The Uses of Games Implemented into Secondary School Level Education


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**Declaration of Originality**


This dissertation is submitted by the undersigned to the Institute of Art Design & Technology, Dun Laoghaire in partial fulfilment of the examination for the BA (Honours) 3D Design, Modelmaking & Digital Art. It is entirely the author's own work except where noted and has not been submitted for an award from this or any other educational institution.



Cian Ryan

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**Abstract**

This thesis is about the implementing of games into secondary school level education. Games have much to offer in terms of education. Games can engage people effectively which could increase participation and communication in school with respect to the rules. As people play games out of their own volition it is important to analyse games and make use of their qualities in relation to motivation. Motivation, interest, and positive emotions which are all integral to the playing of games are also key to a good education. Games could turn work into play and help immerse students into the flow state. Games can assist learning with their design methods and affordances that support performance through continual feedback. This thesis examines the particular qualities of games that show how they are a unique and powerful medium that could impact the secondary school experience positively in many critical ways. It contains deep research on games in relation to education furthering on the works of many progressive researchers which includes recent research on the topic of gamification and game-based learning. Games could be used practically as simulations, or for incorporating formative assessment or for literary projects. This thesis explores psychological theories based on games, well-being in conjunction with education, education's issues, and emotional design. Secondary school level education could be improved, and it is important to do so. It should be malleable to accommodate for changes in society to keep it fresh and interesting. Games are exciting to contemporary youth and so could be used to decrease boredom and influence intrinsic motivation, it could also relieve stress with the ability to replay and play at their own pace. School should be more balanced in terms of methods used such as collaboration and varying forms of assessment while catering for each individual student. With the using of technology and games it is possible to do these things. School should be a place of purpose and enthusiasm for youth leading to a healthier and more fulfilled society.

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Fig. 8: Screenshots, Nico. *Keys to Meaningful Skill Trees*, GD Keys, 5 April 2020. https://gdkeys.com/keys-to-meaningful-skill-trees/. p.41

**Introduction**

Games have been a part of humanity since the dawn of civilisation to enrich our lives. Games are specifically a form of entertainment but importantly are also a means of communicating sentience and the developing of abilities. Games are an activity in which there are a set of rules and a desired experience or outcome through playing with respect to the rules. Games in this light could be used to describe many of humanities' systems and functions such as the idea of working for money, socialising, or education. As discussed by Annika Waern in relation to what constitutes a game, a game "is a system that is intended to be used in a particular way." [1] As such games have an importance towards the development of society.

Games have evolved largely with the rise of digital games and the advancement of technology in the past decades. Digital games are a significant part of people's lives in this day and age for many, especially youth. A study by the researchers Lenhart, Kahne, Middaugh, Macgill, Evans, and Vitak, shows "97% of teens play video games"[2] in America, and so it can be seen that they are important to discuss. The topic of implementing games into education seems to be a contemporary popular subject among educators and researchers and has been proposed for a long time. Covid encouraged such thought, as discussed by Yong Zhao, "the pandemic … created a unique opportunity for educational changes that have been proposed before COVID-19,"[3] since social distancing meant that teaching had to be done in new ways implemented through technology.

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[1] Waern, Annika. 'Framing games.' *Proceedings of Nordic DiGRA,* 2012. http://www.digra.org/wp-content/uploads/digital-library/12168.20295.pdf.

[2] Lenhart, Amanda, et al. "Teens, Video Games, and Civics: Teens' Gaming Experiences Are Diverse and Include Significant Social Interaction and Civic Engagement." *Pew internet & American life project*, 2008.https://files.eric.ed.gov/fulltext/ED525058.pdf.

[3] Zhao, Yong, and Jim Watterston. 'The changes we need: Education post COVID-19.' *Journal of Educational Change* vol. 22.1, 2021, pp. 3-12. https://doi.org/10.1007/s10833-021-09417-3.

The aim of this thesis is to show how games could impact education positively. Chapter one is an observation of games' particular qualities of which could be useful in relation to education. The psychology to do with games and players will be explored looking at concepts such as the magic circle developed by Arlete Dos Santos Petry and self-determination theory developed by Richard Ryan and Edward Deci. The chapter will answer how games are uniquely suited to education with them being a medium in which students could happily engage in, looking at work and play merging, and goals, needs and wants being met. Games could be practically used for literary projects as proposed by Karen Schrier in *Ethics and Game Design, Teaching Values through Play* (2010), or formative assessment of which games make use of for to help players succeed. The issues of education and well-being are investigated furthering on the works of Dr. Maeve O'Brien in "Well-being and post-primary schooling," (2008) for the understanding of why games are being proposed in the first place. Secondary school can be a difficult transitioning period for many students which can have adverse effects on their wellbeing and idea of education. It is important to explore ways to remedy the issues that students have in relation to participation and enthusiasm. Games as discussed by Eva Imania Eliasa in "Increasing values of teamwork and responsibility of the students through games," (2014) encourage participation in a way that is related to the subject matter and rules and as such could be an integral application to education that aids connectivity.

Chapter two examines how games can be useful in relation to cognition. An analytical approach is used looking at learning and thinking and how these are balanced in games for to enact the flow state in which learning is optimized, furthered from Vanessa Hemovich's *The Schema Is (Still) Mightier than the Sword* (2019). The flow state is maintained through games' numerous design methods that can assist learning as discussed by Jan L. Plass in 'Foundations of Game-Based Learning' (2015). These methods are why game-based learning is being proposed from a cognitive standpoint. Game-based learning being the use of digital games to teach in an educational setting, which is gaining traction among researchers and

educators. Game-based learning applications are explored such as the digital game *Variant: limits* (2017) which uses aspects of commercial games such as a narrative and virtual environment and has had high success rates in the game-based course it is a part of. There are also several small-scale games examined that have been implemented into education such as science, technology, engineering and mathematics (STEM) games as discussed by Jan L. Plass in *Handbook of Game-Based Learning* (2020). These have had positive effects while students engage in critical thinking and applied learning. Games incorporate vast amounts of data which can be interacted with, as such there is much to be learned from them. It can be seen with simulations that they are effective for teaching and so it is logical for games to be a part of education for the betterment of students learning.

Chapter 3 concerns how games are motivational and are designed to induce emotions that result in positivity of which could be applied to enhance education. How digital games have affected people's lives positively will be explored and how many are accustomed to them which offers the question of using them for a higher purpose. Motivating students is a difficult task and intrinsic motivation is lacking in schools as discussed by Nicholas Gillet in "Intrinsic and Extrinsic School Motivation as a Function of Age" (2012). Games are good intrinsic motivators, and motivation can lead to increased learning and more goals. Gamification is a topic that is also becoming popular along with game-based learning, where game elements are being implemented into non-game settings for increased learning and motivation. As classified by Armando Toda in "Analysing gamification elements in educational environments using an existing Gamification taxonomy" (2019), they are things like incorporating levels or rewards and serve as a way to diversify the experience and make it more exciting. It is important to interest students and get them wanting to progress in education like they do in games. To assimilate students into progressing academically, education should further consider the design of role-playing games (RPG)'s progression systems which work effectively at motivating players to reach their potential. For example, showing progress, benefits, or which paths to go

down in a branch system would emotionally connect students and give incentive towards building character.

This thesis proposes the changing of secondary school level education with the use of games and game-like methods. It is an amalgamation of research on games' particular qualities, methods, and applications in relation to education. Research is furthered through games discussed in authoritative sources that reflect important concepts and rationales. As games and technology become more prominent in society it is natural for them to bleed into other aspects of life. As such education will continually be affected and should be able to change to accommodate.

**Chapter One: Games Particular Qualities in Relation to Education**

This chapter explores why games are being proposed to be implemented into education due to the particular qualities of games. The concept of the magic circle developed by Arlete Dos Santos Petry, will be discussed to show how games could connect work and play. To get a sense of the psychological reasoning towards why people play games, goals will be inspected along with the concept of self-determination theory[4] (psychological needs developed by Richard Ryan and Edward Deci), to help the understanding of people's wants and needs. By inspecting the concept of procedural rhetoric developed by Ian Bogost, (a videogame designer) in *Fallout 3*, it can be seen that games' uniqueness could fit into education in the form of literary projects or equality studies to engage students more viscerally. The properties of well-being will be explored and its importance in relation to education. This will lead to discussion on the outdated pedagogical design of secondary school and how it could be helped with the implementing of games where a hypothetical game will be proposed to tackle pertinent issues.

Games are a process of interaction, broadly speaking, and can be linked to many conceptualisations as they connect us to the knowledge and experience of humanity with the mainstream. According to John Sharp in relation to the game "Fluxchess", he states it can be "a space within which to explore sensory perception and meaning-making."[5] Through games people interact and get a sense of values to do with interconnected relationships. As such games can be a useful tool for development and could serve a role in education as a means of establishing what is meaningful to students while also being a medium in which they can explore themselves, others, and the educational process.

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[4] Deci, Edward L., and Richard M. Ryan. 'Self-Determination Theory.' *Handbook of Theories of Social Psychology,* Vol. 1, 2012, pp. 416–36. https://doi.org/10.4135/9781446249215.n21.

[5] Sharp, John. *Works of Game : On the Aesthetics of Games and Art*, MIT Press, 2015. https://ebookcentral.proquest.com/lib/iadt-ebooks/detail.action?docID=3339955. P.21.

To further get a sense of games' qualities the magic circle will be explored. The magic circle "is understood as the arena based on space, time or product on which play takes place."[6] Dos Santos Petry describes it as a "scared space" that is the game "material or imaginary". In it differences are dismissed within a state where there are no serious consequences.[7] This is a reason for why games could be useful in education. They can become a medium for communication where people can be themselves. With the magic circle a person will be in a "protective psychological bubble" which can enact a state of "flow." Mihaly Csikszentmihalyi, a psychologist who developed the concept of flow in relation to performance, his understanding of flow is "the state in which people are so involved in an activity that nothing else seems to matter."[8] Flow can create a mode in which the full power of the mind is engaged.[9] As such people can get into a strong work ethic. With games more students would be enticed into this work ethic as games are engaging and interactive. The aim is to merge the concept of playing a game and working together for enhanced experience and learning.

In games goals determine the play experience. Pippin Bar states that "video games contain systems of values which players perceive and adopt."[10] Goals as discussed by Lindley and Sennersten in 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics' (2008) can range hierarchically from those intended by the designers such as missions and levels to those created by the player such as exploration, or personal combat

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[6] Dos Santos Petry, Arlete. 'The Concept of Magic Circle: A Critical Reading.' *Obra Digital*, no. 5, 30 September 2013, pp. 36-57. https://doi.org/10.25029/od.2013.30.5. P.37.

[7] Dos Santos Petry, Arlete. 'The Concept of Magic Circle: A Critical Reading'. *Obra Digital*, no. 5, 30 September 2013, pp. 36-57. https://doi.org/10.25029/od.2013.30.5. P.48.

