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# EFFECTS OF INTRINSIC AND EXTRINSIC MOTIVATION ON GAMIFIED COMPETENCE DEVELOPMENT SUPPORT

*Research paper*

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## Abstract

*Due to the rapid changes in the labor market, reskilling and upskilling are more relevant and important for career development than ever before. As the number of ways to obtain new competences increases, so does the need for individual learning paths and support. Gamification, one of the most representative motivation and persuasive Information Systems, has been employed as one potential approach for self-growth and skill development. This paper examines how different motivations towards acquiring new skills affect the perceived value, i.e., usefulness, enjoyment, and playfulness, of different gamified support for competence development. In the study, different presentations of gamified support were categorized based on their temporality and openness. Utilizing this categorization, a vignette-based survey study was conducted for two focus groups, learners in higher education and lifelong learners, e.g., from companies. The results revealed similarities and differences between the groups. In both groups, intrinsic motivation toward skill development has a positive effect on gamified support with high flexibility, whereas external regulation has a positive effect on short-term support (e.g., via micro-credentials). Lifelong learners who are intrinsically motivated additionally value short-term support (e.g., targeted skills), whereas intrinsically motivated HE students perceive long-term support as valuable (e.g., via study programs).*

*Keywords: competence, development, gamification, motivation.*

## 1 INTRODUCTION

In today's economy, the need for continuous development of diverse and useful competences is evident. Learners in higher education (HE) are facing a perceived skill gap between the competences learned during their studies and the requirements of work-life (Andrews & Higson, 2008). Meanwhile, those who have already started their careers are struggling with the changing demands and requirements of maintaining employment and a concern about future employability (De Vos et al., 2011; Dong et al., 2017). These factors have caused learning of new skills and competences to progressively take place outside of formal education, where individuals need to rely on their self-directedness.

It has been noted that enabling and stable support is required for a successful competence development process to take place (Maurer & Lippstreu, 2008; Roddy et al., 2017). Different Information Systems (IS) solutions (e.g., learning management systems) have been presented to provide digital ways of supporting this process. These solutions have enabled new, often game-like, presentations of gained skills and competences, such as dynamic, guided learning paths (Tondello & Nacke, 2019) and collections, or snapshots, of completed learning opportunities (e.g., Tomic et al., 2019; Facey-Shaw et al., 2018).

Prior literature tends to present gameful support for competence development as ad-hoc solutions for specific skills and development settings, e.g., using badges and other collectibles to present completed training tasks. However, previous literature doesn't provide a comprehensive look at how differences in learning motivation affect HE and lifelong learners' perception of different gameful support of competence development. Without a proper understanding of this issue, it is highly demanding for HE institutions and organizations (e.g., companies, employment offices) to plan, implement, and manage IS for upskilling and reskilling that optimally serve differently motivated individuals in the light of increasing demands of the labor market.

The purpose of this study is to fill the mentioned gap in research by presenting mechanisms of different gamified competence development support and to identify how differences in motivation to develop new skills affect the perceived value of the support mechanisms in HE and lifelong learners. The paper presents an initial categorization for gamified competence development support based on the support's temporality and openness, which address how extensively the learner is guided through the learning content and how much personal room is available for the learner to explore other learning opportunities. The research question in focus is "*How do different learning motivations of higher education learners and lifelong learners affect the perceived value of gamified competence development support?*".

In the paper, different motivations for learning new skills and competences are drawn from self-determination theory (Ryan & Deci, 2000), which addresses intrinsic and extrinsic factors for acquiring new skills. In addition, learners' preference for autonomous learning and sense of self-efficacy are measured. The study was conducted as a vignette-based survey study. The vignettes for competence development support were developed based on the notions of the support's temporality and openness. The two target groups, HE and lifelong learners (total N=923), were both included due to the aforementioned changes in the labor market, with personal development continuing after entering work-life with necessary upskilling and reskilling. The vignettes were evaluated from the perspective of perceived value, consisting of usefulness, enjoyment, and playfulness. The analysis was done using linear regression.

As a contribution, this study provides IS literature with new knowledge on how changes in motivation affect the perceived value of different gamified competence development support. This knowledge can be used in the design process of IS for competence development and learning environment development (e.g., flexible learning pathways). The results of the study help recognize how differently motivated learners can optimally be supported with the help of gamified IS.

## 2 THEORETICAL BACKGROUND

### 2.1 New practices and requirements of competence development

The changes in today's knowledge-based society and the demands for future employment are accelerating the need for constant reskilling and upskilling (Li, 2022). Learning and the development of new skills happen increasingly in the workplace (Nikolova et al., 2014) and in organizational settings (Crosan et al., 1999; Argote & Miron-Spektor, 2011). This process is often described as *Continuing Professional Development* (CPD). CPD has a strong pivot towards occupational competence development and focuses on continuing education, the enhancement of practice through gained knowledge, and maintaining necessary skills throughout a person's work life (Harwood & Clarke, 2006). In turn, the continuous process of learning and development across a person's entire lifespan is described as lifelong learning (Aspin & Chapman, 2000; Tuijnman & Boström, 2002).

