a crucial soft skill for higher education graduates in the current work environment. The dynamic, crisis-ridden and digitalized character of this environment demands self-direction and self-motivation. SL includes strategies that support the creation and maintenance of these abilities (e.g., self-observation). However, the development of SL paradoxically requires SL from the individual or an external impulse. Digital SL training in academic teaching can provide corresponding impulses. This study presents a behaviour change support system (BCSS) targeting the promotion of SL. This BCSS is integrated into a digital hard skill course in a learning management system. With the paradox of needing SL to improve SL in mind, this study aims to investigate whether users' individual SL status influences the behavioural intention (BI) to use an integrated BCSS on SL. The findings indicate that users' self-goal setting and self-rewarding abilities influence the BI to use the presented BCSS.

Keywords: Digital Soft Skill Training, Self-Leadership, Behaviour Change Support System.

1 Introduction

Self-leadership (SL) is a crucial soft skill for modern working styles shaped by digitalisation (Castellano et al., 2021) and is particularly important in the current dynamic and crisis-ridden environment (Mander et al., 2021; Marques-Quinteiro et al., 2019). SL describes a self-influencing process that creates self-direction and self-motivation to perform (Neck & Houghton, 2006). Paradoxically, the individual improvement of SL also requires SL from the individual. However, impulses to overcome this paradox can be provided from the outside (Stewart et al., 2019). In this regard, modularised digital SL training has proven to be effective in the promotion of different SL-related strategies among executives (Krampitz et al., 2023). Moreover, previous studies found indications for the appropriateness of digital elements integrated into higher education courses to train SL (e.g. Furtner et al., 2012). SL training should therefore be integrated into university degree programmes (Napiersky & Woods, 2018). Nevertheless, despite the increasing digitalization in higher education (Bygstad et al., 2022), which offers new opportunities to promote students' soft skills (Volkov et al., 2022), and the increasing responsibility of higher education institutions (HEI) to include appropriate technologies that support soft skill acquisition (Brennan et al., 2023), research on SL training among students often focuses on studies on attendance-based seminars (e.g., Sampl et al., 2017) or other non-digital and extracurricular settings (e.g., Furtner et al., 2012; Montalvo-García et al., 2022). In this regard, behaviour change support systems (BCSS) could support universities' activities to promote the SL of students, as BCSS are designed to influence users' attitudes and behaviours without coercion (Oinas-Kukkonen, 2013) while providing the low-threshold nature required by students (Steinherr, 2023). Steinherr (2021, 2023), for example, designs and evaluates a BCSS to train self-regulated learning, which is strongly related to SL (Steinherr & Vay). These results indicate that digital elements, and a BCSS in particular, could be an

appropriate means to overcome the paradox of needing SL to improve SL (Stewart et al., 2019). However, to unfold the advantages of a BCSS towards a behavioural change, it needs to successfully engage the user in the first step (Lehto & Oinas-Kukkonen, 2015). Considering the two prerequisites for developing SL with a BCSS, the paradox of needing SL to improve SL and the importance of successful initial user engagement, this study focuses on whether users' SL status influences the behavioural intention (BI) to use an integrated BCSS on SL. Therefore, the addressed research question in this study is: *To what extent are users' SL abilities relevant to the behavioural intention to use a BCSS on SL?*

In addition, factors other than users' SL abilities that influence the usage of an integrated BCSS fostering SL shall be identified. This could contribute to the open question of what factors influence students' engagement with technology in higher education (Paulsen & McCormick, 2020), particularly in the promotion of soft skills. To gather insights into these issues, a BCSS is developed and evaluated based on an existing theoretical foundation. The design of this BCSS is developed within a Design Science Research (DSR) project and follows the Persuasive Systems Design (PSD) model defined by Oinas-Kukkonen and Harjumaa (2009). To measure students' SL and the intention to use, the SL questionnaire of Andreßen and Konradt (2007) is combined with the construct measuring the BI to use derived from the technology acceptance model (TAM) (Ghani et al., 2019). Furthermore, qualitative questions are included to identify drivers of the student's intention to use the developed BCSS.

2 Theoretical Background

2.1 Self-leadership

SL describes a self-influencing process creating the self-direction and self-motivation to perform (Neck & Houghton, 2006). SL consists of three primary strategy categories: behavioural, natural reward, and constructive thought pattern strategies (see Table 1). These strategies come from the larger theoretical context of self-regulation and can be promoted and evaluated in terms of their individual application (Neck & Houghton, 2006). The application of SL strategies is, for example, negatively related to job burn-out and positively related to the meaningfulness of work (Sjöblom et al., 2022), work engagement, organizational commitment, or overall work performance (Inam et al., 2021). Furthermore, these strategies aim to create self-direction and self-motivation for an individual to fulfil tasks (Neck & Houghton, 2006), even for tasks which are not inherently motivating (Manz, 1986).

SL strategy category	SL strategy
Behaviour-focused strategies	Doing **self-observation** to be aware of the time, reason, etc. of certain behaviours
	Doing **self-goal setting** to set personal goals (e.g., for career) for different time horizons
	Doing **self-rewarding** for the completion of desired activities or behaviours
	Using **self-punishment** (e.g., self-criticism) to avoid undesirable behaviour
	Doing **self-cueing** (e.g., with calendars) to remind of important activities, appointments, etc.
Natural reward strategies	**Include** more **pleasant aspects** in necessary work activities
	Focus on pleasant aspects included in work activities
Constructive thought patterns	Identify and replace **dysfunctional beliefs**
	Doing **mental imagery** to create optimistic and opportunity-focused thinking patterns
	Doing **self-talk** with a constructive, self-instructive, and self-motivating inner speech

Table 1. SL strategies (Houghton & Neck, 2002; Lucke & Furtner, 2015).