[8] 'Csikszentmihalyi, Mihaly. *Flow*. Guilford Publications Inc, 2005. https://oleksandr-tereshchuk.com/wp-content/uploads/2021/10/Flow-Book-Excerpts-Oct-13-2021.pdf.P.2.

[9] Dos Santos Petry, Arlete. 'The Concept of Magic Circle: A Critical Reading.' *Obra Digital*, no. 5, 30 September 2013, pp. 36-57. https://doi.org/10.25029/od.2013.30.5. P.47.

[10] Barr, Pippin, James Noble, and Robert Biddle. 'Video Game Values: Human–Computer Interaction and Games.' *Interacting with Computers*, vol. 19, no. 2, March 2007, pp. 180–95. https://doi.org/10.1016/j.intcom.2006.08.008.

challenges. They propose the hierarchical goal structure is reflected in a hierarchical structure of schemas within a player's thought processing, where schemas relate systematically to the completion of goals. In this structure are the motivating and pleasurable aspects of the play experience.[11] Such as "effectance"[12] which is the input output relationship between the player and game. "Closures"[13] are the resolution of mental or emotional strain found in narrative or development. "Achievement"[14] refers to the completion of tasks designed by the game that are meant to be significant and act as a furthering of the player's character. "Episodes"[15] are all the in-game activities that a player can engage in like exploration. "Escape"[16], is simply escapism, something unique to traverse and "achievement of a sense of flow,"[17] is

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[11] Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology,* 2008, pp. 1–7. https://doi.org/10.1155/2008/216784. P.3.

[12] "Effectance which is a basic feeling of empowerment created when an action of a player results in a response from the game system." Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology,* 2008, pp. 1–7. https://doi.org/10.1155/2008/216784.

[13] "Closure is interpreted here as the completion of the algorithm constituted by a play schema. Closures may involve completion of expected outcomes and resolution of dramatic tensions, corresponding to the completion of cycles of suspense and relief". Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology,* 2008, pp. 1–7. https://doi.org/10.1155/2008/216784.

[14] "Completion of schemas by the achievement of specific goals". Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology*, 2008, pp. 1–7. https://doi.org/10.1155/2008/216784.

[15] "Episodes may include the excitement of possible action, the pleasures of curiosity and discovery, the pleasures of experiencing negative emotions of suspense followed by the transference of arousal to an ecstatic experience when the challenge creating the anxiety of suspense is overcome." Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology,* 2008, pp. 1–7. https://doi.org/10.1155/2008/216784.

[16] "Escape to an alternative reality provided by the fictional world represented by a game … and facilitated by imaginative displacement." Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International Journal of Computer Games Technology*, 2008, pp. 1–7. https://doi.org/10.1155/2008/216784.

[17] "In game play, this being a state at the boundaries between engagement and immersion, of being totally absorbed in meeting a constantly unfolding challenge … Particular occurring when schema execution demands attentional resources above a level that would result in player boredom and below a level that would result in excessive difficulty." Lindley, Craig A., and Charlotte C. Sennersten. 'Game Play Schemas: From Player Analysis to Adaptive Game Mechanics'. *International*

where the player is engaged and immersed. Through these aspects the psychological reasoning to why people play games can be seen. This could help with the implementing of games into education by understanding why people have goals. People want to have an effect, a sense of developing, and a diverse and unique environment to engage in.

To go deeper into the psychology of gamers "self-determination theory" (SDT) will be useful to examine which is in relation to the need for "autonomy, competence, and relatedness"[18] among human beings. Games can satisfy these needs as discussed by Richard M. Ryan in 'The Motivational Pull of Video Games: A Self-Determination Theory Approach' (2006). It can be seen through "effectance" and the acquiring of "new skills or abilities"[19] and the enacting of them, through the back and forth of gameplay, that players enact a sense of competence which is integral to the gratifications provided by games[20] and makes a person feel in control. Competence when optimal can be related to "flow" which "is a euphoric state of concentration and involvement, often claimed to be one the most enjoyable and valuable experiences one can have."[21] Flow occurs when there is a "balance of challenges and skills".[22] An important point is that

*Journal of Computer Games Technology,* 2008, pp. 1–7. https://doi.org/10.1155/2008/216784. P.3-4.

[18] Ryan, Richard M., C. Scott Rigby, and Andrew Przybylski. 'The Motivational Pull of Video Games: A Self-Determination Theory Approach'. *Motivation and Emotion,* vol. 30, no. 4, 12 December 2006, pp. 344–60. https://doi.org/10.1007/s11031-006-9051-8.

[19] Ryan, Richard M., C. Scott Rigby, and Andrew Przybylski. 'The Motivational Pull of Video Games: A Self-Determination Theory Approach'. *Motivation and Emotion*, vol. 30, no. 4, 12 December 2006, pp. 344–60. https://doi.org/10.1007/s11031-006-9051-8. P.349.

[20] Ryan, Richard M., C. Scott Rigby, and Andrew Przybylski. 'The Motivational Pull of Video Games: A Self-Determination Theory Approach'. *Motivation and Emotion*, vol. 30, no. 4, 12 December 2006, pp. 344–60. https://doi.org/10.1007/s11031-006-9051-8. P.350.

[21] Loïc Caroux, Katherine Isbister, Ludovic Le Bigot, Nicolas Vibert. 'Player–Video Game Interaction: A Systematic Review of Current Concepts | Elsevier Enhanced Reader', 2015. https://doi.org/10.1016/j.chb.2015.01.066. P.12.

[22] Nakamura, Jeanne, and Mihaly Csikszentmihalyi. *The concept of flow. Handbook of positive psychology*, 2002. https://nuovoeutile.it/wp-content/uploads/2015/12/2002-Flow.pdf. P.95.

people play commercial games out of their own volition which is important in terms of autonomy. People have control over what they want to engage in and have the opportunity to replay to develop skills or explore and play at their own pace. In relation to relatedness, it is useful to discuss *Halo 3* (2007) as a prosocial game. *Halo* provided many entertaining interactive modes which would develop players' sense of belonging and familiarity through play, while establishing community with in-game networking. Halo had a strong fanbase which can be seen as there have been several books, movies, and toys to do with the halo franchise among several games. Through SDT it can be seen that videogames can provide much in terms of psychological needs and as such are powerful mediums.



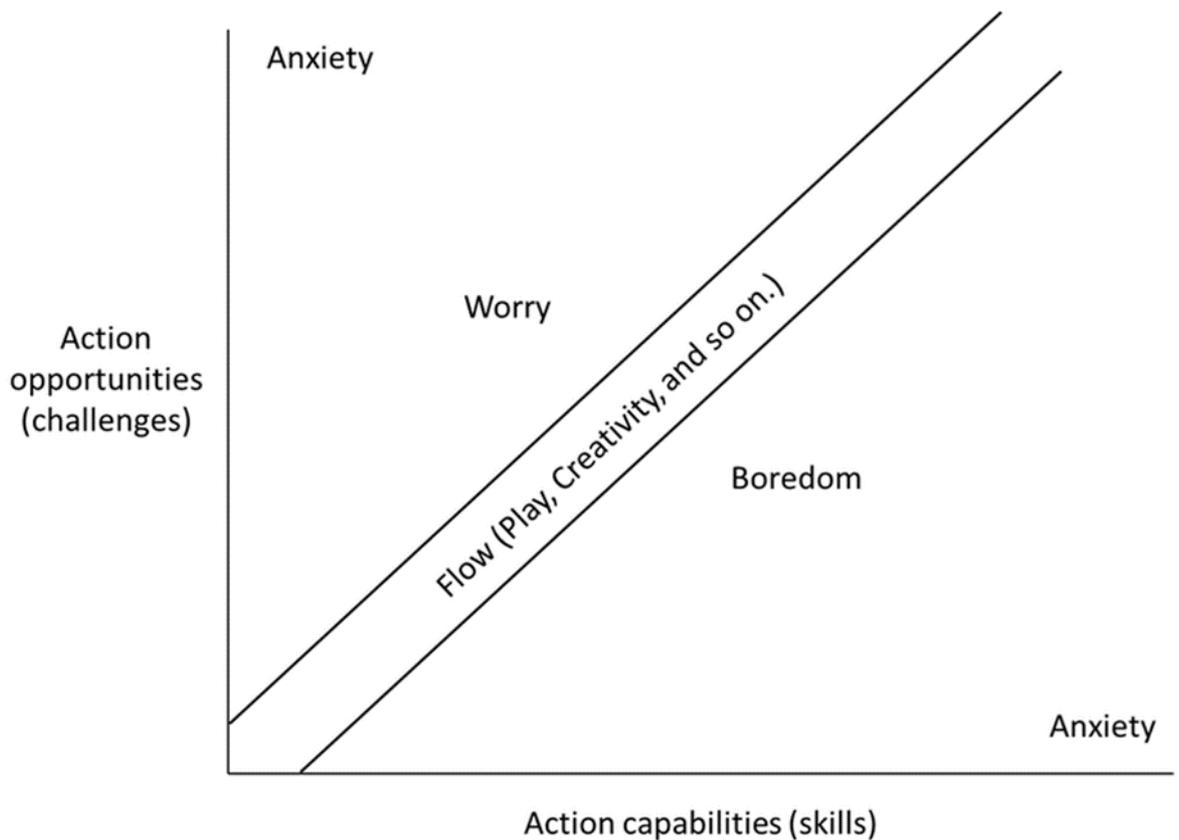Fig. 1 Flow graph (adapted from Csikszentmihalyi, 1975), Schiepe-Tiska, Anja. *In the power of flow: The impact of implicit and explicit motives on flow experience with a special focus on the power domain*. Diss. Universitätsbibliothek der TU München, 2013.[23]

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[23] Schiepe-Tiska, Anja. *In the power of flow: The impact of implicit and explicit motives on flow experience with a special focus on the power domain*. Diss.

An aspect of games' uniqueness can be seen with procedural rhetoric. In the game *Fallout 3* (2008) players can often choose sides and there is a karma mechanic, doing bad things will give you a negative karma and certain things will play out differently because of this. Procedural rhetoric as defined by Bogost is "the art of persuasion through rule-based representations and interactions, rather than the spoken word, writing, images, or moving pictures."[24] In *Fallout* procedural rhetoric plays a big role. It can be seen through killing, as to do so prematurely would leave things undiscovered and unattainable. The player is encouraged to find out all information in relation to quests. Sometimes it is beneficial to further communication between a seemingly bad character. Because of this *Fallout* encourages players to find out the story of both sides and choose for themselves on how best to act. Often choices can be "ethically ambiguous",[25] this can be seen with the karma mechanic as both positive and negative karma can lead to negative responses, altogether adding to the sense of the virtual world being hostile as it is in a post-apocalyptic setting. Bogost furthers his description of procedural rhetoric by saying "Video games' narrative and gameplay elements can support each other to make claims about how the world works."[26] This is an element of what makes games interesting to players. In the case of *Fallout*, a phrase iterated is "war never changes," such things relate to an immersive and meaningful sense to do with the games' and reality's functioning's.

