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Using Hexad User Types to Identify Motivational Preferences among Learners

Completed Research

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Abstract

The Covid-19 pandemic has highlighted the long-standing problem that many students struggle to regulate their motivation in digital learning settings. There is a demand for a framework that provides concrete and tangible strategies on how to foster students' individual motivation. One framework that addresses these demands is the Hexad framework (Marczewski 2013). It defines six user types and corresponding motivational preferences. Research reports positive effects on motivation when considering the framework in information systems. This study initially investigates its context shift towards digital learning. By analyzing the fit of students' motivational preferences of their identified user types and their motivational preferences as learners, a high identification rate appears. However, while Hexad user types are clearly separable, the analysis identified an underlying group- and task-orientation among all students. Overall, the findings suggest that the Hexad framework can function as a guidance for students when selecting effective strategies to promote self-regulated motivation.

Keywords

Higher Education, Hexad User Types, Motivational Preferences, Learning Context.

Introduction

The Covid-19 pandemic further revealed the long-standing problem that many students struggle to self-regulate their motivation, especially in digital learning environments (Sakkir et al. 2021; Tan 2021; Wesselborg 2020). This is alarming as an absence of motivational regulation competence is closely associated with academic procrastination and students' dropout intentions (Bäulke et al. 2018). At the same time, even elaborate learning concepts in which lecturers aim to motivate students, for example through gamification, fail without students underlying motivation (van Roy and Zaman 2017). Furthermore, the ability to motivate oneself is particularly important for students in higher education, as it is required in their later professional life (Liu and Murphy 2018; Majid et al. 2019). Therefore, students should ideally start building on their motivational regulation skills at an early stage of their studies deepen it further on (Corpus et al. 2020).

However, based on current research, there are very few interventions and trainings that specifically address the promotion of competencies to regulate motivation in higher education (Eckerlein 2020; Tan 2021). Here, the required first step is for students to build up knowledge about self-regulated learning motivation in order to understand and be able to apply concrete advice and strategies (Steuer et al. 2019). As a result, there is a need for an underlying tangible concept, that explains motivational structures and offers concrete advice for students to foster their ability to motivational regulation. Research provides various concepts that address motivation (Sekhar et al. 2013). However, existing frameworks often rather abstractly explain motivation within an individuum (Rheinberg and Engeser 2018) or focus on complex cause-effect relationships (Eccles and Wigfield 2002), which are difficult to convey as concrete advice for students. Furthermore, models addressing motivation often only consider intrinsic motivation whereby students' motivation is also influenced by external factors (Ryan et al. 2006).

A framework that comes with the needed requirements for a tangible concept to teach students motivational strategies introduces the Hexad user types (Tondello et al. 2016). These user types are based on established motivational theories (e.g. Ryan et al. 2006) but also integrate findings of research on personality types

(Nacke et al. 2014). It is easily understandable and tangible because, instead of complex cause-effect relationships, it rather presents a distinction of six user types. These six user types, come with concrete strategies for promoting motivation based on the individual motivational preferences of these user types (Tondello et al. 2016). However, this framework has been developed especially for a targeted implementation of gamification elements in information systems (IS) (Marczewski 2013, 2015). Adapting IS according to Hexad user types shows great success and leads to increased user engagement and motivation (Passalacqua et al. 2021). In higher education, it provides educators a framework to motivate students, but so far only regarding the design of gamified IS such as learning management systems (Fischer et al. 2018). Because of its broad scope of application in various IS, as well as its broad theoretical foundation (Tondello et al. 2016) the framework could also offer great potential in differentiating students in terms of underlying motivational preferences outside gamified IS but in a learning context. Here, the Hexad user types could provide a framework that makes it easy for students to build knowledge and become aware of their own motivational preferences, while also giving educators insight into the different motivational structures of their students. To investigate the current application context of the Hexad framework we conducted an initial systematic literature review (vom Brocke et al. 2015), which however further indicates that the Hexad user types so far have been used exclusively for the design of IS. The transfer to a learning environment outside IS seems to be novel. As the authors of the framework call for underlying research, when the framework changes context (Tondello et al. 2016) we aim to address this research gap by investigating the research question: *To what extent are Hexad user types adequate to differentiate motivational preferences of higher education students in a learning context outside of gamified IS?*

To answer this research question, we developed six different personas that represent personifications of the six Hexad user types and are characterized by their individual motivational preferences. Our goal is to identify the fit between the motivational preferences of the user types and students' motivational preferences as learners. Therefore, we first, measured students' Hexad user types and then assigned the students to a corresponding persona that is characterized according to the motivational preferences of students' corresponding user types. Based on a cooperation script, they gained experience with these motivational structures of their persona in a learning task in group work. After completion of the learning task, we conducted a qualitative written survey in which we investigated the extent to which the students could identify with the motivational structures of their persona (= their user type) in this learning scenario.

