Gamify Learning Management Systems to Encourage Students to Complete Work

Computer Science

Teacher Name: ----------

Teacher email: ----------

- **Abstract:** A problem plaguing many students today is distractions when trying to work on important assignments for class, which is only exacerbated by the introduction of computers in education. This creates a difficulty for some to get good grades and complete work on time. To solve this problem, we developed an extension that gamifies the process of working and has website blocking and a focus mode to prevent students from getting distracted. To test if our extension made students more productive, we conducted an experiment that involved its use in a work setting. We first had students answer a survey asking general questions about how they work and then had them work for thirty minutes without the extension and complete another survey. Finally, we had them work using our extension and complete another accompanying survey. About half of the students stated that they felt they accomplished more work with the extension, and all participants stated that they felt less distracted. However, the feedback stated gamification system needed to be more refined in order to feature more consequences and awards for work. Thus, we conclude that, while our extension does make people more productive, more work needs to be done with regard to which features boost productivity the most.

- **Engineering:** The purpose of our project is to help students, especially those who tend to procrastinate the most, focus. Upon research, the most effective and compelling way to achieve this was to create a gamified system on which the user works. Our system features a character that represents the user with an “HP (health points)” metric, which goes up as a user completes tasks and continues to focus but then goes down as a user gets distracted or breaks focus. In our final version, our program blocks websites, that feature a to-do list and a focus timer, which act as missions, as well as an HP and level system, which act as forms of achievement and provide gratification within the game. The system was tested and adjusted upon feedback from students and teachers. In testing, the final product was effective in preventing distractions and helping students work through the aspects of gamification.

Background research:

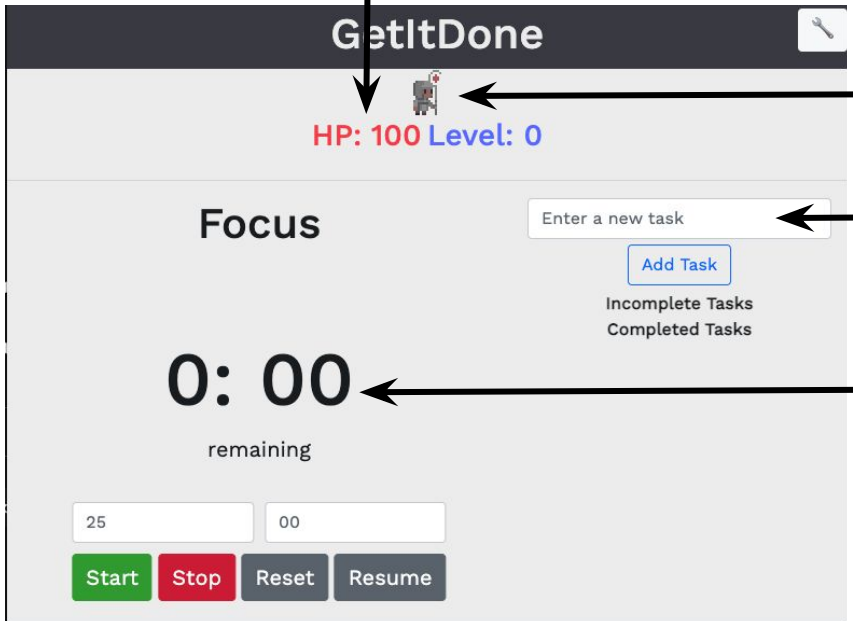
- Gamification has been proven to change how and why users interact with the software by providing them with a feeling of progress and achievement. Generally, “gamification” is defined as the use of game design elements in non-game contexts, and is used to increase user engagement in applications. Gamification is already an emerging trend in many sectors, including business, organization management, health, and social policy.
- Today, many students have grown up with the internet and new technologies, allowing for new approaches and techniques in implementing active learning. The primary problem in modern education is the lack of engagement and motivation of students to participate actively in the learning process In an education setting, gamification processes can provide students with motivation and engagement by making learning more attractive.
- There are several distinctive features that play a crucial role in gamification. Experience points, levels, and challenges can be used to increase engagement, participation, and self-esteem. Points and prizes can be used to motivate users and storylines, visual elements, and goals can further create enjoyment and interest. For example, students using a programming language learning app were assigned different levels of expertise as they progressed through the learning experience.
- According to Gabe Zichermann, the use of game mechanics improves the ability to learn new skills by 40% and leads to a higher level of commitment and motivation of users to activities and processes in which they are involved. Systems such as this are familiar to the current generation of students who have grown up accustomed to the internet and video games. The main goal of gamification in education is to address the problem of lack of motivation among children.
- The introduction of computers into the classroom environment has been considered problematic. Modern web browsers and laptops have promoted the idea of multitasking, resulting in negative effects on comprehension and retention.
- Gamification can also be effectively used in settings where students need to focus. Gamification features can be re-interpreted into systems for focus settings, such as a missions system being a to-do list, and points that increase as a user keeps focus. Systems such as these incentivize the user to keep working by giving positive reinforcement. Gamification systems have already been proven throughout education to make users more effective at work by providing them with motivation and encouragement to keep working.

