# A Virtual Companion for Lifelong Learning – Design Principles for Motivation, Social Learning, and Exam Preparation

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Lifelong vocational learning in a digital context frequently falters due to a lack of motivation, structure, time management, and attention to adult students' work-life balance. In remote settings, students have further little contact with peers and feel disconnected. This paper answers how a Virtual Learning Companion (VLC) can be designed to address these challenges and fulfill the specific needs of vocational students. Following a Design Science Research (DSR) approach, a meta-requirement mapping process combines insights from a literature review and ten semi-structured interviews with vocational students. A focus group with experts from the field of vocational training, online learning, chatbot design, and DSR evaluated the results. As a result, five Design Principles are presented: (1) Motivational Goal Setting, (2) Context and Learner Adaptation, (3) Focus and Control, (4) Promoting Resilience, and (5) Enabling Social Interactions and Feedback. Exemplary Design Features further illustrate the VLC development.

**Keywords:**
virtual companionship, education, design science research, virtual collaboration, Bled eConference

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## 1 Introduction

Lifelong learning is the pursuit of continuous learning and skill development beyond formal education (Cropley & Knapper, 1983). Advanced technologies in distance and hybrid learning environments have opened up new opportunities for lifelong learning. Pedagogical Conversational Agents (PCA) present such a novel technology (Khosrawi-Rad et al., 2022; Wollny et al., 2021) and refer to intelligent dialog systems, e.g., chatbots, which interact with learners using natural language (Gnewuch et al., 2017; Hobert & von Wolff, 2019). A specific form of PCA are Virtual Learning Companions (VLC), designed to facilitate learning and establish a close bond with their users (Greenwald et al., 2016; Strohmann et al., 2022). They are available regardless of time or location and can motivate learners, assist in time management, and foster self-reflection (Gubareva and Lopes, 2020; Khosrawi-Rad, et al., 2022; Wollny et al., 2021). They differ from PCAs by acting relationship-oriented and being designed for long-term use, often inspired by artificial intelligence techniques (Khosrawi-Rad, et al., 2022b).

Vocational training in lifelong learning differs from formal education as it involves adults with diverse backgrounds studying alongside their work commitments (Cropley & Knapper, 1983), covering a wider age range, having limited contact with fellow students, and requiring effective time management between work, family, and studies (Rinn et al., 2022). In vocational training, students must develop self-regulation and acquire structures, skills, habits, knowledge, and attitudes (Cropley & Knapper, 1983; Rinn et al., 2022). To design and develop VLCs for this specific learning context, it is necessary to understand and prioritize the needs and values of learners in vocational training (Rinn et al., 2022). In recent years, research on PCAs has increased (Khosrawi-Rad et al., 2022) and authors proposed design knowledge for various specific application contexts such as argumentative writing support (Wambsganss et al., 2020), avoiding procrastination (Rodriguez et al., 2019), or designing a PCA as a tutor (Winkler & Roos, 2019). However, existing design principles are inadequate for the novel VLC approach and fail to cater to learners in vocational training, highlighting a research gap in VLC design knowledge and facilitating the practical implementation of long-term learning support (Khosrawi-Rad et al., 2022). This study refers to this research gap by answering the research question of how to design VLCs, which address the needs of students in lifelong learning in terms of (1) learning behavior, exam preparation, and time management,

(2) motivation, and (3) social learning. To gather design knowledge, we utilize Design Science Research (DSR) as a practical and scientifically rigorous approach (Hevner et al., 2004). Design principles are derived by integrating kernel theories, VLC design features, and user requirements from ten interviews.

## 2 Theoretical Grounding

This paper aims to highlight and address three specific challenges related to self-regulated learning in vocational education, which encompasses cognitive, metacognitive, behavioral, motivational, and emotional aspects of learning (Panadero, 2017; Rinn et al., 2022): (1) learning strategy, including exam preparation and time management, (2) motivation and goal setting, and (3) social learning. Table 1 represents a theoretical framework derived from a literature review of kernel theories from psychology which form the theoretical basis of the DP formulation (Kuechler and Vaishnavi, 2008; Möller et al., 2022). Design Features (DF) highlight applicable learning techniques and approaches for implementing and applying kernel theories in a VLC (Möller et al., 2020).

