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Online Gamified Training for Business Innovation: Examining an Embodied Gamified E-learning Module on Creativity

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Abstract

This article examines the use of a novel method of delivery of creativity training: a gamified embodied e-learning module for teaching the creative skills fundamental for practical business innovation. The e-module "Academy for Creativity" is examined as an out-of-class study activity for creativity training using interviews with focus groups of students, questionnaires on a larger group of students and individual interviews with teachers. The results reveal embodied gamified e-learning on creativity as a potential for increasing student motivation and engagement as well as a potential for advancing and increasing focus and student time spent on the deliberate practice of creativity as part of business innovation studies. The results also present recommendations for how to implement embodied gamified e-learning on creativity as a natural part of classes on business innovation.

Keywords: creativity training, business innovation, gamified teaching, educational technology for creativity, creativity e-learning.

Introduction

According to policymakers and industry stakeholders, the future economic wellbeing of European societies depends on peoples' innovative skills. The ability to innovate is found to correlate strongly with the performance of the company (e.g. Tidd & Bessant, 2009). However, for other types of organisations (public, governmental etc.), innovation is also a prerequisite for answering the challenges of tomorrow as well as coming up with new ideas, approaches and processes to respond to the ever-increasing expectations of the public (Bloch & Bugge, 2013). Hence, educational institutions must educate students to have the capabilities to be innovative.

While no single definition exists on the term "innovation" (e.g. Adams *et al.*, 2006), there seems to be a consensus on the fact that creative thinking is the foundation of innovation. All innovation begins with the creative act of

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individuals (alone or together in small teams) to improve existing designs or create entirely new concepts that are significantly different from the existing ones (Freeman *et al.*, 1982). The former is often described as incremental innovation, while the latter is characterised as radical innovation of products, services, processes or business models. Common for both of these distinctions of innovation is the creative application of knowledge applied to a specific domain, making creativity a pervasive part of innovation. A recent meta-study finds that the relation between creativity and innovation in existing organisations is strong, in particular at the individual level (Sarooghi, 2015). As such, a fundamental part of any business innovation class should also include a deliberate practice of creativity skills.

Previous studies have found significant effects on creative skills using teaching approaches like theoretical discussions on creativity (Byrge and Hansen, 2013); creative role models (Hennessey *et al.*, 1989); creativity tools (Speedie *et al.*, 1971); creative strategies (Ridley and Birney, 1967), creative processes (Baer, 1988); counseling (Cropley and Cropley, 2000); written assignments on creativity (Robbins and Kegley, 2010); induced positive atmosphere (Clapham and Schuster, 1992); improvisational rhythm (Nelson and Lameli, 1991) and creative role-playing (Karakelle, 2009). It also seems relevant to pay interest to the notion of creative self-efficacy when focused on the development of creativity skills for business innovation. Creative self-efficacy is the self-perception of own creative potential. It can be developed through teaching experiences that makes the student feel comfortable being creative in all kinds of situations and on all sorts of problems (Byrge and Tang 2015).

However, integrating creativity training as a natural part of business innovation courses may be a rather complicated matter for most teachers. Reasons for this include a lack of competence in the field of creativity, a lack of in-class time to perform the training, and in particular, a lack of student motivation in general out-of-class study activities, which continuous creativity training would normally require.

In 2015, a research consortium supported by The European Union's Erasmus+ program[1] was established to develop a solution that could make up for some of the previously mentioned challenges for integrating creativity training. The research partnership developed and published a free plug-and-play web-based solution called Academy for Creativity. It is a digital gamified creativity training system that helps teachers integrate creativity training into their business innovation courses easily and in a meaningful way for young students. The e-

[1] A funding scheme to support activities in the fields of Education, Training, and Youth. It offers opportunities for individuals to spend a mobility or volunteering period abroad and to receive linguistic training as well as organizations to collaborate in project partnerships in the fields of academic and vocational training.

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module has been created in collaboration between the School of Management at the Chinese Academy of Sciences, China; the Edward de Bono Institute for the Design and Development of Thinking at University of Malta, Malta; the Department of Communication at Complutense University, Spain; and the Department of Business and Management at Aalborg University, Denmark.

This paper examines the e-module concerning key creativity skills required for practical business innovation as well as critical insights on how to best apply this tool in teaching settings.