The different strategy categories work in different ways: 1) behaviour-focused strategies aim to directly change a person's behaviour, e.g., by identifying a discrepancy to a desired behaviour by self-

observation; 2) natural rewards strategies try to address different aspects of intrinsic motivation and self-determination to make work more pleasant; 3) constructive thought patterns include a) the creation of thought patterns that influence performance in a positive way and b) the reduction of thoughts having a negative impact on performance (Goldsby et al., 2021; Houghton & Neck, 2002; Lucke & Furtner, 2015; Neck & Houghton, 2006). Table 1 contains the concrete SL strategies for each strategy category with an application-oriented explanation.

Especially for executives, SL is often seen as an essential skill (Goldsby et al., 2021; Watkin et al., 2017). Therefore, the promotion of SL among students is important as it could help them to reduce stress and cope with difficult situations in their study and work life. Furthermore, the use of SL strategies is positively associated with students' own self-efficacy expectations (lknur & Ersin, 2019), better working results, lower perceived strain (Lucke & Furtner, 2015), and career success (Megheirkouni, 2018).

2.2 Behaviour change support systems

BCSS are information systems that aim to influence users' attitudes and behaviours without using coercion or deception (Oinas-Kukkonen, 2013). BCSS are used in a variety of domains, especially in the health sector (Tikka & Oinas-Kukkonen, 2019) and also in higher education (Steinherr, 2021). In a broader context, BCSS are a form of persuasive technology which aims to change human behaviour or attitudes (Fogg, 2002). For the design and development of BCSS, Oinas-Kukkonen and Harjumaa (2009) created the PSD model, which provides three concrete steps and guidance for BCSS development and realization. First, the persuasion context should be analysed. This includes for example 1) identifying particular issues in the application domain, 2) analysing the target group, and 3) identifying technical requirements in the application domain. Second, the PSD suggests developing an appropriate design for the BCSS. For this purpose, the PSD defines four design principle categories: primary task support (e.g. self-monitoring), social support (e.g., normative influence), dialogue support (e.g., reminders), and system credibility support (e.g., trustworthiness). In total, these categories contain 28 different design principles which provide Information on how to design a BCSS. In the last step, a requirement definition for software attributes and software implementation is suggested (Oinas-Kukkonen & Harjumaa, 2009). In the field of BCSS, the PSD model is widely used as a theoretical foundation for the development of new systems (Steinherr, 2021).

2.3 Related work

Behavioural changes through digital interventions among university students have been researched in different areas and with various technologies: e.g. the promotion of self-regulated learning by using a mobile application (Steinherr, 2021) or the reduction of illegal drug use through personalized digital modules (Vasiliou et al., 2021). However, to identify publications directly related to a digital behavioural change in terms of applying SL strategies an initial systematic literature search for *(„self-leadership" OR „self leadership") AND (behaviour change support system* OR "BCSS")* did not provide any results in the databases considered. A total of six databases were searched to obtain the most comprehensive picture possible from this literature review: AIsEL, ACM, EBSCO Host, ERIC, ProQuest, and Web Of Science. The following search string was applied: *AB: („self-leadership" OR „self leadership") AND („student*" OR „college student*" OR „university student*" OR „higher education") AND („development" OR „training*" OR „intervention*").* The search in June 2023 resulted in 182 articles with 26 of them being duplicates. The titles and abstracts of 156 articles were checked for indications regarding the design, execution or evaluation of digital interventions targeting the promotion of higher education students' SL. In total only three publications dealing with digital SL interventions among students were identified. Furtner et al. (2012) created an SL training intervention which started with a pre-test on the SL of the participants. After that, the participants are provided with information and training on all three SL strategy categories in a physical five-hour training session. This is followed by a four-week practice phase and the transfer of the learned SL content is implemented. In this phase, an online platform allows participants to share experiences and achieve goals. Furthermore, the platform is used to provide weekly reflection exercises to the participants, which can be submitted

via this platform. Finally, there is a reflection on the participants' own SL in a physical meeting. The results suggest, that the SL training of Furtner et al. (2012) had positive effects on participants' SL in general. Hwang and Oh (2021) examine the effects of a flipped classroom approach on the SL of students. Thereby, they use e-learning materials to prepare in-person classes containing for example group activities, discussions, or feedback. The results indicate, that a flipped classroom approach with an e-learning preparation has a positive impact on the SL of students. Kang and Kim (2020) examine the effects of video training and simulation training on the SL of students in medical educational contexts. Two groups of students are prepared either with training videos or four hours of simulation to train in a realistic working environment. The results indicate that simulation training in this medical context has a positive impact on SL compared to the provision of video content. In summary, the considered studies use digital tools to support in-person training processes or evaluate the effects of certain technologies on students' SL. However, implications on the design of an integrated and voluntarily used digital SL intervention are missing.

