

# Emotions and Challenges During Game Creation: Evidence from the Global Game Jam

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**Abstract:** The Global Game Jam (GGJ) is an annual worldwide event that brings together game enthusiasts of different backgrounds, motivating them to create games collaboratively under a common theme in a 48-hour timeframe. The constraints on time and theme, as well as the social nature of the event, often leads to an emotionally intense game creation process. This paper examines the emotional experiences of the attendees, specifically collecting data from GGJ participants from five different jam sites in three European countries (N=42). A self-report, open-ended questionnaire gauged respondents' emotions during and after the game design process, their reasoning for reporting these emotions, and the challenges they faced throughout this event. The qualitative analysis of the responses confirms that the creation process is laden with emotions, emphasising the importance of the 'team' and social relationships in how emotions are experienced. Participants referred to time limits and team coordination as the main challenges of the experience. The results are presented through the lens of Positive Psychology, focusing on Positive emotions, Engagement, Relationships, Meaning, and Achievement. Results indicate that (collaborative) game creation can shelter positive emotional and social experiences that can contribute to an individual's sense of growth and well-being.

**Keywords:** Global Game Jam, game design, emotions, Positive Psychology

## 1. Introduction

According to Kultima 'a game jam is an accelerated opportunistic game creation event where a game is created in a relatively short timeframe exploring given design constraint(s) and end results are shared publically (sic)' (2015, p.6). The Global Game Jam (GGJ) is such an annual worldwide event, with growing attendance since it first ran over a decade ago. While the first GGJ, in 2009, was joined by 1,600 participants in 23 countries, GGJ2020, saw 118 countries participating with a total of 48750 jammers (Global Game Jam, 2020). The GGJ tasks participants to develop and upload a functional game on the GGJ website within the 48 hours of the event, and to present the game on the last day of the event. The design constraints include a theme that is announced to participants on the first day ('Repair' was the theme of GGJ2020), as well as optional 'diversifiers'.

The GGJ has also attracted research attention; indicatively in 2013 the international conference 'Foundation of Digital Games' hosted the first GGJ workshop and research in the area has been on the rise ever since. Studies have investigated the participants' experience (Pirker & Voll 2015), challenges in the development processes (Zook & Riedl 2013), the learning potential of game jams (Fowler et al. 2013), and much more. Game jams' popularity amongst gamers and the gaming industry is largely due to skills development, social connections and the especially relevant for this paper the intense experiences of such events (Kultima 2015).

Creativity, and undertaking creative design tasks has been associated with the experience of intense emotions. Particularly, positive emotions seem to be conducive to creativity (Conner & Silvia 2015). Are game jam contexts facilitators of positive emotions, and how does the social aspect influence participants' experiences? Previous research in game jams has indicated that the social factor is responsible for both positive experience of events (e.g. friendly and helpful jammers and organisers), but also negative ones (e.g. problems arising from random group allocation) (Kultima, Alha & Nummenmaa 2016).

This study traces emotional experiences of GGJ participants during and after the game creation process. The GGJ seemed to be an ideal and convenient context given the large and diverse audience immersed in game creation within a short timeframe. This study aims to explore whether game jams as collaborative environments can be conducive to an individual's well-being. The findings are analysed through the PERMA model (Seligman 2012), a theoretical framework for psychological well-being, which is described in the next section.

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## 2. Theoretical Framework

The PERMA model was introduced by Seligman (2012) to describe the elements that contribute to well-being: Positive Emotions, Engagement, Relationships, Meaning and Accomplishment. All five elements contribute to, but do not define well-being. People pursue each element for its own sake, free of coercion.

*Positive emotions* refer to happiness and life satisfaction. According to Fredrickson's broaden-and build theory, experiencing positive emotions can 'broaden the scopes of attention and cognition, and by consequence, initiate upward spirals toward increasing emotional well-being' (Fredrickson & Joiner 2002, p.172). Positive emotions help gain control over negative feelings, such as anxiety (ibid), which is often experienced in creative design, an inherently a demanding task (Wong & Siu 2012).