Digital Creativity Training

The cognitive aspects in creative thinking are mostly related to divergent thinking skills, emphasised in Guilford's (1959; 1967) work as well as in Torrance's (1972, 1993) numerous works. From these, the pivotal creative skills related to business innovation include originality, fluency, flexibility, visualising future scenarios (imagination), and elaboration & persuasion. *Originality* represents the skill to challenge existing notions within an industry, organisation, business or technology as well as producing and identifying novel ideas, e.g. for rejuvenating market offerings or developing a new profit model. *Imagination* expresses the skill to think up and visualising future scenarios as well as the perseverance to defy logic and causality in the search for exciting and inspiring ideas, e.g. new combinations or arrangements of existing resources to generate (new) value through a new product system or service. *Fluency* symbolize the skill to resist the temptation to stop a creative production when a good idea appears in a creative thought process as well as the curiosity to continue the production of ideas to see if an even better idea is about to appear, e.g. for a new type of customer relationship or interactions creating new customer engagement. *Flexibility* is the skill to use cognitive stimulation to change perception at will and to develop new directions of thinking that will lead to a wider variety of ideas (not just more ideas), e.g. to develop a better product-channel fit or change internal core processes or enabling structures. *Elaboration & persuasion* depict the skill to further develop ideas with an open mind towards pre-inventive ideas without the use of judgement as well as to make these ideas understandable and appealing to others, e.g. for persuading network partners to join alliances and create value in a new way, or customers to buy your product through new branding communication.

These skills (as well as other skills related to creativity) can be advanced through training. In fact, numerous studies have shown significant effects on the training of creativity (Rose and Lin, 1984; Scott *et al.*, 2004; Torrance, 1972). However, these studies have focused on face-to-face in-class or process-like training. This paper examines a new method of delivery for creativity training: Online embodied gamified e-learning. Academy for Creativity (www.academyforcreativity.com) is an e-module designed for higher

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educational institutions. It uses gamified elements (Werbach and Hunter, 2012) such as badges (bronze, silver and gold), progress tracker, difficulty levels, instant feedback on performance, experience points as well as an avatar in a virtual world of a typical office. It consists of 11 research-based training games, an assessment method as well as a teacher and a student profile.

The storyline focuses on a robot disguised as a human working in an office. In each game, the robot is presented with tasks at the office that requires creativity. The player (trainee) will have to help their avatar produce creative ideas for these tasks, as robots do not possess creativity skills. Also, trainees need to keep co-workers convinced that the avatar is a human by continuously demonstrating creative contributions to any tasks given.

Training games

Each of the 11 games practices several skills related to creativity and business innovation in different ways: some tasks use verbal stimuli, some figural, while a few use both domains. An analysis shows that each game primarily practices two skills, and each game has between 30 and 90 rounds that cover three levels of difficulty (easy, medium, hard). The 11 games are described in table 1.

Table 1: Overview of the different games available at www.academyforcreativity.com.

Game name and type	Game description	Key creative skills trained
Trend Spotter *(verbal)*	The avatar has to produce ideas for future products for the office by combining trending products in new ways. The trainee needs to create original new products by combining completely unrelated products (and sometimes for a specific market or segment). Also, the trainee needs to be fluent in producing as many new product ideas as possible.	• Fluency • Originality
Draw in One Stroke *(figural)*	The trainee needs to help the graphics team make some drawings of specific items and situations. The avatar has a malfunctioning arm, so it can only draw in one stroke. As a result, the trainee will have to change perception entirely on how he/she usually would draw, for example, a shoe or harbour scenery, as it should now be done with one stroke. This requires the use of the imagination, in particular as the difficulty level goes up.	• Imagination • Flexibility
Cue Up *(verbal)*	The avatar needs to help a colleague with cue cards during his speech. After the speech is over, the trainee will have to support the avatar making the connections between each cue card, creatively and persuasively. With this, the trainee will have to produce a lot of ideas for cue cards quickly and make creative and persuasive elaboration for each set of cue cards.	• Fluency • Elaboration
Poster Perfect *(verbal and figural)*	The avatar needs to help the advertising team by finishing a new campaign poster. The poster has already been started, and the trainee needs to be open-minded	• Elaboration & Persuasion