3 Research Methodology

3.1 Design science research

This study is part of a larger Design Science Research (DSR) project following the DSR cycles of Hevner (2007). In this project, a BCSS targeting the promotion of SL among students within hard skill courses is iteratively improved. This project aims to provide students with adequate SL in a resource-efficient (e.g., teaching time-efficient) way to prepare them adequately for a successful career in a potential leadership role in a dynamic working environment. Therefore, this project has gone through a relevance cycle to identify important leadership skills in an environment, that is becoming increasingly digitized, dynamic, and crisis-ridden (Vay & Steinherr, 2023). In this environment, soft skills related to leadership are in demand like never before (Moldoveanu & Narayandas, 2019). The realisation of the artefact started with an interactive video that trained the SL strategy of self-observation in a very specific hard skill context (Steinherr & Vay, 2022) The next step was to develop a holistic solution that included training modules for all SL strategies. This step included rigour cycles to implement relevant SL theories and build the artefact on existing design knowledge which is relevant for digital soft skill development in higher education. In this regard, the studies of Steinherr (2021, 2023) contain domain-specific design knowledge on self-regulation training with digital elements in higher education. These studies revealed the usefulness of BCSS in higher education. Regarding relevant SL theories and methods, for example, Goldsby et al. (2021), Neck and Houghton (2006), Neck and Manz (2010), and Andreßen and Konradt (2007) revealed valuable information on the SL content and intervention procedure used in the artefact. Besides information on the content and design of the artefact, this rigour cycle also revealed the challenge of needing SL to develop SL (Stewart et al., 2019). This influence of SL on the development of SL raises the question if students with a low SL will use this artefact voluntarily. Against this background, the results of the presented study can be classified as an evaluation of a system design (Offermann et al., 2010) for digital SL promotion in hard skill courses in learning management systems.

3.2 Artifact design and functionality

The name of the developed BCSS is SeLeAT (Self-Leadership Assessment and Training). It was designed according to the design principles of the PSD model. This included a context analysis, the selection of adequate design principles, and their implementation (Oinas-Kukkonen & Harjumaa, 2009). In the first step, as part of the context analysis, the target group of the artefact is analysed: The target group of SeLeAT are university students in business-related study programs who will work and possibly lead in a very dynamic working environment in their later working lives. This environment requires a highly independent working style and a sustainable handling of own resources (e.g., cognitive resources). The independent learning style of many study programs already promotes some strategies to cope with the challenges of this environment inherently (e.g., self-goal setting for exam preparation). This promotion has often an isolated and/or non-explicit character (e.g., Kang & Kim, 2020 or Phillips

et al., 2017). Therefore, SeLeAT targets a holistic but also personalized promotion of all SL strategies. While students are the main target group for the effects of SeLeAT, lecturers are also important stakeholders for this BCSS. SeLeAT needs to be promoted and integrated into university courses. Therefore, it is important that SeLeAT is easy to integrate into existing university systems like learning management systems (LMS). As a web-based system, SeLeAT can meet these requirements because it can be easily integrated into existing web-based educational systems (e.g., Moodle or Stud.IP), for example by using inline frames (iframes). To avoid redundancies among the practical realisations of the design principles, existing functions of the given LMS Stud.IP are used. In sum, the PSD model contains 28 design principles (Oinas-Kukkonen & Harjumaa, 2009) in four categories: primary task support, dialogue support, system credibility support, and social support. The current version of SeLeAT includes 13 of these design principles, with four design principles using the functionalities of the LMS. The selection of the applied design principles is based on several previous design cycles. Figure 1 provides an overview of applied design principles and whether the design principle is realised in SeLeAT or is used from the LMS repertoire.

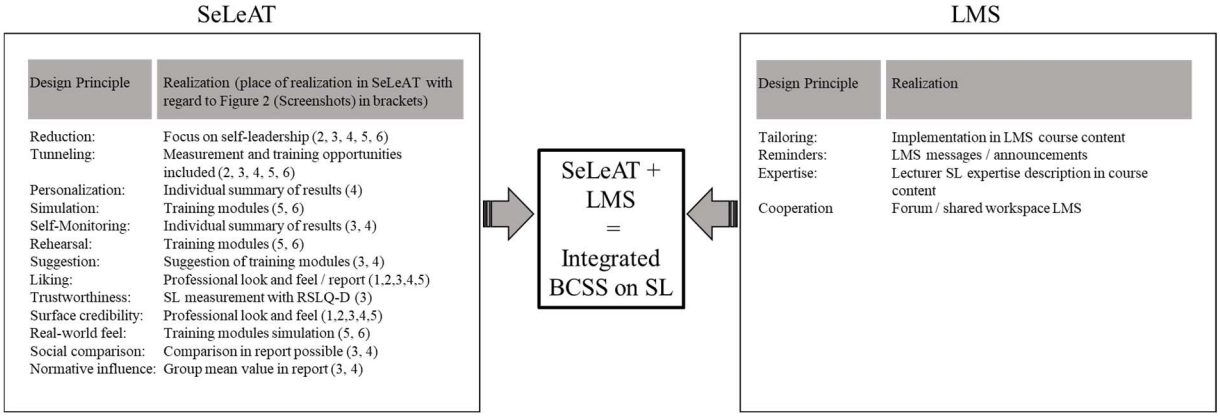

Figure 1. Design principle combination for an integrated BCSS on SL.

Figure 2 depicts SeLeAT integrated into a digital lecture course in an LMS. In this case, the LMS is Stud.IP (Stud.IP e. V., 2023). SeLeAT is integrated using an iframe HTML element. By using this interface, the web-based character of SeLeAT allows an easy and quick integration into common LMS. Thereby, there is no need to integrate common LMS functionalities which are useful for digital soft skill training (e.g., messenger or forum functionalities) into SeLeAT. The yellow frame in Figure 2 marks the login screen of SeLeAT. To log in, no personal data is required. The user is asked to create an anonymous ID, e.g. by combining the first letter of the mother's first name with other letters, such as the second letter of the place of birth. This login procedure is meant to guarantee a low threshold access for students.