This study is the underlying step in a larger research project following Design Science Research (DSR) (Hevner 2007; Hevner and Chatterjee 2010) with the goal to design a training in a higher education context that equips students with demanded competencies to regulate their learning motivation according to their motivational preferences. Our research provides the foundation for future steps of this DSR project and insights for future research. It contributes by investigating the fit of motivational preferences in Hexad user types and motivational preferences of students as learners. In addition, the study also highlights identified similarities as well as differences, and thereby reveals further refinements to distinguish students' motivational preferences. Based on these insights we propose concrete and systematically derived implications for future research and higher education.

Theoretical Background and Related Work

The initial differentiation of users into different types comes from the video game industry. Thus, various models exist to integrate motivating game elements according to different motivational preferences. The most popular ones are the Bartle's player type model which identified four player types within the game genre Multi-User Dungeons (Bartle 1996) and the BrainHex model, which was based on insights from neurobiological findings as well as the results from earlier demographic game design models (Nacke et al. 2014). However, previous models were created specifically for game contexts and should not be generalized to game design (Tondello et al. 2016). Inspired by these models, Marczewski (2013) developed the Hexad model. It is designed to address contexts beyond gaming and therefore provides a broader scope that suggests type-appropriate use of gamification in IS. The Hexad model takes up users' motivational structures and focuses on motivational preferences (Marczewski 2013, 2015; Tondello et al. 2016). It incorporates founded theories such as the Self-Determination Theory concerning the expression of both intrinsic and extrinsic motivation (Ryan et al. 2006; Ryan and Deci 2000). Here, three key intrinsic motivators are defined: 1) competence/mastery, 2) autonomy 3) relatedness (Ryan and Deci 2000). In addition, Marczewski (2013) considers Pink's drive theory, which introduces purpose as an additional motivator (Pink 2011).

Thus, the Hexad framework is a well-founded model that considers established player type models with neurobiological typologies, as well as motivation theories. It also shows correlations with the Big Five personality traits (Tondello et al. 2016). Within the Hexad framework, Marczewski (2013) defines six user types, which differ in the extent to which they are motivated by either intrinsic (e.g., self-actualization) or extrinsic (e.g., rewards) motivational factors: Socializer, Philanthropist, Achiever, Player, Free Spirit and Disruptor (Diamond et al. 2015; Tondello et al. 2016). Table 1 shows the Hexad user types and their motivational preferences that formed the basis for the creation of the persona characteristics in Table 3.

User Type and Motivation		Main Characteristics and Description	
Socializer	Relatedness	Strongly oriented towards others	Desire of being part of a group, want to interact with others and create social connections, reward lies in the interaction itself
Philanthropist	Purpose		Are altruistic and willing to give without expecting a reward
Achiever	Mastery	Like to win and tend to be self-centered	Looking for overcoming challenging obstacles, completing every possible task, learning new skills, reaching 100%, the reward is represented by a feeling of mastery
Player	Extrinsic Reward		Focusing on extrinsic rewards, which they gain through a variety of strategies
Free Spirit	Autonomy	Creative, like to do things their own way, value independence, tend to be self-centered	Looking for freedom to express themselves and act without external control, reward lies to find one's way within the given boundaries
Disruptor	Change		Tend to disrupt either directly or through others to force negative or positive changes, like to test the boundaries and try to push further, reward lies in the triggering of change

Table 1. Hexad User Types with motivational preferences and main characteristics according to Marczewski (2013) and Diamond et al.(2015)

For a systematic overview of the current application context and domain of Hexad user types in literature, we conduct a systematic literature review according to vom Brocke et al. (2015) (see Table 2):

Articles	IS	Gamification	Application Domain						Distribution of User Types (in %)						
			Education	Health	Sustainability	Validation	Warehouse	Museum	Achiever	Player	Socializer	Philanthropist	Free Spirit	Disruptor	Multiple
Passalacqua et al. (2020)									20	20	20	16	24	0	
Passalacqua et al. (2021)									20	20	20	16	24	0	
Akğün and Topal (2018)															
Taşkın and Kılıç Çakmak (2020)															
Manzano-León et al. (2020)															
Li et al. (2019)															
Câmara and Lima (2021)									16	7	9	44	25	1	
Amado and Roleda (2020)									10	33	21	8	6	1	22
Altmeyer et al.									19	18	16	14	19	14	
Ardiana and Loekito (2020)									43	0	10	20	27	0	
Böckle and Yeboah-Antwi (2019)															
Tondello et al. (2016)									24	10	19	24	22	1	