*Engagement* refers to being in a state of Flow, which emerges when our skills are challenged by tasks; it is 'the experience of complete absorption in the present moment' (Nakamura & Csikszentmihalyi 2009, p.195). When people experience Flow, they are not usually aware of it; only after they reflect on past activity, they are able to experience emotions of joy and satisfaction. Fostering high-activation emotions, and engagement seems to be the key to unlocking everyday creativity (Conner & Silvia 2015).

*Relationships*, especially positive ones, contribute to one's sense of well-being. Humans are inherently social animals and their activities cannot be defined outside the sociocultural context. The others play a key role in our daily lives, and positive relationships with others are 'the best antidote to the downs of life' (Seligman 2012, p.20). Self-determination theory has also defined relatedness and the sense of belonging as essential psychological needs (Ryan & Deci 2017).

*Meaning* is about following something that is greater than the self. It is the driving force and purpose of human activity, when all basic psychological needs are satisfied. Meaning is associated with having a purpose in life that goes beyond the individual and serves the greater good.

*Accomplishment* concerns pursuing success, goals, winning. People experience positive emotions when they are fully absorbed in what is worthwhile to them. People may still feel fulfilled and accomplished even if they do not finally 'win' but have put their best self into an activity that is meaningful and greater than them.

Are these elements present in the experiences of game jam participants? The following section will outline the research aims and design of the study.

## 3. Research Methodology

### 3.1 Research aim and objectives

The present study aims to determine whether and how collaborative game creation events can contribute to the well-being of the participants through analysing their emotional experiences and challenges. The context of this research was the GGJ, which was held between January 31 and February 2, 2020, worldwide.

The research questions are:

- What emotions do GGJ participants experience while making a game, and how do they differ from the emotions they experience after this process?
- What are the causes of the participants' emotional experiences?
- What are the main challenges participants faced during the GGJ2020?

To answer these questions, a questionnaire was distributed to the participants immediately after the end of the GGJ. While there is evidence that emotions are better reported via real-time assessment (Keller et al. 2014), this study focuses on the subjectivity of experience and how participants justify their self-reported emotions rather than the distinction between actual versus perceived emotion.

### 3.2 Research design

The questionnaire featured open-ended questions and was distributed online. The researcher opted for a questionnaire as it can reach many people, within a short time, which was essential to keeping the participants'

experience fresh in mind. While semi-structured interviews could allow participants more space or prompts to unravel their thoughts, soliciting interviews would be time-consuming and would hinder the time-critical self-reporting shortly after the jam.

The questionnaire had two main parts: the first asked participants *demographic* and *background* information (e.g. gender, age, occupation, experience in game design). The second part concerned *emotions* and *challenges* as experienced during the GGJ2020. Participants were asked to select a maximum of five emotions they experienced (from a list of 22 emotions) and provide reasons for each of the emotions they annotated. The list of emotions used was taken from Zembylas<sup>2</sup> (2005, p.220) with the addition of 'satisfaction' to the list as in Miller and Gkonou (2018). Participants were then asked to report the main challenges they experienced during the GGJ in free-text responses and whether they would participate again to a jam.

The researcher opted for a convenience sample and distributed the questionnaire based on acquaintance access in three different countries, and five different game jam sites that participated in the GGJ2020, the United Kingdom (The Skiff, Brighton), Malta (Institute of Digital Games) and Greece (venues of Athens, Patras and Thessaloniki). GGJ organizers in UK and Maltese sites were contacted by the end of the jam to disseminate the questionnaire to jammers at their location; for Greek sites, jammers were contacted directly via e-mail (which are available on the GGJ website). 42 participants responded to the questionnaire. The data was analysed through a qualitative prism. Thematic analysis was employed to code and group the data inductively and to define the key themes that emerged from the responses (Bryman 2016).

## **4. Results**

### **4.1 Demographics and Background information**

There were 42 respondents in the questionnaire: 12 identified as female and 30 as male, and the majority (62%) were aged between 18-29 years old. 25 participants were from Greek GGJ venues, 7 from a UK venue, and 10 from a venue in Malta; this data refers to participants' location while jamming, not their nationality. Regarding jammers' experience in game creation, 50% were new to such experiences with a few months to two years of experience, while the other half had 3-15 years of experience. Among the 42 respondents, three jammers did not create a game and are omitted from the survey on emotions in the next section. 36 respondents created digital games and 3 respondents created tabletop or hybrid games.