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	and elaborative to finish the sketch into a finished poster that makes sense. After completing the poster, the trainee will have to make a persuasive and elaborative catchphrase and make the poster fit within a specific objective for the campaign.	• Flexibility
Figure it Out *(figural)*	The avatar needs to help the product design team by putting together a bunch of pre-made random elements in a way that makes sense and is useful. The trainee must use the imagination by moving, rotating and scaling the pre-fabricated shapes to turn them into the specific predefined products. To do so, the trainee must change perception on the designs all the time since the forms available may change during the game or may only be available for one-time-use.	• Imagination • Flexibility
Crazy Connection *(verbal)*	The avatar is about to be revealed as a robot by a colleague at the coffee machine. The trainee needs to produce a lot of creative abstract or concrete connections between random objects to "prove" that it is not a robot, but rather a human. The trainee will need to perceive the objects from many different perspectives and produce as many connections as possible.	• Fluency • Flexibility
Sounds Like an Idea *(verbal and figural)*	The avatar has to help find out what causes some disturbing sounds at the office. The trainee needs to use his/her imagination to help the avatar connect a weird sound to one of three objects. Afterwards, the trainee should produce an original explanation of how this particular object produced this odd sound.	• Imagination • Originality
Language Lab *(verbal)*	The avatar has to help a new intern understand the unique words and terminology used at the office. The trainee needs to produce original definitions of novel words and terms. Also, the trainee must elaborate on the usage of this particular word, by writing persuasive sentences in which the word is used.	• Originality • Elaboration & Persuasion
Race for the Raise *(figural)*	The avatar has to compete with colleagues by spotting ideas that general people and creativity experts would find most creative. The trainee needs to use his/her sense of originality and imagine scenarios to identify the most original ideas.	• Originality • Imagination
The Archive *(verbal – reflective)*	After two hours of training, this reflection-based practice becomes available. It requires the trainee to reflect on the experiences from the training in the other games in a maximum of 200 written words.	• Creative Self-efficacy

Assessment

An automatic assessment is available to provide students with instant feedback on their progression while providing teachers with a simple tool for evaluating student performance. The fundamental notion for assessment is based on task completion because studies have shown consistent significant effects since the 1960s for this kind of training (Rose and Lin, 1984; Scott *et al.*, 2004; Torrance, 1972). Instead, it seems enough to "test" whether students perform the

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exercises prescribed by the teacher. As a result, the automatic assessment is designed to include the following elements:

1. Based on the relation between students actual training time and the minimum training time (workload) set by the teacher, students get a *pass/fail*. If the teacher defines the workload to be 2 hours, then all students performing 2 hours of training will pass.
2. Students receive *experience points* for completing each round in a game. These experience points are related to the key creative skills trained in each specific game (fluency, flexibility, imagination, originality, creative self-efficacy, and elaboration & persuasion). For the total experience points accumulated across all games and all skills, students also get a *creative experience score.*
3. There are three levels of difficulty in each game, visualised by a bronze coin (easy), a silver coin (medium), and a gold coin (hard). Upon completion of all rounds at a specific level, it will open up the next level of difficulty.
4. After completing a minimum of 10 hours training, students can request a *certificate of achievement*, regardless of course requirements, experience points as well as regardless of the amount of bronze, silver and gold coins.

Teachers have a dedicated profile where they can access all data related to the student's creative performance making it possible to assess each game output produced by their students thoroughly.