Table 2. Systematic overview of the application of Hexad user types in current literature

We follow a sequential progress and use bibliographic databases as sources. With a wide defined keyword search in five interdisciplinary databases, we aim for a comprehensive coverage (vom Brocke et al. 2015). The search string “abstract: Hexad” identified in total 26 articles: IEEEExplore (9), ERIC (2), AISel (3), Pubpsych (2), WISO (10), whereby 14 articles were excluded as they did not refer to the Hexad user types. Consequently, our analysis is based on 12 articles. The oldest articles are from 2016 and 2018 whereas 10 out of 12 articles were published within the last years (2019 to 2021). Furthermore, the analysis shows that some articles (4 out of 12) initially translate and validate the Hexad questionnaire in other languages (Spanish and Turkish) or confirmed the framework's validity as a measure of user preferences towards different game design elements and the Big Five personality traits (Tondello et al. 2016). While all studies highlight the potential of the Hexad user types, the status of the Hexad research indicates its novelty. To the extent

that the identified user types were captured, no clear pattern in terms of a typical distribution of user types could be identified. However, in this context, it is notable, that the Disruptor is hardly present. The literature review also shows that the Hexad user types are used for game-based IS to foster user engagement and enjoyment (e.g., Passalacqua et al. (2021)). The transferability to contexts such as healthcare or IS for museums is also demonstrated (Câmara and Lima 2021; Li et al. 2019). Three of the 12 articles use the Hexad user types similar to our approach in the context of higher education. However, while Amado and Roleda (2020) refer to a gamified IS in higher education, we investigate the use of the Hexad user types, also in a higher education learning environment, but outside IS and gamification. Overall, the literature review confirms the potential of the Hexad user types in various use cases, with current literature focusing on gamified IS. Furthermore, researchers conclude that there is a demand for research on the Hexad user types in higher education to foster students' motivation.

The Hexad Scale to Differentiate Students' Motivational Preferences

To answer our research question to what extent are hexad user types adequate to differentiate motivational preferences of students in a learning context, we conducted a role play. Based on a collaboration script, students were instructed to solve a common learning group task and behave according to their assigned persona representing personifications of hexad user types' motivational preferences. During this role play they should behave according to their assigned persona. This allows students to gain concrete experience with motivational preferences as their assigned persona in a realistic learning contest.

At the beginning of the winter semester 2021/22, we surveyed students using the Hexad Gamification User Types Questionnaire for user type differentiation as part of a first-semester seminar for IS students on soft skills. Based on their responses, students were categorized by their identified user type. To take up the motivational preferences of the user types defined within the Hexad scale we created fictional personas with corresponding characteristics. Table 3 presents user types according to the Hexad framework and their corresponding personas, their characteristics in the form of keywords, and a short description of key motivational factors.

User Type and Motive		Personas with Characteristics and key motivational factors	
Socializer	Relatedness	A	Open, outgoing, sociable, group-oriented. Get to know fellow students and build relationships.
Free Spirit	Autonomy	B	Charismatic, confident, creative, power-oriented. Create a particularly good presentation according to own wishes.
Achiever	Mastery	C	Determined, smart, hardworking, rational, self-oriented. Use the task to gain experience and improve skills.
Philanthropist	Purpose	D	Open, helpful, friendly, empathetic, people-oriented. Help group members and enrich others with own knowledge.
Player	Extrinsic Reward	E	Extrinsically motivated, competitive, goal-oriented. Give 100 percent when there is a reward.
Disruptor	Change	F	Rejection, innovation, influence, change-oriented Question the sense of the tasks to generate more innovative ideas.

Table 3. Personas within the role play and corresponding Hexad User Types

According to their identified user types, we assigned students to the corresponding personas. We allocated students into ten groups of five to seven participants and ensured that different personas/user types were represented in each group. Before the lecture, we provided each student with a collaboration script. The collaboration script informs students about their persona and the task of the role play, whereby the role play reflects a realistic scenario of a learning group. The task of the learning group was *"Please prepare a short presentation with the topic: The history of the German business and IS engineering: essentials on the founders and the development of the discipline to the present day"*. The process of the role play is structured in three phases: In the first phase, each student should clearly express and pursue the motivation and goals of the assigned persona. In the second phase, students are instructed to further enforce their persona's goals and motivational preferences without considering the needs of others. Consequently, heated discussions arise. Through the discussion with others, students engaged more deeply and actively with the motivational preferences of their persona as described. The third phase is about finding a conclusion within the arranged learning group, e.g., a compromise or splitting the group. The exact outcome is not part of the instructions for the role play but is left open for each student to assert themselves in different ways. The

duration of the role play was 15 minutes, with five minutes per phase. After the role play, students got time to review their experience with the help of a guided reflection. We used a control group of six students in which students were randomly assigned to personas that did not match the identified user type. With this control group, we strengthen our research by allowing us to distinguish whether students' identification with persona is systematic rather than random.