*Fallout 3* could be implemented as a literary project into school as they do with literature, (as has been mentioned by the researcher and professor Karen Schrier, for "group discussion" for reflection looking at "complex

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Universitätsbibliothek der TU München, 2013. (PDF) In the Power of Flow: The Impact of Implicit and Explicit Motives on Flow Experience with a Special Focus on the Power Domain (researchgate.net)

[24] Jones, Robert. "Saving worlds with videogame activism." *Handbook of research on effective electronic gaming in education*, IGI Global, 2009, pp. 970-988. P. 21.
[25] Schrier, Karen, and David Gibson, eds. *Ethics and game design: teaching values through play: teaching values through play*. IGI Global, 2010. P.11.
[26] Schrier, Karen, and David Gibson, eds. *Ethics and game design: teaching values through play: teaching values through play*. IGI Global, 2010. P.22.

systems, alternative roles, personal choices"[27]). This would be more interesting than ageing literature, for students. According to Sharp "A well designed game could provide an experience unique to games that more clearly drew out ideas and more viscerally engaged the audience than other art forms."[28] Out of the many decisions one can make in *Fallout 3* the students and teachers would discuss the meaning, symbology, and procedural rhetoric behind the quests in the game. The subject could encompass that of equality studies as the game takes karma, class, gender, ability, ethnicity, and religion into account. The subject could incite reflection and encourage students to discuss diversity[29] in the classroom, getting a sense of respect for each other.

It is important to look at happiness and well-being as they are "connected with teaching and education, and with learning and achievements."[30] Games are a great medium for interaction and engagement but the focus of them being implemented into secondary school education should be for the betterment of student's opportunities and experience. "SDT further argues … to the extent any activity affords experiences of volition, effectiveness, and social connection, it should yield enhancements in wellbeing."[31] In "Allardt's model of welfare" which "assesses well-being as an entity in school setting"[32] it explores "having, loving, and being"[33] which are all relevant but "being" more so, as it looks at the importance of there being "opportunities" for "self-fulfilment", "opportunities for improving one's own knowledge and skills" and

[27] Schrier, Karen, and David Gibson, eds. *Ethics and game design: teaching values through play: teaching values through play*. IGI Global, 2010. P.26.

[28] Sharp, John. *Works of Game : On the Aesthetics of Games and Art*, MIT Press, 2015. https://ebookcentral.proquest.com/lib/iadt-ebooks/detail.action?docID=3339955. P.54

[29] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.159.

[30] Konu, A. 'Well-Being in Schools: A Conceptual Model'. *Health Promotion International,* vol. 17, no. 1, 1 March 2002, pp. 79–87. https://doi.org/10.1093/heapro/17.1.79. P.1.

[31] Ryan, Richard M., C. Scott Rigby, and Andrew Przybylski. 'The Motivational Pull of Video Games: A Self-Determination Theory Approach'. *Motivation and Emotion,* vol. 30, no. 4, 12 December 2006, pp. 344–60. https://doi.org/10.1007/s11031-006-9051-8. P.350.

[32] Konu, A. 'Well-Being in Schools: A Conceptual Model'. *Health Promotion International,* vol. 17, no. 1, 1 March 2002, pp. 79–87. https://doi.org/10.1093/heapro/17.1.79. P.1.

[33] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA,* 2008.  P.47.

being able to move at "one's own pace".[34] It can be seen that games can account for these as discussed with SDT.

Exploring how secondary school is outdated or acknowledging its flaws is a pertinent thing to discuss. Secondary school explored by Dr. Maeve O'Brien, (a professor of sociology and human development) is primarily about "control, cohesion and economics."[35] This is because it is "related to industrial employment in both phases of the Industrial Revolution."[36] The resemblances of outdatedness can be seen, from the regimented structure to seating and restrictive communication. There have been progressive changes throughout the years with the using of technology and less strict disciplining. At its core though it is a remnant of a bygone era with an "outdated factory model,"[37] as discussed by the researcher Kurt W. Fischer.

The testing in secondary school can have harmful effects such as the "downward comparison"[38] issue and "culture of individual competitiveness."[39] These issues are furthered due to the function of secondary school being about doing without question which is "problematic in terms of meaning seeking which is core to well-being,"[40] as stated by O'Brien. The standard teaching practice of the teacher being the only source of information to docile students may be outdated.[41] The testing also does not consider all forms of intelligence. Students could benefit from different forms of assessment like

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[34] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA,* 2008. P.139.
[35] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.96.
[36] Becker, Sascha O, Erik Hornung, and Ludger Woessmann. 'Education and Catch-up in the Industrial Revolution'. *American Economic Journal: Macroeconomics*, vol. 3, no. 3, 1 July 2011, pp. 92–126. https://doi.org/10.1257/mac.3.3.92. P.3.
[37] Fischer, Kurt W., and Mary Helen Immordino-Yang. *The Jossey-Bass reader on the brain and learning.* John Wiley & Sons, 2007. P.51.
[38] "Devaluing others so that the self looks good in comparison (what is referred to as downward comparison)". O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.39.
[39] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.147.
[40] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.96.
[41] Bimbola, Oludipe, and Oludipe I. Daniel. "Effect of constructivist-based teaching strategy on academic performance of students in integrated science at the junior secondary school level." *Educational research and reviews*, vol. 5.7, 2010, pp. 347-353. P.348

the implementing of "formative assessment"[42] which is used in games. The "summative assessment"[43] which is what secondary schools implement mainly can have many negative effects when used immoderately. It can have adverse effects on self-esteem, lessening effort. It can lead to a focus on performance rather than learning and "test anxiety", which furthers into "downward comparison" resulting in the unacknowledging of what people can contribute. The teaching methods also only accommodate for particular ways of learning,[44] which inhibits more well-rounded learning.

The testing could be broadened with games, inducting students into an engaging task-oriented experience that is related to the teaching in ways that promote learning through formative assessment. Games would also help with the shifting of focus onto games instead of the teacher. Wynne Harlen, a educator and researcher, states "there is medium-weight evidence that schools vary in the support they give … and that fewer students would give up on themselves as learners if more schools worked to raise these students' sense of self-efficacy, by focusing on task- and learning-centred goals and using assessment to help them succeed. This emphasizes the significance of formative assessment and calls for measures that inhibit the low self-esteem from maturing.[45] Increased self-esteem in a gamified school context would help the communication flow, encourage learning, and improve wellbeing. Games being an interactive medium could enable students to have more control, and in turn knowledge of material, increasing self-esteem and self-efficacy.

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[42] "When the use is 'by learners and their teachers (in order) to decide where the learners are in their learning, where they need to go and how best to get there' (ARG, 2002), the assessment is described as formative or 'assessment for learning'." Harlen, Wynne, et al. 'A systematic review of the impact of summative assessment and tests on students' motivation for learning.' 2002. P.58.

[43] "When the use is to report to students and others where the students have reached in their learning in relation to overall goals and to monitor their progress over time, the assessment is described as summative or assessment of learning." Harlen, Wynne, et al. 'A systematic review of the impact of summative assessment and tests on students' motivation for learning.' 2002. P.59.

[44] Harlen, Wynne, et al. 'A systematic review of the impact of summative assessment and tests on students' motivation for learning.' 2002. P.59.

[45] Harlen, Wynne, et al. 'A systematic review of the impact of summative assessment and tests on students' motivation for learning.' 2002. P.55.

It is useful to explore how the framework of a hypothetical team working game could encourage participation in school connecting students and lessening seclusion.[46] It could balance involvement with clearness, have an aspect of self-government, and could help build strong bonds.[47] Students need a medium to interact properly where the rules are enacted effortlessly, and everyone can function to the best of their abilities. Games can create such a medium if everyone is interested in the game. As discussed by Eva Imania Eliasa, a Doctor of Education, "games become media of communication among members, so everything can run better."[48] This could be helped in the fact that it is a teamworking game and so if there was an emphasis on all types of intelligence in the game's play experience and game mechanic. The game could encourage intellectual expression related to the game resulting in a remedy for many issues that plague the secondary school experience. This is something that deviates somewhat from game-based learning and gamification (which will be furthered later) in that the aim is not so easily targeted. The game would have to adapt and change so that all students are being put to use together, with puzzles, challenges such as dealing with artificial intelligence or simulations all on certain educational subjects. Perhaps the technology for such a game is not yet quite feasible but theorizing it may help in the realisation of it. It is conceivable for a virtual game to be capable of enacting such an experience.

Games have inherent qualities that can be used in education for the betterment of students' development and experience. This can be seen with the magic circle as it enables flow and a strong work ethic disguised as play. By looking at the psychology of gaming through goals and self-determination theory it can be seen that games can cater for peoples' needs and wants which would help in the actualization of making education more effective

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[46] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.124.

[47] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.105.

[48] Eliasa, Eva Imania. 'Increasing Values of Teamwork and Responsibility of the Students through Games: Integrating Education Character in Lectures'. *Procedia - Social and Behavioral Sciences*, vol. 123, March 2014, pp. 196–203. https://doi.org/10.1016/j.sbspro.2014.01.1415. P.202.

through games. Through discussing procedural rhetoric, it can be seen that games could be used as literary projects or to open up discussion in relation to equality studies which could induce deep thought. Games could be beneficial for well-being as they enable a constructive way of being which could relate well into education. Games could enact forms of formative assessment in education which would help balance the process and assist students to succeed while increasing self-esteem and self-efficacy. To encourage participation a teamworking game could be constructive. Digital games can engage students in ways that no other mediums can and so should be considered in the ways presented.

## Chapter Two: Games Uses from a Cognitive Standpoint

This chapter explores why games should be implemented into secondary school from a cognitive standpoint. Feedback is discussed based upon the research of Jan L. Plass, how it constructively affects learning with the supporting and gaining of knowledge for students and players alike. This is furthered with an analysis of thinking and learning in gameplay through game's affordances (the benefits of game design), schema activation (quick processing), and "Cognitive load theory"[49] (using of information efficiently) showing how games can balance them. This is a furthering of the information presented by Vanessa Hemovich and will lead to discussion on game-based learning applications and how they cater for "critical thinking"[50] and "applied learning."[51] Agency as "commitment to meaning" in relation to games and a school setting is discussed in terms of how it could affect cognitive processing. How games can "model complex systems" will be investigated to help broaden the understanding of the uses of games in terms of learning.

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[49] "Cognitive load theory … is concerned with the development of instructional methods that efficiently use people's limited cognitive processing capacity to stimulate their ability to apply acquired knowledge and skills to new situations." Paas, Fred, Juhani E. Tuovinen, Huib Tabbers, and Pascal W. M. Van Gerven. 'Cognitive Load Measurement as a Means to Advance Cognitive Load Theory'. *Educational Psychologist*, vol. 38, no. 1, 1 January 2003, pp. 63–71. https://doi.org/10.1207/S15326985EP3801_8.