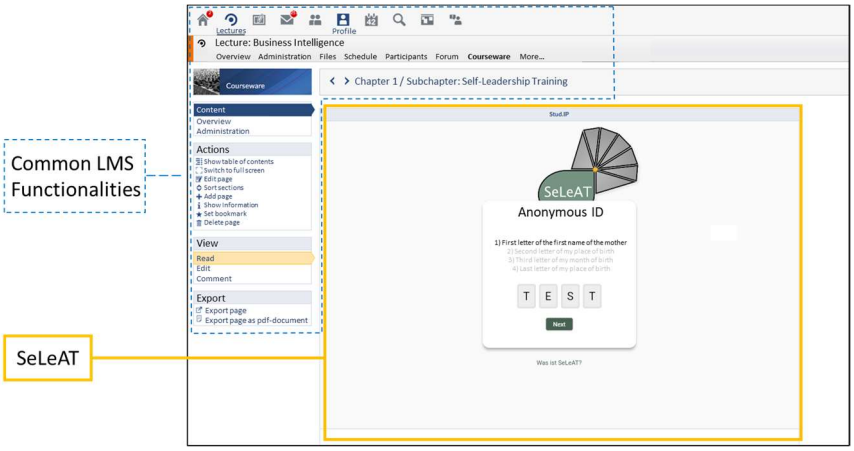

Figure 2. SeLeAT integration in LMS.

Figure 3 depicts the SeLeAT screens following the login screen. Screen 1 shows the collection of basic demographic data (e.g., age). Thereafter, the evaluation of the users' SL takes place. Screen 2 shows three of the 27 questions the evaluation contains. The questions are based on the validated RSLQ-D questionnaire (Andreßen & Konradt, 2007).

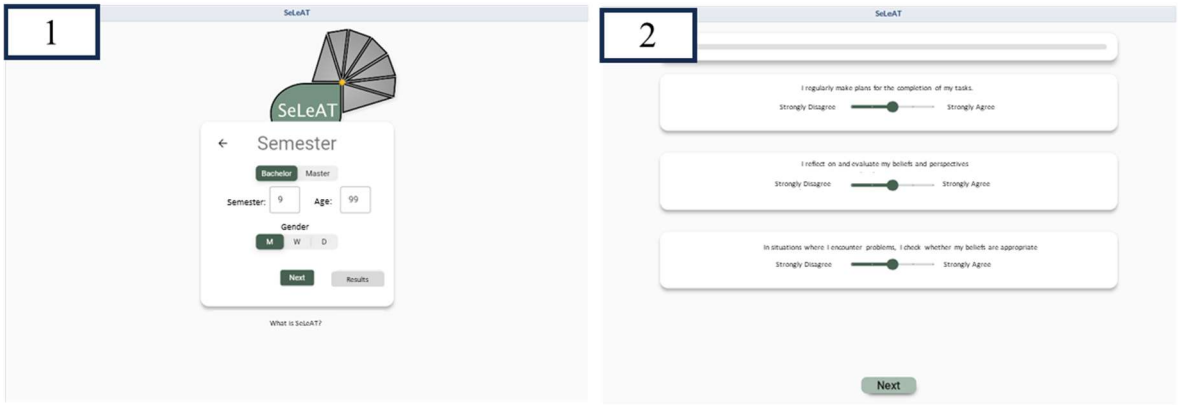

Figure 3. Login screen and SL evaluation.

Based on the users' answers, the dashboard depicted in Figure 4 is created. The depicted dashboard is an excerpt with four (out of nine) exemplary strategy categories. The dashboard allows an overview of the status of users' applications regarding the different SL strategy categories (e.g., self-goal setting). Furthermore, it allows a comparison with the group average of the SL strategy categories, gives a hint on the course of the users' SL development with sparklines, and offers a direct link to a training module for every SL strategy. The dashboard can be exported as .pdf (screen 4 in Figure 4). From screen 3 (see Figure 4), a direct link to SL training modules is available. By using the anonymous ID (see Figure 2) users can jump directly to the SL dashboard (screen 3in Figure 4), check previous results, and select training modules.

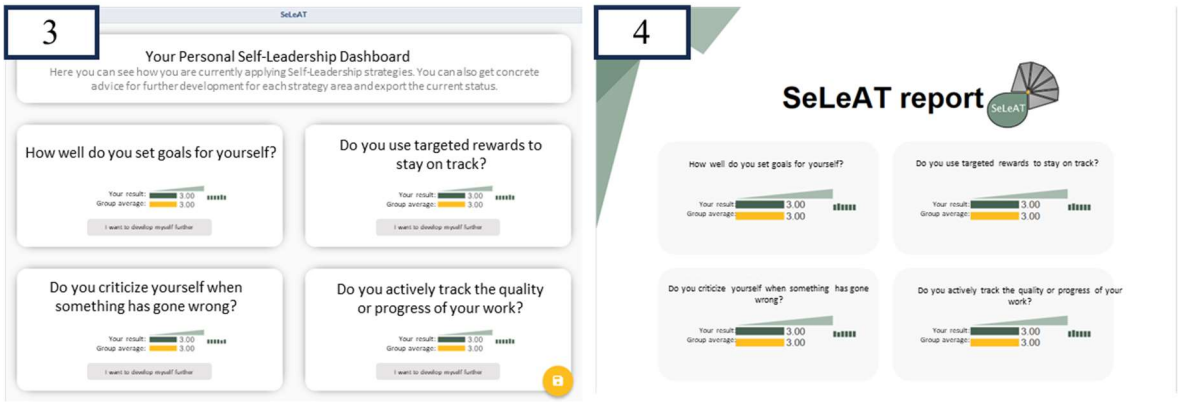

Figure 4. SL dashboard and report.

As depicted in Figure 5, these training modules may include, for example, information explaining SL strategies (screen 5 in Figure 5) or elements fostering active user participation like the formulation and documentation of individual goals (screen 6 in Figure 5). For each training module, a concrete task on a certain SL strategy can be fulfilled and the results can be exported. The training modules are based on H5P technology (H5P Group, 2023). H5P is an open-source technology that allows the creation of HTML5 content and applications. This enables a quick exchange or customization of training modules for every lecturer, e.g., to adapt the training modules to a specific context. The H5P modules can be stored on HEI's own servers and linked to SeLeAT by exchanging the link in the SeLeAT database.