Method

The sample consisted of a total of 57 participants and an additional control group (n =6). While 47 students could clearly be assigned to one user type, we identified ten students incorporating two or three user types. Due to the lack of uniqueness, we had to assign these students to one of their fitting user types. For the control group, the user type was randomly assigned.

The sample contains 79% male and 21% female. The ex-ante differentiation of students by user types was based on the Hexad Gamification User Types Scale according to Marczewski et al. (2013). This questionnaire is based on a 7-point Likert scale and contains 30 items from which a total of six constructs emerge that represent the six user types. Table 4 summarizes our sample according to the Hexad Gamification User Types Scale.

Students with clear user type		Students with multiple user types		Control group	
User type	#	User types	#	Real user type	Assigned user type
Socializer	15	Socializer & Free Spirit	3	Player	Philanthropist
Philanthropist	12	Socializer & Player	2	Socializer	Free Spirit
Free Spirit	12	Socializer & Philanthropist	1	Philanthropist	Free Spirit
Achiever	7	Philanthropist & Achiever	1	Free Spirit	Achiever
Player	11	Free Spirit & Player	2	Player	Free Spirit
Disruptor	0	Player & Philanthropist & Achiever	1	Player	Philanthropist
Σ 47		Σ 10		Σ 6	

Table 4. Sample

Within the group of students that incorporate multiple user types, Socializers and Players each occur three times in combination with others and Free Spirits are combined in two instances. Achievers and Players each occurred only once together with other user types. Therefore, in our sample Achievers and Players present the most clearly measurable user types when applying the Hexad Gamification User Types Scale. These results are consistent with Hexads' author findings that users might display a central type indicating a specific motivation driving their actions most strongly or might be represented evenly by different types portrayed by a profile (Tondello et al. 2016).

After the role play, we used a qualitative survey with the question "What are the similarities and differences between my persona and my own personality?". Students explained this question in the context of a written reflection using coherent sentences on thoughts and feelings.

Findings

Two researchers independently coded students' qualitative data and distinguished if students could identify with the motivational preferences of their persona. The coding resulted in an interrater agreement of 92% indicating a high agreement rate. Out of the 63 statements, three statements were initially differently coded. We discussed and refined these inconsistencies. Table 5 presents students' identification rates.

Identification	Students with clear user type	Students with multiple user types	Control group
Yes	38/47 = 80 %	5/10 = 50 %	0/6 = 0 %
No	9/47 = 20 %	5/10 = 50 %	6/6 = 100 %

Table 5. Identification Rates

The analysis of the identification rate shows a clear trend. The strongest agreement of 80% is, when students experience the learning scenario whereby their persona corresponds to their identified user type. Among the ten students that could not be clearly assigned to one user type, there was an identification rate of 50%. The control group showed the lowest agreement with 0%. Thus, students who were assigned to a

different user type than themselves were mostly unable to identify with the motivational preferences of their persona in the role play.

A closer evaluation of the identification rate among students with clear user type with regard to user types shows, that Achievers identified 100%, while 87% of Socializers, 83% of Free Spirits, 82% of Players, and 75% of Philanthropist did identify with their persona. Regarding the identification rate of students with multiple user types, no clear pattern corresponding to individual user types occurred. Within the control group, no students could identify with the motivational preferences of their persona.

We further investigated the similarities and differences of persona characteristics in the role play and students' statements regarding their real motivational preferences as learners. Table 6 shows the results of our qualitative data analysis for students with clear user types who identified with their persona.

User Type	Similarities	Differences
Socializer	Openness, sociability, importance of social interaction	Missed focus on productivity and task, exaggerated focus on getting to know each other
Philanthropist	Helpfulness, openness, sharing knowledge	Desire to take more task focus, group atmosphere is important but not more important than learning success
Free Spirit	Creativity, taking responsibility, prefer individual work	Need for a good group climate instead of only asserting one's own opinion
Achiever	Determined, hardworking, self-oriented	Desire to work harmoniously with fellow students; Being successful as a team is also important.
Player	Extrinsically motivated, competitive, goal-oriented.	Desire to work harmoniously with fellow students; When studying, they don't necessarily need extra rewards. Good grades are also important.

