# Frontread 2.0

The redesign of an e-learning platform for improving reading speed.

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## 1. Introduction

### 1.1 Problem

Along with technological advances and the current global pandemic, there has been an increased demand for digital tools (Seiler, 2020). Interactions that before were set to occur in a physical environment have now transitioned into the opportunity of occurring in a digital environment. Online-meetings, online-training, and online-classes are just a few examples that have been created through technological advances. During 2020, due to the COVID-19 repercussions, the request for online-classes for students has increased (Witherow, 2020). A company that was located at the forefront of this demand was Frontread, a company that specializes in the training of reading skills. They focus on schools, hence giving students the right tools and methods from an early age. Frontread is currently being used by more than 150.000 students in over 800 schools (Frontread, 2020). However, for the platform to work impeccably and be scalable, there is a need for it to be independent of teachers, something that is not the case today. Frontread is seeking opportunities in how to make the training more self-driven by students, hence, how to make students get a higher progression without being facilitated by their teachers. Furthermore, Frontread wants to explore the possibilities in motivating the students throughout the training and make them more engaged on the platform. Lastly, Frontread wants to further meet the demand for distance learning and make the platform even more suited for students to use at home.

### 1.2 Research question

*How can Frontread make students more self-driven and motivated without the support and help from teachers?*

## 2. Related work

### 2.1 Human behavior

According to Fogg's behavior model, there are three elements that must converge at the same time for a behavior to occur (Fogg, 2009). For a person to perform a target behavior they must be sufficiently motivated, have the ability to perform the behavior and lastly, there must be a trigger that sets off the behavior. If one of these three elements is missing, the behavior will not occur. The underlying mechanism behind how students, or other learners, are willing to change behaviors and how they are encouraged to embrace new knowledge is an important factor for faculties to understand if they wish to promote their students to learn. According to the behavior model, one needs to start with the motivation to establish a change (ibid). Motivation, in general, is the internal process for people to take on new challenges or make a change (Sansone & Harackiewicz, 2012). The essence of motivation is that it is a goal-oriented behavior, hence people expect payoff or satisfaction in the end. To motivate people to perform incremental education or to be invested in learning new skills, one needs to discover the different aspects of motivation that these individuals are driven by (ibid). An aspect of motivation is the person's apprehension of how well they would manage to take on a new task (Fogg, 2009). To have the ability to learn new tasks and get new knowledge

connected to one's education demands confidence, especially if the procedures are extremely different and difficult. Students that have been using the same methods every year in school may not possess that kind of confidence. That is why it is important to discover how one can increase the confidence of the learners to motivate them to learn new skills. (ibid)

The element ability does not just refer to a person's competence in completing a task or adopting new knowledge (Fogg, 2009). Ability also refers to someone's willingness to do the task or if they consider it to be worth learning new knowledge. According to Fogg, there are six aspects one must consider when new behavioral patterns should be encouraged successfully: Time, Money, Physical effort, Brain cycles, Social deviance, and Non-routine. (ibid)

The last element in Fogg's behavior model is the trigger (Fogg, 2009). To execute a new behavior, a person needs some sort of trigger that alarms the person to get started. If there should occur a change of behavior there must exist a trigger that calls for action. Without a trigger, someone can be highly motivated and have the ability to perform the behavior, however, they will not come around to action. Triggers can come in various forms according to Fogg. When the ability is high, but the motivation is low, the trigger can appear as a spark that encourages the person to care and to get them to understand the importance of the change. In school, when students have high motivation, they sometimes need a facilitator, most commonly a teacher, that simplifies the task to amplify the ability to make the change. If a student has high motivation and they have the ability to change their behavior, all they need is a trigger that sets them off. (ibid)

### 2.2 Motivation to read and learn

According to the Education Administration, language is man's foremost tool for thinking, communicating, and learning. People need language to develop their identity, express feelings, and to understand how others think (Abdulaian, 2017). Even though reading is one of the tools required to get good language development, many pupils, especially in Sweden, have a negative attitude towards reading (Hoflin et al., 2018). One theory is that pupils find reading as hard work and time-consuming and takes away energy and time from other activities that they value higher (Abdulaian, S. 2017). To enable pupils to read more, the reading needs to be at an appropriate degree of difficulty, engaging, and meaningful. Thus, having standardized reading material in school that is not adapted, can therefore have a negative impact on the individual pupil (ibid). According to the Swedish Education Act, the school, and ultimately the teachers, carries the main responsibility for children and young people learning to read (Hoflin et al., 2018). However, according to the Russian scientist Lev Vygotskij, all learning takes place in a social process with the environment. Hence, the social aspects of getting children to read play a central role, regardless of if it is the teacher or some other mentor that has the main responsibility (Abdulaian, 2017). Children need role models that value reading and therefore, inspire them to read. Thus, parents and other adults in the child's environment can play a big part in encouraging and facilitating the reading outside of the school hours (ibid). There is a consensus among researchers about the importance of parents' involvement in their children's language learning (Hoflin et al., 2018). The research indicates that parents have great power to influence the reading development of their children if they are informed about the importance of the stimulus that they receive at home. Consequently, one can argue that there is a need for education and information that aims at parents and their needs for acquiring the

right tools to stimulate and promote their children's reading development. (ibid)

To enable children to read, the content needs to feel meaningful and important for the reader (Abdulaian, 2017). Therefore, it is essential that each reader can make personal choices when they are about to read. These choices may need some guidance from an experienced teacher or some other mentor that knows the child on a personal and emotional level. Besides the reading itself, what happens after a reading session is of great importance to get children to stay motivated to read. Children often need to talk about what they have read because reading evokes emotions and thoughts. By having those conversations, the individual learns how to reflect on the content, action, and messages in a story, hence get improved reading comprehension. However, it is not only the reflection part of the conversations that leads to improved reading comprehension, the factor of being active and participating in a social context is beneficial for the reading experience. Hence, the interaction with other peers or mentors is important if children should be motivated to read. (ibid)