[50] "Critical thinking is best understood as the ability of thinkers to take charge of their own thinking. This requires that they develop sound criteria and standards for analysing and assessing their own thinking and routinely use those criteria and standards to improve its quality … Critical thinking, therefore, requires a high degree of continual self-reflection and intellectual discipline … A disciplined mode of thinking. When one learns "history," for example one learns to think historically." Elder, Linda, and Richard Paul. "Critical thinking: Why we must transform our teaching." *Journal of Developmental Education,* vol. 18.1, 1994, p. 34. https://www.proquest.com/openview/919546129618774927ef200f2fc3bb02/1?pq-origsite=gscholar&cbl=2030483.

[51] "Applied learning pedagogies share a design fundamental: the nurturing of learning and growth through a reflective, experiential process that takes students out of traditional classroom settings. The approach is grounded in the conviction that learning is maximized when it is active, engaged, and collaborative. Each applied learning pedagogy provides students with opportunities to connect theory and practice, to learn in unfamiliar contexts, to interact with others unlike themselves, and to practice using knowledge and skills." Ash, Sarah L. 'Generating, Deepening and Documenting Learning,' 2009. p.25

Feedback, negative or positive, is what keeps people engaged in the learning process, if done right it can provide valuable insight encouraging progression. Games are designed so that there is constant feedback with the player through a cause-and-effect relationship. This is one of the reasons games are proposed as learning tools for education in this thesis. Games enable a player to go at their own pace and engage through a loop system in which feedback enables new challenges prompting new responses engaging learning in a clear and concise manner effectively being a vehicle for the flow state.



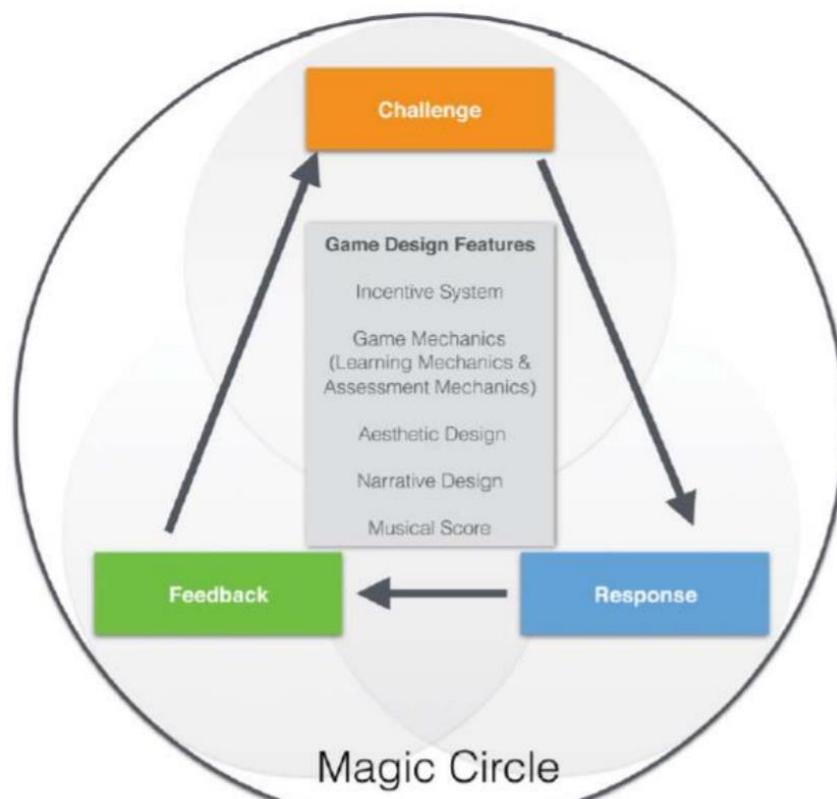Fig. 2: Model of game-based learning, Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of game-based learning.' *Educational psychologist*, vol. 50.4, 2015, pp. 258-283.[52]

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[52] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P. 262

Thinking happens in games through stimuli, obstacles, and experimentation. It is important to make a distinction between thinking and learning to get a better sense of cognitive processing. For controlled thinking the player must stop and assess which is in relation to problem solving. For optimal learning the player will be immersed in a flow state of processing with efficient feedback resulting in the retaining of information which is in relation to memorization of information. Problem solving and memorization of information are the main means in the school teaching practice in relation to cognition. Games have numerous methods or affordances for enhancing these means as discussed by Plass. Firstly situatedness which encompasses the displaying of information at the most opportune times and in ways that reflect reality, facilitating the application of what is learnt.[53] Games offer "repeated opportunity to practice skills and apply knowledge … by providing different, but related, experiences."[54] Games can incorporate the use of "scaffolding," "an ongoing dynamic evaluation of the learner's acquisition of the skills to be learned, and a progressive fading of supports as the learner progresses". Games can also dynamically assess players through gameplay which will give information on the player's "knowledge or skills"[55] while changing to accommodate. These methods assist learning and thinking, helping things flow.

In school memorization of information and problem solving are engaged in the form of tests, lectures and homework which are evaluated in a summative process and can be broken up resulting in less continuity and in turn less connections made from the learning process. This process can make failure appear final also which can take over from the learning aspect and add unhelpful pressure. The affordances of games can help decrease

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[53] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.265.

[54] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.266.

[55] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.266

worrying with the renovation aspect of games such as being able to replay enabling "graceful failure" where students could experiment and learn from failing. These show that games' methods can be a balanced and effective way of aiding learning and thinking.

Schemas are an integral part when it comes to learning and thinking. Vanessa Hemovich in *The Schema Is (Still) Mightier than the Sword*, defines schemas as "an organized mental representation of stimuli to help relate concepts to one another."[56] Through learning people relate things to one another through assimilation and accommodation. Schemas help to "streamline our information processing"[57] and so leads us to prediction and such in games. Schemas aid the enacting of the flow state through quick cognitive processing which requires less controlled thinking that can inhibit the flow state. For the flow state to continue prompt feedback must be given in a clear way with few distractions.[58] "Cognitive load theory"[59] is important to discuss in relation to this as it proposes that too much information will overload the thinking and learning process. Schemas are useful for toning down cognitive load and enabling the flow state.[60] Such things will occur in a well-designed game where schema activation will be enticed through the game design and so learning will be a fast process.

[56] Hemovich, Vanessa. *The Schema Is (Still) Mightier than the Sword: How Cognition Predicts Player Spatial Coding Systems*, 2019. *Youtube*, uploaded by GDC 2021, https://www.youtube.com/watch?v=cDOAueN6mIc. 1:30

[57] Hemovich, Vanessa. *The Schema Is (Still) Mightier than the Sword: How Cognition Predicts Player Spatial Coding Systems, 2019. Youtube,* uploaded by GDC 2021, https://www.youtube.com/watch?v=cDOAueN6mIc. 3:30

[58] Hemovich, Vanessa. *The Schema Is (Still) Mightier than the Sword: How Cognition Predicts Player Spatial Coding Systems, 2019. Youtube,* uploaded by GDC 2021, https://www.youtube.com/watch?v=cDOAueN6mIc.

[59] "Cognitive load theory … is concerned with the development of instructional methods that efficiently use people's limited cognitive processing capacity to stimulate their ability to apply acquired knowledge and skills to new situations." Paas, Fred, Juhani E. Tuovinen, Huib Tabbers, and Pascal W. M. Van Gerven. 'Cognitive Load Measurement as a Means to Advance Cognitive Load Theory'. *Educational Psychologist*, vol. 38, no. 1, 1 January 2003, pp. 63–71. https://doi.org/10.1207/S15326985EP3801_8.

[60] Hemovich, Vanessa. *The Schema Is (Still) Mightier than the Sword: How Cognition Predicts Player Spatial Coding Systems, 2019. Youtube,* uploaded by GDC 2021, https://www.youtube.com/watch?v=cDOAueN6mIc.

It is important to balance controlled thinking with flow and schema activation. An example of where such a balance could occur is with SLA (Second-language acquisition) in games. Jonathon Reinhardt in *Handbook of game-based learning*, discusses when the player has a different language other than the games' pre-set language and so must accustom. Reinhardt explores the *Sims* games in this context as the game incorporates the activities of "everyday life" in a simulation type game such as exercising, painting or following a vocation, as such it is a great way to learn valuable information in relation to language. In such games the player must learn the different meanings of text which would encompass narrative, game controls, and in-game objects. It is important to note that for players to want to play these games it is for the gaming experience and not for the learning aspect. This means that the game design must incorporate a balance between controlled thinking and flow (as immersion in gameplay). To do this, games must compartmentalize information, not display superfluous information, and match "visual and auditory information."[61]

There are several game-based learning games for educational purposes to date. As discussed by the researcher Sebastian Deterding, "students who play educational games often go beyond expectations and tend to have more enthusiasm."[62] It can be argued traditional teaching methods don't create the right atmosphere for learning languages. School must create a want in students for participation and learning and in turn diversify the atmosphere. Game based learning games could help this happen while enhancing cognitive processing. The game *Influent* (2022) which aims to teach vocabulary, "provides a visualisation of items. Alongside basic nouns found in the environment, the game teaches adjectives and verbs associated with

[61] Plass, Jan L., Richard E. Mayer, and Bruce D. Homer. *Handbook of Game-Based Learning.* Cambridge, UNITED STATES: MIT Press, 2020. http://ebookcentral.proquest.com/lib/iadt-ebooks/detail.action?docID=6018189. P.400.

[62] Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. 'From Game Design Elements to Gamefulness: Defining "Gamification"'. In *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments* , 2011. https://doi.org/10.1145/2181037.2181040. P.1.

each noun."[63] The game however is lacking in gameplay and is described as "confined"[64]. It is not the type of game someone would play simply for the experience. This is important as for educational games to be fully effective they must take some incentive aspects from the usual commercial games.

A game that takes on board the incentives found in commercial games, discussed in "Game-Based Course Design: A New Approach for Effective Online Teaching" (2019), is *Variant: Limits* (2017), which is a game for teaching calculus.[65] The gameplay is similar to commercial type games in that there is a character to relate to along with a narrative and an interesting environment to explore. The goals are related to the story which implements challenges in the form of puzzles which incorporate the workings of calculus. The game was taken very seriously in terms of implementation into a "formal educational setting." It was tested first as an "experimental research study" and after became the centre of an undergraduate level course. It can be seen that the game engages students on a practical level and many "reported positive learning outcomes."[66] Having a game-based course (GBC) is a good way to incorporate games into a "formal educational setting" and shows that commercial type games are being recognised for their potential in terms of immersion and education. An important point about the game is it is to be self-directed which would make a big difference to learners as they would have more control and would be able to home in on what they need to learn. It is also connected to reality through outside discussion incorporating

[63]  Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. 'From Game Design Elements to Gamefulness: Defining "Gamification"'. In *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments,* 2011. https://doi.org/10.1145/2181037.2181040. P.3.

[64] Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. 'From Game Design Elements to Gamefulness: Defining "Gamification"'. In *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media,* 2011. https://doi.org/10.1145/2181037.2181040. P.3.

[65] "Calculus, branch of mathematics concerned with the calculation of instantaneous rates of change." 'Calculus | Definition & Facts | Britannica'. Accessed 21 January 2023. https://www.britannica.com/science/calculus-mathematics.