The development of new competences has become more abundant with easier access to numerous learning contents. The introduction of *Massive Online Open Courses* (MOOCs) has received attention in recent years as a way to enhance and gain new competences in HE and workplace settings (Littlejohn et al., 2016). Recently, small learning opportunities and *micro-credentials* have emerged as a practical and transparent way to carry out and prove the development of new skills (Kiiskilä et al., 2023). While these

solutions have improved the opportunities for versatile competence development, they have also accelerated the separated gathering of skills and the fragmentation of a person's overall learning process.

For competence development to take place, sufficient support is required (Maurer & Lippstreu, 2008; Roddy et al., 2017). Implementations of learning support have ranged from mentoring (Mikkonen et al., 2022) to group learning practices (Gillies, 2003) and digital learning tools (Evans et al., 2020). Additionally, the notion of flexibility has been introduced as a tool that supports individuals in different learning paths (Wanner & Palmer, 2015; Edwards, 1998). According to Li et al. (2020), the flexible learning process attempts to take into consideration different backgrounds, situations, and skill levels that individuals may have when presented with new learning opportunities. Flexibility in learning and the notion of lifelong learning both aim to create more possibilities for individual development (Evans & Ping Fan, 2002). In HE and vocational settings, new opportunities for supporting competence development through flexibility are found in information systems, some of which utilize gamification. Li et al. (2020) and Taylor & Hung (2022) point out that flexible IS solutions help meet individual needs and preferences for competence development in HE and workplace environments.

## 2.2 Gamification as a tool for competence development support

This study utilizes *gamification* as an approach to finding a solution to the research question. The academic term “gamification” was first defined by Detering et al. (2011) as “the use of game design elements in a non-game context”. Such a definition separated gamification from “serious games” and play design, focusing on principles and mechanics used for creating games. With the rapid development of gamification research, including in IS (e.g., Schlagenhauer & Amberg, 2015), the understanding of gamification has evolved from employing design elements to creating game-like experiences led by affordances (Koivisto & Hamari, 2019) and further expanded to broadly refer to “technological, economic, cultural, and societal developments in which reality is becoming more gameful” (Hamari, 2019). Gamification is believed to afford positive growth in motivation, attitudes, and behavior (Hamari, 2019).

According to Tobon et al. (2020), gamification includes the interaction of game design features and the subject's inclinations, which creates gameful experiences. However, these design features are referred to with differing labels such as “gamification elements” (e.g., Tobon et al., 2020; Toda et al., 2019) and “gamification mechanics” (e.g., Thiebes et al., 2014; Kocadere & Çağlar, 2018). Accordingly, Garrett & Young (2019) state that “game mechanics” are the “elements of gamification”. Other taxonomies, such as the one provided by De Liu & Webster (2017), describe “gamification objects” as the “building blocks of a gamified system”. Among the most common game design features that are utilized in non-game environments are different point systems, badges/achievements, and leaderboards.

Existing literature reviews in education (e.g., Oliveira et al., 2023; Nadi-Ravandi & Batooli, 2022, Khalil et al., 2018) have pointed out that the use of gamification yields a positive outcome when utilized to enhance the motivation and engagement of learners. Alsawaier (2018) has added that the benefit is typically the biggest for those who are not intrinsically motivated to learn. Chalco et al. (2015) argued that many aspects of gamification, such as rewards, collaboration, and competition, promote individual and independent learning.

The goal of this paper is not to highlight the perceived value of individual gamification design features that are used to enhance learning motivation. Rather, the focus is on utilizing gamification to support individuals in navigating through the expanding options for the acquisition and development of new skills, such as guiding an employee through a set of short courses for acquiring new qualifications or helping an HE student through a comprehensive, multi-year study program. A comparison of mechanisms of support that help individuals navigate through competence development is limited in the literature. For this study, a categorization that describes the mechanisms of gamified support was extracted from educational and gamification literature followed by practical examples of gamified IS. The initial categorization for the mechanisms of competence development support is based on notions of *temporality*, which determines if the provided support is short-term or long-term, and *openness*, which determines if the support is open-ended or closed-ended.

Short learning activities are often utilized in a short period of time when learning is focused on a specific goal or when the learner intends to enhance a specific skillset (Roddy et al., 2017). Completing micro-credentials is an example of this (Pirkkalainen et al., 2022). On the contrary, long-term competence development is handled in a longer period of time targeting a more holistic and comprehensive mastery of multiple skills. Traditional curriculum-based study programs (Boud & Falchikov, 2006) and the development of transversal and other skills throughout a person's lifetime (Aspin & Chapman, 2000) are examples of this. Although gamification literature does not theorize short-term and long-term mechanisms, different types of temporal features have been identified for the support, e.g., achievements, badges, and trophies versus pathways, progression, and skill trees (Majuri et al., 2018). In this study, we argue that different gamified support for competence development, e.g., skill trees and badges, can be used to help individuals navigate through both short-term (a narrow set of skills) and long-term (a deep dive into certain skills) competence development activities.

