EVALUATION OF A **GAMIFICATION** APPROACH FOR OLDER PEOPLE IN E-LEARNING

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C. Gellner, I. Buchem

Berliner Hochschule für Technik (GERMANY)

BHT Berliner Hochschule für Technik

ePA coach

Federal Ministry of Education and Research

INTRODUCTION

Gamification research has mainly focused on younger populations, although it also can improve older people's motivation to learn. However, gamification needs to be integrated in a meaningful and carefully selected way for this target group.

In the ePA-Coach project, we address the gap of the infrequent research of **gamification for seniors** and develop a senior-friendly approach for an e-learning application to enhance seniors' motivation to use the learning environment.

As a first step, we conceptualized an initial gamification base model for senior learners, using an literature review, the Octalysis framework, and a survey with experts from the project partner organizations. *In the next step*, we **examined** the developed gamification approach **with the target group**. The results of this investigation are described below.

RESEARCH QUESTIONS

Main research question in the ePA-Coach project regarding the gamification approach: *To what extent can motivational psychological obstacles be overcome by incentive mechanisms from gamification in the use of e-learning offers in the health sector by senior citizens?*

The research conducted is one of the steps towards answering this research question at the end of the project, following four research questions:

RQ1: What previous **experience** do seniors have with **digital games and digital learning applications**?

RQ2: How motivating are the **core drives of the Octalysis framework** perceived by seniors regarding the use of an e-learning program?

RQ3: How motivating are selected **gamification elements** perceived by seniors regarding using an e-learning program?

RQ4: How do seniors rate the characteristics of the Gamification User Hexad Scale **player types**?

OCTALYSIS FRAMEWORK AND GAMIFICATION USER HEXAD SCALE

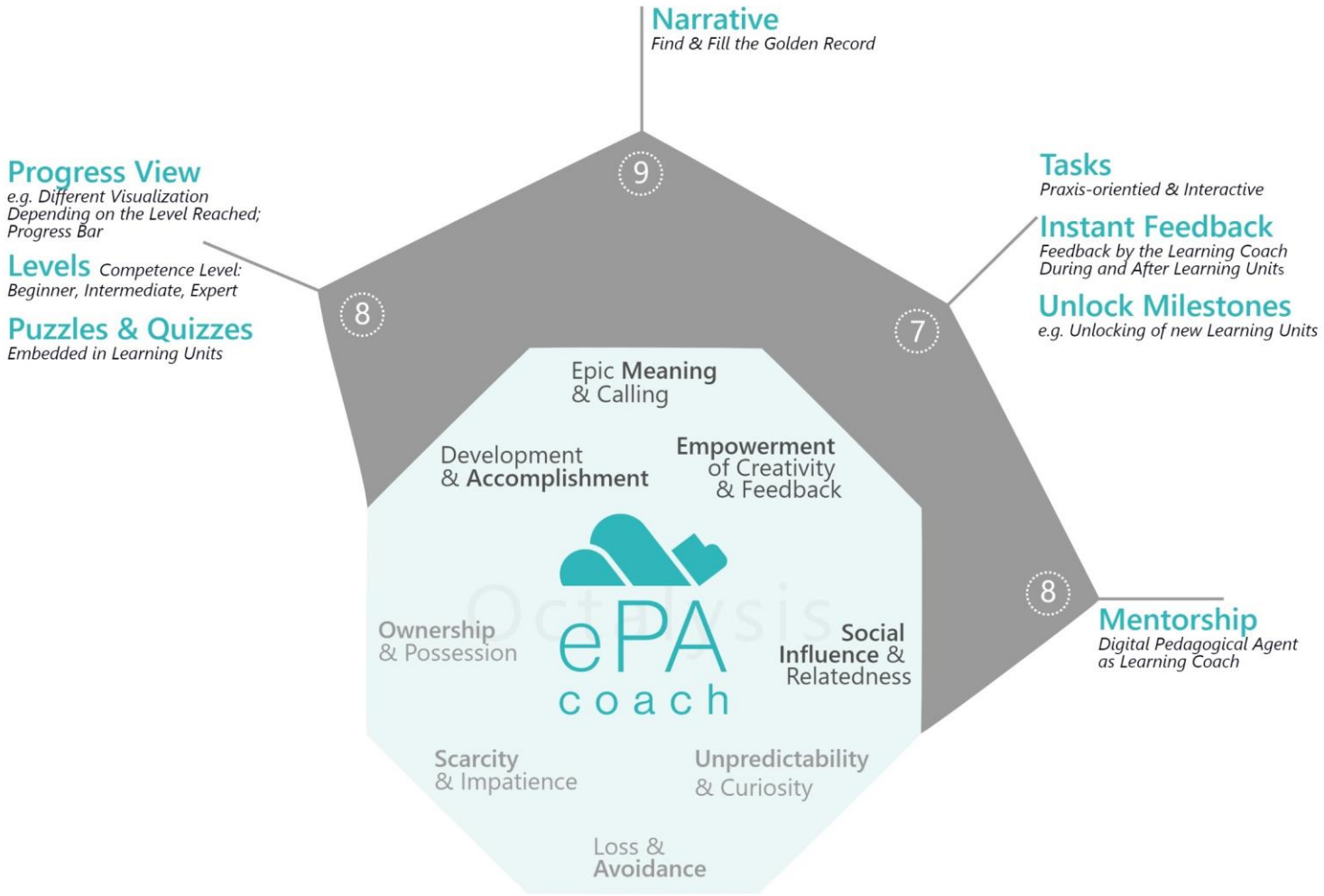
Octalysis Framework [5]

