

Using Modular Method Cards for Competency-Oriented Teaching in Academia

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ABSTRACT

Purpose – Part time study offers are getting more and more popular and offer great possibilities for peoples' professional and personal development. Methods competence and the personal development are basic foundations of a successful innovation management and consequently represent important components in education as well as in employees' professional environment. While conservative and commonly applied learning systems and ways of knowledge mediation like lectures, printed learning materials like books increasingly loose importance, students demand for more flexible and competency-oriented methods to support their learning efforts. Based on previous research (Zagel et al. 2019) an empirical study on influencing factors for modern learning processes and learning- and teaching concepts (e.g., blended learning, gamification), this paper presents the concept, prototype, and evaluation of a novel education system, called the method cards. It represents a competency-oriented and playful approach to teach learning content and methods with a special focus on part time students and a practically oriented environment.

Design/Methodology/approach – The concept is developed using the design science approach and is evaluated amongst 57 students of different semesters using a modified version of the User Experience Questionnaire developed by Schrepp et al. (2014). The results as well as options for a further development of the concept are presented.

Findings – Results show that the concept is well accepted by the students and offers multiple additional use cases in academia as well as in practical areas.

Research limitations/implications (if applicable) – While the approach was tested with students only, we still miss the respective evaluation in a business context, e.g., during creative or innovation workshops.

Practical implications (if applicable) – This research helps practitioners and academics to further target their teaching and learning efforts towards imparting competencies. The physical format combined with digital elements allows a day-to-day application of the tool.

Originality/value – The concept might further support research in the area of blended learning, offering an innovative approach to competency-based teaching.

Key words – Teaching, Innovation Management, Blended Learning

Paper type – Research paper

Introduction & Motivation

Modern teaching and learning concepts are less and less focused on the mere transfer of knowledge, but increasingly focus on competence, value and method mediation. In addition to kindergartens and schools, this development can be observed above all at universities and in company training. Knowledge transfer and the application of the learned competences are the big challenge. The implementation of this requires practice, and thus time, which in today's world called "v.u.c.a." is often considered the most important and scarcest resource. Modern degree programs such as the extra-occupational study program ZukunftsDesign (Hoffmann et al. 2017) in Kronach, Germany, deal with the challenge of knowledge and competence transfer and try to introduce students to modern and innovative methods that they can apply both personally and in companies. The transfer is intended to promote the further development of degree programs, students and local companies. For example, content from a variety of fields such as ethics & values, team dynamics, leadership, innovation techniques and theories, communication, cooperation, moderation and mediation with innovative methods, as well as individually selectable content from compulsory elective modules are imparted to students in a playful manner. This knowledge serves the students and workers of the future as a tool to develop personally, but also to improve companies and organizations.

An idea has emerged to facilitate the transfer of content used in study and appropriate knowledge and competencies to other areas. So-called "method cards" were developed (Zagel et al. 2019). With a blended (Zehetmaier 2007, S. 2; Moritz W. 2008, S. 21-22) learning approach, it should be possible to retrieve the content learned as needed, to internalize it in a playful way and to be able to present it comprehensibly to other people. Thus, appropriate method cards are developed for application in teaching and later also in companies. In addition to the design of the cards and the selection of topics, the content is developed. Also, the idea emerged that content that complements the method cards should be retrievable on a parallelly developed website. Thus, the approach is pursued to design an innovative blended learning system, which pursues a playful approach and generates an added value in interaction with the card system.

The aim of this paper is the concept and development of the card system as well as the evaluation of a second prototype iteration. In this way an attempt is made to answer the following research question: Can a system be developed that includes a playful approach to the communication and application of knowledge and methods in the course of innovation management?

The Method Card Toolkit

Based on this idea a first prototype of the method card system was developed and evaluated (Zagel et al. 2019). The results of this evaluation served as the basis for a second development iteration. In the course of this work it has already been confirmed that the needs of students, universities and companies are compatible. Linking these needs in an overarching teaching and learning system seems to make sense. For the implementation some points should be considered. In order to ensure the benefits for businesses through the system, the exemplary cards as well as the additional content on the website must address not only the needs of normal students, but also the needs of business people. A high degree of practical usefulness is required. As the method should be used by people of various professional and academic backgrounds and in ad-hoc situations the system needs to be developed in a way that it can be used without subject-specific background knowledge.