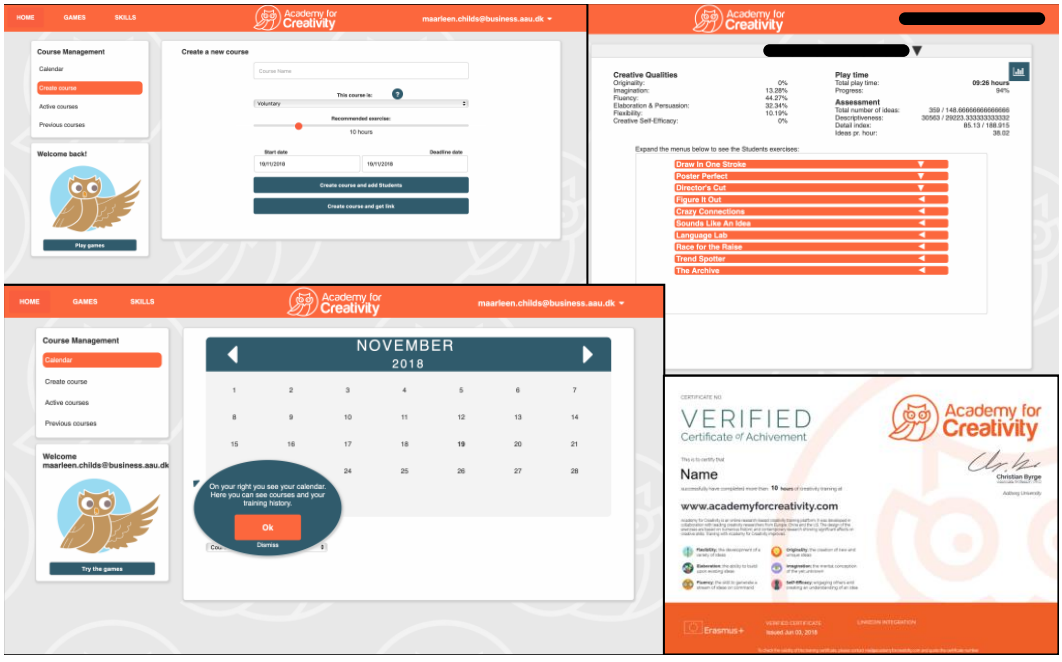

***Illustration 1*: Screen-dumps from the teacher profile at www.academyforcreativity.com.**

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Teacher Profile

Teachers can set up courses for their students and design these by providing a course name, setting the total workload (between 15 minutes to 50 hours), select starting and deadline date as well as choose whether the course is an obligatory or extracurricular study activity. There are no requirements for prior knowledge about creativity for the teacher to use this e-module.

Teachers can send a link to the students from which they can sign up and automatically enrol into the intended course. It is also possible to track students for total training time, the total number of ideas produced, level of idea descriptiveness, detail index, ideas generated per hour as well as the distribution of training time on each of the skill variables. Finally, it is also possible to browse through all individual ideas produced by each student.

Teachers can create as many courses as needed (one every semester, one for different classes, a number for differentiated learning in a class, etc.). A calendar provides an overview of all courses showing starting date, deadline and average student progress.

Student Profile

There are no requirements for prior knowledge about creativity for the student to use this e-module. When students sign up, the avatar will inform them about the story-line of the game. Furthermore, during playing time the avatar will provide the student with information, such as suggestions to what tasks to perform each day, noticing when a new level is reached in a specific game and so on.

When invited to a course, the calendar gives students an overview of their progress concerning course completion and performed training. A 'Skills' page provides an overview of the experience-based points gained through training. When setting up a new account, only three games are available. The other games become available as the student reach specific goals from playing. These goals are visible for the student at all time and are designed in this way to increase the gamification aspect.

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Illustration 2: **Screen-dumps from the student profile at www.academyforcreativity.com.**

Key Insights

A study on the use of Academy for Creativity was conducted, involving two focus group interviews with a total of 59 students as well as a questionnaire with 49 other student respondents. The results revealed that a progression based on completion of game rounds is more motivating for continuing training than an individual evaluation based on personal creative production. It seems that the mere expectation of assessment diminishes the motivation to perform this kind of out-of-class study activity. Furthermore, the gamification elements were found to be great motivators for engagement in training. Some students even referred to the e-module as *entertaining*. Other external motivation factors for engagement in the e-module included receiving a certificate of completion, an expected future work requirement for creative skills (93% considered creativity as one of the most important skills for their future career), higher marks in final exam, innovative business development (97% of the respondents consider creativity to be essential for new entrepreneurial ventures), and to gain personal creative powers. Seventy-three per cent found that the e-module advanced their skills related to the production of novel and interesting ideas. Interestingly, 6% (after using the e-module) considered creativity an ability that cannot be practised through training.