### **4.2 Key emotions during and after the game creation**

Regarding the 39 respondents who created a game, there was a breadth of different emotions reported during and after the game creation experience at the GGJ2020. Figure 1 shows the number of self-reported emotions during or after game creation, sorted by their total number in both phases. The most common emotions during the game creation process were enthusiasm (64% of respondents), happiness (62%), fear/anxiety (38%), frustration (38%), pride (36%), and satisfaction (33%). Regarding emotions experienced after the game creation, the most common emotions reported were pride (67%), satisfaction (67%), happiness (56%), and enthusiasm (28%).

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<sup>2</sup> Although Zembylas' research concerns frequently experienced emotions during teaching, the researcher found the emotion list appropriate and relevant, as both classrooms and game jams are social and learning environments. The researcher shares Zembylas' socio-political view of researching emotions, as they are interactive and performative, influenced by the social context; not idle states that reside only in the mind of the participants.

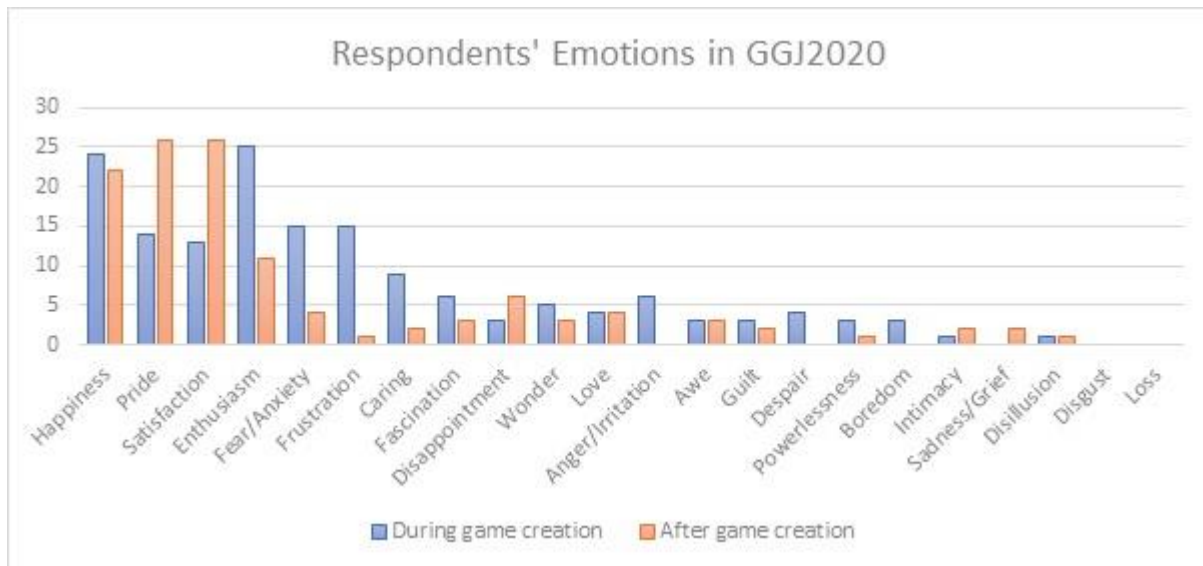


Figure 1: Emotions in GGJ2020

The differences between the self-reported emotions during and after the game creation are substantial. Pride and satisfaction are present during the process and increase significantly after the game jam is over, while enthusiasm, fear/anxiety and especially frustration dwindle in the end. Happiness is prevalent in both phases. The most prevalent negative emotion after the game jam is disappointment (15% of respondents).

The following sections analyse respondents' reasons for the most common emotions. As noted in Section 3.2, thematic analysis was employed to code and group the data and to define the key themes that emerged from the responses per emotion. Respondents are anonymised but labelled as 'Rx' based on their participant number.

#### 4.2.1 Happiness

During the game creation process, participants predominantly attributed happiness to *creativity* and *teamwork*. Respondents felt happy because of the process of making itself: 'nothing better than creating a game' (R5). Participants were happy 'for being creative' (R38) and even equated happiness with creativity (R8). Teamwork and the collaborative environment also contributed to this emotion. Respondents mentioned that they felt happy because they 'didn't expect to see this amount of creativity and talent amass' (R15); and were 'speaking with awesome developers' (R32). Working and interacting with experienced others seems to bring inspiration to participants. Meeting new and rejoicing with old friends was also a factor of people's happiness.