[66]Thomas, André, et al. "Game-based course design: A new approach for effective online teaching." *European Conference on Games Based Learning.* Academic Conferences International Limited, 2019. https://doi.org/10.34190/GBL.19.201.

learning on the uses of calculus along with a sophisticated form of assessment by showing gameplay analytics.



Fig. 3 Screenshot, *Variant: Limits (2017), Triseum,* Image from Richard Nira's article.[67]

There are many educational games in the realms of science, technology, engineering and mathematics (STEM). Although most are not on the same level as *Variant: Limits* in terms of gameplay. STEM games enable cognitive processing through simple game functions that are designed to place students in fields related to STEM engaging useful thought and learning. "STEM games give players a specific purpose and rationale to collect data, solve problems, find patterns, and design solutions, thereby developing and refining skills that are valuable practices in STEM fields". It is important to

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[67] Richard Nira. *Video games help students master calculus,* Texas A&M University School of Performance, Visualization & Fine Arts. August 2021. https://pvfa.tamu.edu/news/2021/08/04/untitled-6/.

discuss such games as they offer a diverse change to the educational environment and enable "critical thinking"[68] and "applied learning."[69]

STEM games would impact critical thinking in students as the games would immerse students in a functional way through its game mechanics to the subject material. STEM games incorporate the use of roles and so students would have to understand and be able to apply the role's needs such as interacting with others in relation to the material. This would lead them to think in terms of the subject, enabling practical thinking such as scientific reasoning as students must experiment, collect data, and apply useful knowledge. The roles would influence self-reflection in students and give insight into the fields and so could encourage continual assessment of their own thinking making it more efficient and critical. Critical thinking is a way of being more so than thinking as it leads to the asking and answering of the right questions in relation to the subject.

In the alternate-reality game *Vanished* (2011) "there is a diverse array of activities to engage in, including collecting backyard measurements, playing online games, visiting real locations, conversing with scientists, and participating in forums to debate theories."[70] These games would exhibit

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[68] "Critical thinking is best understood as the ability of thinkers to take charge of their own thinking. This requires that they develop sound criteria and standards for analysing and assessing their own thinking and routinely use those criteria and standards to improve its quality … Critical thinking, therefore, requires a high degree of continual self-reflection and intellectual discipline …  A disciplined mode of thinking. When one learns "history," for example one learns to think historically." Elder, Linda, and Richard Paul. "Critical thinking: Why we must transform our teaching." *Journal of Developmental Education,* vol. 18.1, 1994, p. 34. https://www.proquest.com/openview/919546129618774927ef200f2fc3bb02/1?pq-origsite=gscholar&cbl=2030483.

[69]  "Applied learning pedagogies share a design fundamental: the nurturing of learning and growth through a reflective, experiential process that takes students out of traditional classroom settings. The approach is grounded in the conviction that learning is maximized when it is active, engaged, and collaborative. Each applied learning pedagogy provides students with opportunities to connect theory and practice, to learn in unfamiliar contexts, to interact with others unlike themselves, and to practice using knowledge and skills." Ash, Sarah L. 'Generating, Deepening and Documenting Learning,' 2009. p.25.

[70] Plass, Jan L., Richard E. Mayer, and Bruce D. Homer. *Handbook of Game-Based Learning*. Cambridge, UNITED STATES: MIT Press, 2020.

applied learning in students as they are collaborative, incorporate the use of technology, while visiting different places and conversing with people unlike themselves. Such games would be beneficial for growth as they would be a rich, active, experience outside the norm of the usual. Students engaged with scientific content from these games resulted in the applying of knowledge outside the game with groups that formed due to the games where the students worked together to further solve problems related to the content. This information is useful as it shows students would be better engaged in school content with diversity and applied learning strategies.



Fig. 4 Screenshot of Online Forum, *Vanished* (2011), MIT STEP.[71]

Agency in relation to games is described by the researcher Karen Tanenbaum, as "representing commitment to meaning."[72] This could be understood as the dedication to the furthering of a game and what that entails. As such agency relates to goals and functioning's and so is important

http://ebookcentral.proquest.com/lib/iadt-ebooks/detail.action?docID=6018189. P.396-397.
[71] *Vanished,* 2011, MIT STEP. http://web.mit.edu/mitstep/category/tags/vanished.html.
[72] Tanenbaum, K, and J Tanenbaum. 'Commitment to Meaning: A Reframing of Agency in Games,' 2009.

to discuss as it is a factor in how people play games or how well a student is engaged in their education. For learning in an environment with other learners, agency is important to discuss. Agency can be exercised individually as is done in a traditional secondary school setting. A good practice as can be seen in social games, for people to reach their goals, is the implementing of "proxy agency (where individuals influence others), and collective agency (where individuals form groups and act together)."[73] In an optimal school setting, students could have opportunities to work together to achieve their goals. Collaboration in secondary school is something that should be implemented along with games. It should be more active with agency in solving problems and learning. It can be seen this happens in games with "observational learning," as discussed by Plass, where "in some cases, observers have been found to learn more from the game than players"[74]. This is because everyone is focused on the game and wants to solve problems and demonstrate learning. This enforces the idea that goals when fixed upon by a group can influence a strong work ethic or cognitive approach among members. This could be helped with "distributed cognition" (where expertise is provided within socially normed contexts to solve problems)."[75] This could be done through teacher intervention among groups formed where the focus would not just be the teacher and a particular student being tested but rather the group. These are reasons for why games through agency towards learning could fit into an educational context.

Games can incorporate complex systems of data that can be interacted with and change with respect to the rules of the system. Through players interacting with complex systems, they get a sense of the relationships through statistics in action which in turn will familiarize them with complex

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[73] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.274.
[74] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.275.
[75] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.274.

systems which would be useful for business, science, and government work. Through RPG or governing games players could tackle "global social, economic, and environmental challenges we face today."[76] *SimCity EDU* (2013) is useful to discuss in this context in which students play the role of mayor. One of the practices in the game is for students to describe the relationships within the complex systems, through formative assessment developing capabilities which are exercised better through such games. An aspect of solving environmental challenges in education is with *Environmental Detectives* (2008), where "students used mobile handheld devices to engage in an augmented reality role-playing game where they needed to solve an impending environmental crisis."[77]



Fig. 5 Picture of handheld device used in *Environmental Detectives* (2008), MIT TEP.[78]

Simulations can be very effective for educating and can be used in training people for certain careers. In this context it is useful to discuss how education could create a simulation game that includes education on how to

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[76] Schrier, Karen, and David Gibson, eds. *Ethics and game design: teaching values through play: teaching values through play*. IGI Global, 2010. P.29.
[77] Plass, Jan L., Richard E. Mayer, and Bruce D. Homer. *Handbook of Game-Based Learning*. Cambridge, UNITED STATES: MIT Press, 2020. http://ebookcentral.proquest.com/lib/iadt-ebooks/detail.action?docID=6018189. P.396.
[78] *Environmental Detectives*, MIT TEP. https://web.mit.edu/mitstep/ar/ed.html.

interact in civic life such as taking part in the economy developing useful skills looking at how to obtain a home and nourishing relationships.[79] The traditional Sims games are modelled in a way that incorporates similar goals to do with these objectives. The games discussed could have a strong impact on applied learning, "contextual learning"[80] and "preparation for future learning"[81] in which they learn useful concepts and strategies for life.

Through examining feedback and the affordances of games it can be seen that games can facilitate learning and thinking. Establishing how schemas and controlled thinking affect the flow state is integral to understanding how games function. By looking at game-based learning applications it can be seen that games can be a practical way to learn while also enhancing critical thinking and applied learning. It is important to get a sense of how agency affects cognitive processing in an educational setting and in games and how it could improve the work ethic in students. Finally exploring how games' have the capacity to model complex systems is constructive for to have an impact on real world issues. Digital games can help cognition flow supporting what is learned through clear and useful information while influencing further learning with integral incentive.

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[79] O'Brien, Maeve. "Well-being and post-primary schooling." *Dublin: NCCA*, 2008. P.99.
[80] "Contextual learning as learning that is designed so that students can carry out activities and solve problems in a way that reflects the nature of such tasks in the real world." Yevtukh, Volodymyr. 'From Teaching to Learning: Presentation of Contextual Manual,' 2017. P.10.
[81] "To facilitate learning to apply knowledge in appropriate ways in circumstances encountered in life." Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.275.

## Chapter Three: Games Uses from a Motivational and Emotional Standpoint

This chapter explores why games should be used in a secondary school setting from a motivational and emotional standpoint. Motivation in relation to games will be examined by looking at the positive effects games have had on people's lives that came about due to motivations and positive emotions that games induced. This will lead to discussion on students' motivations looking at how intrinsic motivation is important and low among students which is something that could be helped with videogames. This will lead to discussion on "situational interest"[82] which is brief interest from engagement, and its relation to learning which shows learning is basically a by-product of motivation. This will lead to discussion on "individual interest"[83] (which is full interest), intrinsic goals, and knowledge of material, to show how pertinent they are for growth and in turn education. "Gamification" will be a main topic defined as "the use of game design elements in non-game contexts"[84] for educational purposes. Armando Toda who has a PhD in Computer Science, advocates the use of games as "tools to motivate" and classifies gamification. Through the classification of gamification, the significance of motivations and emotions in a school context is explored, showing how they could be enhanced with game elements. This will lead to the exploring of "emotional design" which is the using of design to influence emotions that

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[82] "Situational interest is defined as temporary interest that arises spontaneously due to environmental factors such as task instructions or an engaging text." Schraw, Gregory, Terri Flowerday, and Stephen Lehman. 'Increasing Situational Interest in the Classroom'. *Educational Psychology Review*, vol. 13, 1 September 2001, pp. 211–24. https://doi.org/10.1023/A:1016619705184. P.211.

[83] "Individual interest is conceptualized as a relatively stable affective-evaluative orientation toward certain subject areas or objects." Schiefele, Ulrich. "Situational and individual interest." *Handbook of motivation at school.* Routledge, 2009, pp. 211-236. http://hillkm.com/EDUC_712/Week_3/Schiefele_2009.pdf. P.198.

[84] Sailer, Michael, and Lisa Homner. 'The Gamification of Learning: A Meta-Analysis'. *Educational Psychology Review*, vol. 32, no. 1, March 2020, pp. 77–112. https://doi.org/10.1007/s10648-019-09498-w. P.8.

encourage learning.[85] This will result in discussion on the progression system in RPG games showing how design affects motivation.

Motivation is a broad ranging term which encapsulates the extent and direction of action. It concerns "why people decide to do something, how long they are willing to sustain the activity, how hard they are going to pursue it."[86] As such motivation can be related to several things that have been discussed throughout this thesis such as goals, autonomy, competency, meaningfulness, flow, and relatedness. It is important to note that "intrinsic"[87] and "extrinsic"[88] motivations are both equally key to all-round motivation. Games incorporate both and so has resulted in games' prominence in today's society and culture among youth.