A study was later conducted involving individual interviews with five teachers that integrated the e-module into their teaching. The results revealed a series of recommendations for other teachers. Firstly, teachers should try to introduce the e-module in the classroom and together set up accounts so that students get a good experience of how it will be to use the e-module as an out-of-class study

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activity. Secondly, the creativity training should be made obligatory, have a strict deadline, and the overall workload should reflect approximately 15 minutes of practice per day in the given period. Thirdly, the e-module should be introduced in-class involving preferably both a short introduction to creativity theory, examples of some "off-line" creativity training exercises as well as allowing the students to get familiar with the e-module by letting them try out some of the games on laptops during class (individually or in pairs). Finally, the e-module should be related to the course objectives through a classroom discussion. In a business innovation course, it would be essential to discuss how the creative skills may be relevant for example to the innovation types in Doblin's taxonomy: configuration (profit model, network, structure, process); offering (product performance, product system); and experience (service, channel, brand, customer engagement) (Keeley *et al.,* 2013). Alternatively, it may be relevant to discuss the level of importance of creative skills in the different phases of an innovative process, e.g. from ideation to planning and development and later commercialisation and diffusion (e.g. Rogers, 1983) or initiation, development and implementation (e.g. Van de Ven *et al.*, 1999).

Núñez *et al.* (2019) used a combination of skin reaction detectors and a questionnaire to test comparatively for attention, emotional response and likability among students using Academy for Creativity. The scholars found significantly more stable levels of attention and a higher emotional response at the beginning of the training compared to a control group that performed off-line adoptions of the Academy for Creativity games. They also found high levels of likability related to innovativeness and dynamics of the games as well as game playing time. The training using Academy for Creativity had a positive effect on attention and emotional response compared to the control group, and students generally liked the gamification aspect of the e-module.

Hänninen *et al.* (2019) later performed a comparative study on communication students (bachelor level) to discover the effects of using Academy for Creativity as a supplement to a traditional teaching module in creativity. Their test included an adjusted digital version of the Abbreviated Torrance Test. The researchers found a significant effect for the students that used the e-module in addition to the mandatory classes compared to the control group that only attended classes.

Discussion and Conclusions

This paper presents an examination of a novel e-module for gamified online out-of-class study activities for teaching the creative cognitive skills fundamental for practical business innovation. The examination shows some exciting possibilities for increasing student motivation as well as student engagement, which is of particular interest because there seems to be a general student disengagement in out-of-class study activities (Betihavas *et al.,* 2016). Maybe this kind of e-

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modules can help students become more engaged in out-of-class study activities, as also pointed out by Dingli *et al.*, 2018.

The creative cognitive skills mentioned as a prerequisite for business innovation requires a period of deliberate practice. However, most teaching settings do not allow much time for deliberate practice. Instead, they tend to focus on "knowledge of", i.e. introducing methods, practices and theories about business innovation. Deliberate practice is often limited to one or a few real or theoretical cases where students are expected to produce ideas for a new configuration, offering or experience at a theoretical level. This level of deliberate practice is far from enough to develop the prerequisite creative skills needed for business innovation among students. The results from this paper open up for the possibility to introduce (more) deliberate practice-oriented study activities of the necessary vital creative skills into a business innovation curriculum for teachers lacking competencies in the field of creativity. Maybe this kind of e-module is a solution for introducing the deliberate practice to the teachings of innovation and in particular courses that take a more practical approach to business innovation.

Implementing online digital study activities is not an issue-free task. There may be a general issue to whether "online learning" and "gamification" fit the learning culture of the educational institution, program or the students enrolled. There may also be a more specific issue related to the group of students that are not experienced with (online) gaming from their private life or comfortable with this type of study activity (Landers and Armstrong, 2017). This is especially relevant to consider in third world countries with low "digital native" rates as well as in educational institutions where computers are not common practice in the classroom. Although studies show that online gamified courses can be experienced as both effective and engaging, this may not be the case for all students. However, during our focus group interviews, one student challenged this perception, explaining that "[…] normally, I dislike all kinds of digital games, however, this game somehow caught my attention".

The study by Hänninen *et al.* (2019) proved that Academy for Creativity had a significant effect on the improvement of student's creative competencies. Theoretically, this implies that students would also improve their capacity to innovate; yet, further research could study how strong the transfer effects are from digital creativity training to off-line versus online business innovation. It may be that digital creativity training has a better effect on creative skills applied in a digital domain.

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Guidelines for Applying Research to Practice

According to a recent McKinsey study, only 6% of corporate CEOs are satisfied with the innovation processes in the company. An effective approach to fast-track innovation in organisations is to invest in the existing resources; more specifically, the employees. While the deliberate practice of employee's creative skills does not guarantee more innovators, it is, however, a guarantee of increasing the odds of innovation.