## 2.3 Learning theories

### 2.3.1 Self-regulation theory

Research has shown that self-regulated learning (SRL) is important in both traditional and online learning contexts (Pérez-Álvarez et al., 2018). Furthermore, SRL skills are especially important in learning environments where the outermost responsibility lies on the students, and guidance from teachers is low (ibid). Self-regulated learning refers to how students become masters of their learning processes (Zimmerman, 2002). However, self-regulation is not a mental ability or an academic performance skill, rather a process of planning and reflecting. According to Zimmerman and other social learning psychologists, the process of SRL can be seen as three cyclic phases. (ibid)

The first phase is the forethought phase which refers to the processes that take place before the learning has begun (Zimmerman, 2002). This phase consists of two major classes, task analysis, and self-motivation. Task analysis involves strategic planning and goal settings (ibid). Goal-setting theory is based on the premise that a large proportion of human actions are directed by conscious goals, and with that becomes meaningful (Locke & Latham, 1994). According to Locke and Latham's goal-setting theory, a well-defined goal should include two attributes, content, and intensity i.e., “what should I learn”, and “how quick and thorough should I learn it” (ibid). The second class in the forethought phase, self-motivation, refers among other things to the student's intrinsic interest i.e their inner will to learn, along with the student's self-efficacy beliefs about having the capabilities and skills to complete the task (Zimmerman, 2002).

Performance is the second cyclic phase in the SRL process and refers to the processes that take place during the learning (Zimmerman, 2002). The performance phase involves self-control and self-observation. By adapting and adjusting to the strategies chosen in the forethought phase, the student carries out the self-control part of the performance phase. Self-observation refers to how the student perceives their studying to be most successful, which is tested through recordings and experimenting. An example of a recording could be that the student record the time it takes to read a text in a school environment compared to reading the same text at home. By recording and experimenting with different scenarios, the students learn to observe their process. (ibid)

The third and last phase is the self-reflection phase refers to the processes that take place after each learning effort (Zimmerman, 2002). The two classes in this phase are self-judgment and self-reaction. The self-judgment process includes that the student evaluates what caused success or failure of

learning. Furthermore, the student of self-regulated learning should also be able to diagnose if they achieved their learning goal or not. In the process of self-reaction, the learner should measure how satisfied they are with what they have learned. (ibid)

### 2.3.2 Self-determination theory

To be motivated means to be inspired to act or perform a task. While motivation can vary in amount, it can also vary in the form of different kinds of motivation. Ryan and Deci (2000) describe the amount as the *level of motivation* and the kinds as the *orientation of motivation*, the orientation concerns of why an action is performed. Further, Ryan and Deci (2000) present the self-determination theory (SDT) which distinguishes between kinds of motivation based on reasons and goals for performing a task, mainly distinguishing between extrinsic motivation and intrinsic motivation. Extrinsic motivation refers to performing a task because of the outcome that it leads to an intrinsic motivation refers to performing a task because of the enjoyment or inherent interest of the task itself and, the inherent interest that arises is what gives rise to knowledge and skill and thus intrinsic motivation is crucial for learning. To achieve intrinsic motivation there are a few psychological needs that have to be fulfilled, that is the need for autonomy, competence, and relatedness. (ibid)

Autonomy refers to the feeling of independence and control of the tasks, competence refers to the need to control the outcome and the feeling that you can accomplish a task and relatedness refers to the feeling of care and connection with others (Ryan & Deci, 2000). However, schools and the educational activities prescribed by schools are not designed to be intrinsically interesting and it has been shown that intrinsic motivation becomes weaker with each advancing grade. Within SDT a second sub theory, referred to as Organismic Integration Theory (OIT), was introduced to detail the different forms of extrinsic motivation and the contextual factors that either promote or create an obstacle towards a sense of more intrinsic motivation. According to SDT, it is possible to promote the internalization and integration of behavior and thus move towards the sense of a more intrinsic motivation meaning that it is possible to simulate intrinsic motivation with the right form of extrinsic motivation and that it is possible to move around in the spectra of the different forms of extrinsic motivation described in OIT. (ibid)

## 2.4 E-learning and gamification

It has been shown that the new generation of pupils differentiates from earlier generations regarding the use of media since tablets, the internet, and other technologies are constantly present. Therefore, by integrating elements of games in classroom activities, pupils will be more involved and engaged in the learning process (Malas & Hamtini, 2016). Applied in the context of e-learning, Malas and Hamtini (2016) writes about gamification, defined as "the concept of applying game-design thinking to non-game applications to make them more fun and engaging".

Further, the goals for implementing gamification include achieving user engagement, user behavior, organizational productivity, and learning, and it has been shown that it can increase engagement with course materials and improve motivation, participation, and collaboration in learning settings (Nand, 2019). Nand et al (2019) also identified that from children's perspective the most appealing characteristics of engaging computer games are levels of difficulties, feedback from the current level, and graphical presentation. Further, they investigated if children's learning is enhanced when embedding those game characteristics into an educational tool, with the purpose of teaching children numeracy. They found that the educational tool was more effective in enhancing children's learning when the characteristics were embedded and that the children found it more engaging (Nand, 2019).

From a pedagogical view, one issue with e-learning is that it lacks the natural engagement and emotional transition that a present teacher could provide to a student (Muntean, 2011). Therefore, an e-learning platform must compensate for this by stimulating the learners in other ways. When taking a closer look at gamification techniques that are appropriate to the learning process and e-learning, Muntean (2011) analyzes Fogg's Behavior Model (FBM) (Fogg, 2002). The model points out that motivation and capability do not alone guarantee a certain behavior, but that calls to action, triggers, that tells the student when to do what in an e-learning system is equally important. Muntean (2011) mentions the combination of intrinsic- and extrinsic motivation (Deci & Ryan, 20xx) to raise motivation and engagement through gamification. Examples of gamification for intrinsic motivation are altruism, competition, cooperation, sense of belonging, love or aggression, whereas classifications, levels, points, badges, awards, missions are examples of gamification for extrinsic motivation (Muntean, 2011).

According to Muntean (2011), when gamifying e-learning, any student needs to have the ability to edit a personal profile and should retrieve points after accomplished tasks in order to feel that accomplishing different levels in the e-learning platform is an achievement. For accomplishing difficult tasks or exercises the students should receive special bonuses. Additionally, they must be offered feedback on their progression as well as social interaction to simulate the familiar environment of a classroom.