With the inclusion of web-based learning environments, non-linear and open-ended approaches to learning have become more accessible and ubiquitous (Müller et al., 2018; Robberecht, 2007). Micro-credentials have emerged as an open-ended solution for competence development (Pirkkalainen et al., 2022), allowing full flexibility to navigate how far the learner wants, with full autonomy and limited control over individuals' choices. On the contrary, pre-determined (goals clearly defined), closed-ended learning paths, such as educational curriculum and professional training (Gamrat et al., 2014; Copenhaver & Pritchard, 2017) can define the boundaries of skill development. Gamification literature doesn't recognize open-ended and closed-ended mechanisms per se. However, studies have identified gamified support such as badges and other collectibles (Kyewski & Krämer, 2018) that can be utilized for these purposes, giving the individual full freedom versus clear boundaries to explore new skills.

It's critical to acknowledge that the aspects of temporality and openness are not dichotomous (i.e., short vs. long, open vs. closed), but instead, they can be considered as a continuum. Some ways of competence development can be done in a matter of hours or days (e.g., micro-credentials), others in weeks, months, or years (e.g., study programs). Likewise, some ways of competence development allow more flexibility and freedom (e.g., self-directed development) than others (e.g., professional training).

### 2.3 Self-determination theory and the motivation to learn

Self-determination theory (SDT) has emerged as a widely used approach to explain human motivation and behavior in multiple settings (Ryan & Deci, 2000), such as health promotion and exercise (Ng et al., 2012; Manganeli, 2018), workplaces and organizations (Gagné & Deci, 2005; Deci et al., 2017), and learning and education (Guay, 2022; Brooks & Young, 2011).

SDT differentiates intrinsic interests and extrinsic values that motivate an individual to achieve optimal performance results from their actions (Ryan & Deci, 2000). Gagné & Deci (2005) state that a simple dichotomy between intrinsic and extrinsic motivation can prove itself difficult to utilize in different settings, and that extrinsic motivation can vary depending on the level of interest towards the task. Thus, extrinsic motivation in SDT is often regarded as a continuum that separates driving external attributes to complete a task while intrinsic motivation is seen as factors that make a person perform a task for the person's own sake or purely out of the interest towards the task itself (Ryan & Deci, 2000).

According to Gagné & Deci (2005), when motivation is fully controlled by external factors, like rewards and monetary benefits, motivation is said to be externally regulated. The authors also state that external regulation is the type of extrinsic motivation that is usually considered when intrinsic motivation is contrasted. Externally regulated learners can hold a negative relationship with learning and development avoiding learning tasks when possible (Hon-Keung et al., 2012). At the far end of the SDT continuum is amotivation, which is used to describe a person's lack of motivation to perform a given task altogether.

Alsawaier (2018) states that SDT aims to explain how the satisfaction of psychosocial needs of autonomy, or the ability of personal choice-making, competence, or the ability to overcome challenges, and relatedness, or the ability to succeed in relation to others, promotes different types of motivation.

According to Alsawaier (2018), these three needs, i.e., making personal choices, succeeding in challenges, and social collaboration, are successfully satisfied in gameful environments. The relationship between gamification and SDT has been addressed in previous literature (e.g., Xi & Hamari, 2019).

## 3 METHODOLOGY

### 3.1 Vignette study approach

The research question was addressed with the methodological approach of a two (temporality of gamified support: short-term vs. long-term) by two (openness of gamified support: closed-ended vs. open-ended) within-subjects design vignette study. According to Atzmüller & Steiner (2010), vignettes are a flexible and versatile way to present a participant with different use case scenarios and situations. This study adopts the two key components of a vignette study: surveying respondent-specific characteristics and the core vignette experiment where different descriptions of objects and scenarios are presented. Vignettes are a cost-effective and easily administrable approach for conducting studies in different training settings (Peabody et al., 2000; Atzmüller & Steiner, 2010), allowing respondents to reflect on contextualized and concrete viewpoints. For these reasons, vignette study was deemed relevant and appropriate for the aim of the study. Four vignettes (Figure 1) of gamified competence development support were developed based on the notions of temporality and openness. Each of the four vignettes presented a distinct way to gamefully support a learner and guide their progression on their learning path:

- Vignette 1 (later referred to as V1) followed the principle of long-term & open-ended.
  - The support presented in vignette 1 deals with high flexibility, and the competence development support is considered to be long-term and open-ended. The learner can achieve and acquire skills in any order on multiple, individual, and unrelated learning paths. These skills can be with no clear end goal, such as “soft” skill development (e.g., language skills, problem-solving).
- Vignette 2 (V2) followed the principle of short-term & closed-ended.
  - The support presented in vignette 2 operates with less flexibility, and the competence development support is considered short-term and closed-ended. There’s a clear, linear learning pathway and a pre-determined end goal that the learner is trying to achieve (e.g., a programming language). The learner starts from the basics and then moves towards more advanced learning content. Multiple different ways can take the learner to their goal, but the point is to follow one specific path.
- Vignette 3 (V3) followed the principle of long-term & closed-ended.
  - The support presented in vignette 3 operates with little flexibility. Here, competence development support is considered long-term and closed-ended. There are mostly clear, linear learning pathways of independent skills and competences that compose a larger expertise (e.g., a study program). A learner acquires different skills in different areas at a different pace. Some skills may be connected (e.g., from basic studies to advanced studies), while others are not (e.g., minor studies).
- Vignette 4 (V4) followed the principle of short-term & open-ended.
  - The support presented in vignette 4 showcases the learner their granted skill badges and certificates from completed competence development activities (e.g., taking part in professional training). The certificates are digitally verifiable, meaning that acquired skills and competences can be proved to employers. Here, competence development support is considered short-term and open-ended as the learner is not supported or guided towards the next learning opportunities and the completion of individual skills happens intensively.