**Table 1: Conceptualization and References to Theoretical Foundations**

| | Learning Strategy, Exam Preparation & Time Management |
|---|---|
| Kernel Theory | Cognitivism: Long-, Short-term, and Working Memory (Cowan, 2008); Cognitive Bottleneck Theory (Saxe et al., 2019); Multitasking (Rosen, 2008); Shallow & Deep Knowledge (Bennet & Bennet, 2008; Jackson & Graesser, 2007); Chunking (Miller, 1956; Rosenbloom et al., 1989); Bloom's Taxonomy (Bloom, 1956); Selective Attention (Johnston & Dark, 1986); Expertise (Gobet, 2019); Transfer and Situated Learning (Greeno et al., 1993); Deliberate Practice (Anders Ericsson, 2008); |
| DF | Flipped Classroom (Bergmann & Sams, 2014); Pomodoro Technique (Cirillo, 2018); Micro-learning (Hug, 2006; Javorcik & Polasek, 2019); |
| | Motivation |
| Kernel Theory | Intrinsic and Extrinsic Motivation (Reiss, 2012; Serin, 2017) Flow (Nakamura & Csikszentmihalyi, 2014); Self-Determination (Deci & Ryan, 1980); The Model of Goal Directed Behaviour (Ajzen & Madden, 1986); Goal-setting (Locke & Latham, 2012); Exam-Anxiety (Stöber, 2004); Attribution (Kelley, 1967); Self-directed learning (Merriam & Baumgartner, 2020; Tekkol & Demirel, 2018); Social Identity perspective on motivation (Ellemers et al., 2002; Mirbabaie et al., 2021) |
| *DF* | SMART Goal Setting (Doran, 1981); Rubicon Model of Action Phases (Achtziger & Gollwitzer, 2009); |
| | Social Learning |
| KernelTheory | Vygotsky's Sociocultural Learning Theory (Hall, 2007; Vygotsky, 1978); Social Facilitation (Bond & Titus, 1983; Zajonc, 1965); Social Learning (Bandura & Walters, 1977); Theory of Social Comparison (Festinger, 1954; Michinov, 2012); Media Synchronicity Theory (Dennis & Valacich, 1999); |
| *DF* | Three Types of Feedback (Jackson & Graesser, 2007) |

## 2.1 Learning Strategy, Exam Preparation, and Time Management

Cognitivism theories inform the selection of efficient learning strategies and effective learning materials by revealing how humans process information. Effective learning strategies align workloads with an individual's cognitive abilities, facilitating exam preparation and time management. The working memory's limited capacity can suffer from cognitive overload by processing excessive information and reduced accuracy and increased errors, known as "choking" (Saxe et al., 2019; Slonim, 2002; Welford, 1952), as the brain rapidly switches between tasks (Rosen, 2008). Similar performance losses occur in multitasking (Welford, 1952). Breaking down content into small, focused learning units (Rosenbloom et al., 1989) as applied in microlearning (Yin et al., 2021) and learning in short, sequenced intervals, as applied in the pomodoro technique (Cirillo, 2018), foster more sustainable learning outcomes. The depth of processing affects information retention (Graesser et al., 2017). Learning by heart is easier but less sustainable than profound understanding (Bloom, 1956). Content that has been studied briefly and superficially is stored in short-term memory and quickly forgotten (Cowan, 2008). Deep learning includes mechanisms like repetition and deliberate practice (Anders Ericsson, 2008; Cowan, 2008). Transferring existing knowledge to new situations through associations and integration expands knowledge networks (Greeno et al., 1993). Interactive teaching concepts, like the flipped classroom, promote deep learning as, students act as teachers (Bergmann & Sams, 2014; Huang et al., 2019). Vocational training benefits from connecting new information to existing knowledge, expertise, and experience (Greeno et al., 1993). In summary, a VLC should assist learners in optimizing efficiency, deep learning, and exam performance by aiding in workload planning, organization, and prioritization based on individual capacities and timelines. Incorporating existing learning strategies like micro-learning, the pomodoro technique, or flipped classroom as design features in a VLC can provide advantages such as moderation, feedback, personalization, and active learning.