- Gamification framework in form of an **octagon** with eight core drives: (1) Meaning, (2) Accomplishment, (3) Empowerment, (4) Social Influence, (5) Ownership, (6) Unpredictability, (7) Scarcity, and (8) Avoidance
- Core drives have an **intrinsic, extrinsic, positive or negative motivating focus** and an **individual** score between null and ten **for** the **motivational strength**
- **Several** game techniques for each core drive, e.g. badges, points, and quests

Gamification User Hexad Scale [6-8]

- Six player or user types with different degrees in intrinsic and extrinsic motivational factors: Philanthropists, Socialisers, Free Spirits, Achievers, Players, and Disruptors
- Suggestions for game techniques or design elements per user type

EPA-COACH GAMIFICATION BASE MODEL[2]



METHODOLOGY

Online-Questionnaire

- Five sections
- perceived motivation of the Octalysis core drives and game techniques with items adapted from the Value/Usefulness dimension of the Intrinsic Motivation Inventory (IMI)
- players types with items adapted from the User Hexad Scale

Period: 03.05. to 31.05.2021

Target group: older persons, minimum age: 65 years

Data analysis

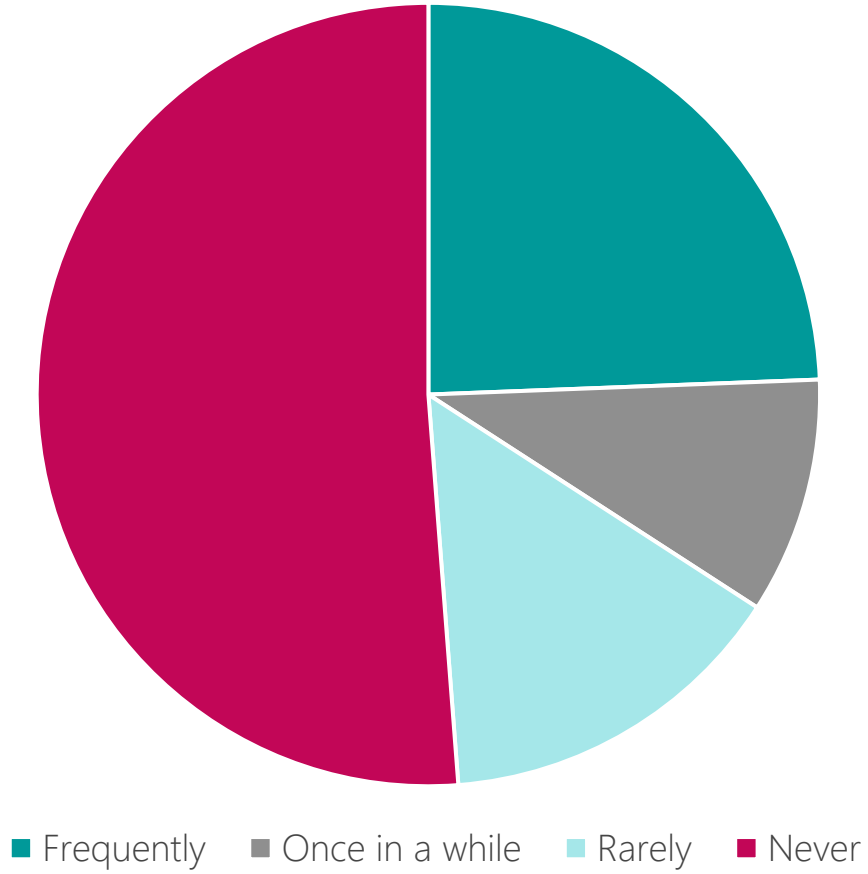
- IBM SPSS Statistics
- descriptive methods such as frequency distributions, mean values (M) and standard deviation (SD).
- correlation and difference analyses (rank correlation according to Spearman and Mann-Whitney-U test)

Sample resulted randomly:

41 senior citizens
20 females and 21 males
age: 66 to 93 years; average: 74.7 years

SENIORS' FREQUENCY OF PLAYING DIGITAL GAMES

How often do you play games on your computer, tablet or smartphone?



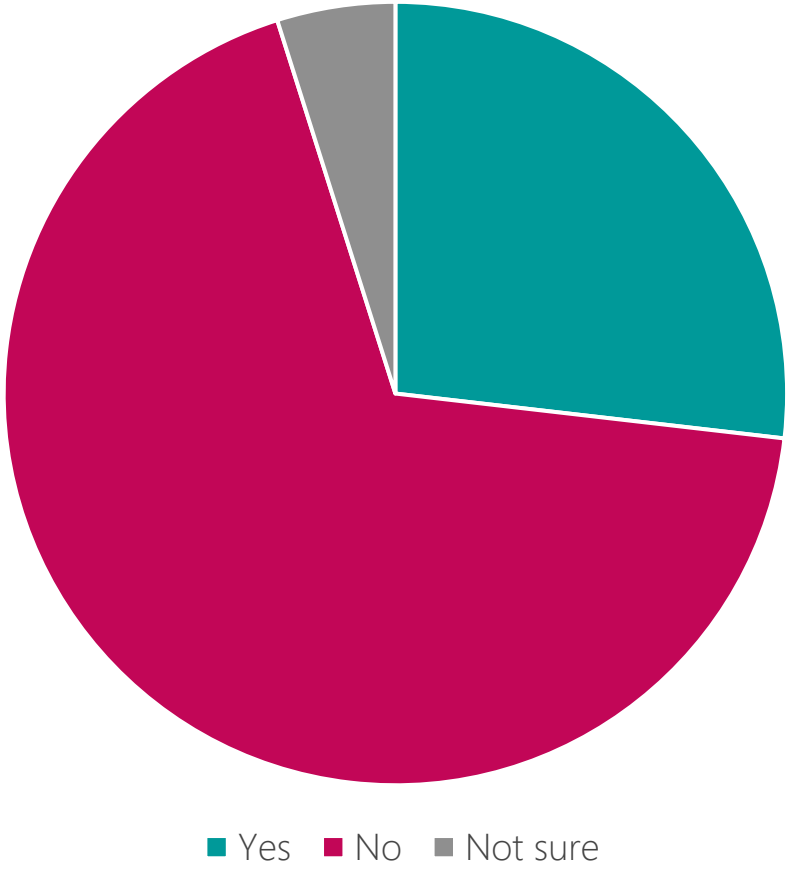
	Frequency (n)	Percent (%)
Frequently (several times a week)	10	24.4
Once in a while (several times a month)	4	9.8
Rarely (several times a year)	6	14.6
Never	21	51.2

[…] what are the games you play called?