After the game creation process, many participants also reported happiness, which was attributed to the *outcome*, and the engaging *community*. Participants were very content with the results and that they 'actually finished with a complete game' (R32). Teamwork and community also played a role, as participants mentioned that they were happy 'to be part of something exciting' (R29) and were 'glad we all made it' (R13). The presence of others, either as teammates or as a general audience seems to be catalytic to their happiness both during game creation and afterwards.

#### 4.2.2 Fear/Anxiety & Frustration

Fear/anxiety was almost as common an emotion during game creation as happiness. Participants attributed fear to *time*, *outcome*, and *ability*. Participants reported being afraid 'for the deadline' (R31) and 'for not finishing my game' (R32), for the quality of the game, e.g. '[...] I wasn't sure if the idea is going to work' (R4), and for their personal skills to carry through: 'Am I going to make it? All by myself?' (R33).

Frustration is another frequently reported emotion during game creation. Frustration is attributed to *outcomes not being as expected*, e.g. 'initial ideas were not working' (R20), *technical issues*, e.g. 'because of bugs and bad code design' (R36) and *personal skills* e.g. 'Everyone in my team was better than me' (R24); 'I wished my skillset was more technical, so I could contribute more' (R35). Interestingly, frustration was often reported in the context of the *team*, e.g. when 'some team members did not contribute much and also hindered development'

(R22), or when time was spent 'in team conflicts' (R31). After the game creation process, both fear/anxiety and frustration are much more subdued.

#### 4.2.3 Pride

Respondents reported pride during and primarily after the creation process. They attributed their pride to *teamwork* and their *personal efforts*. During game creation jammers felt proud that 'the team was handling every problem really well' (R19) and that 'each member was good at their field' (R41). Participants valued their team's effectiveness. They were proud of their efforts and contributions, e.g. '...I had the original idea for the game' (R27). Participants felt self-pride as they were surprised with their achievements. Their surprise is evident in the next quotes: 'My skills turned out to be useful' (R28); 'When implementing things I couldn't even imagine (sic) I could' (R34); 'Damn, I'm good at this' (R18).

After the game creation process, pride was the most common emotion along satisfaction. Respondents attributed pride to their *team*; their *outcome*; their *effort*; and the *context of the community*. Many respondents were proud to have completed a game, e.g. 'We had created a game in 3 days; anyone should be proud of that' (R42), 'I applied my skills to create something I consider good' (R35). The community's response played a strong role for this emotion, e.g. when 'people loved the presentation' (R4). Moreover, participants felt pride when comparing their game to those of other jammers, e.g. 'Our game was better than many of the others presented' (R22), and 'One of the few groups with a completed game' (R25).

#### 4.2.4 Enthusiasm & Satisfaction

As seen from Figure 1, enthusiasm is high during the game creation process, and drops substantially after it is over. The opposite trend is shown for satisfaction.

Enthusiasm during the game creation process is attributed to the *process* itself, and the *creative climate* of the community. Game jammers were enthusiastic when coming up with great game ideas and 'some cool art' (R23), 'for learning new things' (R38) and for '...seeing rapid progress' (R9) during the process. Observing others work positively motivated participants, e.g. 'Because there were lots of creative people around and I knew something great will happen' (R4). Enthusiasm after the game creation is attributed to the *outcome* of the process and *prospects* of their activity. Participants were enthusiastic 'for completing a functional result' (R38), and mentioned they 'would really like to continue doing hardware stuff, not just in jams' (R18); 'wherever may this game go i wanna (sic) find out' (R6).

Participants reported satisfaction during the process, and they attributed it to their *progress* and *plans working*. Participants were aware of their progress, e.g. 'learned a lot in just a weekend' (R37) and that 'after hours of coding and making art, the game was suddenly alive!' (R9); 'My fellow jammer's first-time jam was very productive (proud of her)' (R6). They were satisfied when 'everything seemed to be under control' (R22) and 'during development it turned out we're going to finish a game on time' (R4).