Table 6. Comparison of personas characteristics and student's motivational preferences among students with clear user type

Among the nine students with clear user types who did not identify (see Table 5) the qualitative statements suggest that they perceived their persona characteristics as too exaggerated. Free Spirits expressed too much autonomy that comes with dominance and persuasion in the group, where Philanthropists claimed not to be exclusively human-oriented in learning groups but to focus more on the task. The Player sees a purely extrinsic focus in their group as unfair and emphasize the importance of intrinsic motivation and the Socializer describes themselves as rather reserved with more task focus

Further investigations of the similarities and differences to persona characteristics among students with multiple user types who did not identify with their user type in the role play showed a clear trend. The students who embodied the Socializer combined with other user types such as Free Spirits, Players, and Philanthropists most strongly identified themselves with the motivational preferences of the Socializer independent from their assigned persona. For example, a student with the Free Spirit and Socializer user types assigned to a persona with the motivational preferences of a Free Spirit might is more likely to identify with the motivational preferences of the Socializer. The importance of group climate and teamwork were prominent in the students' statements rather than the motivational preferences of their assigned persona. So, for students with multiple user types that include the Socializer, the Socializer prevails most reliably.

The responses of the control group were analyzed and separately summarized in Table 7. The results indicate that the identified differences to the assigned user types correspond to the main motivational preferences of students' real user types. Furthermore, students' identified similarities to the assigned user type did not present main characteristics of user types but vague attitudes or actions.

Real user type	Assigned user type	Similarities	Differences
Player	Philanthropist	Work productively with a team, openness	Desire for less human focus, because the right to determination suffers as a result, own opinion loses out to others
Socializer	Free Spirit	authority, creativity	Desire for less autonomy Missing ability to work in a team
Philanthropist	Free Spirit	Contribute good Ideas	Missing social skills and empathy, Desire for team orientation
Free Spirit	Achiever	Highly motivated, determination	Attitude that satisfaction does not only depend on achievement. Achieving one's own performance is not the focus

			Does not understand university a competition Dislikes comparison of performance
Player	Free Spirit	No further information	Strong desire for autonomy, power and authority disrupts the group climate
Socializer	Free Spirit	Self-confidence, Charismatic	Desire to be more group orientated with less autonomy but group

Table 7. Comparison of personas characteristics and student's motivational preferences among students with clear user type

Discussion and Implication

Our results suggest the Hexad framework as a potential solution for differentiating students in terms of underlying motivational preferences outside of gamified IS in a learning context. That is based on the fact that we identified the fit between the motivational preferences of the user types in the form of the assigned persona in the role play and students' motivational preferences as learners. The high identification rate of 80% for the students with clear user types and the identification rate of 0% for the control group confirm that identification with user type's motivational preferences is possible through an active learning experience. Here, the active learning experience with their user type enabled students to reflect on their motivational preferences and to become aware of similarities and differences. Thus, we conclude that an active learning experience with the user type is the first important step in building knowledge about motivational preferences.

The fit between the motivational preferences of the user types embodied by the persona in the role play and the actual motivational preferences of the students as learners was investigated through a qualitative analysis of a written survey. To this end, we examined the similarities and differences between the persona characteristics in the role play and students' statements about their actual motivational preferences as learners. We found that for the students with clear user types, the similarities to the persona characteristics were consistent with the motivational preferences of their user types. For example, the Socializers emphasized the importance of social interaction, the Free Spirits emphasized creativity, and the Players emphasized an extrinsic focus. Students with a lack of identification address the fact that the personas were too tailored to the central motivational preference of their user type. For example, Achievers lacked group focus, while Socializers also missed the need to accomplish a task. Therefore, it should be considered that while most students can be differentiated by user types according to their motivational preferences, other essential needs in an educational context should not be neglected. For the learning context, it can be concluded that students perceive group harmony as essential to their learning success regardless of their user type and associated motivational preferences. Thus, students prefer to act for the good of the group in order to achieve their learning goal, even if this means limiting their own motivational preferences. The same pattern could be identified when analyzing the statements of the Socializers and Philanthropists. Students with these user types incorporate the motivational preferences of their user type and understand and value the importance of interaction in the learning context. However, in our learning context they also strongly aim to contribute to the learning task. Also, Players set aside their extrinsic focus as they value a good group relationship and therefore aim for a successful completion of the task. The same applies to the Free Spirit, who like to explore creativity as a stand-alone individual without acting to autonomously in a learning environment but also act group-oriented. We also identified that Achievers, do not only focus on their own performance but also on the progress of the group.