This research was developed for and tested with higher educational institutions subjects (students and teachers). Yet, practitioners such as business consultants, managers and executive CEOs could use Academy for Creativity to integrate creativity training in organisations, as some of the main issues mentioned in this paper are quite relevant in the business world as well (lack of competencies, lack of time, lack of motivation).

These are the guidelines for applying Academy for Creativity in organisations:

- Start by investigating the e-module yourself to get an experience of what the employees will encounter. Go to www.academyforcreativity.com, see the user guides, read about the research behind and set up a teacher, consultant or leader account. You will thereby have access to all training games at all times.
- Select the employees that should be practising their creativity skills. The selection process can be done in several ways, based on whether or not participation can be made obligatory for the whole organisation, department or team. Remember that innovation (and the practice of creative skills) should not be restricted to the R&D department, innovation department or similar; employees at all levels need to develop their innovation skills. The results presented in this paper suggests that creativity training should be obligatory in a teaching setting. In theory, obligatory participation of all employees would be the best to increase the odds of innovation but might not be possible to implement in most organisations for various reasons. A smaller group of participating employees would be more realistic as a starting point. If you cannot freely choose yourself, you can use one of the following approaches:
    - Make an open invitation to all employees for a workshop on innovation and how to improve personal creativity skills. Make it something special – an innovative community, maybe even give it a name. The people that show up are the ones that are internally motivated.
    - Hand-pick individuals based on their position. This approach ensures that you have the right gatekeepers involved, but you risk that they are not intrinsically motivated to participate or have the

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time.
    - Have HR identify individuals based on their personality traits and invite them to a meeting. Look for employees scoring high on the 'openness' trait from the Big Five personality dimensions (or similar) as these are most likely to participate in new activities. Furthermore, research have found this trait to be highly correlated with creative achievement.
    - Ask team or divisional leaders to point out people that have free capacity to participate. This will ensure that the participants have the required time available for continuous training, but their motivation and engagement might be low.
- Introduce the e-module to the involved employees to set up accounts so that they get a good experience of how it will be to use the e-module. If legitimacy is an issue, you could start out by focusing on why innovation is important and how creative skills are related to innovation capacity and that these skills can be trained.
- Set up a training schedule with a deadline (14 days or one month) and invite the participates. Advise the employees to train 15 minutes daily.
- Follow up on each employee's progress using your own profile. You could write individual emails with some of the statistics from their creative production compared to the average of the involved employees. Write weekly emails to everyone where you acknowledge their effort; you could present the top three weekly performers (based on total amount of training or the progression in relation to total training program).
- After the training period has ended, gather everyone for a meeting to discuss how the training have affected them (in their working life, personal life etc.). Get the participants to share stories about how they have used their creativity skills (new product, service, process, or business model ideas). Set a realistic goal for the next period of time (one month, two or six months). Talk about ways to involve other employees.
- Share all results with the whole organisation (progression of participants, number of produced ideas in the beginning compared to the end etc.).

You should pay specific attention to older employees, as elderly workers might not be familiar with (online) gaming or comfortable with this type of activity. However, that is not a reason to exclude them from using Academy for Creativity; they might just need additional support in the beginning of the training period.

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References:

Adams, R., Bessant, J. & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of Management Reviews* 8(1), 21-47.

Baer, J. M. (1988). Long-term Effects of Creativity Training with Middle School Students. *Journal of Early Adolescence,* 8(2)*,* 183–193.

Betihavas, V., Bridgman, H., Kornhaber, R., & Cross, M. (2016). The evidence for "flipping out": a systematic review of the flipped classroom in nursing education. *Nurse Education Today*, 38, 15–21.

Bloch, C., & Bugge, M. M. (2013). Public sector innovation - From theory to measurement. *Structural change and economic dynamics*, 27, 133-145.

Byrge, C., & Hansen, S. (2013). Course in New Thinking in Higher Education: Enhancing Creativity Through the Means of Training, Theory and Workshop. *Problems of Education in the 21st Century*, 51, 18–32.

Byrge, C., & Tang, C. (2015). Embodied Creativity Training: Effects on Creative Self-efficacy and Creative Production. *Thinking Skills and Creativity,* 16, 51–61.