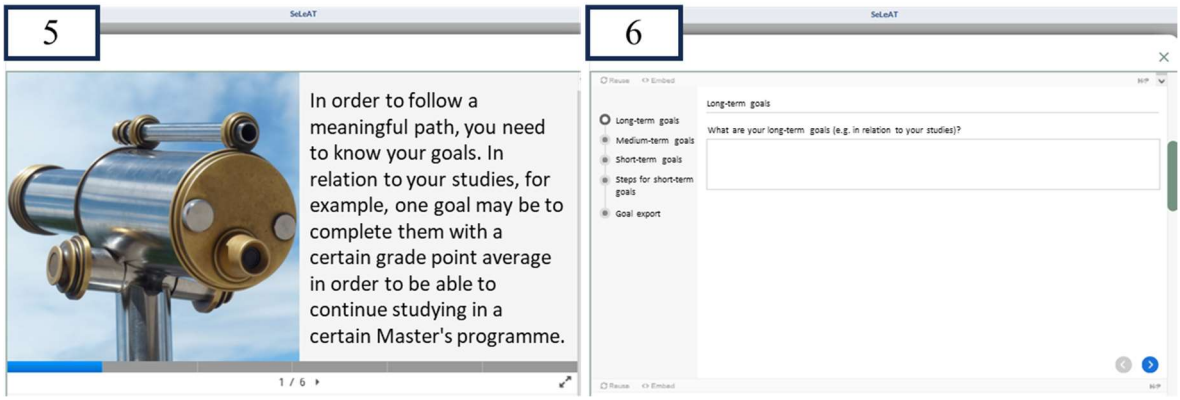

Figure 5. Training module and documentation.

3.3 Data collection

The study took place as part of a hard-skill bachelor's course on business intelligence at a German university. This course is available for different study programmes, e.g., business administration or business informatics. 82 students participated in this evaluation. The use of SeLeAT and participation in the survey was voluntary and was not linked to an examination or similar. 25 of the participants were female, 57 were male. Table 2 describes the age and semester structure among the participants.

Age	**18-21**	**22-25**	**25-28**	**28-31**	**32-35**
# participants	55	23	2	1	1
Semester	**4**	**5**	**6**	**7**	**8**	**10**
# participants	46	2	30	1	2	1

Table 2. Age and Semester of the participants.

The evaluation strategy choice follows the suggestions of Venable et al. (2016). In this regard, the goal of the evaluation is to gather data on the BI to use SeLeAT and also the individual SL of the participants. Due to the user-focused design of the RQ, we follow a human risk & effectiveness evaluation strategy. Moreover, the advanced development status of SeLeAT reasons for an ex-post evaluation of the BI to use SeLeAT to derive summative conclusions. The next steps according to Venable et al. (2016) are to determine the properties to evaluate and to design the evaluation. In the following two sections these properties and the design of the evaluation are described:

1) During the usage of the artefact, the evaluation of the individual SL took place (see Figure 3). This evaluation of the participants' SL abilities grounds on the validated German version of the Revised Self-Leadership Questionnaire (RSLQ-D) (Andreßen & Konradt, 2007). In this survey part, we measured students' agreement with the items of the RSLQ-D using a 5-point Likert scale. The 5-point Likert scale is chosen to keep the SL capturing within SeLeAT as simple as possible for the users.

2) An ex-post approach (Venable et al., 2016) is chosen for the collection of data on the intention to use SeLeAT as a whole. To gather meaningful data on the intention to use, we used the behavioural intention to use scale derived from the technical acceptance model (Ghani et al., 2019). In this survey part, we measured students' agreement using a 7-point Likert scale. In addition, the following two questions were included to gain insights into influencing factors other than SL abilities: "What could motivate you to use SeLeAT regularly?"; "What could prevent you from using SeLeAT regularly?".

The results from these two data sources were combined by using an anonymous primary key each participant created in the artefact and used in the survey tool.

3.4 Internal consistency and descriptive data

The internal consistency of the measured items was determined by analysing Cronbach's alphas (α) for the constructs of the RSLQ-D and the BI to use in the TAM (see Table 3).

Questionnaire	Construct	α	Min	Max	Mean
RSLQ-D (5-point-Likert scale)	Self-observation	.476	3.00	5.00	4.0732
	Self-goal setting	.653	2.00	5.00	3.8008
	Self-rewarding	.818	1.33	5.00	3.4675
	Self-punishment	.654	2.00	5.00	3.8821
	Self-cueing	.789	1.67	5.00	3.5935
	Natural rewards	.369	2.33	5.00	3.4675
	Self-talk	.681	1.67	5.00	3.6220
	Mental imagery	.790	1.33	5.00	3.3659
	Identification and replacement of dysfunctional beliefs	.644	2.00	5.00	3.6911
TAM (7-point-Likert scale)	Behavioural intention to use	.916	1.00	7.00	4.2835

Table 3: Descriptive Data

The descriptive data (see Table 3) suggest that the participants apply SL strategies on different levels. While self-observation has the highest mean value (4.0732), the SL strategy category mental imagery shows only a mean value of 3.3659. The mean value of the behavioural intention to use is at a moderate level (4.2835). The reliability analysis of the constructs shows that not all constructs have at least an acceptable or moderate Cronbach's alpha ≥ 0.61 (Taber, 2018; van Griethuijsen et al., 2015). Therefore, the constructs of self-observation and natural rewards are not included in further analysis.