The vignettes were presented separately in high resolution images in the context of a fictitious digital learning platform for competence development and included a description of their operating principle (e.g., V1: “This support relies on flexibility and shows your acquired skills separately from each other.”).

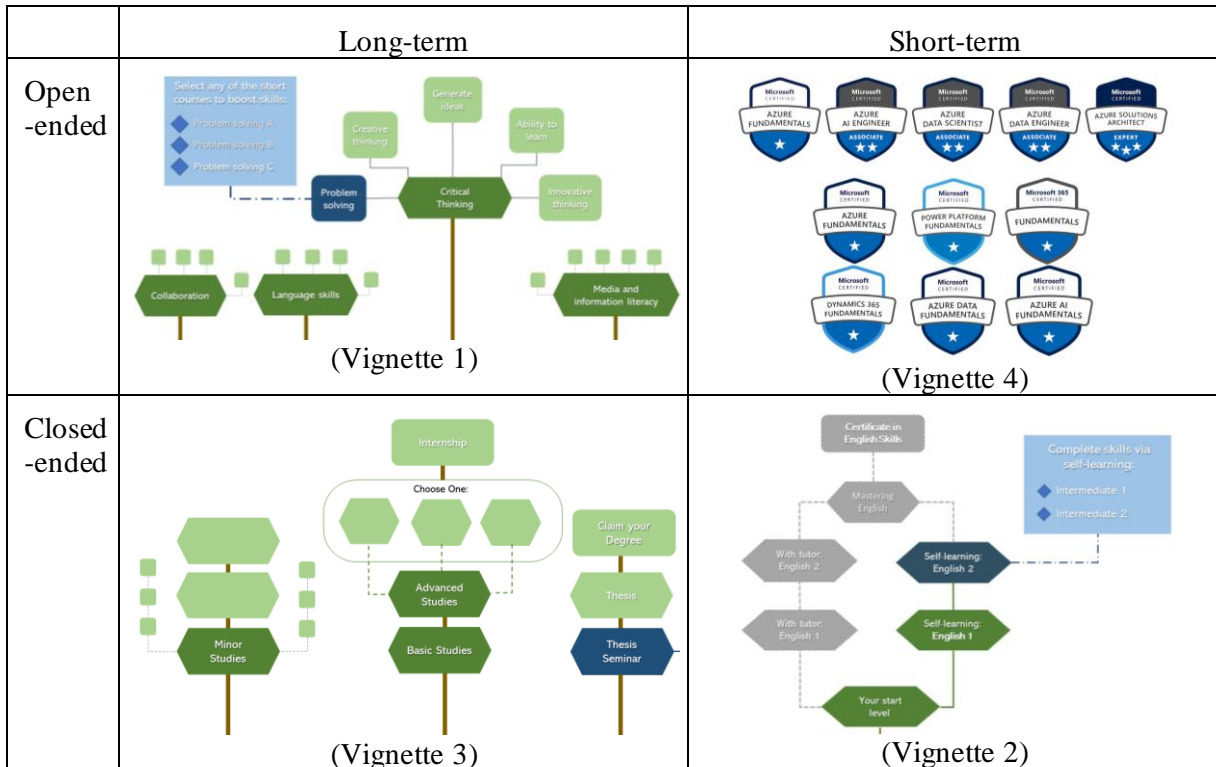


Figure 1. The study design matrix with interfaces of gamified competence development support presented to the participants.

### 3.2 Participants and data collection

As per Atzmüller & Steiner’s definition (2010) of a vignette study, two separate components for the questionnaire needed to be established. The first part of the survey included demographic questions including the education and employment status of the participant. Additionally, participants were asked about their motivation and approaches toward learning new skills and competences. This part used validated constructs for measuring participants’ intrinsic motivation and external regulation towards learning, lack of motivation (“amotivation”), and preference for autonomous learning. Similar to prior SDT studies (e.g., Liu et al., 2014), the participants’ self-efficacy was measured. This refers to the person’s belief in their capabilities and the ability to succeed with presented challenges (Stewart, 2021). Self-efficacy also has a strong connection with setting goals for personal competence development (Stewart 2021). The second part of the survey was composed of four vignettes for competence development support where each participant evaluated all four vignettes. The vignettes were presented to the participants in the same order (first vignette 1, then vignette 2, then vignette 3, then vignette 4, see Figure 1).