The statements of the control group further support the applicability of the Hexad framework in the learning context for differentiating students in terms of underlying motivational preferences. Here, the data shows that students had almost nothing in common with their assigned persona. Our analysis of the students' statements regarding differences between assigned persona and their own perceived motivational preferences reveals that students mentioned their user types corresponding motivational preferences. For example, a Socializer that was assigned to the persona with the motivational preferences of a Free Spirit expressed the desire for less autonomy but wishes for good teamwork. With the lack of identification of our control group we confirm the solid foundation and suitability of the Hexad framework for our application context. After all, an active learning experience does not lead to identification with an indeterminate user type, but only if the persona characteristics match the key motivational preferences of the real user type. Another key finding is that among students with multiple user types, the Socializer was the most prevalent.

This can be concluded from the written survey, as students consistently mentioned the importance of group climate and teamwork, rather than emphasizing the motivational preferences of their actual persona in the role play.

From these findings, we derive the following implications for educators, learners, and researchers: An active learning experience with personas representing the Hexad framework is shown to be suitable for identifying with the motivational preferences of one's own user type. On this basis, concrete trainings can be developed for students to make them aware of their motivational preferences in order to improve their ability to regulate motivation. When designing such trainings, educators have to take into account not only the central needs of the user types. In the learning context, the final learning success is the superordinate goal, which can be achieved in the context of a learning group only by group harmony. Consequently, instructors should not exclusively consider the essential motivational preferences of the user types, but rather place the group focus in the center of attention. For students, it can be deduced that learning according to the motivational preferences of their user type can be valuable and effective to raise motivation. Our findings indicate that besides the underlying desire for a good group climate Achievers and Players are motivated by progress and achievement. For both good grades in their studies and success experiences e.g., through the achievement of self-set intermediate goals boost motivation. Players could amplify this effect by defining additional rewards. Furthermore, Socializers, as well as Philanthropists, could raise their motivation to learn through forming learning groups. And Free Spirits should be careful not to have too strict restrictions and time schedules when learning but allow enough room for creativity and innovation. Thus, students could apply the Hexad framework in self-learning phases to regulate and targeted foster their motivation. Here, further research should explore the effect of applying such strategies corresponding to the user type as well as how to raise students' awareness of their user type to enable them to apply user type corresponding motivational strategies. As an implication for future research, it is possible to investigate the occurrence of these six user types in our application context, outside of gamified IS. It becomes evident that the user types, even though they differ in their motivational preferences, can be combined into some core profiles due to their uniform task and group orientation. The need for research is reinforced by the additional fact that we were only able to measure five of the six user types. A solid synergy will make it much easier for educators to identify user types and explore targeted training to increase awareness of motivational preferences.

Conclusion and Outlook

While previous research has confirmed the potential of Hexad user types for tailoring gamified IS that foster users' engagement and motivation, our study expands the application context. We investigate the fit of these user types and motivational preferences of students outside IS. Our findings indicate a high fit and supports that the Hexad user types can also differentiate students in higher education according to their motivational preferences. However, in this context, small refinements need to be considered: Our findings reveal that all students show a certain group- and task-orientation, despite their underlying real user types. While these results appear to mitigate the sharp contrast between the types of users in the educational context, they also indicate that students' group and task orientations could be interpreted as basic motivational preferences of higher education students. Next to these underlying motivational preferences of students, a differentiation according to the motivational preferences of their user types is predominantly accurate. Consequently, students' motivation can be effectively targeted if the motivational preferences of the particular type of user are taken into account.

So far, our findings are limited by the absence of the user type Disruptor. This prevents us from investigating whether the Disruptor can characterize learners based on their motivational preferences. However, other studies are also based on samples without Disruptors, suggesting that this user type is uncommon. Furthermore, the size of our sample and especially the size of the control group is limited. However, we were still able to identify clear and robust patterns in students' statements. Nevertheless, repeating the experiment with a larger control group would strengthen the results.

The generalizability of our findings is only conditionally given. While this study indicates that the Hexad user types can also identify motivational structures outside gamified IS but also in learning groups in higher education, we do not suggest that the Hexad framework is transferable to all other contexts based on our findings. Furthermore, the participants of our study are all first-semester IS students. With more learning experience at universities, motivational preferences could change as well. Considering findings on team constellations, the composition of the groups regarding user types may also have an influence on the group

structure and climate (Belbin 2012). For a broader generalizability of the Hexad user types, there is a need for further research. Our study is the first contribution in a larger DSR project towards a training for motivation regulation towards motivational preferences for university students. Considering the established model of Prochaska and DiClemente (1983) we understand awareness as a fundamental step towards sustainable training for motivational regulation. The results of our initial study reinforce the idea of including the motivational preferences of Hexad user types, by investigating whether students' knowledge about their motivational structures can enable them to select suitable and target strategies for self-motivation. Building knowledge about motivational preferences is thus a fundamental step (Steuer 2019) upon which we build our further research when investigating strategies, that enables university students with demanded competencies to regulate their learning motivation according to their motivational preferences. In light of the growing trend that digital learning is emerging even outside of the Covid-19 pandemic, we understand these strategies universal important for students learning and their later careers.