- **Primary Problem:** Students can easily get distracted when working on schoolwork on computers.
- **Hypothesis:** If we gamify the process of studying and working on homework, then we can prevent the distractions of students while working resulting in improved productivity.
- **Requirements:** The requirement for our extension is to provide tools that students can use while working that incentive, motivate, and encourage working with breaking focus, while not being distracting on their own.
- **Materials:** Google Chrome, Visual Studio Code, HTML, CSS, JavaScript, computer

- **Procedure/Engineering design process**: First, we created a Google Chrome extension using HTML, CSS, and JavaScript, as well as several Google Chrome and Classroom APIs. This extension blocks any distracting websites that a user specifies, sets a focus timer, provides the user with a to do list, and gives an HP level, which increases when a focus timer is completed and a task is completed, but then decreases whenever the user attempts to visit a blocked websites. Our design was setup to mimic games with the HP and level system, but still act as a tool, in order for the extension to not become a distraction. This system was tested by students using a Google Chrome browser on a laptop in a quiet environment with little to no other distractions. The users were then given twenty minutes to complete homework without the extension, and then complete an accompanying survey asking how distracted they felt and how much work they got done, and then were given twenty more minutes to complete homework with the extension enabled, with another similar survey afterward. A link to the extension and surveys can be found here.

Designing the Extension(Continued)

Health Points & Leveling System
These systems may invoke engagement, motivation and sense of achievement, since it acts as a metric of how much work you have completed. Ideally, the goal of the user is to increase the HP and level of their character, so to achieve that result they continue to work.



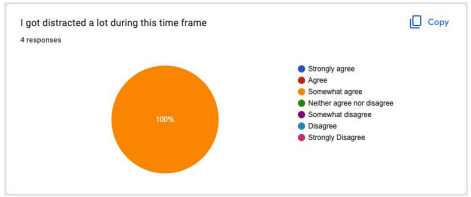
User avatar
The user is represented by a pixel character. In a gamification system, this could invoke interest and engagement.

To Do List
Under gamification, the to do list is a form of levels, creating engagement, motivation and sense of achievement as each task on the list is completed.

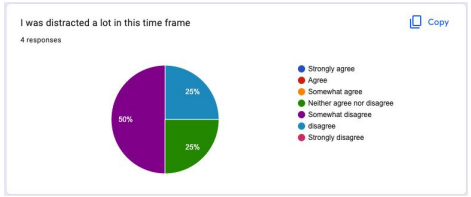
Focus timer
Under gamification, this acts as a form of indicating progress, creating engagement and motivation to continue to work.

Compiled Results

Perceived amount of distractions

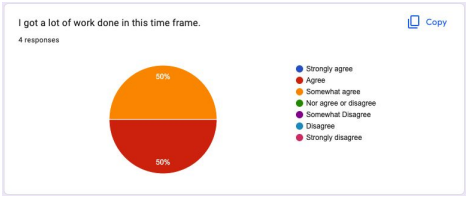


Without the gamified system

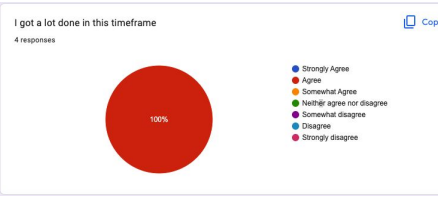


With the gamified system

Perceived amount of work completed



Without the gamified system



With the gamified system

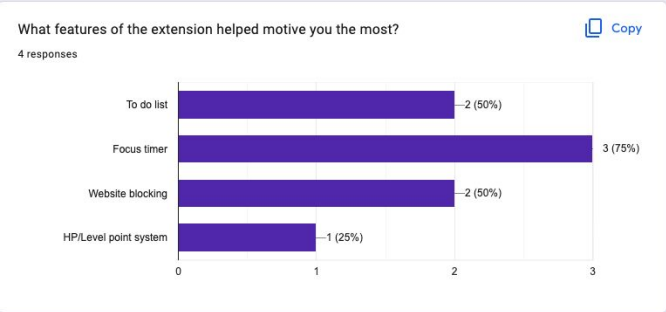
Result of Trials

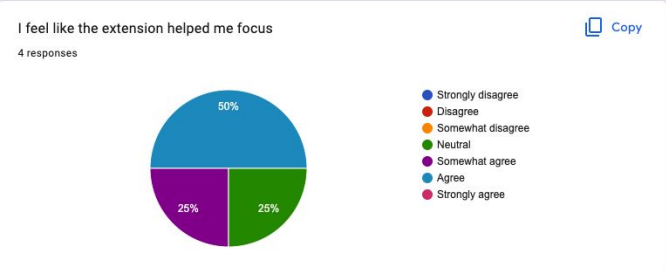
Result: Out of the four participants, all no longer agreed with the statement that they felt distracted during the time frame with the gamified system enabled, while the all participants somewhat agreed that they were distracted during this time frame.