As mentioned previously, the study was focused on two respondent groups, learners in HE and lifelong learners. The data was gathered via an online survey. Participants for the survey were recruited from an online panel service Prolific in November 2022. The use of online panels has been deemed a valid and appropriate way for data collection in prior IS literature (Lowry et al., 2016). Initially, 1,104 responses were gathered in total, with 546 responses coming from HE (bachelor, master, and doctoral level) and 558 from lifelong learners (working part-time, full-time, or seeking employment). Attention trap questions were used (e.g., “If you're still paying attention, select ‘agree’”) to screen out non-attentive responses, incomplete surveys were deleted, and some remapping of the respondent groups was done. The final sample consisted of 923 responses with 544 from HE learners and 379 from lifelong learners. In the final sample, the age range was from 18 to 65, with a mean age of 26.4. 508 respondents were male, 402 were female, and 13 identified as other. As for the educational level of the participants, nine had

completed primary education, 367 had completed secondary education, 422 had a bachelor's degree, 120 had a master's degree, and five had a doctoral degree.

### 3.3 Measures used in the study

Items for measuring *intrinsic motivation* were related to the participant's desire to gain new knowledge and skills out of personal pleasure or fulfilment. These items were adapted from Tremblay et al.'s (2009) research on work motivation. *External regulation* was adapted from Lim & Chapman's (2015) use of the Academic Motivation Scale (AMS). *Amotivation* was adapted from Smith et al.'s (2012) alternative configuration of the AMS. Learners' preference for *autonomy* was measured by using adapted items from Gözükarar & Çolakoğlu's (2016) work on job autonomy and satisfaction. Items for measuring participant's *self-efficacy* were adapted from Chen et al.'s (2001) general self-efficacy scale.

The perceived value of the gamified support comprised of *perceived usefulness* (Davis, 1989), *perceived enjoyment* (van der Heijden, 2004), and *perceived playfulness* (Högberg et al., 2019). Perceived usefulness and enjoyment were measured to determine the utility, or productivity, and the sense of fun, or pleasure, of the provided competence development support. Chesney (2006) has stated that productivity and pleasure are the determining factors for the acceptance of new IS. The *perceived usefulness* construct is based on the widely adopted Technology Acceptance Model (TAM) (Davis, 1989). The items were adapted from Hamari & Koivisto's (2015) work on gamification services. Measuring the usefulness of gamified competence development presentations was deemed important as it defines whether a learner would maximize the ease and effectiveness of learning when gamified support is provided. Items in *perceived enjoyment* were adapted from van der Heijden's (2004) scale of perceived enjoyment of hedonic information systems and were used to measure the extent to which interaction with the presented gamified support for competence development is enjoyable. *Perceived playfulness* has a strong effect on user acceptance of new services and products (Lin et al., 2005; Ahn et al., 2007), which is why it was seen as important to be measured in each vignette. The scale was adapted from Högberg et al.'s (2019) questionnaire for gameful experience in systems and services (GAMEFULQUEST). Items in the scales were adapted from their original context to reflect the competence development support setting. All scales and items used in the study can be found in Table 1.

### 3.4 Data analysis

IBM SPSS2 Statistics Version 28 and Version 29 were used for the data analysis of the study. First, an exploratory factor analysis (Principal Axis Factoring) was conducted to construct the latent variables (Table 1). Due to the nature of the vignette study, participants responded to the items four separate times. For this reason, the items and their loadings are also listed on four separate occasions (Table 1). In all of the vignettes, the Kaiser-Meyer-Olkin (KMO) measure, which implies the adequacy of sampling, confirmed that the factoring of the items was possible with values ranging between 0.946 and 0.959.

In all four vignettes, Bartlett's test of sphericity had a high degree of statistical significance ( $p < 0.001$ ). The factors correlated with each other via the use of the Promax rotation method. During factor analysis, it turned out that some items in the perceived playfulness scale didn't work well and had a low loading (below 0.4). Five out of nine items were dropped and four items were retained to preserve loadings above 0.4 (Gefen et al., 2000). The descriptive statistics of the factor analysis are presented in Table 1. Cronbach's alpha values, the means, and the standard deviation of each construct also appear four times. In each four vignettes, all three constructs had a Cronbach's alpha value above 0.70, which implies that the internal consistency of the scales was sufficient (Santos, 1999). Sum variables were calculated as means of the original survey items. The average value for perceived usefulness, enjoyment, and playfulness in each vignette was between 3.91 and 5.45 on a 1-7 scale, implying that these qualities were perceived at least somewhat positively (Table 1). A series of linear regression analyses (Joshi et al., 2015) were conducted (Table 2) with motivational factors as independent variables and perceived usefulness, enjoyment, and playfulness of each four vignettes as dependent variables.