Looking at the aspects of the teaching and learning psychology (Alonso et al. 2017, p. 8ff; Levine 2016, p. 25; Miezal 2017), the card systems can support the learning process in the different needs. The active learning process should be promoted through the direct involvement of learners. The learning card system should thus establish the direct practical relevance and support the users to

implement what they have learned directly in their professional environment. This can happen, e.g., through application examples, worksheets, tips and tricks for the implementation displayed on the cards and the homepage. Also, the implementation of workshops targeting on the direct application of the content is an idea. The card format is handy, and the cards can be easily transported. Furthermore, the system needs to be able to be used directly in practical project work. The constructive learning process can be promoted by the flexible use of the system. For example, social interactions can improve the learning process, as well as performance-related emotions and overall meaning. The learners are provided with an achievable goal. Gamified elements can evoke emotion. They should therefore be used for the positive emotionalization of the method. Social processes are part of the educational and learning psychology that can have a major impact on the learning process and are very important for extra-occupational students with compressed presence time compared to other forms of study. Interaction must be guaranteed. This can be achieved through increased attendance events or through the possibility of exchanging information with each other via the digital platform. The playful use of the card system can additionally strengthen the social aspect. But learning should also be a situational process. This aspect can also be supported. By being able to apply the knowledge directly to a given context, the learner can better remember and at the same time understand better. The use of the card system in project work and at the workplace is therefore important for the learning success. Since the finally resulting system should be flexible enough to be retrieved depending on the situation, the aspect of situational learning can be supported. This flexibility also strengthens the self-determined learning process, which is very important for adult learners. Furthermore, the system benefits the different types of learners, as the contents can be approached in different ways and are individually selectable. It furthermore supports teachers in the transfer of knowledge and can be an added value for companies.

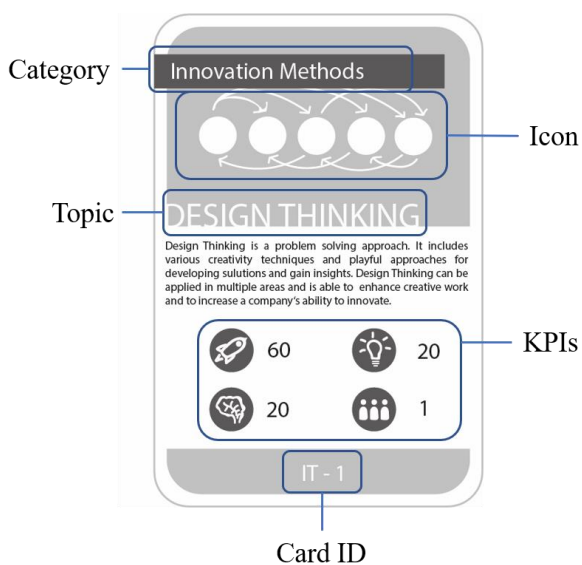


Figure 1 - First Prototype

The second prototype iteration resulted in an optimized design of the card system. Based on the findings of the previous version shown in Figure 1 (as presented in Zagel et al. 2019), the design was further developed in the course of this work. Figure 2 shows the front and back of the new cards and explains the different components. Another icon group has been added, which provides information on the application areas of the respective method.