## 2.2 Motivation

Motivation is gradual and can involve varying levels of extrinsic or intrinsic motivation, although the distinction between the two polarities is fluid and there is a continuum between intrinsic and extrinsic motivation (Reiss, 2012). Extrinsic motivation is determined by external factors such as rewards or punishments, while

intrinsic motivation is driven by personal interest and passion for an activity (Serin, 2017). Working on an intrinsically motivating task is the prerequisite for the experience of flow and the complete immersion and absorption in an activity (Nakamura & Csikszentmihalyi, 2014), often seen as the ideal state of learning. Further, a task or activity that elicits a flow experience must be slightly demanding and extend existing capacities (Nakamura and Csikszentmihalyi, 2014). Learners need clear proximal stretching goals and immediate feedback about the progress that is being made (Nakamura and Csikszentmihalyi, 2014). The goal-setting theory confirms that high and specific goals can motivate increased performance (Locke & Latham, 2012). In this context, the SMART Method (Doran, 1981) helps formulate specific, measurable, attainable, realistic, and time-related goals. However, setting adequate goals might not be enough for long-term motivation (Locke & Latham, 2012). The theories of planned behavior (Ajzen, 2011) and goal-directed behavior (Aarts & Elliot, 2011; Ajzen & Madden, 1986) state how beliefs shape intentions and behavior. Doubts, fears, and lack of control are the biggest obstacles to goal achievement (Ajzen & Madden, 1986). Exam anxiety is caused by self-doubts or negative self-efficacy beliefs and increases with pressure, excitement, or stress before the exam (Morris & Liebert, 1970; Stöber, 2004). To counteract negative beliefs, the Self-Determination Theory (Deci & Ryan, 1980) suggests that effective learning fulfills three fundamental psychological needs: competence, autonomy, and relatedness. The feeling of competence can be enhanced by adopting a favorable attribution style that enhances a positive self-image (Kelley, 1967): Attributing positive outcomes and achievements to internal capacities, efforts, and progress, while considering negative results as situational and changeable (e.g. caused by lack of time), can enhance self-confidence. Autonomy can be increased by setting motivational goals that are in line with one's capacities. Learning should further be self-directed (Tekkol & Demirel, 2018), and learners should be in control of planning, continuing, and evaluating their learning experiences (Merriam & Baumgartner, 2020). Didactic models such as the Rubicon model of action phases (Achtziger & Gollwitzer, 2009), guide the learner through different phases of task accomplishment, i.e. goal setting, planning, realization, and evaluation of goal achievement. To conclude, a VLC should aid learners in enhancing their motivation through the utilization of strategies that promote goal-setting (Locke & Latham, 2012), autonomy, confidence (Deci & Ryan, 1980), and self-efficacy beliefs (Tärning & Silvervarg, 2019). Incorporating established didactical methods such as the SMART-Method for goal setting (Doran, 1981) and the Rubicon model of action

phases (Achtziger & Gollwitzer, 2009) can be beneficial features to foster motivation and flow. The use of a VLC allows for more meaningful and self-directed learning, enabling learners to apply these strategies independently.

### 2.3 Social Learning

As seen before, learning is highly context-dependent and influenced by the social environment, culture, and task (Hall, 2007; Lave & Wenger, 1991; Vygotsky, 1978). Socio-constructivism suggests learning is best as a shared social rather than an individual experience (Allport, 1920; Rosenberg, 2009). The groups, peers, or social cycles people belong to strongly define their social identity and how they see themselves (Ellemers et al., 2002; Mirbabaie et al., 2021). People learn through observing, modeling, and imitating the behaviors, attitudes, and emotional reactions of others (Bandura & Walters, 1977). Learners form an image of their self and competencies through social comparison with relevant others, for example, fellow students, teachers, or role models (Festinger, 1954). Yet, in remote learning, receiving adequate feedback is often an unmet need (Rinn et al., 2022). It is difficult to foster natural social exchange (Kock, 2005). Even rich media cannot ensure optimal collaboration, as the communication channel must be adapted to the task (Dennis et al., 2008; Dennis & Valacich, 1999). Thereby three types of feedback can be distinguished (Jackson & Graesser, 2007): First, task-based feedback gives practical and domain-specific advice on how to complete an activity and avoid mistakes; second, progress-based feedback evaluates the overall learning progress; and third empathic feedback offers emotional support. In digital settings, task-based feedback can be provided in a fast, synchronous way, helping learners to identify errors and proceed (Jung et al., 2010). Students further benefit from recoding common questions of other students (Dennis et al., 2008). Concerning emotional or procedural feedback, findings suggest a positive effect of exchanges on social media in knowledge sharing and building trust among peers (Cao et al., 2012). Yet not all learners are comfortable sharing their emotions and data online (Atske, 2021). To conclude, a VLC should provide feedback to support a positive self-image and competence. While automated scoring and task-based feedback are common practices, the provision of emotional support is still in its nascent stages.