## 2. Method

A design thinking approach (see Figure 1) was used to structure the project in an iterative manner, whereas the Double Diamond method (see Figure 1) was applied to divide the phases into Discover, Define, Develop and Deliver (Ordóñez et al., 2017). The methods used in the design process were not linear but were conducted based on insights along the process, in line with the iterative mindset.

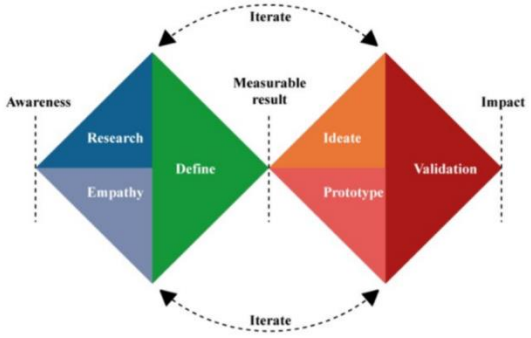


**Figure 1** - *Design Thinking Double Diamond Scheme*

### 3.1 Discover

#### 3.1.1 PACT Analysis

To understand the preliminary requirements, a PACT-analysis (Benyon, 2019) was conducted. The purpose of the PACT-analysis was to define what people, activities, contexts, and technologies to consider in the design process.

#### 3.1.2 Literature Review

A literature review on learning theories, e-learning, gamification, human behavior, and motivation was conducted in order to find a solid ground for all the design choices. In order to organize and summarize the findings of the literature review, a mind map was created (Digital Society School, n.d.). The mind map was then analyzed, which resulted in insights regarding which learning theories to use as a ground for the project.

#### 3.1.3 Participatory user testing of the current platform

The user study was initially thought to be in the form of semi-structured, think-aloud, user interviews to understand- and emphasize with the user needs to set up requirements for the design. However, due to the current situation regarding COVID-19, physical meetings were restrained, and it was not possible to get in touch with

students using the Frontread platform. Consequently, a participatory user study was conducted with the aim to gain insights about the current platform.

#### 3.1.4 Heuristic evaluation

Following the process of defining user problems- and needs, a heuristic evaluation was conducted (Digital Society School, n.d.) with the client. The evaluation was conducted through a digital meeting on Microsoft Teams, where the client was asked questions about the current Frontread platform and its context of use, as well as the future vision.

### 3.2 Define

#### 3.2.2 Proto personas

To understand the needs and concerns of the stakeholder and users of Frontread, a proto-persona workshop was performed. During the session three personas were sketched, all with different motives and worries. Furthermore, to understand the complexity of the personas, multiple questions regarding frustrations, goals, and needs were asked to get in the mindset of the personas. As a result, various requirements were stated which were later addressed in the Develop phase.

#### 3.2.3 Teacher interview

In addition to the proto-persona workshop, an interview with a teacher that uses Frontread was conducted to further understand the mindset of how teachers experience the platform. Moreover, their apprehension of how their students interact with the platform, and which role they as teachers have to take in order to facilitate the students.

### 3.3 Develop

#### 3.3.1 Solution Brainstorm and How Might We

When the problems were stated and concretized, the design thinking activity "How Might We" was conducted to brainstorm possible solutions to the different challenges. Thus, to every problem that was found, a question on how the problem might be solved was asked and answered. This resulted in multiple ideas and solutions which were later iterated on to further narrow down the possible solutions.

To further elaborate on the solutions found in the How Might We method, an additional brainstorming session was conducted. A sheet with a blank table was passed around where the participants were asked to fill out ideas in line with the Design Method Brainwriting (Digital Society School, n.d.). The rows and the columns of the bland table were based on what was found in the Discover and the Define phases

#### 3.3.2 User Journey

A user journey that included the solution (see 3.3.1 Solution Brainstorm) was created to ensure a good user experience. Besides creating a good experience, the aim of the user journey mapping was to simplify the process of creating a mockup prototype in the next phase of the Double Diamond.

### 3.4 Deliver

#### 3.4.1 Prototyping

To realize the ideas defined in the Develop phase, they were visualized in the form of wireframes that were later put together into a mockup.

#### 3.4.2 Stakeholder Interview

The wireframes were shown to the client for evaluation. Since actual users of the platform were hard to get, the client further had to act in the role of a user when evaluating the wireframes.

## 4. Result

The result from the four phases in the Double Diamond are presented below.

### 4. 1 Discover

From the PACT-analysis it was found that the primary people to consider in the design process are the students using the platform for practicing their reading speed, and

secondary the teachers who administer the learning process. The main factors defined for the students were:

- the student might have trouble reading
- the student might have problems with concentration
- the student might be high performing
- the students might have different motivational needs, where some might be motivated by competition with themselves- or others, seeing their progress, having fun, doing something that interests them, or by external expectations- or pressure.

Additionally, Frontread employees were also considered important since they are responsible to ensure the quality of the learning platform and would also be involved in the technical development of the design. Other stakeholders such as school administration and parents were also found and considered in the discovery phase. The activities performed on the platform were reading-, skimming-, fixation-, span- and working-memory exercises. Also, other activities not connected to the actual learning exercises were navigating through different modules, levels, and exercises, receiving feedback, understanding- and analysing the students' progress. The Frontread platform could be used in the context of in-classwork, homework, with help from parents or teachers, or through self-management.

The literature review resulted in insights about motivation to read, motivation in general, self-management, e-learning, and gamification. The key insights are shown in a mind map (see Figure 2) containing the most important outcomes and how they are related to each other.