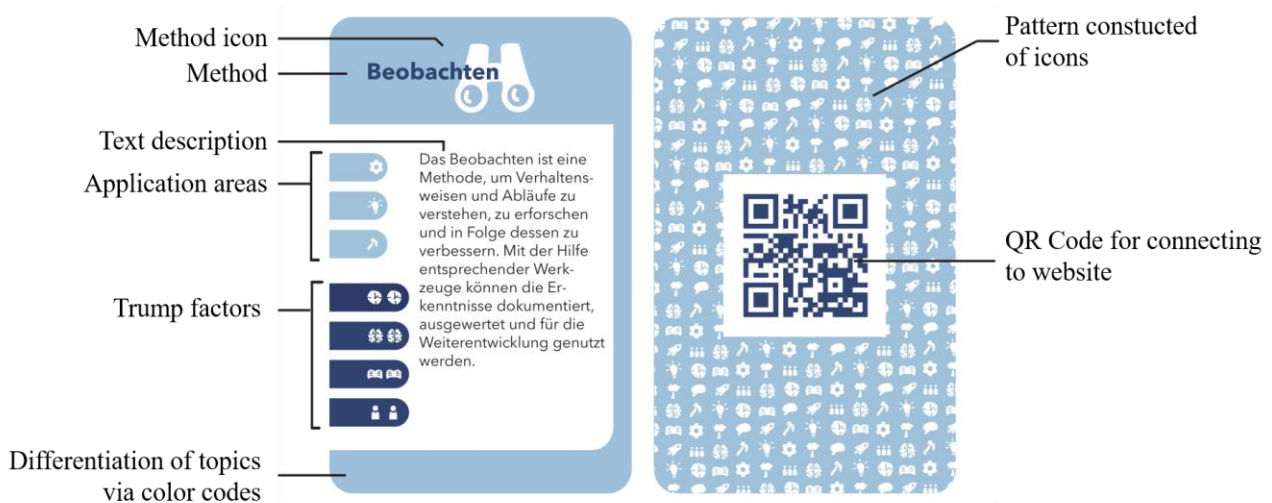


Figure 2 - Second Prototype

The icons provide users with information about when to use the method in a goal-oriented manner and in which situation they can help. In the new design, this icon group has been added to the left edge in the middle (upper left icon group with light blue background). The addition of another icon group to the old design initially harmed the clarity and contributed more to the confusion than to support the perception. For this reason, fundamental changes to the layout still had to be made. This includes the arrangement of all icons (except the explanatory icon for the method) on the left side of the map. This has the advantage that the design appears much tidier. A distinction between the areas of application and the trump factors is still possible. The color design and the slightly indented position of the icon group of the application areas support this visual differentiation. At the same time, more space was created for the important, explanatory text and the font size can be increased, which in turn improves readability. The font of the body text was changed to a modern, sans serif font (Avenir Next) in size 8pt. It is much easier to read than the previously selected font. Even in the bold version, this font is still easy to read in the method naming.

Evaluation Method

The presented concept was evaluated amongst students of the Master Course “ZukunftsDesign” in Kronach, Germany (Hoffmann et al. 2017) during winter term 2018/2019. The targeted group of extra-occupational students is present almost every second week during their studies. During the so called “triple”, a three-day presence, all students from first to fourth semester are on site, as well as several teachers, coaches, and professors. In total 80 persons were invited to take part in the evaluation.

As the concept was completely new to them the evaluation was started with a short introduction presentation. In order to being able to experience and test the method cards, a prototypic set of 20 cards was handed out to each student. In order to recreate an ideal setting the cards were professionally manufactured in their final, high quality (comparable to the quality of a typical card game). Content-wise they contained methods in the area of Innovation Management. Each of the physical cards contained a QR-code, linking to an individual website and consequently extending the content through additional descriptions, multimedia, and templates. The students were asked to test the cards during their student projects and fill out a questionnaire.

We used the standardized User Experience Questionnaire (UEQ) by Schrepp et al. (2014), respectively Laugwitz et al. (2008) which is typically used to measure user experience, focusing on perceived Attractiveness, Quality of Use, and Design Quality of software systems. It allows evaluating the dimensions attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty based on 26 items. While Attractiveness is a pure valence aspect, Perspicuity, Efficiency,

and Dependability mark pragmatic, goal-oriented quality aspects (Quality of Use). Stimulation and Novelty, in contrast, describe hedonic, non-goal-oriented, quality aspects (Design Quality). The questionnaire consists of word pairs of contrasting attributes that may apply to the tested process, system, or software. The items are arranged in the form of a seven-stage semantic differential. This questionnaire was extended by additional questions for demographic data (age, gender, semester) and the possibility to provide qualitative feedback using the Feedback Capture Grid (Stanford 2009). This method allows capturing feedback on “what worked”, “what could be improved”, “questions”, as well as upcoming “ideas”.