## 3 Method

Design Principles (DPs) contribute to design knowledge and guide effective and innovative conceptual design at a meta-level, (Gregor et al., 2020; Möller et al., 2020). Following the DSR approach, the research plan follows six steps for formulating DPs (Möller et al., 2020): (1) Definition of a practically relevant problem, formulated as a research question (see introduction section). (2) Identification of kernel theories as a justificatory knowledge base (see theory section). (3) Development of User Stories (US) from a thematic analysis of semi-structured interviews with students from three vocational learning institutions in Germany, promoting a user-centered approach to artifact development (Abras et al., 2004). (4) Meta-requirement mapping, clustering similar US into distinct meta-requirements. (5) Formulation of preliminary DPs, based on the meta-requirements and kernel theories, following a predefined framework from Gregor et al. (2020). Suggestions for DP implementation through exemplary design features (DFs) are derived from both the interviewees' suggestions and the literature. (6) Evaluation of the DPs in an expert focus group.

Ten semi-structured interviews were conducted with vocational education students from three German institutes offering hybrid or online courses, selected through a systematic stratified sampling approach to representing various demographic backgrounds (Gläser & Laudel, 2010). Six men and four women aged 22 to 50 were interviewed. The structured interview guideline provided deeper insights into seven themes identified in a prior quantitative survey (Rinn et al., 2022): (1) respondent's life and (2) learning situation, (3) methods and techniques used, (4) learner's motivation, (5) social learning, (6) time management, and (7) learning success and learning challenges. Open-ended questions were used to generate creative, original, and atypical answers. Finally, the interviewees were asked to draw conclusions based on their answers about the design of a VLC. The interviews were conducted by two independent researchers (Dec 2021-Mar 2022) and lasted from 33 to 84 minutes. Interviews were voice recorded and transcribed using the software Happy Scribe. Personal data was anonymized. A qualitative thematic content analysis (Mayring, 2015) of the ten transcribed interviews was carried out with the software MAXQDA 2020. The coding scheme was deductively generated and refined based on the interview guideline and participants' statements. The analysis yielded 844 codes, highlighting the top three codes for each theme. The findings were synthesized in

36 user stories (US), illustrating a specific user's needs and preliminary requirements for VLC-supported learning. US were formulated as follows: "As <role>, I want <requirement>, so <need>." Throughout a meta-requirement mapping process, four researchers used an adapted 1-2-4-all method (Lipmanowicz & McCandless, 2014) to link user stories and kernel theories and create a consolidated set of meta-requirements. Researchers independently clustered a subset of meta-requirements, which were then peer-reviewed and finally discussed and consolidated by all researchers.

Based on these meta-requirements and prescriptive knowledge derived from the literature, a set of preliminary DPs was formulated following a predefined framework from Gregor et al. (2020), specifying the aim, implementor and user, context, underlying mechanisms and rationale for each DP (see the digital appendix: https://bit.ly/eBled23). The DPs were evaluated by a focus group of five experts from different domains (online- and remote teaching and learning, chatbot design, DSR). The DPs and prototypical examples of DF were presented to the experts using the online collaboration platform Miro. Following the presentation of each DP, participants individually completed an online survey based on the light reusability framework (Iivari et al., 2018), assessing five factors: accessibility, importance, novelty and insightfulness, actability and guidance, and effectiveness. The effectiveness of each DP in addressing the targeted construct was measured using a reflective self-assessment. (e.g., "Compared to my current situation, I believe that a VLC that incorporates this DP would improve motivation."). After the survey completion, each DP was openly discussed in the focus group and qualitative feedback was recorded.

## 4 Artifact Description

The meta-requirement mapping of the kernel theories and interview results were summarized in five DPs for VLCs in digital teaching, which are explained below.