- Card games (n=13) / Solitaire (n=10)
- Puzzle games: Sudoku, crossword puzzles or quiz games (n=8)
- Strategy games / Mahjong (n=3)
- Other: Puzzles, Bowling, Simulation game

SENIORS' EXPERIENCE WITH DIGITAL LEARNING APPLICATIONS

Did you already use a learning program on your computer, tablet or smartphone?

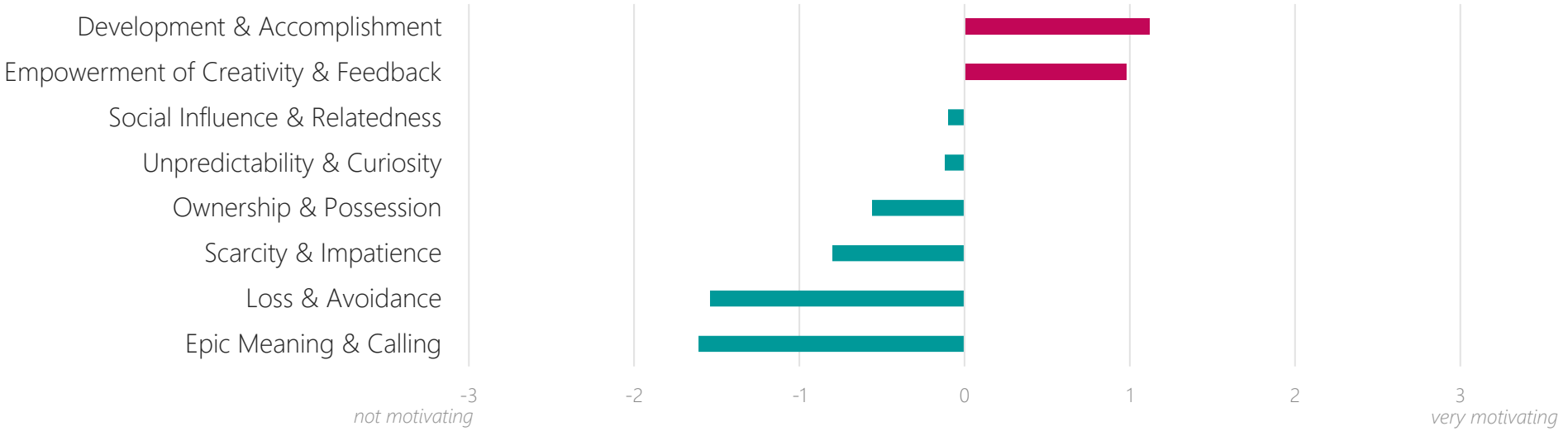


	Frequency (n)	Percent (%)
Yes	11	26.8
No	28	68.3
Not sure	2	4.9

What did you learn in the learning program or what was the name of the learning program?