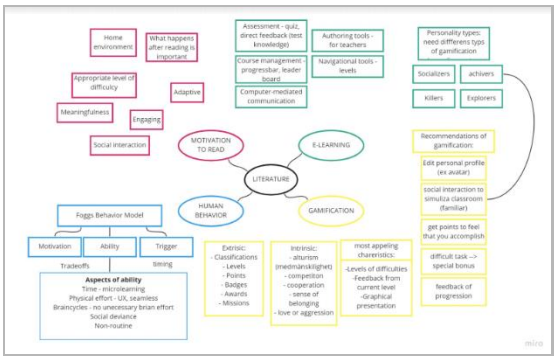


**Figure 2** – *Mind Map of key insights from literature review*

## 4. 2 Define

Key insights, moreover the needs, and concerns that could be proclaimed from the define phase based on the problem statement, proto-personas, and the interview with the Frontread using teacher was following:

- the training needs to be more self-driven by the student
- the platform needs to include more motivational features and gamification elements
- the interface needs to be more fun and engaging to conceal the repetitiveness that is necessary throughout the training
- the exercise flow needs to be more clear to enable students to easily continue with their training
- the training-process of students must be presented through a comprehensible design, so students understand their progression

## 4. 3 Develop

The brainstorming session resulted in the following ideas:

- Redesign the onboarding to make users understand why it is important to practice reading and improve reading speed by using relatable examples.
- The student should be able to set your own goals with preset suggestions on what the goals could be, e.g. "Read subtitles", "Read conversations in computer games".
- The student should be able to choose themes for each module in the

course in order to reduce the feeling of repetition and also make the content more personalized.

- Make the interaction and flow in the training section more seamless by giving the students the ability to take shortcuts to the next level/exercise.
- Automatically generate a degree of difficulty of reading speed, as well as automatically generate feedback during the training.
- Implement game elements such as an individual progress bar, a guided path, and instant feedback.
- Show visualization of the progress in an overview page as well as relatable examples to compare the reading speed and flashing time
- Implement a way to interact with the teacher by a chat
- Increase the autonomy for the students by giving them the ability to change the order of the exercises

The User Journey including many of the suggested design ideas resulted in a user journey map (see Figure 3).

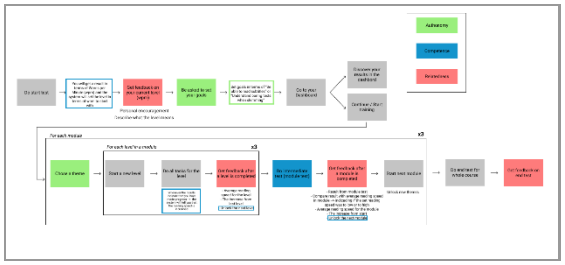

**Figure 3** - *User Journey Map with the suggested user flow with included design ideas*

### 4.4 Deliver

The stakeholder interview with the client gave feedback regarding the ability to select themes and the ability to change the order of the exercises. The client liked the idea of selecting themes, however, they thought it could be hard to implement many different and specific themes. Regarding the order of the exercises, they claimed that there was a purpose with the given order and that changing the order might confuse the users. Therefore, the number of themes to select from was reduced and the feature of changing the order of the exercises was removed.

### 4.5 Final Delivery

The final delivery resulted in a mockup prototype including the design ideas that were developed during the design process. The prototype consists of two main parts, the training part and the personal dashboard including an overview of the result.

First, the user can set their own individual goals (*See Image 1*) and get personal feedback on their progress in relation to that goal (*See Image 2*).

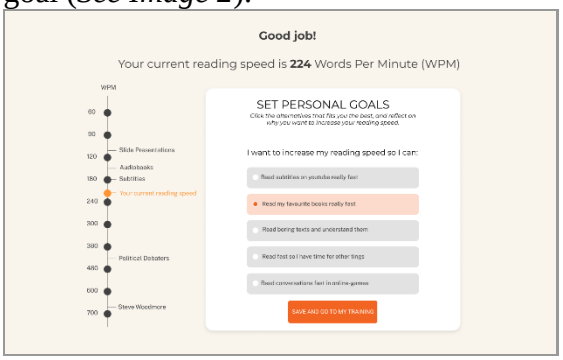


**Image 1** - *At the beginning of the course, the user can set their own goals.*

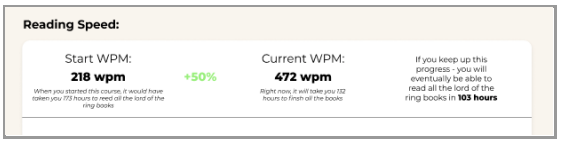


**Image 2** - *An example of how the user gets feedback in relation to their personal goal.*

In the training section, the user can select themes for the different modules (see Image 3). The themes will change the user interface of the training section as well as the texts that users are reading. When finishing a level, the user can choose to go directly to the next without having to go back to the course overview (see Image 4).

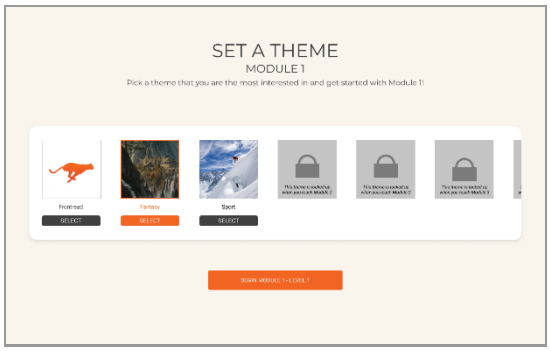


**Image 3** - *The user can select a new theme for each module*

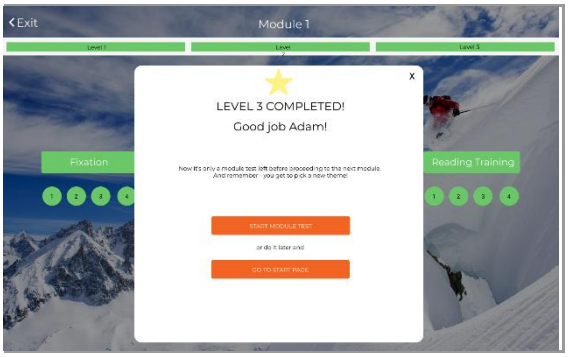


**Image 4** - *The user gets the choice to go directly to the next level*

Throughout the training, the user will get feedback after accomplishing levels and modules including the result for that level/module (see Image 5). When the users' scores are too high, the system will automatically change the level of reading speed and/or blinking time, the system will notify the user when these changes occur and explain why (see Image 6). There is also a progress bar visible in the training section (see Image 4, 5, and 6)