Evaluation Results

Finally, 57 students aged between 23 and 57 years actively took part in the evaluation. 26 of them were in their first semester, 9 in their second, 9 in their third and 7 in their fourth semester. The following table shows the results of the User Experience Questionnaire.

Table 1 - Evaluation Results

	Arithmetic mean	Confidence (p=0,05)	Alpha Coefficient
Attractiveness	1.483	0.297	0.91
Perspicuity	1.642	0.295	0.80
Efficiency	1.607	0.272	0.78
Dependability	1.243	0.236	0.56
Stimulation	1.135	0.275	0.79
Novelty	0.774	0.280	0.70

In addition, Figure 3 shows the arithmetic means combined in the different UX dimensions ranging from 0.774 (novelty) to 1.642 (perspicuity). The confidence interval is displayed as a black bar. Referring to Schrepp et al. (2014) almost all of the values are located in a positive range (green). Only the novelty dimension is in the neutral range (yellow) and none is in the negative range (red).

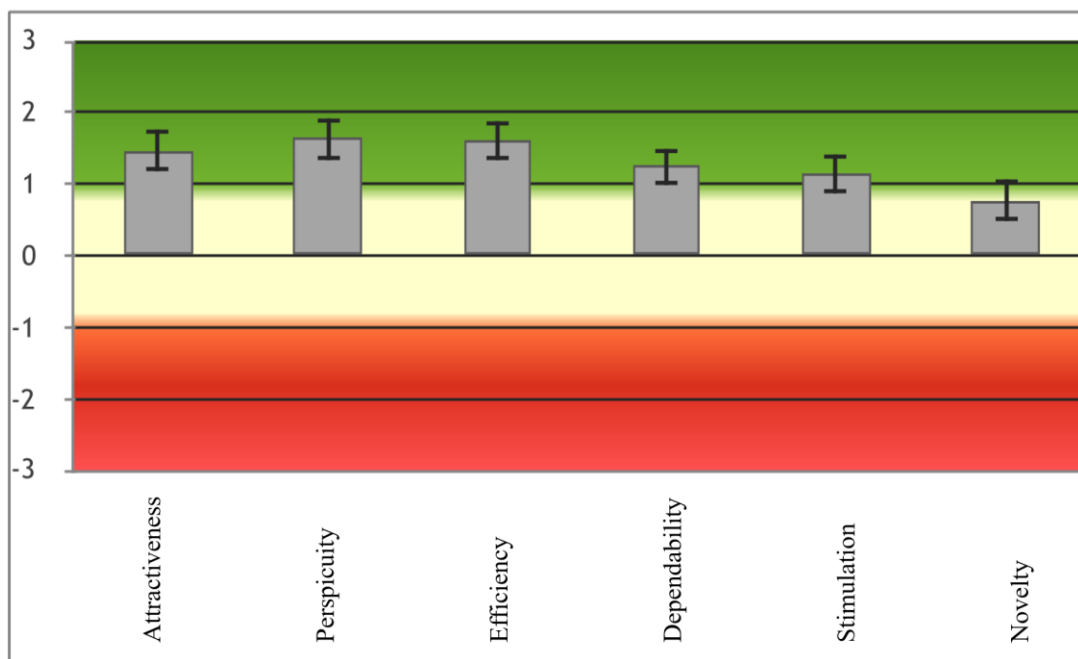


Figure 3 - Evaluation Results Range Comparison

Novelty and stimulation together represent the hedonic quality aspect, while perspicuity, efficiency, and dependability sum up in the pragmatic quality aspect. When combining the individual dimensions, the concept realized values of 1.47 for attractiveness, 1.50 for pragmatic as well as 0.95

for hedonic quality. While the hedonic value is the lowest, it still resides in the positive range (see Figure 4).