It is relevant to look at games as a cultural phenomenon as games can have a strong impact on peoples' lives. In the article 'Players' perspectives on the positive impact of video games: A qualitative content analysis of online forum discussion' (2015), Jeroen Bourgonjon conducts studies using videogame forums to see how games impact players' lives in positive ways. It can be seen among the results that games, for some people encourage "self-development" through "experimentation with identity" which can lead to the "proteus effect"[89] where the way a player conducts himself in-game has an

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[85] "Emotional design refers to the use of design features to induce emotions that are conducive to learning" Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.271.

[86] Dörnyei, Zoltán, and Ema Ushioda. *Teaching and researching: Motivation*. Routledge, 2013. P.4.

[87] "Motivated to do an activity for its own sake" Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P. 268 -269.

[88] "Motivated to do an activity for instrumental or other reasons, such as receiving a reward" Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P. 269.

[89] "That an individual's behavior conforms to their digital self-representation independent of how others perceive them— a process we term the Proteus Effect." Yee, Nick, and Jeremy Bailenson. 'The Proteus Effect: The Effect of Transformed Self-Representation on Behavior'. *Human Communication Research*, vol.33, no. 3, July 2007, pp. 271–90. https://doi.org/10.1111/j.1468-2958.2007.00299.x.

impact on his "real-life identity" through psychological permeation. For example, a player may act differently online according to their character's appearance which permeates into their real-life behaviour. Games can influence an individual's welfare with "enjoyment, self-reflection, escapism, and the therapeutic use of games." Games had impacted players lives in terms of education as players "reported how video games had stimulated their curiosity, thus raising interest in school subjects." Games had been a noteworthy part of life for some players along with some games having caused "real-life action" such as games having "influenced their career."[90] Games already serve as an impactful medium in today's society in ways related to motivation and emotions which is a reason for why videogames are being looked at to be implemented into education. People are well accustomed to videogames, as the previously stated study shows that "97% of teens play video games",[91] and so games could possibly fit into education as a familiar medium.

Motivating students is a hard task and it can be seen that their motivation is mostly extrinsic rather than intrinsic. There are some discrepancies when evaluating extrinsic motivation as Adnan Tasgin who has a PhD in curriculum and instruction relates it to ""easy work", "dependence on teacher" and "pleasing teacher""[92] which are all quite negative in regards to motivation. Nicholas Gillet recognises its value but makes the distinction by adding the "self-determined"[93] aspect to it relating choice into the matter. As adolescents

[90] Bourgonjon, Jeroen, Geert Vandermeersche, Bram De Wever, Ronald Soetaert, and Martin Valcke. 'Players' Perspectives on the Positive Impact of Video Games: A Qualitative Content Analysis of Online Forum Discussions'. *New Media & Society*, vol. 18, 1 February 2015. https://doi.org/10.1177/1461444815569723.

[91] Marin Petkov, George E. Rogers, and Purdue University. 'At Issue: Using Gaming to Motivate Today's Technology-Dependent Students'. *Journal of STEM Teacher Education*, vol. 48, no. 1, 2011. https://doi.org/10.30707/JSTE48.1Petkov. P.9.

[92] Tasgin, Adnan, and Yunus Tunc. "Effective Participation and Motivation: An Investigation on Secondary School Students." *World journal of education*, vol. 8.1, 2018 pp. 58-74.https://doi.org/10.5430/wje.v8n1p58. P.62.

[93] "As posited by Self-Determination Theory (Deci and Ryan 2000), including forms of extrinsic motivation that have been referred to as self-determined extrinsic motivation (i.e., going to school out of personal choice) and non self-determined extrinsic motivation (i.e., going to school out of internal or external pressure". Gillet, Nicolas, Robert J. Vallerand, and Marc-André K. Lafrenière. 'Intrinsic and Extrinsic School Motivation as a Function of Age: The Mediating Role of Autonomy Support'.

grow, they take on board more self-determined extrinsic motivation. This is important for growth and helps with the possibility of gaining intrinsic motivation which will lead to significant future goals. Intrinsic goals are beneficial towards well-being and so it is important to look at ways to influence students' intrinsic motivation in school by "providing experiences that they enjoy and want to continue,"[94] stated by Plass in relation to games. Games could influence intrinsic motivation more leading to a more all-round, balanced, motivation in school resulting in a better experience encouraging a better academic future for students.

""Situational interest"[95] is defined as temporary interest that arises spontaneously due to environmental factors such as task instructions or an engaging text." This is the main motivation in people that engages learning in school or games. The more this interest is enacted the more learning will occur along with increased motivation and positive emotions towards the material. In games this process is designed effectively to encourage more motivation. With educational games the supposition is that the situational interest manifested in learners will mature into "individual interest"[96] in the school content.[97] Games help bridge the gap between what is interesting and school content for youth.

*Social Psychology of Education*, vol. 15, no. 1, 1 March 2012, pp. 77–95. https://doi.org/10.1007/s11218-011-9170-2. P.79.

[94] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist,* vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.268.

[95] "Situational interest is defined as temporary interest that arises spontaneously due to environmental factors such as task instructions or an engaging text." Schraw, Gregory, Terri Flowerday, and Stephen Lehman. 'Increasing Situational Interest in the Classroom'. *Educational Psychology Review*, vol. 13, 1 September 2001, pp. 211–24. https://doi.org/10.1023/A:1016619705184. P.211.

[96] "Individual interest is conceptualized as a relatively stable affective-evaluative orientation toward certain subject areas or objects." Schiefele, Ulrich. "Situational and individual interest." *Handbook of motivation at school.* Routledge, 2009, pp. 211-236. http://hillkm.com/EDUC_712/Week_3/Schiefele_2009.pdf. P.198.

[97] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist,* vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.269.

In this context it is important to look at material and intrinsic personal goals in relation to "individual interest". Knowledge of material can make a big difference to development as it can open up possibilities through insight, encourage motivation and lead to intrinsic goals and meaning making which can be seen with games. Intrinsic goals can lead to individual interest incorporating a strong desire to complete or broaden the scope of the goal. This can be seen in games such as *Rome Total War* (2004) where the goals are up to the player. The goals incorporate cunning thought which enriches the experience while interesting the player to the factual things such as units and cities that plays a role in the methods used. The personal goals and interests foster an appreciation of such facts as it leads to more connections in terms of history. Intrinsic goals "promote people's natural growth tendencies"[98] and so are very constructive to have especially in education as they will lead towards meaningful future goals.

Gamification has been proposed by many to be implemented into a school context "to enhance students' engagement and motivation."[99] "The ability to relate to video games makes the students excited about the topic,"[100] as stated by the researcher Marin Petkov. Gamification differs from game-based learning in that game-based learning is the using of games to teach while gamification uses "game-like" methods for improving teaching by influencing behaviours and frames of mind conducive to learning.[101] In *'Analysing gamification elements in educational environments using an existing*

[98] Vansteenkiste, Maarten, Joke Simons, Willy Lens, Kennon M. Sheldon, and Edward L. Deci. 'Motivating Learning, Performance, and Persistence: The Synergistic Effects of Intrinsic Goal Contents and Autonomy-Supportive Contexts.' *Journal of Personality and Social Psychology*, vol. 87, no. 2, 2004, pp. 246–60. https://doi.org/10.1037/0022-3514.87.2.246. P.246.

[99] Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.1.

[100] Marin Petkov, George E. Rogers, and Purdue University. 'At Issue: Using Gaming to Motivate Today's Technology-Dependent Students'. *Journal of STEM Teacher Education*, vol. 48, no. 1, 2011. https://doi.org/10.30707/JSTE48.1Petkov. P.10.

[101] Sailer, Michael, and Lisa Homner. 'The Gamification of Learning: A Meta-Analysis'. *Educational Psychology Review*, vol. 32, no. 1, March 2020, pp. 77–112. https://doi.org/10.1007/s10648-019-09498-w. p.82.

Gamification taxonomy' (2019), Armando Toda presents five "dimensions" of gamification that can be "applied in an educational environment."[102]
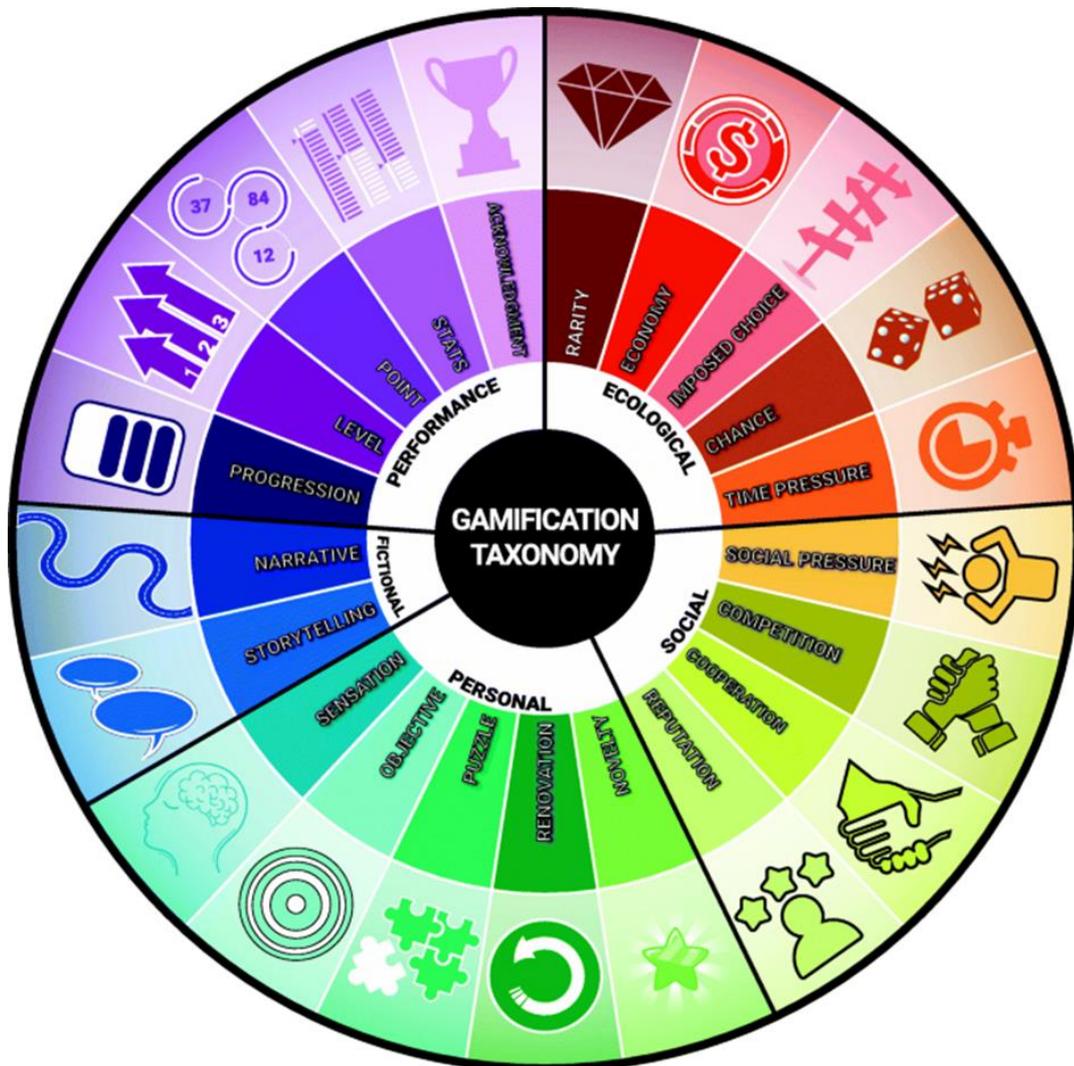


Fig. 6 Gamification Taxonomy, Toda, Armando M., et al. 'Analysing Gamification Elements in Educational Environments Using an Existing Gamification Taxonomy. *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14. [103]

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[102]Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14. https://doi.org/10.1186/s40561-019-0106-1.