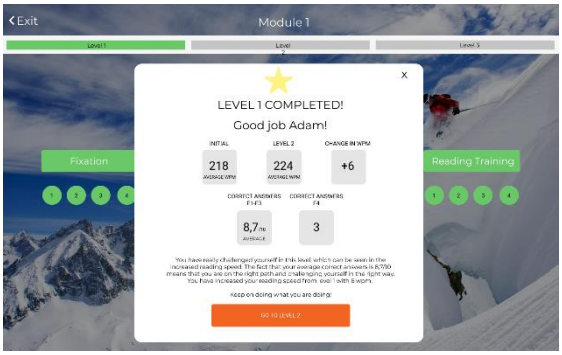


**Image 5** - *Feedback after a complete level*

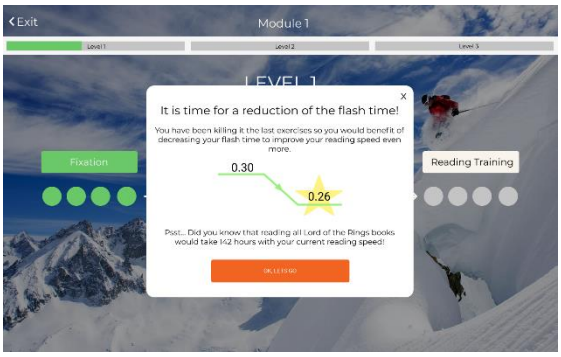


**Image 6** - *Information when the system changes the flash time*

In the personal dashboard section, the user will have access to an overview-page with visual representations of their results where they easily can understand and reflect on their process and progress (see Image 7 and 8).

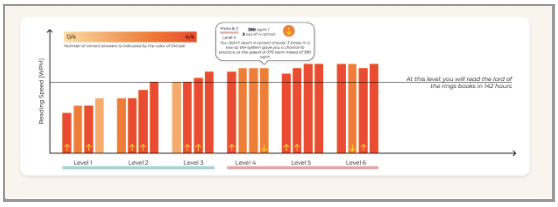

**Image 7** - *Visualization of the users' result from the reading training*

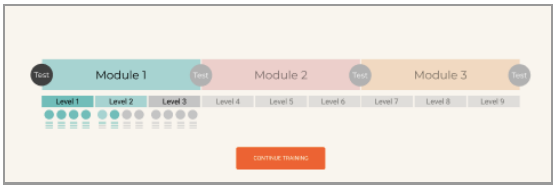


**Image 8** - *A detailed progress bar*

The user will also get personalized feedback from their teacher and respond to the feedback in the form of a chat (see Image 9).

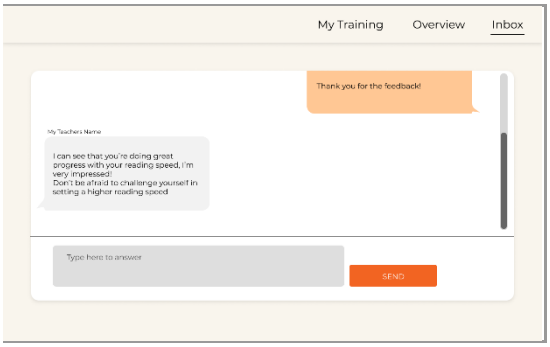


**Image 9** - *The user can chat with their teacher*

# 5. Discussion

The feature of having the ability to set personal goals follows the theory of task analysis that takes place in the forethought phase in the self-regulation theory (Zimmerman, 2002). By setting their own goals, the student will reflect on why they want to learn and thus it becomes meaningful (Locke & Latham, 1994). The students will also get the feeling of autonomy and thus the motivation will increase, in line with the self-determination theory (Ryan & Deci, 2000).

One of the problems with the current platform was that the students perceived the platform to be very repetitive and that nothing changed along the way. The actual training needs to be repetitive, but the content and surroundings do not. An important part of gamification applied in e-learning contexts is that the different levels should be enhanced (Muntean, 2011) so that the student always will be encouraged to go to the next level. Therefore, the choice of selecting themes was implemented following the theory of gamification to emphasize that the levels are changing. The variation of content and visual interface provided by the themes help enhance the feeling of reaching new levels. Besides gamification, the selectable themes enable customization of the platform, enabling the students to control and self-determine the training, following the autonomy aspect of the self-determination theory (Ryan & Deci, 2000).

One aspect of Fogg's behavior model explains the importance of high ability to perform tasks (Fogg, 2009). By enabling a shortcut when navigating between exercises and levels in the training, the threshold for continuing the training will be lowered leading to increased ability to continue with less effort. By giving the students the option to either go back to the level overview or use the shortcut option, they will get to self-determine how they want to navigate and thus be more motivated (Ryan & Deci, 2000).

Another way to increase motivation is to enhance the feeling of accomplishment and mastering a task (Ryan and Deci, 2000). By letting the system automatically increase the level of difficulty, and also give feedback to the user when doing so, the students feel they are progressing and thus are more motivated to continue the training. If no progress is being made, the system can also decrease the level of difficulty. By doing so, the students will be at the proper level, where they are being challenged but still feel that they have the ability to master the task. Adjusting the students to their proper level will thus keep them motivated since they not only get the feeling of mastering a task but mastering a challenging task. Besides system-generated feedback, the feedback from the teachers will provide personal encouragement and enhance the feeling of care and connection from others which will lead to higher motivation (Ryan & Deci, 2000). By getting feedback on progression by interaction with the teachers, the familiar environment of a classroom will be simulated (Muntean, 2011). The overview part of the platform will work as a personal profile in line with how Muntean (2011) describes gamification in an e-learning context. The students can change their goals and get personalized feedback related to their goals. To illustrate the progress, visualization of how the difficulty levels have changed was to give the students a feeling of accomplishment to increase motivation (Ryan & Deci, 2000).