Vignette	Construct	$\alpha$	Mean	SD	Item description	Load ing
1 Support for competence development: Long-term / Open-ended	Perceived usefulness	.896	5.357	0.961	USE1 This kind of support makes it easier for me to start developing my competences.	.793
					USE2 This kind of support is useful for the purposes of my competence development.	.781
					USE3 This kind of support enables me to accomplish more with regard to my competence development.	.793
					USE4 I feel more effective with regard to my competence development when using this kind of support.	.703
					USE5 I find this kind of support useful for developing new competences.	.648
	Perceived enjoyment	.903	5.422	1.044	ENJ1 I find this kind of support enjoyable.	.884
					ENJ2 I find this kind of support pleasant.	.721
					ENJ3 I find this kind of support exciting.	.596
					ENJ4 I find this kind of support interesting.	.578
	Perceived playfulness	.783	4.917	1.063	PLAY1 This kind of support leaves room for me to be spontaneous.	.679
					PLAY2 This kind of support taps into my imagination.	.639
					PLAY3 This kind of support makes me feel that I can be creative.	.775
					PLAY4 This kind of support feels like I'm revealing a mystery.	.464
2 Support for competence development: Short-term / Closed-ended	Perceived usefulness	.905	5.448	0.979	USE1 (same item description as for Vignette 1)	.791
					USE2 (same item description as for Vignette 1)	.859
					USE3 (same item description as for Vignette 1)	.778
					USE4 (same item description as for Vignette 1)	.697
					USE5 (same item description as for Vignette 1)	.782
	Perceived enjoyment	.908	5.151	1.145	ENJ1 (same item description as for Vignette 1)	.730
					ENJ2 (same item description as for Vignette 1)	.722
					ENJ3 (same item description as for Vignette 1)	.699
					ENJ4 (same item description as for Vignette 1)	.591
	Perceived playfulness	.859	4.288	1.285	PLAY1 (same item description as for Vignette 1)	.851
					PLAY2 (same item description as for Vignette 1)	.655
					PLAY3 (same item description as for Vignette 1)	.913
					PLAY4 (same item description as for Vignette 1)	.539
3 Support for competence development: Long-term / Closed-ended	Perceived usefulness	.919	5.033	1.174	USE1 (same item description as for Vignette 1)	.743
					USE2 (same item description as for Vignette 1)	.849
					USE3 (same item description as for Vignette 1)	.878
					USE4 (same item description as for Vignette 1)	.690
					USE5 (same item description as for Vignette 1)	.864
	Perceived enjoyment	.934	4.575	1.375	ENJ1 (same item description as for Vignette 1)	.718
					ENJ2 (same item description as for Vignette 1)	.755
					ENJ3 (same item description as for Vignette 1)	.709
					ENJ4 (same item description as for Vignette 1)	.629
	Perceived playfulness	.908	3.909	1.476	PLAY1 (same item description as for Vignette 1)	.924
					PLAY2 (same item description as for Vignette 1)	.818
					PLAY3 (same item description as for Vignette 1)	.870
					PLAY4 (same item description as for Vignette 1)	.679
4 Support for competence development: Short-term / Open-ended	Perceived usefulness	.935	5.257	1.285	USE1 (same item description as for Vignette 1)	.775
					USE2 (same item description as for Vignette 1)	.911
					USE3 (same item description as for Vignette 1)	.818
					USE4 (same item description as for Vignette 1)	.753
					USE5 (same item description as for Vignette 1)	.826
	Perceived enjoyment	.935	5.148	1.377	ENJ1 (same item description as for Vignette 1)	.701
					ENJ2 (same item description as for Vignette 1)	.748
					ENJ3 (same item description as for Vignette 1)	.803
					ENJ4 (same item description as for Vignette 1)	.692
	Perceived playfulness	.885	4.309	1.422	PLAY1 (same item description as for Vignette 1)	.806
					PLAY2 (same item description as for Vignette 1)	.746
					PLAY3 (same item description as for Vignette 1)	.877
					PLAY4 (same item description as for Vignette 1)	.690

Table 1. Vignette-specific factor loadings for items in each construct, N=923.

## 4 RESULTS

The results of the regression analysis (Table 2) indicate the effects of motivational factors (based on SDT) on the four vignettes constructed based on two main facets of gamification, duration (long-term vs. short-term) and form (closed vs. open), representing distinct temporal and openness characteristics of gamified competence development support. In terms of the perceived usefulness of vignette 1 (long-term & open-ended), the results showcase strong similarities between the two respondent groups. Intrinsic motivation has a strong effect on the perceived usefulness of vignette 1 in both groups. Differences between the groups in closed-ended vignettes 2 (short-term) and 3 (long-term) are more evident. Lifelong learners who are intrinsically motivated perceive utility in short-term and closed-ended guidance (e.g., through guided short-term training) (.170\*\*), whereas similarly motivated HE students perceive utility in long-term and closed-ended guidance (e.g., through a study program) (.174\*\*). Further, in both groups, self-efficacy has a strong effect on the perceived usefulness of flexible, open-ended support. In lifelong learners, this effect is toward short-term support (e.g., through micro-credentials) (.342\*\*\*), whereas in HE learners the effect is toward long-term support (.202\*\*\*). In both groups external regulation has a strong effect on the perceived utility of each vignette.