REFERENCES

- Akgün, Ö., and Topal, M. 2018. "The Turkish Adaptation Study of the Gamification User Types Hexad Scale," *International Journal of Assessment Tools in Education* (5:3), pp. 389-402.
- Altmeyer, M., Tondello, G. F., Krüger, A., and Nacke, L. E. "HexArcade," in *Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, P. Mirza-Babaei, V. McArthur, V. Vanden Abeele and M. Birk (eds.), New York, NY, USA: ACM, pp. 219-230.
- Amado, C. M., and Roleda, L. S. 2020. "Game Element Preferences and Engagement of Different Hexad Player Types in a Gamified Physics Course," in *Proceedings of the 11th International Conference on E-Education, E-Business, E-Management, and E-Learning*, M. Kawamura, K.-C. Chen and Y. Ma (eds.), New York: ACM, pp. 261-267.
- Ardiana, D. P. Y., and Loekito, L. H. "Gamification design to improve student motivation on learning object-oriented programming," p. 12041.
- Bartle, R. 1996. "Hearts, clubs, diamonds, spades: Players who suit MUDs," *Journal of Multi-User Dungeons research* (1:1).
- Bäulke, L., Eckerlein, N., and Dresel, M. 2018. "Interrelations between motivational regulation, procrastination and college dropout intentions," *Unterrichtswissenschaft* (46:4), pp. 461-479.
- Belbin, R. M. M. 2012. *Management Teams*, Hoboken: Taylor & Francis.
- Böckle, M., and Yeboah-Antwi, K. 2019. "Designing at the Intersection of Gamification and Persuasive Technology to Incentivize Energy-Saving," in *Proceedings of the 18th Conference on e-Business, e-Services and e-Society*, I. O. Pappas, P. Mikalef, Y. K. Dwivedi, L. Jaccheri and J. Krogstie (eds.), Trondheim: LNISA.
- Câmara, L., and Lima, A. P. de. 2021. "Gamification of Mobile Applications as a Tool for Optimising the Experience of Museums," in *Marketing and Smart Technologies*, Á. Rocha, J. L. Reis, M. K. Peter, R. Cayolla, S. Loureiro and Z. Bogdanović (eds.), Singapore: Springer Singapore, pp. 185-198.
- Corpus, J. H., Robinson, K. A., and Wormington, S. V. 2020. "Trajectories of motivation and their academic correlates over the first year of college," *Contemporary Educational psychology* (63), pp. 1-15.
- Diamond, L., Tondello, G. F., Marczewski, A., Nacke, L. E., and Tscheligi, M. 2015. "The HEXAD Gamification User Types Questionnaire: Background and Development Process," Workshop on personalization in serious and persuasive games and gamified interactions.
- Eccles, J. S., and Wigfield, A. 2002. "Motivational beliefs, values, and goals," *Annual review of psychology* (53), pp. 109-132 (doi: 10.1146/annurev.psych.53.100901.135153).
- Eckerlein, N. 2020. *Motivationsregulation im Studium: Entwicklung und Evaluation eines Trainingsprogramms*.
- Fischer, H., Heinz, M., and Breitenstein, M. 2018. "Gamification of learning management systems and user types in higher education," in *Proceedings of the 12th European Conference on Game-Based Learning*, M. Ciussi (ed.), Sophia Antipolis: Curran Associates, Inc.
- Hevner, A., and Chatterjee, S. 2010. *Design Research in Information Systems*, Boston, MA: Springer US.
- Hevner, A. R. 2007. "A Three Cycle View of Design Science Research," *Scandinavian Journal of Information Systems* (19:2), pp. 87-92.