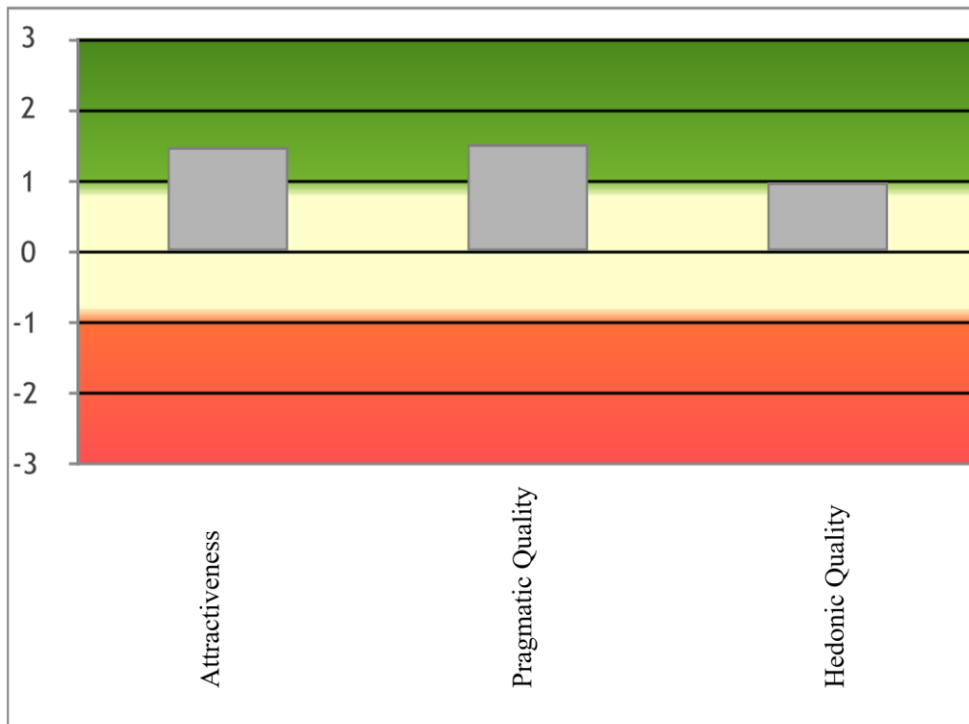


Figure 4 - Evaluation Results Combined Dimensions

When looking at the results of the individual items of the questionnaire it becomes obvious, that the single aspects have all been rated quite positively. The item with the lowest score is “unpredictable / predictable” with a value of 0.6 – the item with the highest score is “impractical / practical”, rated at 1.7 (see Figure 5).