### 5.1 Future development

The greatest obstacle for the redesign of the Frontread platform was the lack of evaluation with real users and thus that is the most important aspect for future development. The evaluation would be in the form of semi-structured interviews where students could elaborate on their thoughts on the mockup prototype. The focus would be to find out if the students would be motivated

to use the platform more independently because of the changes that were made. Based on the feedback from students, more iterations would be made until reaching a solution that eventually could be technically implemented in the platform as an MVP and evaluated in a quantitative way with real users.

According to Fogg's behavior model, motivation and ability are trade-offs meaning that if one is high, it can compensate for the other being low (Fogg, 2009). However, they also need a trigger to execute a task. The triggers are now in the form of facilitation from teachers in school or parents at home, the final goal is however to make the training fully self-driven without any required involvement from teachers. Future development would therefore be to investigate how the system could trigger the students, perhaps in the form of notifications.

The solution presented is focusing on increasing the intrinsic motivation i.e. the inner will to learn, by giving the students room for reflecting and setting their own goal as well as giving relatable examples of reading speed. One idea that was initially thought out was to implement more intrinsic motivation in the onboarding as well. The onboarding would explain to the students why it is important to practice reading with Frontread, empathizing the intrinsic motivations behind it in line with the forethought phase in the self-regulation theory (Zimmerman, 2002)

## 6. Conclusion

As the requests for online-classes for students have increased (Witherow, 2020), there has been a higher demand for digital tools (Seiler, 2020). One company located at the forefront of this demand is Frontread who specializes in the training of reading speed for students in elementary school. Frontread is looking for ways to make the training more self-driven by the students, without the involvement of their teachers. To do so, the students need to be more motivated to use the platform and also implement self-management to achieve independence. The current Frontread platform was therefore redesigned using a design thinking approach following the phases of the double diamond. Throughout the phases, stakeholder interviews were held, various brainstorming sessions were conducted and a mockup prototype was created containing gamification elements and features for increasing motivation. One possible improvement would be to evaluate further with real users.