[103] Toda, Armando M., et al. 'Analysing gamification elements in educational environments using an existing Gamification taxonomy.' *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14. https://doi.org/10.1186/s40561-019-0106-1. P.6.

Toda examines the "performance/measurements" dimension of gamification looking at ""Point,"[104] "Progression,"[105] "Level,"[106] "Stats,"[107] and "Acknowledgement."[108] These elements found in game design are a vital motivational factor towards the continuing of playing games through feedback and could be constructive in education. The "ecological" dimension refers to the environment being interesting and engaging Toda explores "Chance,"[109] "Imposed choice,"[110] "Economy,"[111] "Rarity,"[112] and "Time

[104] "Known as scores, experience points, skill points, etc. It is a simple way to provide extrinsic feedback to the users' actions." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.5.

[105] "Provides an extrinsic guidance to the users of their advance in the environment, allowing these users to locate themselves." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.p.5.

[106] "This is related to an extrinsic hierarchical layer that provides the user new advantages as they advance in the environment." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.5.

[107] "Known as information, Head Up Display (HUD) and data." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[108] "Also known as badges, medals, trophies and achievements. It is a kind of extrinsic feedback that praises the players' specific set of actions." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.5.

[109] "Randomness, luck, fortune or probability … user has a probability of getting a special item based on its luck." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.6.

[110] "Choice, judgment, and paths." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14. https://doi.org/10.1186/s40561-019-0106-1. P.6.

[111] "Known as transactions, market, exchange … Examples are trading points for advantages within the environment and related to the content." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.6.

[112] "Known as limited items, collection, exclusivity … limited resources within the environment which can stimulate the learners through a specific goal." Toda, Armando M., et al. "Analysing gamification elements in educational environments

Pressure."[113]  Such elements would add to the learning experience in terms of absorption potentially influencing participation. The "Social" dimension of gamification encompasses collaboration looking at "Competition,"[114] "Cooperation,"[115] "Reputation,"[116] "Social Pressure."[117] It is important to note it would be "constructive competition"[118] and not "destructive competition"[119] as noted by the researcher Michael Sailer in 'The Gamification of Learning: a Meta-analysis' (2019). An element of collaboration in education would be helpful and add incentive while giving a sense of community and purpose. The "personal" dimension encompasses "Sensation,"[120] "Objectives,"[121]

using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.7.

[113] "Time itself used to pressure the learners' actions." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.7.

[114] "An intrinsic concept tied to a challenge where the user faces another user to achieve a common goal … using scoreboards." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[115] "Where the users must collaborate to achieve a common goal." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.7.

[116] "It is related to titles that the learner may gain and accumulate within the environment." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1. P.7.

[117] "Related to social interactions that exert pressure on the learner." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[118]  "Good-natured and encourages cooperation and mutual support … aimed at improving everyone's skills" (Sailer, Michael, and Lisa Homner. 'The Gamification of Learning: A Meta-Analysis'. *Educational Psychology Review*, vol. 32, no. 1, March 2020, pp. 77–112. https://doi.org/10.1007/s10648-019-09498-w. p.81

[119] "Succeeding by tearing others down." Sailer, Michael, and Lisa Homner. 'The Gamification of Learning: A Meta-Analysis'. *Educational Psychology Review*, vol. 32, no. 1, March 2020, pp. 77–112. https://doi.org/10.1007/s10648-019-09498-w. p.81.

[120] "This is either visual or sound stimulation, etc. It is related to the use of learners' senses to improve the experience". Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[121] "Missions, side-quests, milestones, etc. This intrinsic concept is related to goals." Toda, Armando M., et al. "Analysing gamification elements in educational

"Puzzle,"[122] "Novelty,"[123] "Renovation,"[124] "Puzzle."[125] Through personal dimensions gamification can engage students on a personal and meaningful level. The "fictional" dimension in a school setting incorporates "Narrative"[126] and "Storytelling"[127] for enhancing the experience. Narrative can have a constructive effect on retention and motivation.[128] Such strategies in the context of school would help the methodologies flow while instilling lasting connections in students' memories. Through the discussion of gamification, it can be seen how game elements are motivational while showing how they could be implemented into secondary school education ingratiating students into learning in a dynamic and engaging way.

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environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[122] "Challenges, cognitive tasks, actual puzzles." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[123] "Related to the updates that occur within the environment, by adding new information, content or even new game elements." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[124] "Known as boosts, extra life, renewal, etc. This concept is intrinsically related to the property of re-doing a task, event or any of the sorts. It allows the learner a second chance after they fail a task." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[125] "Challenges, cognitive tasks, actual puzzles." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[126] "Also known as karma system, implicit decisions, etc. Examples of this are giving a small token of appreciation to the students that opt to interact with other students, subtly and discreetly." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14.https://doi.org/10.1186/s40561-019-0106-1.

[127] "Audio queues, text stories, etc. It is the way the story of the environment is told (as a script). It is told through text, voice, or sensorial resources. It is highly used as a tool to support the narrative within an environment." Toda, Armando M., et al. "Analysing gamification elements in educational environments using an existing Gamification taxonomy." *Smart Learning Environments*, vol. 6.1, 2019, pp. 1-14. https://doi.org/10.1186/s40561-019-0106-1. P.8.

[128] Sailer, Michael, and Lisa Homner. 'The Gamification of Learning: A Meta-Analysis'. *Educational Psychology Review*, vol. 32, no. 1, March 2020, pp. 77–112. https://doi.org/10.1007/s10648-019-09498-w. p. 81.

It is important to explore how affective states relate to the playing of games. Emotion, motivation, and cognition are all interrelated and pertain to "self-esteem"[129] and "self-efficacy"[130] with the enacting of goals. Games build a player up in order to play a game and reinforce positive emotions in this process which correspond to high levels of self-esteem and self-efficacy in the material. It can be seen that the game elements discussed with gamification are designed to induce positive emotions, this is clear with the medals or "renovation" aspects, even ones with potential ambiguous outcomes such as narrative can "lead to increased positive arousal compared to a game without narrative,"[131] as discussed by Plass. Games are ultimately intended to induce positive emotions as they are a form of entertainment. To do this there is a plethora of game design elements such as discussed with gamification dimensions along with artistic design, game mechanics, story and music.[132] These add to the diversity and dynamics of gameplay inducing a variety of emotions resulting in positive emotions to do with the overall game. Effectively every aspect of game design is able to produce emotions, as stated by Plass and "empirical evidence suggests that positive emotions can broaden the scope of cognitive resources and enhance learning outcomes."[133]

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[129] "Self-esteem refers to an individual's sense of value or self-worth, or the extent to which people value, appreciate or like themselves." Lane, John, Andrew M. Lane, and Anna Kyprianou. "Self-efficacy, self-esteem and their impact on academic performance." *Social Behavior and Personality: an international journal*, vol. 32.3, 2004, pp. 247-256. https://doi.org/10.2224/sbp.2004.32.3.247.

[130] "Self-efficacy can be defined as the levels of confidence individuals have in their ability to execute certain courses of action, or achieve specific outcomes." Lane, John, Andrew M. Lane, and Anna Kyprianou. "Self-efficacy, self-esteem and their impact on academic performance." *Social Behavior and Personality: an international journal*, vol. 32.3, 2004, pp. 247-256. https://doi.org/10.2224/sbp.2004.32.3.247.

[131] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533.

[132] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533.

[133] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533.

Social-Historical Context
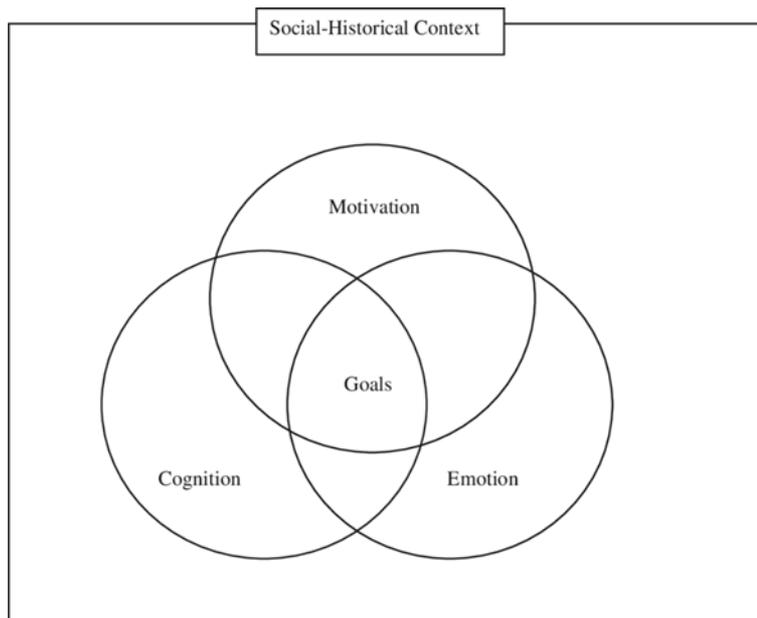
Motivation

Goals

Cognition          Emotion

Fig. 7 Venn diagram showing goals as the intersection between cognition, motivation, and emotion, DeCuir-Gunby, Jessica T., Lori Price Aultman, and Paul A. Schutz. 'Investigating transactions among motives, emotional regulation related to testing, and test emotions. *The Journal of Experimental Education,* vol. 77.4, 2009, pp. 409-438.[134]

In this context it is pertinent to discuss affective states in a school setting. As discussed by Reinhard Pekrun in *Positive Emotions in Education* (2002)*,* "positive emotions are essential for human behaviour and adaption. They help to envision goals and challenges, open the mind to thoughts and problem-solving, protect health by fostering resiliency, create attachments to significant others, lay the groundwork for individual self-regulation, and guide the behaviour of groups, social systems, and nations."[135] As such positive emotions in a school context are highly influential towards prospering academically if channelled constructively. Emotions are fickle things but vastly important to be acknowledged and expressed. Through doing so it is possible to channel emotions towards positive ones as seen with what

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[134]DeCuir-Gunby, Jessica T., Lori Price Aultman, and Paul A. Schutz. "Investigating transactions among motives, emotional regulation related to testing, and test emotions." *The Journal of Experimental Education*, vol. 77.4, 2009, pp. 409-438. https://doi.org/10.3200/JEXE.77.4.409-438. P.350.