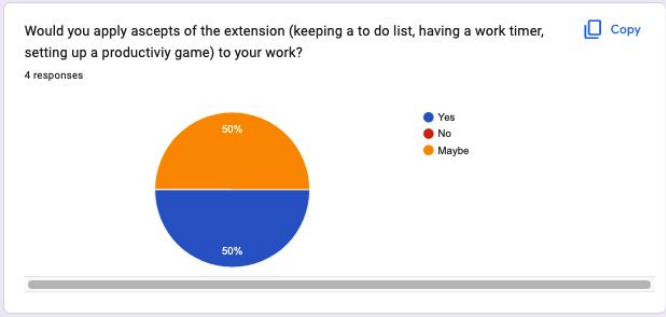
Result of Trials

Result: Out of the four participants, on average, more people with the gamified system stated that they felt like they agreed with the statement that they got a large amount of work completed within the twenty minute time frame with the gamified system enabled compared to the time frame without the twenty minute gamified system enabled.

Complied Results







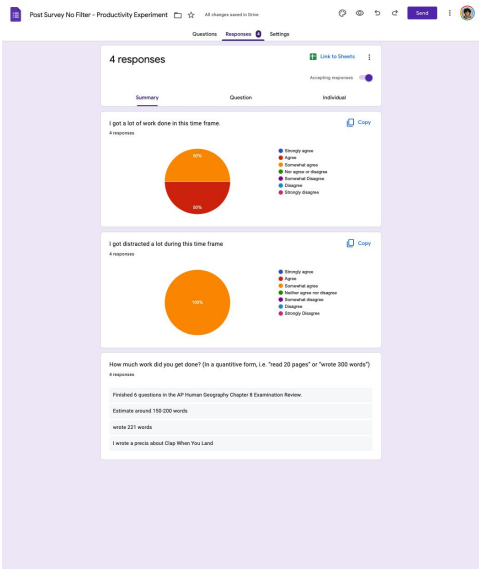
Result of Trials

Result: Out of the four participants, a majority claimed that the focus timer helped them focus the most within the extension, one of the gamified systems that is intended to encourage students to work.

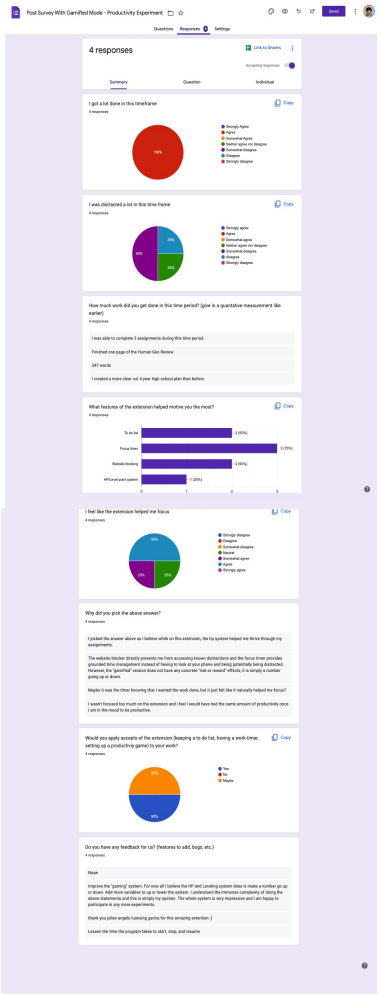
Out of the four participants, 75% claimed agreed on some level that the extension and its gamification system had helped them focus, while only 25% took a neutral stance.

All four participants also stated that they would at least consider implementing one of the aspects of the extension, like keeping a to do list, having a work timer and setting up a productivity game, into their own work.

Post examination survey **without** gamification system



Post examination survey **with** gamification system



Summary: We found that all of the respondents either somewhat agreed(50%) or agreed(50%) with the statement, “I got a lot of work done in this time frame,” when not using the extension, whereas all the respondents agreed with the statement after using the extension. 100% of respondents said they somewhat agreed with the statement, “I got distracted during this timeframe,” whereas 50% somewhat disagreed, 25% disagreed, and 25% neither agree nor disagree with the statement after using the extension. When asked if the extension helped them focus, 50% agreed, 25% somewhat agreed, and 25% remained neutral. When asked which features helped the most, 75% of respondents said the focus timer motivated them the most, 50% said the to-do list, 50% said the web-blocking, and 25% said the gamification system. Finally, 50% said they would apply the aspects of extension to their work, and 50% said they might.