Satisfaction peaked significantly after the game creation was over, due to the *joined accomplishment*, managing the *deadline*, and *community's feedback*. Completing a game together with their loved ones brought emotions of pride and satisfaction to the participants: 'I helped my students make their first game' (R23), 'when we aim high, and in the end achieve most of our goals with the team' (R34). Satisfaction stemmed also from receiving the community's acceptance. For example, participants emphasised that other jammers talked about their game, played it and liked it.

Enthusiasm seems to be linked with the process itself, the exploration, and the unknown of the experience; it is therefore heightened in the beginning. Conversely, satisfaction is associated with the result and the completion of the project, as participants felt fulfilled to have delivered a functional game on time.

### 4.3 Challenges

The main challenges participants faced during the event concerned *team management*, handling *deadlines*, and *technical issues*. As for team issues, game jammers mentioned that it was hard 'to get everybody in the team in the same page' (R12) and 'making sure that everyone is on track and is understanding the bigger picture rather

than their own work' (R23). Working with strangers, assigning tasks, and leadership were also challenges. Participants mentioned:

Nobody was coordinating our 7 person team for the first half, this led to wasted work. I usually fulfil this role, but wanted to take a back seat so other people could lead. Instead we had no leader (R39).

teamwork was challenging because each of us was from a different field, I mostly found that they were lacking creativity some of them and that while some of us wanted to create something innovative others wanted to go with safer options and approaches (R31).

Having more than 2 members experienced on the same field needs writing a spec to follow. Ain't noone (sic) got time for that in a jam (R41).

Time management and technical issues impacted the participants' action, e.g. '...to properly address bugs as they arise in the development process.' (R26), 'get familiar with the tools, think of algorithms suitable for the game' (R38) and 'coding whilst being awake for 24h in a row' (R29). Time constraints forced people to let go of their initial ideas and improvise.

Despite the challenges participants faced, all respondents indicated that they would attend the GGJ in the future, one respondent particularly mentions: '...every year is a new adventure with its ups and downs' (R20).

## **5. Interpretation of results through well-being theory**

Positive emotions, the creative process, participants' teams, the environment of the GGJ, but also the challenges entailed (e.g. time constraints, the task itself) were the main recurrent themes identified in participants' responses. As the themes seem to overlap with the components of well-being theory, this section will use the five elements of the PERMA model to interpret and refine the results of this study.

### **5.1 Positive Emotions**

Positive emotions are predominant in the questionnaire responses: happiness, enthusiasm, pride, satisfaction. These emotions were attributed to a) the creation process itself b) the social environment and the relationships with others, c) the outcome of the process. It seems that the endeavour itself fills participants with positivity, and the result is particularly rewarding. Being with people who share the same passion and sensing their enthusiasm evokes the same positive emotions to participants. The process of emotional contagion (Frenzel et al.2018) is evident in the social setting of the game jam. Seeing other people work enthusiastically and passionately triggered similar emotions in them.

### **5.2 Engagement**

Flow, which is the cornerstone of engagement, is the state of complete absorption in a task. Flow can emerge when a challenge drives peoples' activity and stretches their skills (Nakamura & Csikszentmihalyi 2009). Game creation itself is a challenge, but the tight deadline and having to work with strangers ramp up the difficulty. Hence, participants experienced anxiety or frustration during the game creation process as they were alert and working towards their goal. Previous research has indicated that emotions such as anger, and even team conflict can trigger creativity (Yang & Hung 2015). The experience of these two negative emotions forced people to bring out their best selves and did not seem to have detrimental consequences to the overall experience. Moreover, these emotions were not present when the challenge had finished and were substituted with feelings of happiness and satisfaction.

### **5.3 Relationships**

The others were a recurrent theme in participants' responses for the emotions and challenges they experienced in the GGJ. Three categories of relationships can be identified that had different effects on the participants: a) the team, b) the other jammers and c) the wider community. The team was a source of happiness and enthusiasm, especially when participants worked with their loved ones. Simultaneously, the team was the cause of frustration and a major challenge, as it was hard to coordinate when people grouped in large teams or with strangers. The team has been found to be one of the major factors that shape jammers' experience, positively

or negatively (e.g. Kultima, Alha & Nummenmaa 2016) and hence studies have suggested tools for optimising grouping of participants (Pirker, Punz & Kopf 2019). The other jammers affected participants' experience during game creation as each jammer stayed active and creative by seeing other people work and compared their games to the work of others. The wider community and context of the GGJ was the motivation for people to join the jam, meet and interact with people experienced in game creation. The community provided game jammers with a pleasant and creative environment that reinforced their sense of belonging.