In terms of perceived enjoyment for vignette 1 (long-term & open-ended), intrinsic motivation and external regulation showcase similarities between the groups, with a difference in external regulation of HE learners who have a significantly stronger effect (.232\*\*\*). Clear differences are again in closed-ended vignettes 2 (short-term) and 3 (long-term). Intrinsic motivation in HE learners affects the perceived enjoyment of long-term and closed-ended support (.241\*\*), whereas similar motivation in lifelong learners has an effect on the perceived enjoyment of short-term support (.304\*\*\*). Additionally, a lack of motivation towards learning new skills and competences in HE learners shows an effect on perceived enjoyment of closed-ended support (short-term: .151\*\*\*, long-term: .123\*). Also, the autonomy of HE learners had a positive effect on vignette 2 (short-term & closed-ended) (.207\*\*). In vignette 4 (short-term & open-ended), like perceived usefulness, external regulation had a positive effect on perceived enjoyment in both groups (HE learners: .370\*\*\*, lifelong learners: .304\*\*).

In terms of perceived playfulness, similarities between the groups are the most evident with longer-term supports, vignette 1 (open-ended) and vignette 3 (closed-ended). Another clear finding is that a lack of motivation towards learning in HE learners has a significant effect on perceived playfulness in each gamified support vignette, regardless of their mechanisms (V1: .139\*\*\*, V2: .300\*\*\*, V3: .228\*\*\*, V4: .221\*\*\*). In vignette 2 (short-term & closed-ended), differences are in intrinsic motivation and its effect on perceived playfulness (HE learners: .156\*, lifelong learners: .412\*\*\*). Finally, in HE learners, intrinsic motivation (.183\*), external regulation (.218\*), and amotivation (.221\*\*\*) affected perceived playfulness in vignette 4 (short-term & open-ended), but no effect was found between the motivational factors of lifelong learners and perceived playfulness of the same vignette.

	lifelong learners			HE learners		
	<i>perceived usefulness</i>	<i>perceived enjoyment</i>	<i>perceived playfulness</i>	<i>perceived usefulness</i>	<i>perceived enjoyment</i>	<i>perceived playfulness</i>
<b>Vignette 1: long-term, open-ended</b>	<b>1.091*</b> (constant)	<b>1.873***</b> (constant)	.773 (constant)	<b>1.509***</b> (constant)	<b>1.291**</b> (constant)	<b>.880*</b> (constant)
Intrinsic motivation	<b>.165**</b>	<b>.300***</b>	<b>.278***</b>	<b>.189***</b>	<b>.247***</b>	<b>.206***</b>
External regulation	<b>.306***</b>	<b>.186*</b>	.061	<b>.196***</b>	<b>.232***</b>	<b>.169*</b>
Amotivation	<b>.095*</b>	.021	<b>.105*</b>	.024	.045	<b>.139***</b>
Autonomy	.084	-.038	<b>.166*</b>	.081	.114	<b>.131*</b>
Self-efficacy	<b>.143*</b>	.160	<b>.188*</b>	<b>.202***</b>	.114	<b>.152*</b>
	R squared: .215	R squared: .203	R squared: .199	R squared: .224	R squared: .205	R squared: .176

	lifelong learners			HE learners		
	<i>perceived usefulness</i>	<i>perceived enjoyment</i>	<i>perceived playfulness</i>	<i>perceived usefulness</i>	<i>perceived enjoyment</i>	<i>perceived playfulness</i>
<b>Vignette 2: short-term, closed-ended</b>	<b>3.125*** (constant)</b>	<b>2.614*** (constant)</b>	1.111 (constant)	<b>2.340*** (constant)</b>	<b>1.876*** (constant)</b>	.354 (constant)
Intrinsic motivation	<b>.170**</b>	<b>.304***</b>	<b>.412***</b>	.054	.092	<b>.156*</b>
External regulation	<b>.254***</b>	.124	-.074	<b>.307***</b>	<b>.199*</b>	.113
Amotivation	-.061	.019	<b>.187**</b>	.014	<b>.151***</b>	<b>.300***</b>
Autonomy	-.010	-.037	-.014	<b>.149*</b>	<b>.207**</b>	.117
Self-efficacy	.006	.047	<b>.181*</b>	.008	.005	<b>.189*</b>
	R squared: .131	R squared: .103	R squared: .137	R squared: .109	R squared: .080	R squared: .124
<b>Vignette 3: long-term, closed-ended</b>	<b>1.697* (constant)</b>	1.503 (constant)	.760 (constant)	<b>2.904*** (constant)</b>	<b>1.682** (constant)</b>	1.208 (constant)
Intrinsic motivation	-.037	.108	<b>.294**</b>	<b>.174**</b>	<b>.241**</b>	<b>.240**</b>
External regulation	<b>.335***</b>	.106	-.131	.091	.015	-.081
Amotivation	.027	.085	<b>.240***</b>	-.014	<b>.123*</b>	<b>.228***</b>
Autonomy	.133	.107	.128	.071	.126	.166
Self-efficacy	.116	.165	.178	.052	.104	.084
	R squared: .077	R squared: .050	R squared: .087	R squared: .061	R squared: .072	R squared: .068
<b>Vignette 4: short-term, open-ended</b>	.831 (constant)	.841 (constant)	-.752 (constant)	<b>1.354* (constant)</b>	<b>1.921** (constant)</b>	.396 (constant)
Intrinsic motivation	-.065	.038	.261	.021	-.071	<b>.183*</b>
External regulation	<b>.334***</b>	<b>.304**</b>	.180	<b>.424***</b>	<b>.370***</b>	<b>.218*</b>
Amotivation	.003	.062	.287	.065	.029	<b>.221***</b>
Autonomy	<b>.180*</b>	.173	.044	.107	.103	.058
Self-efficacy	<b>.342***</b>	<b>.220*</b>	.300	.064	.122	.125
	R squared: .179	R squared: .110	R squared: .150	R squared: .087	R squared: .062	R squared: .081