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## Attachment 1 - Figures

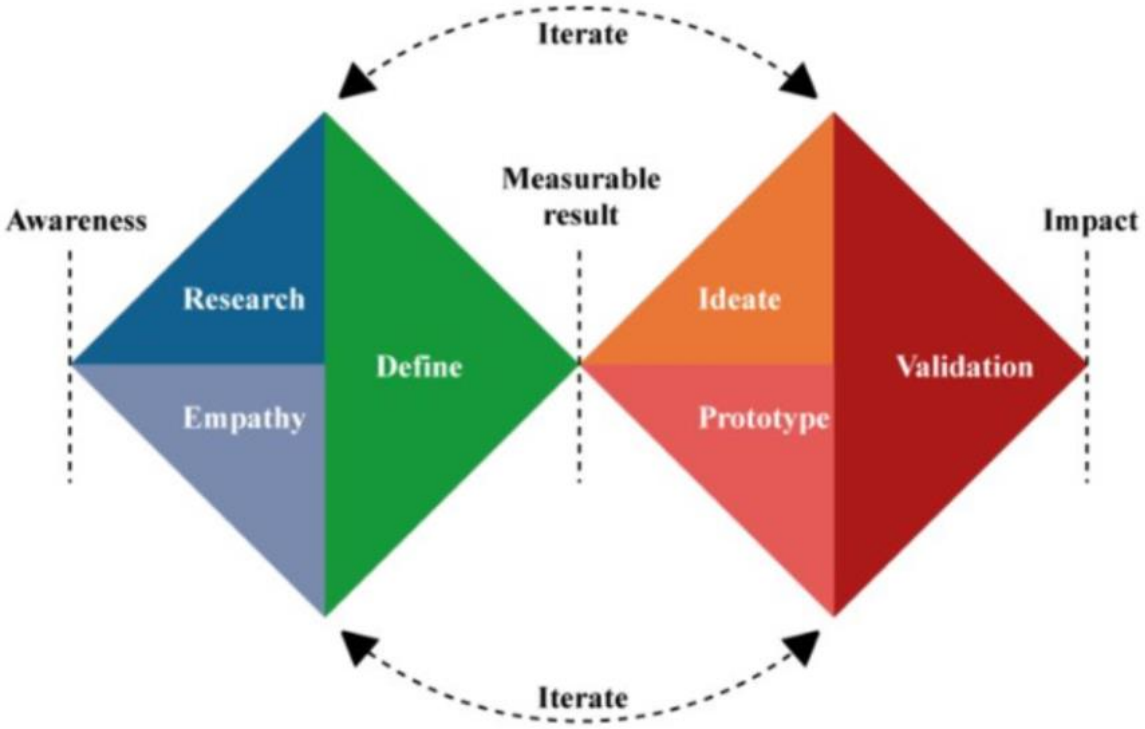


**Figure 1** - *Design Thinking Double Diamond Scheme*

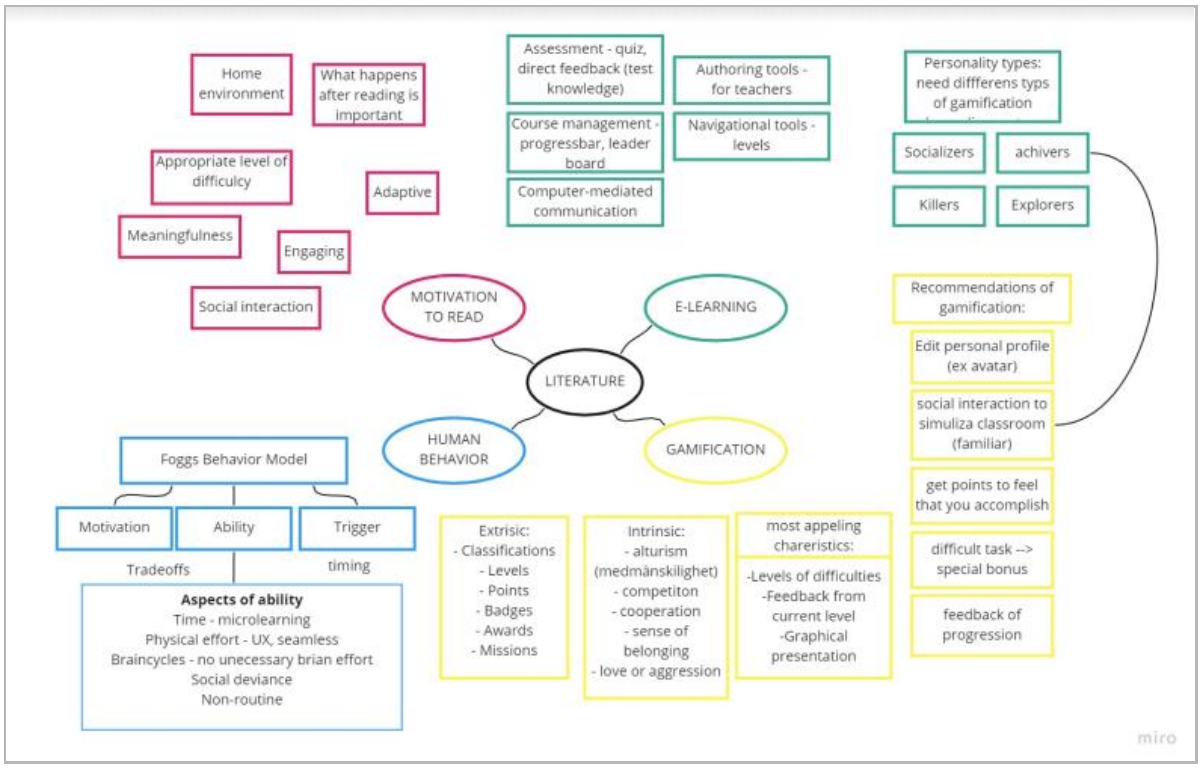


**Figure 2** - *Mind Map of key insights from literature review*

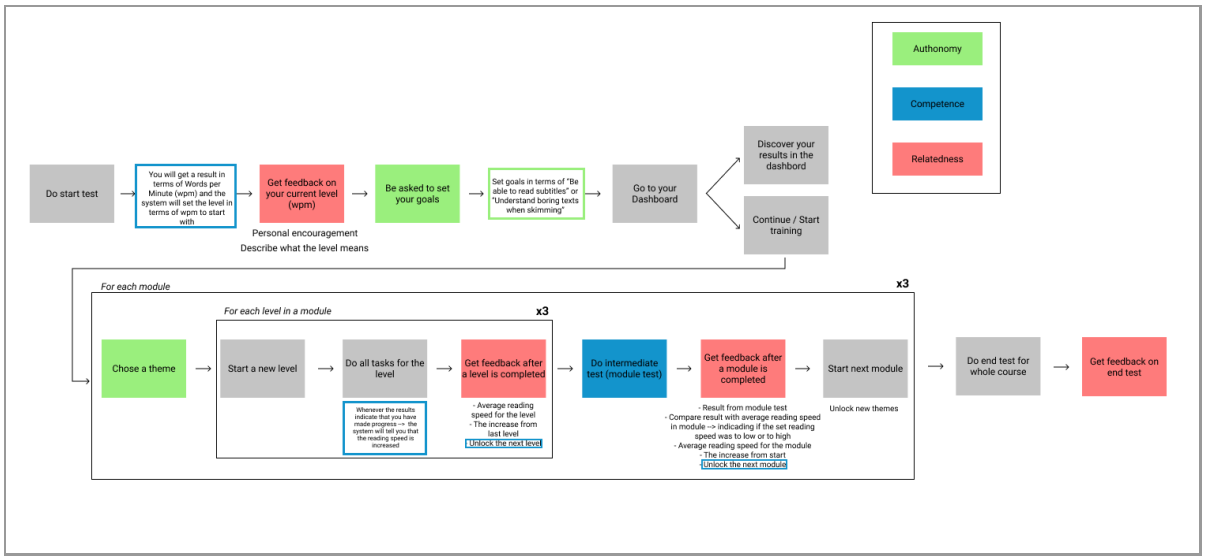


**Figure 3** - *User Journey Map with the suggested user flow with included