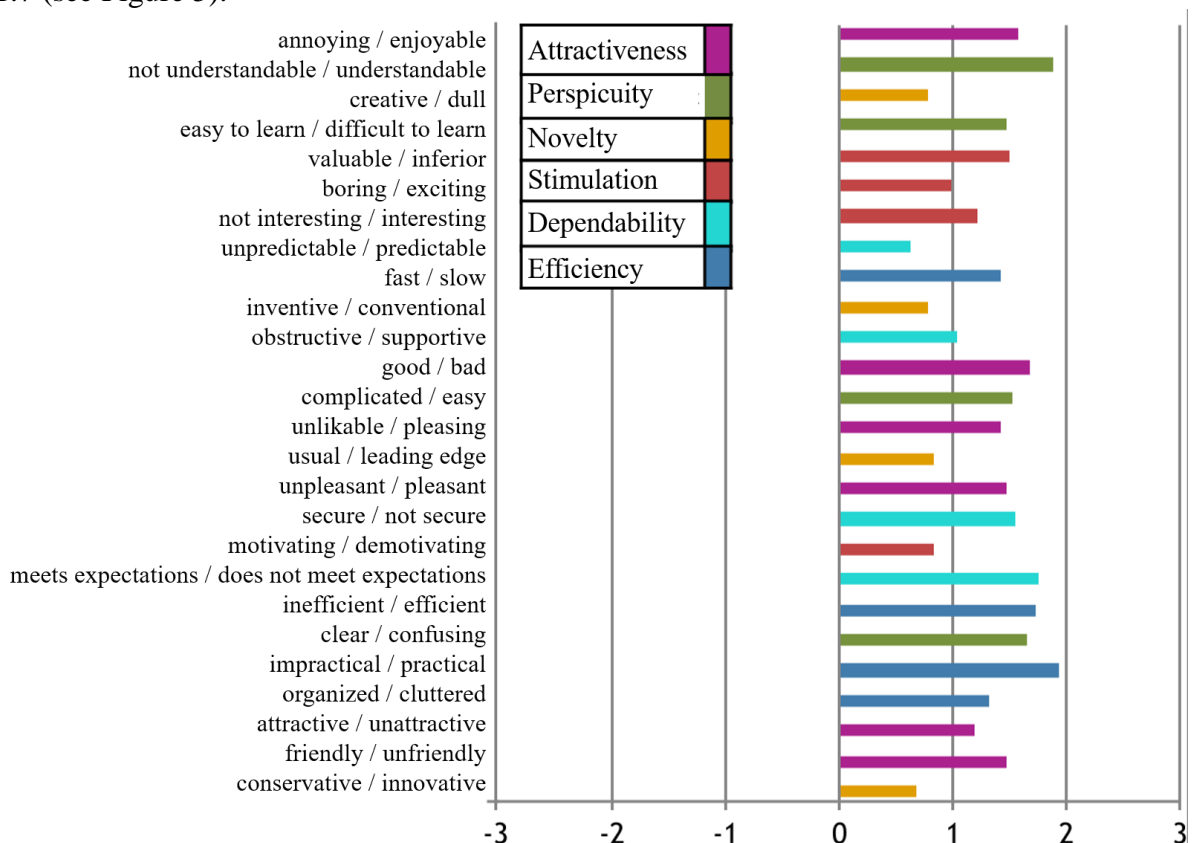


Figure 5 - Detailed Study Results

Only the items of the “Stimulation” dimension show a relatively large deviation. In such a case, the Cronbach alpha value can provide deeper insights. Questions that belong to the same UX aspect should have a high correlation (Schrepp et al. 2015). The alpha coefficients calculated for the values of the evaluation carried out can also be found in Table 1. The highest alpha coefficient is found in the UX aspect attractiveness (0.91), the lowest in UX aspect controllability (0.56). As the value is less than 0.6, the scale “dependability” should be interpreted carefully.

In the more detailed data analysis of the individual values of the evaluation in total 13 inconsistencies become obvious. However, these 13 inconsistencies are based on the feedback of 13 different respondents. The contradictions can be found in the following UX aspects: transparency (3), efficiency (2), controllability (6), stimulation (1), originality (1). For the number of respondents, we calculated a precision of 0.25 and an error probability of 0.1. In order to minimize the error probability to 0.05 at least 80 respondents would be required.

To gain a deeper understanding of the practicability of the results captured, the UEQ offers the possibility to compare the results using an integrated benchmarking tool. The comparison is based on hundreds of previous studies and allows an indication of a market comparison. To do so, the benchmark compares the arithmetic means of the tested solution with the values in the database. The benchmark is shown in Table 2.

Table 2 - Benchmark Results

	Arithmetic mean	Benchmark	Interpretation
Attractiveness	1.47	Above average	25% of BM results better, 50% of results worse
Perspicuity	1.64	Good	10% of BM results better, 75% of results worse
Efficiency	1.61	Good	10% of BM results better, 75% of results worse
Dependability	1.24	Above average	25% of BM results better, 50% of results worse
Stimulation	1.14	Above average	25% of BM results better, 50% of results worse
Novelty	0.77	Above average	25% of BM results better, 50% of results worse

The comparison with the provided benchmark must nevertheless be questioned critically. The UEQ is used for the evaluation of product developments at different stages. The system evaluated here is already relatively well developed. The questionnaire is also used to further develop less enhanced systems. As a result, significantly more negative results can be achieved, which are included in the average value mentioned here. Furthermore, very different product evaluations were combined for the benchmark. For each product, however, other properties are important. Nevertheless, the benchmark offers the possibility to relativize one's own results.

Discussion

After interpretation of the data mentioned, the direct analysis of the data related to the product and possible strengths and weaknesses of the system should be carried out. The UEQ does not suggest concrete solutions for improving the evaluated system, but it provides guidance on where improvements are necessary and most effective (Schrepp et al. 2015). The results of the individual averages provide information about which properties are rated as most appropriate and which are not.