Clapham, M. M., & Schuster, D. H. (1992). Can Engineering Students be Trained to Think More Creatively? *Journal of Creative Behaviour,* 26(3), 156–162.

Cropley, D. H., & Cropley, A. J. (2000). Fostering Creativity in Engineering Undergraduates. *High Ability Studies,* 11(2), 207–219.

Dingli, S. M., Xerxen, S. P., Byrge, C., Brøndum, K., Nunez, P., Hänninen, L. I., & Tang, C. (2018). Learning Perspectives on Digital Embodied Creativity Training. *Journal of Creativity and Business Innovation*, 4, 111-123.

Freeman, C., Clark, J., & Soete, L. (1982). *Unemployment and technical innovation: A study of long waves and economic development*. London: Frances Pinter.

Guildford, J. P. (1959). Three faces of intellect. *American Psychologist*, 14, 469-479.

Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

Hänninen, L. I., Tang, C., Núñez, P., Byrge, C., Brøndum, K., Dingli, S. M., & Xerxen, S. P. (2019). Digital Creativity Training: Improvements in creative self-efficacy, creative production, transfer effect and motivation for creativity training. *Unpublished manuscript*.

Hennessey, B. A., Amabile, T. M., & Martinage, M. (1989). Immunizing Children Against the Negative Effects of Reward. *Contemporary Educational Psychology*, 14(3), 212–227.

Karakelle, S. (2009). Enhancing Fluent and Flexible Thinking Through the Creative Drama Process. *Thinking Skills and Creativity,* 4(2), 124–129.

Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2013). *Ten types of innovation: The discipline of building breakthroughs*. Hoboken: John Wiley & Sons, Inc.

Landers, R. N., & Armstrong, M. B. (2017). Enhancing instructional outcomes with gamification: An empirical test of the Technology-Enhanced Training Effectiveness Model. *Computers in Human Behavior,* 71, 499-507.

Nelson, A., & Lameli, B. (1991). The Role of Imagery Training on Tohono O'Odham Children's Creativity Scores. *Journal of American Indian Education,* 30(3), 24–32.

Núñez, P., Hänninen, L. I., Ramos, D., & Maqueda, J. (2019). Creativity training gone digital: Exploring the training experience for online creativity training on communication students. *Unpublished manuscript*.

Ridley, D. R., & Birney, R.C. (1967). Effects of Training Procedures on Creativity Test Scores. *Journal of Educational Psychology,* 58(3), 158–164.

Robbins, T. L., & Kegley, K. (2010). Playing with Thinkertoys to Build Creative Abilities Through Online Instruction. *Thinking Skills and Creativity,* 5, 40–48.

Rogers, E.M. (1983). *The Diffusion of Innovations*. New York: The Free Press.

Rose, L. H., & Lin, H.-T. (1984). A Meta-analysis of Long-term Creativity Training Programs. *Journal of Creative Behaviour,* 18(1), 11–22.

Sarooghi, H., Libaers, D., & Burkemper, A. (2015). Examining the relationship between creativity and innovation: A meta-analysis of organizational, cultural, and environmental factors.

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Journal of Business Venturing, 30, 714–731.
Scott, G., Leritz, L. E., & Mumford, M. (2004). The Effectiveness of Creative Training: A Quantitative Review. *Creativity Research Journal,* 16(4), 361–388.
Speedie, S. M., Treffinger, D. J, & Feldhusen, J. F. (1971). Evaluation of Components of the Purdue Creative Thinking Program: A Longitudinal Study. *Psychological Reports,* 29(2), 395–398.
Tidd, J., & Bessant, J. R. (2009). *Managing innovation: integrating technological, market and organizational change.* Hoboken: Wiley.
Torrance, E. P. (1972), Can We Teach Children to Think Creatively. *Journal of Creative Behaviour,* 6(2), 114–143.
Torrance, E. P. (1993). The Beyonder in a thirty-year longitudinal study. *Roeper Review*, 15, 131–135.
Van de Ven, A., Polley, D.E., Garud, R., & Venkataraman, S. (1999). *The Innovation Journey*. New York: Oxford University Press.
Werbach, K., & Hunter, D. (2012), *For the win: How game thinking can revolutionize your business*. Philadelphia: Wharton Digital Press

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