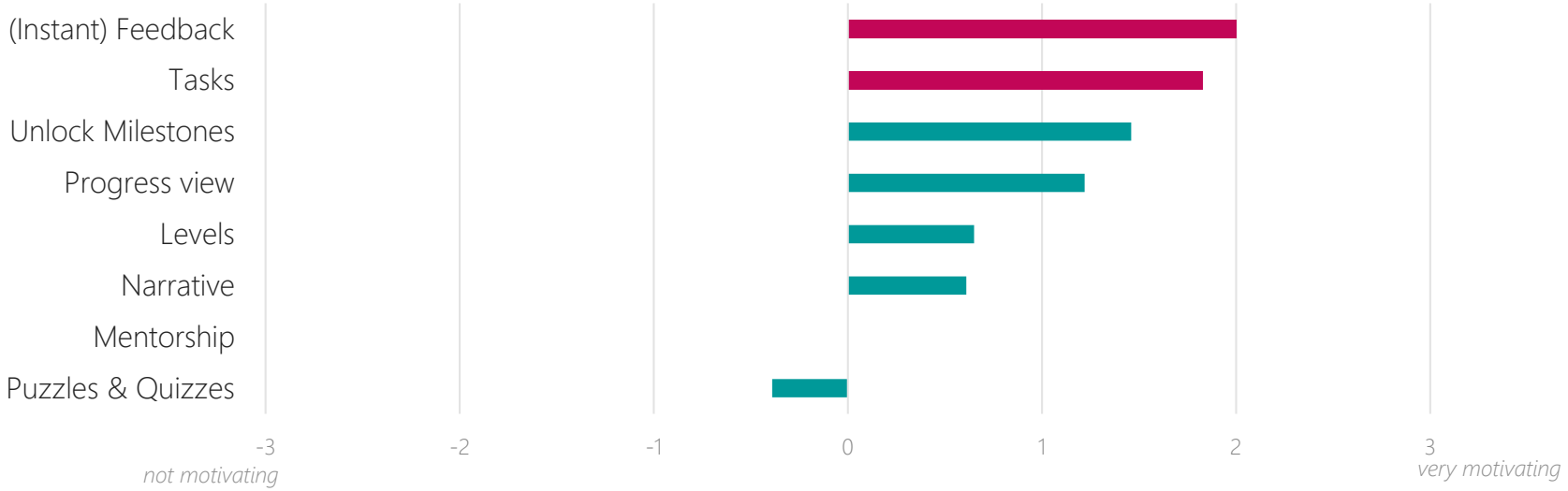
- Foreign languages (n=8) / e.g. Duolingo and Babble
- Brain training (n=3) / e.g. NeuroNation, PC skills and PC applications

SENIORS' PERCEIVED MOTIVATION OF OCTALYSIS CORE DRIVES



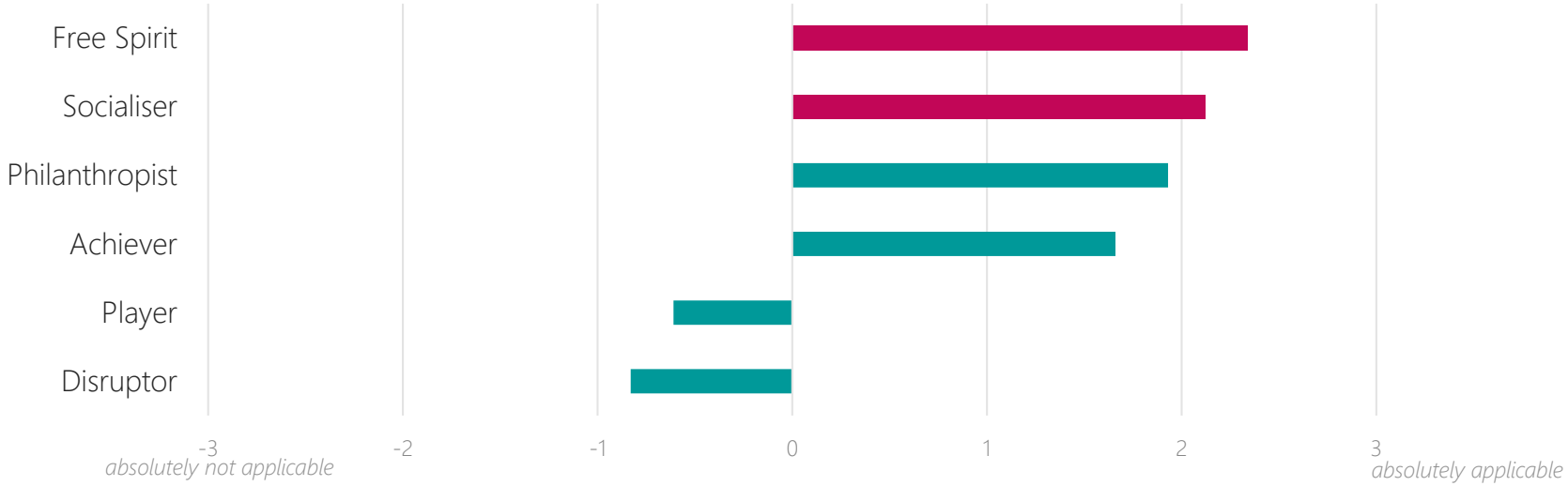
No	Octalysis core drive	Item	M	SD
1	Epic Meaning & Calling	I can be someone special.	-1.61	1.595
2	Development & Accomplishment	I can see my learning progress and achievements.	1.12	1.552
3	Empowerment of Creativity & Feedback	I can learn by being creative and trying things out.	0.98	1.651
4	Ownership & Possession	I can appreciate and improve virtual elements or objects.	-0.56	1.817
5	Social Influence & Relatedness	I can be connected with other users.	-0.10	1.892
6	Scarcity & Impatience	I can achieve learning goals only with great effort.	-0.80	1.728
7	Unpredictability & Curiosity	I receive unpredictable and random learning tasks.	-0.12	1.937
8	Loss & Avoidance	I have to expect negative consequences for certain actions.	-1.54	1.818