3.5 Relation of self-leadership strategy application and BI to use

To detect relations between the SL strategy application and users' BI to use SeLeAT, we performed a multiple linear regression analysis. Table 4 presents the results of the multiple linear regression analysis.

Independent variable	Regression coefficient	Standard error	p-value	Significance (p≤.10)	VIF
Self-goal setting	0.515	0.267	0.058	Significant	1.632
Self-rewarding	0.335	0.183	0.071	Significant	1.168
Self-punishment	0.028	0.227	0.903	Not significant	1.376
Self-cueing	0.125	0.183	0.498	Not significant	1.323
Self-talk	-0.343	0.237	0.153	Not significant	1.373
Mental imagery	0.252	0.197	0.205	Not significant	1.328
Identification and replacement of dysfunctional beliefs	-0.233	0.246	0.347	Not significant	1.276
R^2:	0.152	Durbin-Watson statistic:		2.091	
Adjusted R^2:	0.046	# of cases:		82	
F-Statistics:	1.430				

Table 4. Multiple linear regression analysis results (BI to use as dependent variable).

For the analysis, IBM's Statistical Package for Social Sciences (SPSS) was used. The collected data was analysed and the prerequisites (linear relationship, no outliers, independence of the residuals, no

multicollinearity, homoskedasticity, and normal distribution) were identified as given. The Durbin-Watson-statistic value of 2.091 shows that the underlying model has no autocorrelation. The values for the variance influence factor (VIF) prove that there is no multicollinearity. The value for the R^2 proves a moderate goodness of fit and the adjusted R^2 a low goodness of fit (Cohen, 2013). As this study is an exploratory study, a p-value of $p \leq 0.1$ is determined as the criterion for significance (Labovitz, 1968). Consequently, only two strategy categories are significant in predicting the behavioural intention to use SeLeAT: *self-goal setting* (p=.058) and *self-rewarding* (p=0.071). *Self-punishment*, *self-cueing*, *self-talk*, *mental imagery*, and *identification and replacement of dysfunctional beliefs* were not statistically significantly related to the BI to use SeLeAT. In addition to the quantitative data, two open questions are asked as described in section 3.3. These questions target motives and obstacles to the regular usage of SeLeAT. In sum, 76 mentions of motives and 69 mentions of obstacles were collected and assigned to superordinate motive or obstacle categories. Table 5 exemplarily shows the assignment of three user statements to the motive category "personal development" and the obstacle "lack of time".

	Motive for regular usage: Personal development	**Obstacle for regular usage: Lack of time**
User 1	"To work on myself and to grow".	"Too much time consuming".
User 2	"To develop myself and achieve my goals faster".	"Occupation with other subjects too high".
User 3	"Improving my personal way of working"	"Too little time during the semester or during the examination period".

Table 5. Exemplary assignment of mentions to categories.

Table 6 lists all identified motive and obstacle categories as well as the number of mentions. A total of 19 categories addressing motives as well as 13 categories addressing obstacles were identified.

Motive for regular usage	**Mentions**	**Obstacle to regular usage**	**Mentions**
Personal development	16	Lack of time	29
External incentive	14	Complexity	11
Noticeable benefit	10	Technical issues	10
Ease of use	8	Lack of benefits	4
Reminders	6	Lack of external incentives	3
Compatibility	5	Better alternatives	2
Embedding in course	2	Extrinsic pressure	2
Embedding in a face-to-face event	2	No course embedding	2
Extension of functionality	2	No positive impact	2
Pleasant visualization	2	**4 obstacles with one mention:** Collection of personal data, small user base, poor software quality, poor software reputation	
9 motives with one mention: Variety training modules, visualization progress, software popularity, lecturer, embedding in the study program, personalization, testimonials from other users, relevance for future work life, large use base			
Sum of mentions:	76	Sum of mentions:	69

Table 6. Motives and obstacles for regular usage.

Regarding motives, the categories "personal development" (e.g., increased application of SL strategies), "external incentives" (e.g., soft skill certificates) and "noticeable benefits" (e.g., higher motivation due to SL strategy application) are the three most mentioned categories. After these rather user-centric

categories, more technical categories such as “ease of use”, “reminders”, and “systems compatibility” follow. Regarding obstacles to regular usage, the categories “lack of time”, “complexity”, and “technical issues” are the three most mentioned categories. Further identified obstacle categories are for example “lack of benefits”, “lack of external alternatives”, “extrinsic pressure” or “no course embedding”.

4 Discussion

The goal of this study was to clarify to what extent the intention to use a BCSS on SL is influenced by users’ SL abilities. Furthermore, possible other influence factors on the BI to use should be identified. These issues are addressed by an evaluation of the system design of the presented integrative BCSS on SL. Based on our quantitative and qualitative findings, we discuss the context of the findings, derive practical implications for the integration of digital SL training in higher education courses and digital soft skill training in general, and discuss a potential theoretical contribution of the findings.