#### **5.4 Meaning**

Meaning refers to pursuing activities that are bigger than the self. A participant mentioned that they felt happiness for 'being part of something bigger - the jam' (R3). The gaming community seems to be an important factor that drives participants' intrinsic motivation in taking part in game jams (Reng, Schoenau-Fog & Kofoed 2013). Specifically, respondents mentioned that they participated as creating their games is their passion, or for the sake of the process and challenge itself. Being and working with friends and game enthusiasts were also reasons for their commitment to the event. Participants also reported instrumental motivation for joining the jam, e.g. to gain experience in game design, opportunities for networking and possible professional gains. What kept participants going was their personal passion and sharing it with the wider community. As a participant mentioned: 'I'm glad there's no trophy or first place. I was happy to nose around other teams to see what's building' (R41).

#### **5.5 Accomplishment**

Even though there are no prizes involved for best games, delivering a functional and nice game defined the jammers' sense of accomplishment. Participants were proud to have finished their work on time and the effort they put in it. For some people delivering this game felt as winning a personal bet. A participant was especially proud: 'My first game jam after 2016 from when I became a father' (R32). The enhanced difficulty of the endeavour (Ariely 2016) and participants' personal histories linked to the event added more importance to their accomplishment.

### **6. Lessons learned**

The five elements of well-being are present in the participants' experience of the game jam. The heightened positive emotions, the challenging task at hand, and most importantly the relationships with the community and other jammers facilitated positive experiences of the event and gave meaning to their actions. Game creation is a powerful learning experience, emotionally evocative and could be introduced into classrooms to foster well-being. Introducing students to game design to develop their computer and game literacies along with the teaching of other school subjects (e.g. languages, math) is not a new idea (Papavlasopoulou, Giannakos & Jaccheri 2017). However, the evidence from the GGJ suggests a set of principles for making a creative experience positive in the long-term and not just to temporarily engage students.

The principles include making the creative task a) challenging, b) collaborative, c) meaningful and d) have a tangible outcome. Time constraints in the GGJ paradoxically fuelled the positivity of the experience. Had there not been a limited timeframe or other constraints, participants' skills would not be challenged, and creativity would not be subsequently triggered. The social environment seems to do more good than harm through the effect of emotional contagion (Frenzel et al. 2018). It is essential to form the group by applying principles of social mediation (Shabani 2016); e.g. having advanced students work with less advanced ones is beneficial for both. Moreover, the design task should be meaningful to students. People attended the GGJ because of their genuine interest and passion in games; were they asked to design a product other than a game, their motivation would not be that strong. Finally, having a tangible outcome as a product of the game jam reinforces their sense of accomplishment and can act as a memento and showcase of their hard work.

There are certain limitations in this study which could be tackled in future work. The study used a self-report questionnaire, and therefore the responses might lack objectivity. Adding observations or stimulated-recall interviews, though intrusive and time-consuming, could yield more in-depth data and triangulated responses. Selection bias may have occurred by the convenience sample of this study. Data was aggregated from European countries but did not account for cultural differences of each venue. Following a contextual or cross-cultural approach might provide more holistic perspectives. It could be worth researching how different cultures engage in social environments and how these exchanges are perceived emotionally.

## 7. Conclusion

This study investigated the emotional experiences and challenges of participants in the GGJ2020. Interpreting the data through the PERMA model offered a solid framework which highlights the reasons why game jams are powerful and positive experiences and how their elements could be applied for educational purposes. The interactions with the community, the challenges of the process, and the common goal of the event shaped peoples' actions, charged them with positive emotions and gave meaning to their effort. The positive impact of the GGJ as identified in this study could be applied to educational contexts. Engaging students in active learning by making, rather than by having them passively consume games, can foster positive and creative classroom experiences that can contribute to their well-being. As Dougherty highlights: 'As makers we enjoy repeatedly experiencing this creative process. By taking our own ideas seriously, sharing them with others, and developing them, we give our life meaning and purpose.' (2016, p.143).