[135] Pekrun, Reinhard, et al. "Positive emotions in education." 2002, pp. 149-173. https://doi.org/10.1093/med:psych/9780198508144.003.0008. P.149.

happens in games due to game design. Education's design is somewhat lacking pertaining to emotional, motivational, or cognitional aspects. This can be seen with the way it is a "one-size-fits-all model,"[136] as stated by Susan Yonezawa, that doesn't engage the complexity of each students' motives.

Secondary school education could be improved by incorporating some form of "Emotional design"[137] into the teaching methods. "Emotional design refers to the use of design features to induce emotions that are conducive to learning." It could be beneficial to establish the idea that negative emotions if seen through, could end up as overall positive emotions as seen with games and so education could implement emotional design to induce a variety of emotions that result in positive emotions towards the subject. A way to do this would be through gamification's "acknowledgements" perhaps showing negative aspects of performance in ways that entice vigorous performance or through "chance" by having students explore around in the medium or environment to find the chance aspect which would encourage progress by showing a good way to start or showing possible benefits of completion. It is important to design the educational process to make it diverse and engaging in ways suited to the student to encourage ample effort.

In the topic of design, it is important to look at the progression system in RPG games. As stated by Plass "games are designed to ensure players are able to achieve."[138] When players are thinking about what they want to achieve in games it is only a question of how, with no doubt in their potential, as it is known the game will provide opportunities for development. "Research has demonstrated that students who experience deflated competence and

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[136] Yonezawa, Susan, Makeba Jones, and Francine Joselowsky. 'Youth Engagement in High Schools: Developing a Multidimensional, Critical Approach to Improving Engagement for All Students'. *Journal of Educational Change*, vol.10, no. 2–3, May 2009, pp. 191–209. https://doi.org/10.1007/s10833-009-9106-1. P.194.

[137] "Emotional design refers to the use of design features to induce emotions that are conducive to learning" Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.271.

[138] Plass, Jan L., Bruce D. Homer, and Charles K. Kinzer. 'Foundations of Game-Based Learning'. *Educational Psychologist*, vol. 50, no. 4, 2 October 2015, pp. 258–83. https://doi.org/10.1080/00461520.2015.1122533. P.268.

efficacy believe that their academic situation is permanent and that there is nothing they can do about it,"[139] as discussed by Lisa Legault (an associate professor of psychology). As such design and emotions are key to development and are important to be focused on in school.

Progressing in an RPG game does not differ ultimately from progressing in education in terms of functionality. A person will gain experience from spending time developing their character in a particular field and this will lead to the actualization of their goal, that is to have the best possible skills for the way they intend to play the game, which could translate to what type of career students would want. In RPG games the want to improve the player's character is paramount due to the layout of the game. This is in relation to game design where the player is given incentives that play on the players emotions and motivations. An important incentive can be things like visually showing the progression system, which paths they can go down and what skills will be gained. This will induce positive emotions towards the possibilities for development. Another incentive would be the idea of progression being valuable by having numerous effects for the learning of skills along with incorporating small steps that acknowledge and promote progress in an explicit way. Instead of secondary school just providing work for students it should try and emotionally connect students to what they are learning. As such education could be improved with the using of techniques as seen in games to promote students to further their aspirations.

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[139] Legault, Lisa, Isabelle Green-Demers, and Luc Pelletier. 'Why Do High School Students Lack Motivation in the Classroom? Toward an Understanding of Academic Amotivation and the Role of Social Support.' *Journal of Educational Psychology*, vol. 98, no. 3, August 2006, pp. 567–82. https://doi.org/10.1037/0022-0663.98.3.567. P.578.
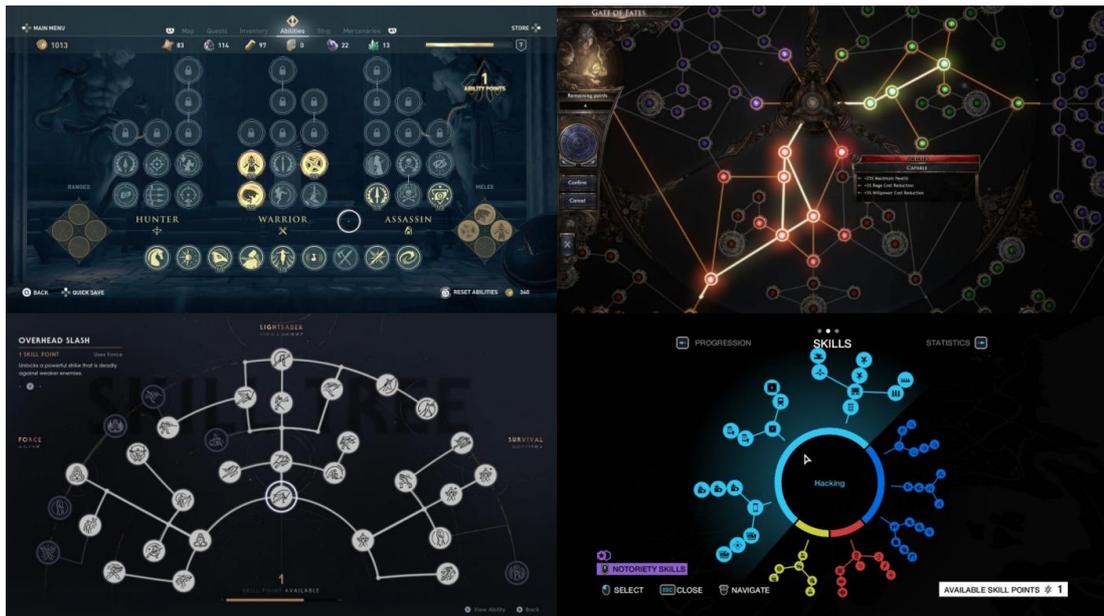
Fig. 8 Screenshots of RPG progression systems "skill trees," Nico. GD Keys, 2020.[140]

Through the exploration of motivation, it can be seen that games have an inherent quality to motivate. They are embedded in today's society and culture and are good intrinsic motivators which leads to individual interest which are reasons for why games could be used for the purposes of education. This is furthered with the examining of gamification which leads to discussion on how emotions are integral towards development and are interrelated to motivation and cognition. Through exploring the differences in the progression system of games and education it can be seen why emotions and motivations are important for growth while getting a sense of how education could be improved in terms of design. Motivation and emotions are of key concern in education and games.

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[140] Nico. *Keys to Meaningful Skill Trees*, GD Keys', 5 April 2020.
https://gdkeys.com/keys-to-meaningful-skill-trees/.

**Conclusion**

As time progresses games may play a more important role in the lives of students. It is important to theorize how education could be improved as it is a determining factor in peoples' lives. It is perhaps one of the most direct ways to influence society and the future as it teaches the next generation. Purposeful games and game elements could be used to engage students on a profound level that builds them up and aids learning. Games are becoming recognised for being more than that of just entertainment. This thesis synthesised key reasons why games are being looked at seriously as a means of enhancing the educational experience. Game-based learning and gamification are becoming accepted among educators which may result in the changing of the ways secondary schools operate, perhaps altering society.

It can be seen throughout this thesis that there are several issues to do with secondary school. In ways it is outdated with a factory model that restricts, does not account for all types, and has unbalanced methods. Its design is lacking in relation to motivation and its pedagogical design could be improved with the use of formative assessment and the incorporating of emotional design to balance teaching practices and promote students' growth. Positive emotions are important for developing healthily especially in education. To maximize the potential for developing positive emotions in students, gamification could be implemented which would also influence both intrinsic and extrinsic motivation. Failure should not be stigmatized but acknowledged as a means of learning and development. Education should nurture the uniqueness of each student motivating them to participate and live a healthy life. Secondary school would be enjoyable if the students truly wanted to be there and wanted to learn. They could work together to promote learning among each other and could potentially engage in ambitious and purposeful content. Motivation is key to learning through interest, it is the spark that ignites the flames that begets connections and positive emotions.

It can generate intrinsic goals which are very valuable as they correlate to an increase in desirable work which can lead to meaning and fulfilment.

Digital games can engage students in ways that no other mediums can, like with Bogost's procedural rhetoric, or as well as in terms of cognition as shown by Plass and motivation as demonstrated by Toda. Through the magic circle as discussed by Petry we can see that games enable a state of being that incorporates flow while also enabling people to be themselves. With an examination of the play experience from Lindley and Sennersten in "Game play schemas," and Ryan and Deci's self-determination theory we get a sense of why and how games are a broad and powerful medium in which much can be provided. Games are mediums of interaction and so there can be much to discuss about them. As such games have been proposed by Schrier to take over from literature in literary projects. This thesis goes further into the potential uses of games. Teamworking games as discussed by Eliasa could help participation and connectivity. School could be a much more engaging and appropriate place where every student feels accepted with a sense of purpose in what they are doing. There could be practical applications such as simulations on participating in civic and economical life preparing students for pertinent things as discussed by O'Brien, which would be valuable. Games could enable direct control over learning through the ability to replay and play at their own pace. Through gameplay analytics students would be able to view detailed data in relation to performance. Games could familiarize students with complex systems as mentioned by Schrier and in turn education could potentially become a resource for innovative solutions towards global issues which would also involve students to the state of the world.

Commercial games' incentives (gameplay, characters, context and environments) are important to note for game-based learning. Having an interactive medium without good incentive will not be as effective for large scale applications. Simple games will work to diversify the educational environment but to reach the full potential of games, serious games must make use of the incentives found in commercial games. *Variant: Limits* and

the Game-based course it is a part of are a substantial step towards a more progressive education. It stands to show that commercial type games can work as educational means effectively and as a result we may see even more grand and useful games in the future.

STEM games are practical small-scale games designed with specific purposes, to develop applicable knowledge and skills for those fields. These games could help interest students as they are purposeful and could give practical insight to what a career in these fields may be like. Critical thinking as discussed by Linda Elder and Richard Paul, and applied learning as discussed by Sarah L. Ash, are core to a good education. It is important to engage these which can be done with purposeful games enlightening students to a subject in critical ways. Such games could balance controlled thinking with schema activation as explored by Hemovich resulting in an enjoyable and informative experience.

Games could open up education innovatively by making use of the mediums contemporary youths are attached to. Presently games through phones can be used as work mediums which resonates well with them as seen with STEM games. In the future there could be much greater technology in use such as powerful virtual reality systems. As such the possibilities for games could become quite boundless. Anything could be taught in fantastical and efficient ways while translating work into play and intensifying learning. There is still much to be considered and much research to be put into effect but it is clear that education has much to gain from the implementing of games and game elements. An exciting concept is the using of game companies to design educational games. It is important for secondary school education to become more malleable and suited for each individual student with the use of technology and better methods.

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