SENIORS' PERCEIVED MOTIVATION OF OCTALYSIS GAME TECHNIQUES



No	Octalysis core drive	Item	M	SD
1	Narrative	I learn like in a book or film with a narrative or story.	0.61	1.745
2	Levels	I learn in stages so that the learning content becomes more and more difficult and extensive.	0.65	1.762
3	Puzzles & Quizzes	I can solve puzzles and quizzes within the learning content.	-0.39	1.787
4	Progress view	I can view my learning progress.	1.22	1.525
5	(Instant) Feedback	I receive immediate feedback from the programme on my entries.	2.00	1.225
6	Unlock Milestones	I can unlock further learning content.	1.46	1.380
7	Tasks	I can learn through practical tasks.	1.83	1.430
8	Mentorship	I am supported by a digital mentor or coach.	0.00	2.025

PLAYER TYPES OF SENIORS



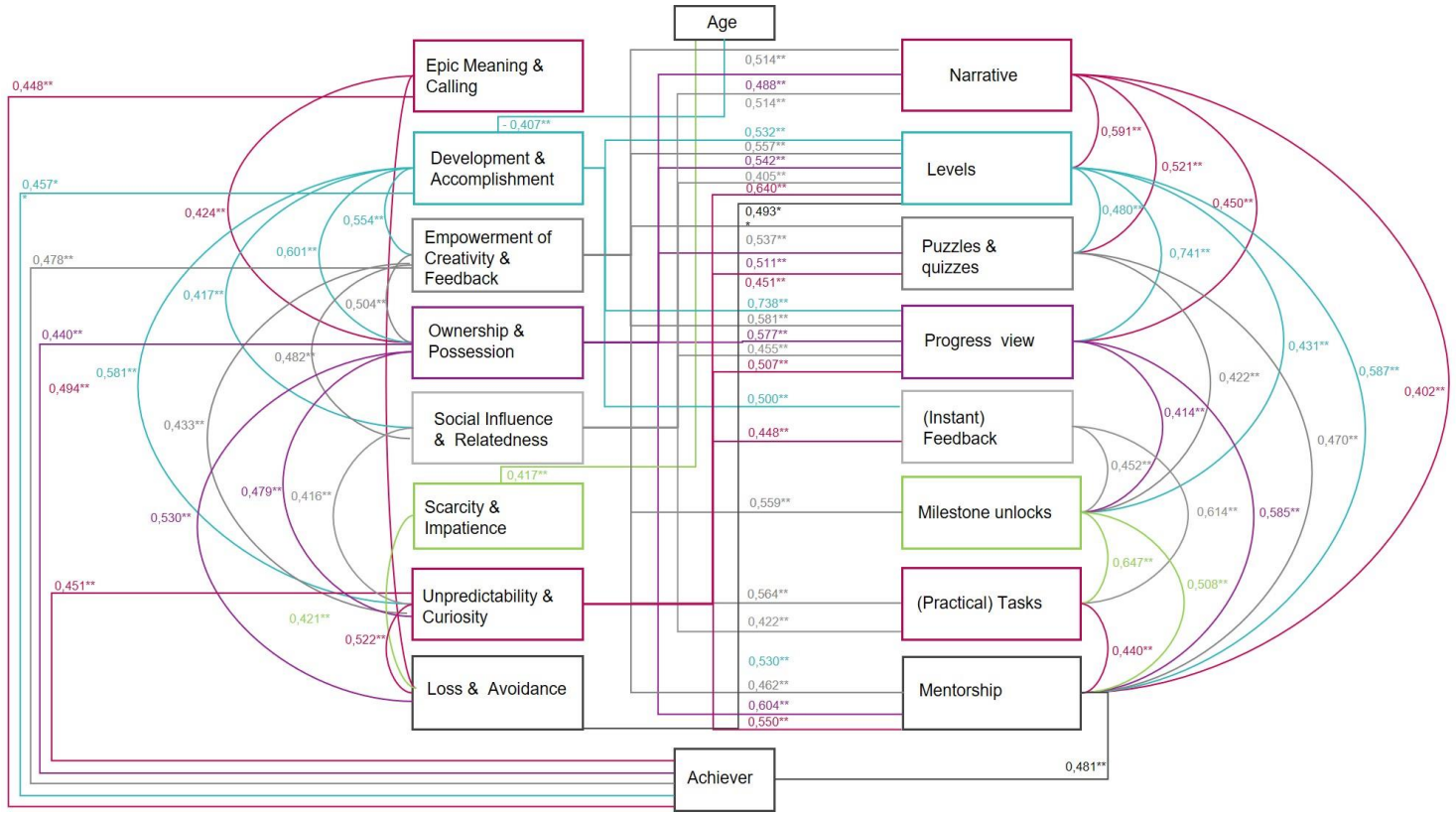
No	Player type	Item	M	SD
1	Free Spirit	It is important for me to be able to go my own way.	2.34	1.039
2	Socialiser	It is important to me to be able to exchange ideas with others.	2.12	1.122
3	Philanthropist	It makes me happy when I can help others.	1.93	1.170
4	Achiever	I want to improve all the time.	1.66	1.039
5	Player	I like competitions and winning prizes.	-0.61	1.922
6	Disruptor	I love to provoke and don't like to follow rules.	-0.83	1.626

CORRELATIONS AND DIFFERENCES

There were a few differences and many correlations. Due to the *large number of significant correlations*, only those with a **significance level of p<0.01** (very significant) are shown in the figure.

Correlations with the strongest effects ($r_S \geq .600$, $p < .001$):

- Level and Puzzles & Quizzes (r_S=.741)
- Development & Achievement and Progress View (r_S=.73)
- Unlock Milestones and (Practical) Tasks (r_S=.647)
- Unpredictability & Curiosity and Level (r_S=.640)
- (Instant) Feedback and (Practical) Tasks (r_S=.614)
- Ownership & Possession and Mentorship (r_S=.604)
- Development & Achievement and Ownership & Possession (r_S=.601)



Difference:

Instant Feedback and Gender - Female seniors rated the gamification technique more motivating (M=2.55; z=-3.395, p=.001) than male seniors (M=1.48); strong effect size (r=0.53)

ANSWER THE RESEARCH QUESTIONS (1)

What previous experience do seniors have with digital games and digital learning applications?