4.1 Discussion of the findings

This study reveals that two SL strategies are statistically significant ($p \leq 0.1$) related to the BI to use SeLeAT. First, the SL strategy of *self-goal setting* has a significant positive relationship to the BI to use (0.515*). This implies that students using the SL strategy of *self-goal setting* tend to have a higher BI to use SeLeAT. Concerning the paradox of needing SL to improve SL, this result means that SeLeAT is not fully able to support overcoming this paradox for self-goal setting, as it also influences BI to use SeLeAT. Therefore, additional impulses for *self-goal setting* besides SeLeAT are suggested (e.g., in the exam-relevant hard skill content). This could help to increase users’ usage of SeLeAT. Furthermore, the significant influence of *self-goal setting* goes in line with the qualitative gathered data on motives for regular usage. For example, external incentives (e.g., soft skill certificates) awarded for regular and successful usage could be seen as externally set goals, which could support intrinsic motivation (Mossholder, 1980) and thus could promote *self-goal setting* (Steinbauer et al., 2018). They are with 14 mentions the second most named motive for regular usage. Second, *self-rewarding* also has a significant positive relationship with the BI to use SeLeAT (0.335*). This implies that students who use strategies related to self-rewarding tend to have a higher BI to use for SeLeAT. Concerning the paradox of needing SL to improve SL, this result means that SeLeAT is not fully able to support overcoming this paradox for *self-rewarding*, because it also influences BI to use SeLeAT. Therefore, additional impulses for *self-rewarding* besides SeLeAT are suggested (e.g., by prompting self-rewarding with the LMS messenger). This goes in line with the qualitative data, in which external incentives were mentioned 14 times as a motive for regular usage. These findings imply that an integrative BCSS on SL in higher education should include mechanisms in the hard skill content or the LMS to foster self-rewards (e.g., for the regular usage of the SeLeAT). These mechanisms should signal to the user when they should reward themselves. Furthermore, these self-chosen rewards could represent noticeable benefits for the user (e.g., a pleasant activity), which were also mentioned in the qualitative statements on motives for regular usage. The SL strategies *self-punishment*, *self-cueing*, *self-talk*, *mental imagery*, *identification and replacement of dysfunctional beliefs* turned out to be not significantly related to the BI to use SeLeAT. This indicates that SeLeAT as a BCSS may be helpful in overcoming the paradox that individuals need SL to improve SL (Stewart et al., 2019) at least for these non-significant SL strategy domains. As already described, only two SL strategy domains turned out to be relevant for the BI to use SeLeAT: *self-goal setting* and *self-rewarding*. Therefore, lecturers could concentrate on fostering these two strategy domains among students in the hard skill part in order to foster also the usage of SeLeAT. *Self-punishment, self-cueing, self-talk, mental imagery, identification and replacement of dysfunctional beliefs* could be addressed by the embedded BCSS SeLeAT in a resource-efficient way.

The qualitative data revealed further motives for usage which were mentioned more than twice such as ease of use and complexity. This highlights the importance of well-known factors influencing BI to use which are defined, for example, in the technology acceptance model (Venkatesh & Bala, 2008) and should not be neglected in further research into technology that examines the promotion of soft skills. This can also be observed in the mentioned protentional obstacles like complexity. The low adjusted R^2

(0.046) is consistent with this finding as it emphasizes the importance of factors other than SL that are important for BI to use SeLeAT. Moreover, the most commonly named obstacle is lack of time. This implies that digital soft skills training within hard skills courses should require as little time and effort as possible for participants and/or soft skills development should be integrated in a way that emphasizes its importance also towards students so that they take the appropriate time for it.

4.2 Practical implications

The findings described in Chapter 4.1 allow the design of SeLeAT to be further developed in the next DSR cycle and provide practical advice for the integration of soft skills training into LMS courses in general. The relevance of self-goal setting for the BI to use and the motivational factors through external incentives imply that it is important to embed SeLeAT in a holistic didactic concept that supports *self-goal setting*, e.g., by offering incentives (e.g. soft skill certificates) for which students can strive for. These incentives could be described, communicated, and promoted in the content of the hard skill course in which SeLeAT is implemented. The place of implementation for the PSD design principle *tailoring* (see Figure 1) in the hard skill content is therefore reasonable to describe for example user-specific incentives (e.g., certificates). In this way, the integrated BCSS could become more persuasive (Oinas-Kukkonen & Harjumaa, 2009). Furthermore, by keeping this design principle implemented in the hard skill course content, any instructor using SeLeAT can tailor it to a specific group or use case and create a more inclusive solution in any LMS. Moreover, this solution may attract more students to SeLeAT, as they will have to use the hard skill course content to prepare for the exam and will inevitably take notice of the optional SL content. Besides external incentives, qualitative data revealed personal development (e.g., daily use of SL strategies) and noticeable benefits (e.g., higher learning motivation by using SL strategies) to be the most and third-most cited motives for regular use. These two motives could also be linked to goal setting. Development could be measured by the achievement of previously set intermediate goals, and benefits could be measured, for example, by reaching goals quickly. From a technical point of view, personal development could, for example, be depicted by a progress tracker in SeLeAT showing users' development. In the SeLeAT dashboard (see Figure 4), sparklines already depict users' progress. As the survey data revealed the importance of this motive, a more prominent depiction of this graphical progress presentation could be beneficial. To make benefits noticeable, the shared workspace (e.g., forum) of any LMS could easily be used to create a digital exchange platform for users to foster users' common reflection on the individual SL strategy usage and its possible benefits. The PSD design principle *cooperation* (Oinas-Kukkonen & Harjumaa, 2009) is thus realized with LMS functions (see Figure 1) and SeLeAT becomes more inclusive from a system perspective. The direct influence of *self-rewarding* strategies implies the promotion of this strategy in the LMS course materials in which SeLeAT is implemented. Specifically, this could be realized by conferring badges or points and levels (Oxarart & Houghton, 2021). Therefore, in the next iterative development step of SeLeAT, the design principle *rewards* from the PSD framework (Oinas-Kukkonen & Harjumaa, 2009) should be implemented in the hard skill content or realized with LMS means.