Table 2. Regression results for the effect of motivational factors on gamified competence development support (unstandardized coefficients B), \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

## 5 DISCUSSION AND CONCLUSION

### 5.1 Theoretical contributions

Previous IS literature (e.g., De Liu & Webster, 2017; Silic & Lowry, 2020) has established gamification as a suitable approach to support both educational and organizational competence development. This paper adds to this previous literature by identifying how to optimally use gamified IS to support different learners; those who are self-driven and inherently interested in their personal development but also those who are in danger of falling out of educational or career development due to inclination towards external regulation or amotivation. The differences in attitudes and preferences of HE and lifelong learners towards gamified learning solutions and IS for competence development have been examined before (e.g.,

Antonaci et al., 2019; Taylor & Hung, 2022). However, this paper adds to previous research by articulating that differing motivations towards learning play a role in how gamified support is perceived.

Similarities between the groups were found in the effect of intrinsic motivation on the perceived value of long-term and open-ended support (allowing high flexibility) and external regulation on the perceived value of short-term and open-ended support. This finding supports previous literature (Copenhaver & Pritchard, 2017), where it is noted that employees and HE students are motivated by short and flexible development opportunities, like micro-credentials, that provide external recognition.

The differences between the groups arise in the perceived value of closed-ended support. Intrinsic motivation toward skill development in lifelong learners affects the perceived value of short-term and closed-ended support, while the same motivation in HE learners affects the perceived value of long-term and closed-ended support (likely due to their connection to long-term study programs). A similar finding is seen with self-efficacy, which has an effect on perceived utility of long-term and open-ended support in HE learners, and an effect on short-term and open-ended support in lifelong learners.

As a second contribution to IS literature, this paper presents an initial categorization of gamified competence development support based on the notions of temporality and openness. Gamification features adapted to the learning context have previously been categorized, e.g., based on their achievement-, immersion-, and social-based utility (Majuri et al., 2018). Although the categorization of gamified support based on temporality and openness doesn't appear in prior literature as such, it successfully helps bring the differences and preferences of different learners into light. With this categorization, we present the four vignettes (Figure 1) which are an important addition to the gamification literature in IS. Specifically, the vignettes represent different gamified IS approaches to competence development support and as shown by the empirical findings, the respondent groups perceive their value in different ways.

## 5.2 Practical contributions

The findings of the study are especially important for designers of gamified training and learning IS as well as for institutions and organizations providing competence development. First, the findings provide important considerations for design knowledge of gamified IS that can assist and support the implementation of the approaches (represented in the vignettes) in LMSs, digital learning environments, and corporate training platforms. These can help end users navigate through different competence development opportunities via gamified IS.

Second, HE and other educational institutions can use the study findings to pay attention to how different learners are supported optimally. By understanding the effects of motivational factors, institutions can prevent unmotivated students from dropping out and provide more personalized pathways to develop their skills and competences. Additionally, companies in different industries that provide training and development opportunities to their employees can benefit by targeting different types of learners with specific gamified development support. Providing the wrong kind of support for individuals can cause frustration to the learner and waste resources of the organization.

## 5.3 Limitations and future research

While this study succeeds in showcasing new knowledge on a previously uncharted focus area, the research process has some issues and possible limitations. The authors were aware that the respondents might approach gameful support presented in the vignettes as a user experience or user interface test, i.e., purely focusing on the appearance and the visual appeal of the presentations, not the driving mechanisms behind them. Learners with less experience with games and game-like elements might have been prone to provide feedback on the visual aspects of the vignettes and not the mechanisms. This issue was acknowledged early on and approached by stating in the instructions of each vignette that the presentations are an example of a mentioned competence development support mechanism (e.g., long-term & open-ended) and that the survey is for providing feedback on the mechanisms. Also, the four vignettes were presented to the participants in a within-subject design approach, i.e., each participant was exposed

to each vignette in the same order. In this study design, the order of the exposure can make some participants overly sensitive to variations in the vignettes (Charness et al., 2012). Future studies could explore whether the findings hold true if the vignettes were presented in a randomized order.

In the study, demographic information (gender, age, highest completed degree, employment field, position, experience in the current job, employed full-time vs. part-time) was gathered but not considered in the analysis. Adding this information to the analysis and collecting data on the cultural background of the respondent could reveal new insight into the perception of gamified competence development support. Also, for future research, it is worth considering if the gamified support mechanisms could be constructed with other dimensions than temporality and openness. Competence development can have different aspects or dimensions to it, such as the difficulty of the skills being learned (beginner – master).

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