- Seniors had little experience with digital games and learning applications.
- The seniors had slightly more experience with digital games than digital learning applications.
- Card games, especially solitaire, and digital learning applications for language learning such as Duolingo and Babble were mentioned most often.

How motivating are the core drives of the Octalysis framework perceived by seniors regarding the use of an e-learning program?

- Core drives Development & Accomplishment and Empowerment of Creativity & Feedback most motivating
- Epic Meaning & Calling and Loss & Avoidance have the lowest scores
- Intrinsic core drives more motivating than the extrinsic ones

ANSWER THE RESEARCH QUESTIONS (2)

How motivating are selected game techniques perceived by seniors regarding using an e-learning program?

- Instant Feedback, (Practical) Tasks, and Unlock Milestone most motivating
- Mentor and Puzzles & Quizzes have the lowest ratings
- Female seniors perceived the gamification technique Instant Feedback more motivating than male seniors.

How do seniors rate the characteristics of the Gamification User Hexad Scale player types?

- Highest mean values for the intrinsic player types Free Spirit, Socialiser and Philanthropist
- It's important for seniors to go their way and exchange ideas with others and help them
- Extrinsic player types Player and Disruptor received negative mean scores

RECOMMENDATIONS

Based on the evaluation results, we derived the following five recommendations for further developing a gamification approach to promoting senior motivation in the e-learning context.

Adjustment of the central core drives	The results show the highest perceived motivation for the core drives empowerment and achievement. Accordingly, the gamification concept should be adjusted to make Epic Meaning & Calling no longer the main core drive. Due to its very low perceived motivation, it should only have a secondary influence on learning motivation.
Empowerment focus	The results generally show a high perceived motivation in the empowerment gamification aspects. The core drive, associated elements such as feedback and tasks, and the Free Spirit player type received high ratings.
Removal of two game techniques	The gamification techniques quizzes & puzzles as well as the narrative will be removed from the existing gamification approach as participants rated them the lowest.
Free Spirit and Socialiser	To further develop the gamification approach, the goals and needs of the Free Spirit and Socialiser player types should be considered. These player types received the highest ratings.
Integrate more gamification techniques	For the further development, integrating other gamification techniques is conceivable. The integration of the core drive Ownership & Possession could consider due to the strong correlations with a core drive and a gamification technique.

The ePA-Coach base gamification model evaluated here will be adapted accordingly in the further course of the project.

CONCLUSIONS

This presentation showed the results of an evaluation of a gamification approach for senior citizens including seniors' previous experience with digital games and learning applications, the perceived motivation of all the Octalysis framework core drives and several game techniques, and user types following the User Hexad Scale.

Results show …

- **little previous experience** with digital games and learning applications.
- **highest** ratings for the core drives Development & Accomplishment and Empowerment of Creativity & Feedback
- **highest** values for the game techniques Instant Feedback, Tasks, and Unlock Milestones
- **highest** ratings for the player types Free Spirit and Socialiser
- very significant **correlations** between core drives, gamification techniques, and player types
- significant **differences** between gender and Instant Feedback
- *motivation-psychological obstacles of seniors in e-learning could be overcome primarily by intrinsically oriented gamification incentive mechanisms that aim to empower and further develop seniors and enable social interactions with others*

CONCLUSIONS: FURTHER STEPS

Revise the base gamification model according to the evaluation results and recommendations **to an extended gamification model**.

Integrating game techniques of the developed extended gamification model **into the ePA-Coach learning platform**, and **evaluate again** with the target group.

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CONTACT & ACKNOWLEDGEMENTS

Carolin Gellner
Berliner Hochschule für Technik
Research Associate
M.Sc. Computer Science and Digital Media
carolin.gellner@bht-berlin.de

Prof. Ilona Buchem, PhD
Berliner Hochschule für Technik
Sub-project Lead
Professor for Communication and Media
buchem@bht-berlin.de

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