- Li, K., Hong, Z., and Shi, M. 2019. "Research on the Application of Gamification Design Methods in IoP-Based System," in *Proceedings of the 18th International Conference on Computer and Information Science*, S. Xu, Y. Wang, M. Shi, W. Shang, J. Liu and K. Zhang (eds.), Beijing: IEEE, pp. 274-278.
- Liu, X., and Murphy, D. 2018. "Constructing a Connected Programm in IT/IS: A Non-R1 University Case," in *Proceedings of the 21st Annual Conference of the Southern Association for Information Systems*, J. Godin and N. Kordzadeh (eds.), Georgia: Digierto, pp. 1-6.
- Majid, S., Eapen, C., Aung, E., and Oo, K. T. 2019. "The Importance of Soft Skills for Employability and Career Development: Students and Employers' Perspectives," *Journal of Soft Skills* (13:4), pp. 7-39.
- Manzano-León, A., Camacho-Lazarraga, P., Guerrero-Puerta, M. A., Guerrero-Puerta, L., Alias, A., Trigueros, R., and Aguilar-Parra, J. M. 2020. "Adaptation and Validation of the Scale of Types of Users in Gamification with the Spanish Adolescent Population," *International journal of environmental research and public health* (17:11).
- Marczewski, A. 2013. "A Player Type Framework for Gamification Design," available at <https://www.gamified.uk/user-types/>.
- Marczewski, A. 2015. *Even Ninja Monkeys Like to Play: Gamification, Game Thinking & Motivational Design*, Gamified UK.
- Nacke, L. E., Bateman, C., and Mandryk, R. L. 2014. "BrainHex: A neurobiological gamer typology survey," *Entertainment Computing* (5:1), pp. 55-62.
- Passalacqua, M., Sénécal, S., Frédette, M., Nacke, L. E., Pellerin, R., and Léger, P.-M. 2020. "A Motivational Perspective on the Personalization of Gamification," in *Proceedings of the 18th Conference of the Special Interest Group on Human-Computer-Interaction*.
- Passalacqua, M., Sénécal, S., Frédette, M., Nacke, L. E., Pellerin, R., and Léger, P.-M. 2021. "Should Gamification be Personalized? A Self-deterministic Approach," *Transactions on Human-Computer Interaction* (13:3), pp. 265-286.
- Pink, D. H. 2011. *Drive: The Surprising Truth about What Motivates Us*, New York: Penguin Group.
- Prochaska, J. O., and DiClemente, C. C. 1983. "Stages and Processes of Self-change of Smoking: Toward an Integrative Model of Change," *Journal of Consulting and Clinical Psychology* (51:3), pp. 390-395.
- Rheinberg, F., and Engeser, S. 2018. "Intrinsic Motivation and Flow," in *Motivation and Action*, J. Heckhausen and H. Heckhausen (eds.), Cham: Springer International Publishing, pp. 579-622.
- Ryan, and Deci. 2000. "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemporary educational psychology* (25:1), pp. 54-67.
- Ryan, R. M., Rigby, C. S., and Przybylski, A. 2006. "The Motivational Pull of Video Games: A Self-Determination Theory Approach," *Motivation and Emotion* (30:4), pp. 344-360.
- Sakkir, G., Dollah, S., and Ahmad, J. 2021. "E-Learning in COVID-19 Situation: Students' Perception," *EduLine: Journal of Education and Learning Innovation* (1:1), pp. 9-15.
- Sekhar, C., Patwardhan, M., and Singh, R. K. 2013. "A literature review on motivation," *Global Business Perspectives* (1:4), pp. 471-487 (doi: 10.1007/s40196-013-0028-1).
- Steuer, G., Engelschalk, T., Eckerlein, N., and Dresel, M. 2019. "Assessment and Relationships of Conditional Motivational Regulation Strategy Knowledge as an Aspect of Undergraduates' Self-regulated Learning Competencies," *Zeitschrift für Pädagogische Psychologie* (33:2), pp. 95-104.
- Tan, C. 2021. "The impact of COVID-19 on student motivation, community of inquiry and learning performance," *Asian Education and Development Studies* (10:2), pp. 308-321.
- Taşkın, N., and Kılıç Çakmak, E. 2020. "Adaptation of Modified Gamification User Types Scale into Turkish," *Contemporary Educational Technology* (12:2) (doi: 10.30935/cedtech/7942).
- Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., and Nacke, L. E. 2016. "The Gamification User Types Hexad Scale," in *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, A. Cox, Z. O. Toups, R. L. Mandryk and P. Cairns (eds.), New York, NY, USA: ACM, pp. 229-243.
- van Roy, R., and Zaman, B. 2017. "Why Gamification Fails in Education and How to Make It Successful: Introducing Nine Gamification Heuristics Based on Self-Determination Theory," in *Serious Games and Edutainment Applications*, M. Ma and A. Oikonomou (eds.), pp. 485-509.
- vom Brocke, J., Simons, A., Riemer, K., Niehaves, B., Plattfaut, R., and Clevén, A. 2015. "Standing on the Shoulders of Giants: Challenges and Recommendations of Literature Search in Information Systems Research," *Communications of the* (37:1), pp. 205-224.
- Wesselborg, B. 2020. "Enhancing of self-regulated learning strategies for health care students to improve e-learning in the "Corona semester" as an interdisciplinary task," *GMS journal for medical education* (37:7), 76.