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## 8. References

- Ariely, D., 2016. *Payoff: The hidden logic that shapes our motivations*. Simon and Schuster.
- Bryman, A., 2016. *Social research methods*. Oxford university press.
- Conner, T.S. and Silvia, P.J., 2015. Creative days: A daily diary study of emotion, personality, and everyday creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 9(4), p.463-470.
- Dougherty, D., 2016. *Free to make: How the maker movement is changing our schools, our jobs, and our minds*. North Atlantic Books.
- Fowler, A., Khosmood, F., Arya, A. and Lai, G., 2013, October. The global game jam for teaching and learning. In *Proceedings of the 4th Annual Conference on Computing and Information Technology Research and Education New Zealand* (pp. 28-34).
- Fredrickson, B.L. and Joiner, T., 2002. Positive emotions trigger upward spirals toward emotional well-being. *Psychological science*, 13(2), pp.172-175.
- Frenzel, A.C., Becker-Kurz, B., Pekrun, R., Goetz, T. and Lüdtke, O., 2018. Emotion transmission in the classroom revisited: A reciprocal effects model of teacher and student enjoyment. *Journal of Educational Psychology*, 110(5), p.628-639.
- Global Game Jam, 2020. *Live Status*. Retrieved April 2020 from <https://globalgamejam.org/status>
- Keller, M.M., Frenzel, A.C., Goetz, T., Pekrun, R. and Hensley, L., 2014. Exploring teacher emotions: A literature review and an experience sampling study. In *Teacher motivation* (pp. 91-104). Routledge.
- Kultima, A., 2015. Defining Game Jam. In *Proceedings of Foundations of Digital Games Conference* (Vol. 15).
- Kultima, A., Alha, K. and Nummenmaa, T., 2016, October. Building finnish game jam community through positive social facilitation. In *Proceedings of the 20th International Academic Mindtrek Conference* (pp. 433-440).
- Miller, E.R. and Gkonou, C., 2018. Language teacher agency, emotion labor and emotional rewards in tertiary-level English language programs. *System*, 79, pp.49-59.
- Nakamura, J. and Csikszentmihalyi, M., 2009. Flow theory and research. *Handbook of positive psychology*, pp.195-206.
- Papavlasopoulou, S., Giannakos, M.N. and Jaccheri, L., 2017. Empirical studies on the Maker Movement, a promising approach to learning: A literature review. *Entertainment Computing*, 18, pp.57-78.



Pirker, J., & Voll, K., 2015, June. Group forming processes-experiences and best practice from different game jams. In *Workshop Proceedings of the 10th International Conference on the Foundations of Digital Games*.

Pirker, J., Punz, A. and Kopf, J., 2019, August. Social interactions in game jams: a jammer recommender tool. In *Proceedings of the 14th International Conference on the Foundations of Digital Games* (pp. 1-4).

Reng, L., Schoenau-Fog, H., & Kofoed, L. B., 2013, May. The motivational power of game communities-engaged through game jamming. In *Proceedings of the 8th International Conference on the Foundations of Digital Games* (pp. 14-17).

Ryan, R.M. and Deci, E.L., 2017. *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Seligman, Martin EP, 2012. *Flourish: A visionary new understanding of happiness and well-being*. Simon and Schuster.

Shabani, K., 2016. Applications of Vygotsky's sociocultural approach for teachers' professional development. *Cogent education*, 3(1).

Wong, Y.L. and Siu, K.W.M., 2012. A model of creative design process for fostering creativity of students in design education. *International Journal of Technology and Design Education*, 22(4), pp.437-450.

Yang, J.S. and Hung, H.V., 2015. Emotions as constraining and facilitating factors for creativity: Companionate love and anger. *Creativity and Innovation Management*, 24(2), pp.217-230.

Zembylas, M., 2005. *Teaching with emotion: A postmodern enactment*. Information Age Publishing.

Zook, A. and Riedl, M.O., 2013, May. Game conceptualization and development processes in the global game jam. In *Workshop proceedings of the 8th international conference on the foundations of digital games* (pp. 1-5).