### 4.1 Motivational Goal Setting (DP1)

The goal of DP1 is to design a VLC which promotes motivational goal setting for the learner in the planning stage of the learning process (Achtziger & Gollwitzer, 2009) to build up competence awareness, autonomy (Deci & Ryan, 1980), self-efficacy (Ajzen & Madden, 1986), and motivation (Locke & Latham, 2012; Nakamura & Csikszentmihalyi, 2014). Boundary conditions are addressed in DP5, namely the need for adaptation to the learner's individual needs and a realistic self-assessment. To manage time and tasks appropriately constraints and workload need to be anticipated (see DP3). The following mechanisms ensure motivational goal setting: (1) Set long-term goals **that inspire the learner and** that reflect personal development, skill acquisition, and career opportunities (Hall, 2007; Vygotsky, 1978). (2) Breaking down tasks into short-term learning goals that are specific, challenging, and attainable (Doran, 1981; Locke & Latham, 2012). (3) Constantly evaluate the progress towards a learning goal to increase the learners' autonomy (Achtziger & Gollwitzer, 2009; Deci & Ryan, 1980). (4) Increase the perception of competence, and self-efficacy by celebrating success, goal achievement, and challenges (Deci & Ryan, 1980; Kim, 2001). The following DFs support these mechanisms: The SMART concept (Doran, 1981) helps to formulate motivational goals. The Rubicon model (Achtziger & Gollwitzer, 2009) is a framework for planning, tracking, and evaluating goal achievement and milestones. Goals and progress can be visibly displayed, e.g., in the form of a personal mission statement, progress bar, or success record.

### 4.2 Enabling Social Interactions and Feedback (DP2)

The goal of DP2 is to provide valuable feedback and social support to the learner while performing a task, especially during the progress evaluation phase (Hall, 2007; Vygotsky, 1978). Feedback should be provided by peers and instructors on three levels to promote the perception of competence and social relatedness (Jackson & Graesser, 2007): (1) Task-related feedback, (2) empathic feedback for social connection, and (3) procedural feedback on long-term goals. Further, feedback-givers must be matched according to the needs and experience of the learner to foster a motivational, upward comparison (Festinger, 1954). Task-related feedback should be provided by knowledgeable colleagues or instructors through a rich, low-threshold, and highly synchronized communication channel (Dennis & Valacich,

1999). Procedural feedback should be given by experts in the field who have more expertise and experience than the learner. Different channels should be used: Personal networks, such as Instagram, are better for reaching out to friends and family and getting empathetic feedback. Professional networks, such as LinkedIn, allow networking with experts for procedural feedback. Task-based feedback and the ability to interact and discuss with instructors and peers should be available via a direct, built-in chat feature.

### 4.3 Focus and Control (DP3)

DP3 aims to foster focus, concentration and perceived control while limiting disruption to allow an experience of flow (Nakamura & Csikszentmihalyi, 2014), throughout different work phases (Achtziger & Gollwitzer, 2009). The following mechanisms are suggested help to avoid cognitive overload and enhance concentration (Saxe et al., 2019): The VLC should help divide content into smaller work packages aligned with the learning goal (Aarts & Elliot, 2011), and individual circumstances (Miller, 1956; Rosenbloom et al., 1989), e.g., through time-boxing or micro-learning (Hug, 2006). The VLC can further instruct learners on coping strategies for managing external factors, such as deadlines and unforeseen events, to improve their sense of control and competence.

### 4.4 Fostering Resilience (DP4)

The goal of DP4 is to equip the learner with coping strategies for stress and exam anxiety (Stöber, 2004). The aim is to foster the learner's sense of competence, autonomy, and resilience (Deci & Ryan, 1980; Stöber, 2004). Since learning difficulties are a personal matter, it is necessary that the user accepts the VLC as a mentor and strives for long-term interaction. The following underlying mechanisms can help foster resilience: (1) Recording the learner's mental state and stress level through the collection of personal and behavioral data, (2) Providing an initial assessment and suggesting professional contacts if needed. A VLC cannot replace specialist intervention for severe psychological symptoms, (3) Suggestion of personalized interventions based on learner's perceived competence, agency, and self-efficacy beliefs. (4) The VLC supports planning by estimating the required time for preparation based on historical data.