4.3 Theoretical contribution

Besides the artefact-specific findings, this study also contains a theoretical contribution regarding higher education students' BI to use technology. To determine the BI to use, the Technology Acceptance Model (e.g., TAM 3) (Venkatesh & Bala, 2008), the Unified Theory of Acceptance and Use of Technology (UTAUT) or the UTAUT 2 (Venkatesh et al., 2003; Venkatesh et al., 2012) are used often. All models include factors that influence users' BI to use technology, from a more system or application-oriented perspective to a user-environment perspective to a perspective that focuses on the user him or herself (see Table 7). However, there is still a need for research into possible user-specific influencing factors (Marangunić & Granić, 2015). By proving a significant relationship between the SL strategies of *self-goal setting* and *self-rewarding*, this study adds a possible new facet to user inherent factors influencing the BI to use: self-regulation (in this study in the form of SL). Especially for the use case of optional

usable learning technology, this influencing factor could be important when measuring the BI to use. Table 7 enlists and categorizes the constructs contained in the TAM 3, UTAUT, and UTAUT 2 scales.

construct focus	**TAM 3 constructs** (Venkatesh & Bala, 2008)	**UTAUT constructs** (Venkatesh et al., 2003)	**UTAUT 2 constructs** (Venkatesh et al., 2012)
System / Application	Perceived ease of use	Effort expectancy	Effort expectancy
	Output Quality	Self-efficacy	
User environment	Subjective norm	Social influence	Social influence
	Voluntariness	Facilitating conditions	Facilitating conditions
	Image		Price value
	Job relevance		
	Result demonstrability		
User herself/himself	Perceived usefulness	Performance expectancy	Performance expectancy
	Computer self-efficacy	Attitude toward using technology	Hedonic motivation
	Perceptions of external control	Anxiety	Habit
	Computer anxiety		
	Perceived enjoyment		
	Self-goal setting / self-rewarding		
→BI to use technology			

Table 7. Common constructs influencing the BI to use.

For the user-focused perspective, the SL constructs *self-goal setting* and *self-rewarding* could be a valuable extension. Furthermore, it might be worthwhile to examine whether these two SL constructs overlap with constructs already included in the scales in Table 7, such as performance expectancy or hedonic motivation. In this way, additional factors related to self-regulation influencing the BI to use technology could be included in established scales.

5 Conclusion

By investigating the relationship between self-leadership and the behavioural intention to use, we were able to provide implications for digital SL promotion within hard skill course content in an LMS. This study reveals that the SL abilities of users are partially related to their BI to use an integrated BCSS which promotes SL and is integrated into an LMS. These findings imply several insights for digital SL training and digital soft skills promotion in higher education in general.

First, the application of self-goal setting and self-rewarding is significantly related to the BI to use an integrated BCSS fostering SL. Consequently, these strategies should be fostered in the hard skill content in which digital soft skills training for SL is embedded (e.g., by including goal-setting prompts in learning materials) or by using means of the LMS (e.g., notifications with the LMS messenger). In this way, users' BI to use a BCSS addressing SL could be fostered and SL strategies trained at the same time. Second, other SL strategies (e.g., self-cueing) are not significantly related to the BI to use a BCSS on SL. This finding suggests that a BCSS is an appropriate means to overcome the paradox of needing SL to improve it (Stewart et al., 2019), as missing SL abilities related to these SL strategies do not influence students' intention to use this BCSS in a significant way. A BCSS could therefore be a suitable means of promoting these strategies in a resource-efficient way for lecturers. Third, from a theoretical perspective, self-regulatory aspects may be a valuable extension for common scales targeting the measurement of the BI to use technology (e.g., UTAUT 2). To include this aspect, the items in these scales could be supplemented or adapted with regard to a self-goal setting or self-reward perspective.

This could improve the explanatory power of the established models addressing the BI to use technology (e.g. UTAUT 2), particularly in the context of higher education. From a practical point of view, this study contains concrete suggestions on how to implement a BCSS on SL in a hard skill course and how to further develop the presented BCSS in the next DSR cycle. Furthermore, it highlights the importance of integrating digital soft skill content in a holistic didactic concept (e.g., tailored incentives for the usage of the digital content, providing feedback on personal development) and the importance of established influencing factors on the BI to use (e.g., complexity).

6 Limitations and Further Research

This study provides valuable insights for the integration of digital SL support into hard skills courses. However, the generalizability of the findings is limited by the selection of study participants exclusively from business-related study programmes. Furthermore, this study is limited by the fact, that two SL constructs were not able to meet the pre-defined criteria for internal consistency (Cronbach's alpha ≥ 0.61). Although the significance level applied ($p \leq 0.1$) is reasonable for an exploratory study (Labovitz, 1968), the results should be proven by a larger long-term study with more participants from various study programmes and a significance level of $p \leq .05$. Moreover, due to the focus on SL, the present study does not consider other possible influence factors on BI to use SeLeAT than SL (e.g. social desirability or motives of hedonic motivation). Therefore, we suggest that future studies on digital soft skill training systems like SeLeAT should include more holistic questionnaires evaluating the BI to use and its determinants (e.g. UTAUT 2). This could shed light on more relevant factors that influence students' BI to voluntarily use digital soft skills training offers. These offers could help universities implement much-needed structured soft skill training approaches for students. In this way, students could be equipped with the necessary soft skills for a dynamic work environment at reasonable educational resource consumption (e.g., teaching time). Furthermore, the integrated and voluntary, but still explicit character of solutions like SeLeAT could avoid crowding out effects between hard skills and soft skills in a curriculum as additional dedicated soft skill courses are not necessary. However, besides the investigation of factors influencing the BI to use, it is also important to prove the effectiveness of such approaches. Therefore, we propose integrating digital SL training elements such as SeLeAT into hard skills courses and analysing their effectiveness. Besides its' central results, this study provides also starting points to implement effective design elements for promoting the participation of integrated soft skills training among students (e.g. implementing soft skills certificates as rewards in a BCSS). However, also the effects of self-goal setting and self-reward on the BI to use technology in the university context should be further investigated to increase the explanatory power of the corresponding scales (e.g., UTAUT 2).

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