Conclusion: On average, the extension made students more productive through the to do list and focus mode features, which created engagement and motivation for students to continue working, therefore eliminating many distractions and making students more focused to their work. However, feedback and post experiment surveys illustrate how the HP and level system was not very effective in incentivizing work due described lack of real punishment or award. Despite this, the gamified process of focusing was effective in motivating students to continue to work, resulting in increased productivity.

Engineering: The tools implemented into the extension, primarily the to do list, level and HP system, and focus mode, were considered helpful in incentivizing users to focus, and resulted in described increased productivity and lessened distractions. This functionality was helpful in maximizing productivity but was not complicated and distracting on its own in order to cause its own distractions.

References

1. Busch, Carsten. “ECGBL2014-8th European Conference on Games Based Learning.” *Google Books*, Google, 2014, books.google.co.uk/books?hl=en&lr=&id=IedEBQAAQBAJ&oi=fnd&pg=PA50&dq=gamification%2Bin.%2Beducation&ots=bG-j3R1IY3&sig=q8tldWMHLR0zAAwwsbXwIR36knY&redir_esc=y#v=onepage&q=gamification%20in.%20education&f=false.
2. Cohen, Aaron M. “The Gamification of Education - ProQuest.” *The Gamification of Education - ProQuest*, Sept. 2011, www.proquest.com/openview/cd7c307a00a42b8e6174353151f42b93/1?pq-origsite=gscholar&cbl=47758.
3. Dontre, Alexander. *The Influence of Technology on Academic Distraction: A Review*, 24 Oct. 2020, onlinelibrary.wiley.com/doi/epdf/10.1002/hbe2.229.
4. Giang, Vivian. “'Gamification' Techniques Increase Your Employees' Ability to Learn by 40%.” *Business Insider*, Business Insider, 18 Sept. 2013, www.businessinsider.com/gamification-techniques-increase-your-employees-ability-to-learn-by-40-2013-9?r=US&IR=T.
5. Kiryakova, Gabriela, et al. *Gamification in Education*, 2014, d1wqtxts1xzle7.cloudfront.net/53993982/293-Kiryakova-libre.pdf?1501188976=&response-content-disposition=inline%3B+filename%3DGamification_in_education.pdf&Expires=1675541327&Signature=YAxdSrZ4mmRRodPsbgMTT-lmh8y4o1hyD-xa4Ll5mWG4xbqo-blTFnbkCf9PdVvWuPdSU7wJ2NeiRNdIyl2E3SRenoWFD0tutPvw8Gbytkh0td7n3MvHqYgAPFhzUFzpCxlwizoRZi8ZJm3cMcNgdJOwGHojsi-1uwad4H-~aXdQo8qp04wXKjafIX~2uk5BhpA4AEuZpzUSxUFNG76pc9Ny5NeuxtxkVpP9eSxGSlUfzRB71UiBSz9kD~2a29k3-wxILo-mJelXP~rCv0Y6V-M1mX9hNeuoExyg-krmzIbXall4T2XDII-D0sQkaJVmxG06pRWAIN4ebqJrhvkRfg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA.
6. Macdonald, Shaun, and Stephen Brewster. “Gamification of A to-Do List with Emotional Reinforcement.” *Gamification of a To-Do List with Emotional Reinforcement*, 15 Apr. 2019, eprints.gla.ac.uk/184005/1/184005.pdf.
7. Masters, Tom. “When You Have ADHD and Need Motivation, Turn Your Life into a Game.” *Edge Foundation*, 21 Oct. 2017, edgefoundation.org/when-you-have-adhd-and-need-motivation-turn-your-life-into-a-game/#:~:text=%E2%80%9CGamification%20works%20by%20releasing%20dopamine,needed%20to%20achieve%20that%20reward.
8. Stott, Andrew, and Carman Neustaedter. “Analysis of Gamification in Education - Simon Fraser University.” *Analysis of Gamification in Education*, 2013, clab.iat.sfu.ca/pubs/Stott-Gamification.pdf?source=post_page----------.
9. “To Gamification of Education - Rotman School of Management.” *A Practitioner’s Guide To Gamification Of Education*, 10 Dec. 2013, www.rotman.utoronto.ca/-/media/files/programs-and-areas/behavioural-economics/guidegamificationeducationdec2013.pdf.
10. Wu, J.H., et al. “The Internet and Facebook Usage on Academic Distraction of College Students.” *Computers & Education*, Pergamon, 12 Feb. 2019, www.sciencedirect.com/science/article/abs/pii/S036013151930034X.