### 4.5 Context- and Learner Adaptation (DP5)

DP5 aims to provide individualized support to the learner throughout the entire learning process. The VLC should collect information about individual needs, preferences, and circumstances. Further, the VLC should have an extensive knowledge base about the learning content to determine the right level for examination protocols and learning time (see also DP3). The VLC should provide a transparent communication of results and provision of feedback about learning behavior (see also DP4), and should suggest learning materials and methods based on learners' preferences and learning progress. However, such an approach needs the user's consent before implementing any adaptations.

## 5 Evaluation

A focus group of five experts assessed the DPs. All DPs were deemed understandable and accessible, indicating no misinterpretation due to non-comprehension. The experts further differentiated between "must-have" and "nice-to-haves" DPs, which would be useful but less urgent. The focus group unanimously chose Motivational Goal Setting (DP1) as the most relevant DP. The experts found that the SMART-goal-setting method, including the visualization of goals, was an effective feature. However, limitations were noted in the actability and responsiveness of the VLC to the learner. DP2, "focus and flow", was rated as the second priority. There were controversial opinions about the exemplary design feature, the pomodoro technique. A pedagogical expert noted that time restrictions may disrupt the flow. Developers suggested improving the user experience of VLC by pooling different methods to enhance flow and focus into a single, multi-device interface. Context- and learner adaptation (DP3) was rated as "relatively" important. One participant said that this DP is highly relevant because it best expresses what makes the VLC a true "companion". Yet, the complex, individualized design may be overwhelming for inexperienced learners, who may need time to learn how to use it effectively. Therefore, a "basic" and a "pro" version are proposed to provide suitable guidance and actability. Overall, the focus group viewed the ability to facilitate social interaction and feedback (DP4) as beneficial but not essential. The VLC should inquire if learners are willing and able to connect and provide support to their peers. Most experts valued feedback and comparisons to other students. Controversy surrounds the involvement of external feedback givers for emotional and procedural

feedback. The option to disable social media usage is crucial to address privacy concerns related to sharing information about learners' progress. The importance of stress reduction and the promotion of resilience and well-being through a VLC (DP5) was discussed, with some controversy over the provision of in-depth psychological care. Experts agreed on the relevance of stress reduction, but some argued that in-depth psychological care might be beyond the competence and objectives of a VLC. The experts suggested that it may be more feasible for a VLC to focus on preventive measures, such as improving time management skills and promoting breaks, physical activity, and social contact. The VLC could track and analyze behavioral data to assess workload and support healthy habits, as long as data protection is ensured.

## 6 Discussion

In recent years, research on PCA has increased (Khosrawi-Rad et al., 2022) and researchers contributed design knowledge on PCAs in different application contexts (Rodriguez et al., 2019; Wambsganss et al., 2020; Winkler & Roos, 2019). We extend this knowledge to vocational training by user-centered DPs for VLCs. The DPs were derived from user interviews and expert evaluations, highlighting its relevance and validity to the target group. However, the missing instantiation is a limitation that future studies should further evaluate. Based on the evaluation of the DPs, a VLC should address the diverse needs of individual learners, such as their learning strategies, exam preparation, time management, motivation, and social learning. Each identified kernel theory (see Table 1) contributes to the understanding and description of selected learners' requirements. However, our research indicates a need for more transdisciplinary research as developing complex information systems like VLCs incorporates insights from diverse fields like cognitive and social psychology and pedagogy. Further, we identified 23 scientific concepts (see Table 1), which help to extract concrete applications, such as methods or guidelines, and are identified as design features (DF). The results of the evaluation of the DPs show that some of the identified concepts are very helpful, such as the formulation and visualization of SMART goals (Doran, 1981) and the provision of feedback on three levels (Jackson & Graesser, 2007). However, some aspects are controversially discussed, e.g., the pomodoro technique (Cirillo, 2018), and privacy issues.

## 7 Conclusion

The transformative power of technology in lifelong vocational education cannot be denied. As distance and hybrid learning become more prevalent, the need for personalized support increases. This paper presents a set of design principles for Virtual Learning Companions (VLCs) that can promote resilience, goal setting, content focus, and control over the learning process while providing tasked-based feedback to address the lack of structure, time management, and work-life balance support. Additionally, a VLC can address the issues of disconnection, lack of peer contact, and motivation commonly experienced by adult students, by facilitating social interaction and emotional feedback. The results contribute to the research stream on digital lifelong vocational education and offer practical insights for developers and providers of learning platforms, ultimately leading to better learning outcomes and success for adult learners.

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