Basically, the average value of the original UX aspect is by far the lowest. The values are neutral or in the positive range, on the border to the neutral. This could be because a more conservative system (card system) has been combined with modern methods (QR codes, website). Furthermore, there are already existing method card systems on the market. The difference in how the system developed differs from existing systems may not have been sufficiently highlighted in the presentation. Otherwise, it should be noted that conservative does not automatically mean bad. Here, a familiar format was chosen to promote and facilitate the use of the system. The most innovative approach of the system, which is represented by the linked homepage with different gamified elements, could not be sufficiently presented yet, nor be tested by the users. The degree of innovation (originality) of the system should therefore be increased by further developments. However, the results also show that this further development is necessary to achieve a higher degree of innovation.

The best way to average the UX aspect is to be transparent. According to the respondents, the system is particularly clear and concise. Attributes that support learners of all ages. From this it can be concluded that the system can also motivate the part-time learners in the learning process. In the second best, the mean of the UX aspect cuts off efficiency, which, together with the transparency, is assigned to the pragmatic qualities. The system is described by respondents as being particularly pragmatic and efficient. They therefore rate it as a solution-oriented and practice-oriented system, which offers them added value. These values are, of course, influenced by the user's assessment of the transparency and vice versa. Only a system that is transparent can be efficient. In terms of attractiveness, the system is interpreted as good, enjoyable, pleasant and sympathetic. The combination of visual and content characteristics seems to be attractive to users. The attractiveness of a system is very important, as it increases the motivation to use the system regularly.

The next UX aspect controllability must be interpreted very cautiously due to conspicuous scattering and correlation of the data obtained. This can be due to different points. For example, the possible misinterpretation of terms related to the evaluated system has been considered. Moreover, when considering the different answer possibilities of this UX aspect, it is noticeable that the attributes are very different. These are unpredictable / predictable, disabling / supportive, unsafe / secure and not in line with expectations / in compliance with expectations. Above all, the value for unpredictable / predictable is very low and in the neutral range compared to the other values. The question was also not answered by three respondents. It may be difficult for users to connect the evaluated system to the term. A scale may also be irrelevant to the evaluated product. Another reason could be that not all aspects of the system were sufficiently explained at the presentation, and thus not all were clearly visible to the users, which is why they rated this value relatively poorly. A more structured, more detailed explanation of the system, e.g. also in the form of a supplementary instruction manual, or in the form of explanatory workshops instead of a presentation could be very useful to be able to provide users with more user-friendliness of the system.

The last UX aspect to be treated is stimulation. In this subject area, all values are positive, but you can still interpret suggestions for improvements to the system. In the area of stimulation, users value the system as particularly valuable and interesting. The properties follow exciting and activating. Above all, these two qualities can be promoted through workshops and linking with the gamified elements. The UX aspect of stimulating a product is very important, as it can support the long-term use of a system. Stimulation occurs especially during use. The results for this area would probably be meaningful especially after a long-term use of the system.

Conclusion and future research

In summary, respondents rated the system as fundamentally positive. There is a need for application of such a concept among the students. Looking at the different results of the evaluation, it can be

assumed that the respondents see the system as providing benefits for personal development and the learning process. Above all, the attractiveness, as well as the pragmatic qualities can convince. In terms of UX aspects, the transparency and efficiency of the system are particularly good. The system, as it has been evaluated, is transparent and understandable. In this work it could be shown that the clarity of learning materials, especially for extra-occupational students and adult learners, is very important. The system can therefore support the target group in the learning process. It is described by respondents as being particularly pragmatic and efficient. They rate it as solution-oriented and practice-oriented. As far as innovation value is concerned, there is still room for improvement. It became clear that the whole system and its evaluation could be improved. Especially the digital content is still in a rather early prototyping stage. Another evaluation needs to be done to capture feedback for the holistic solution both in a studying as well as in a long-term working context.

Consequently, the current results are limited through a rather small number of interviewees and the lack of long-term experience of the respondents. Using the method cards as well as their digital content as everyday working tools might provide deeper insights and further support the future development.

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