design ideas*

## Attachment 2 - Images

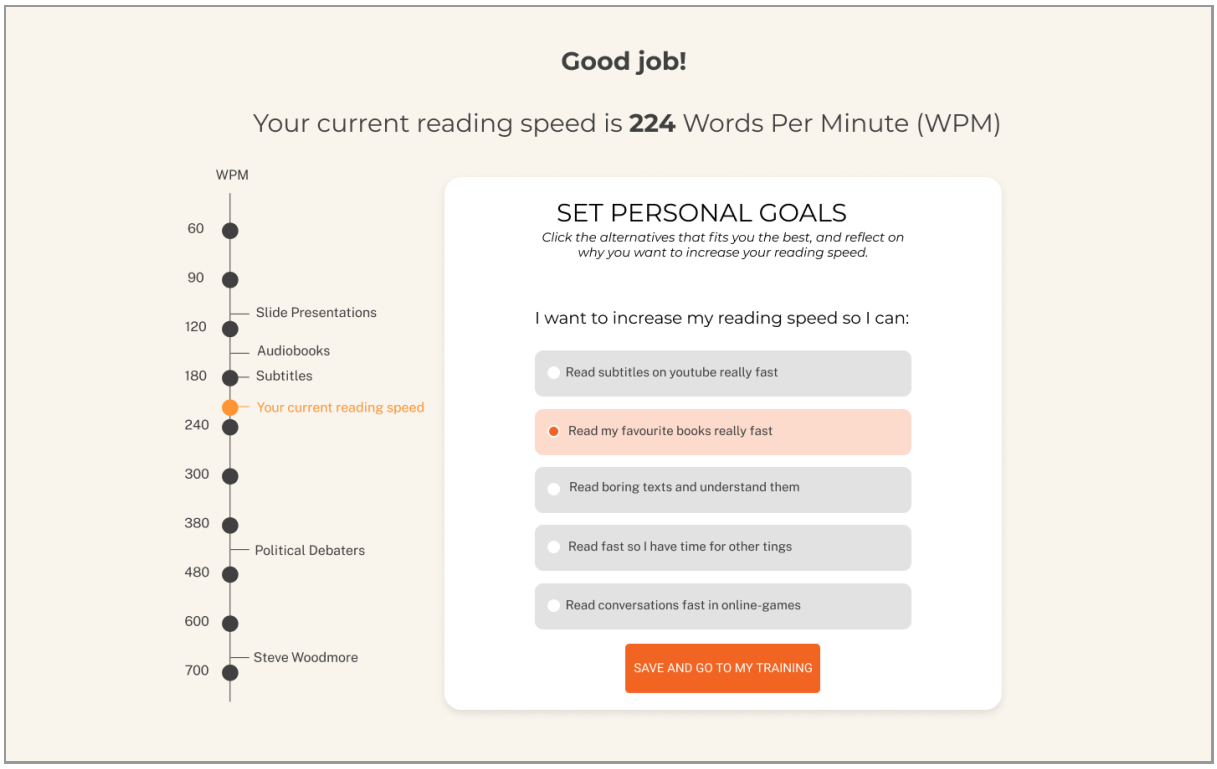


**Image 1** - *At the beginning of the course, the user can set their own goals.*

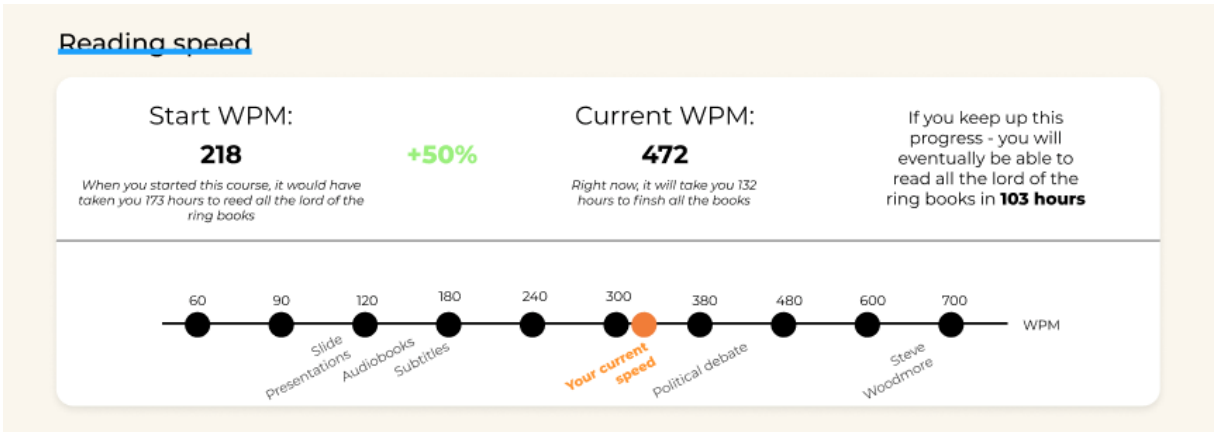


**Image 2** - *An example of how the user gets feedback in relation to their personal goal.*

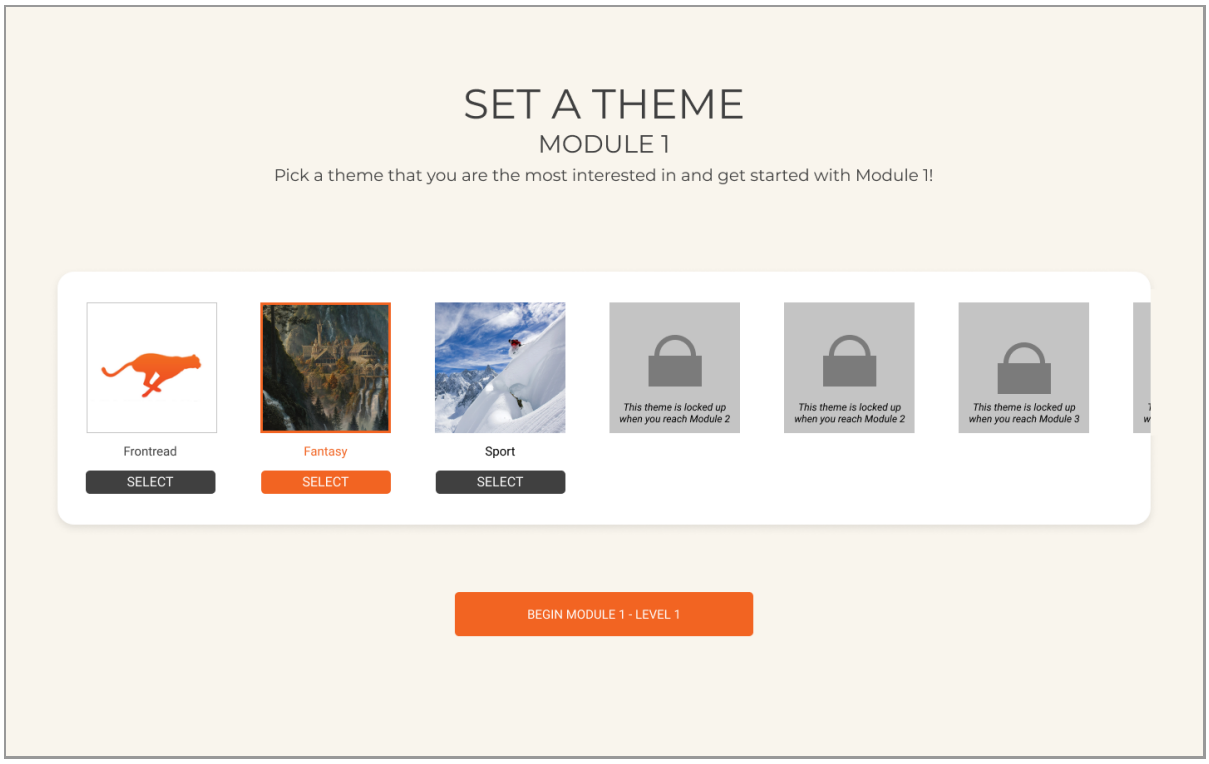


**Image 3 -** *The user can select a new theme for each module*

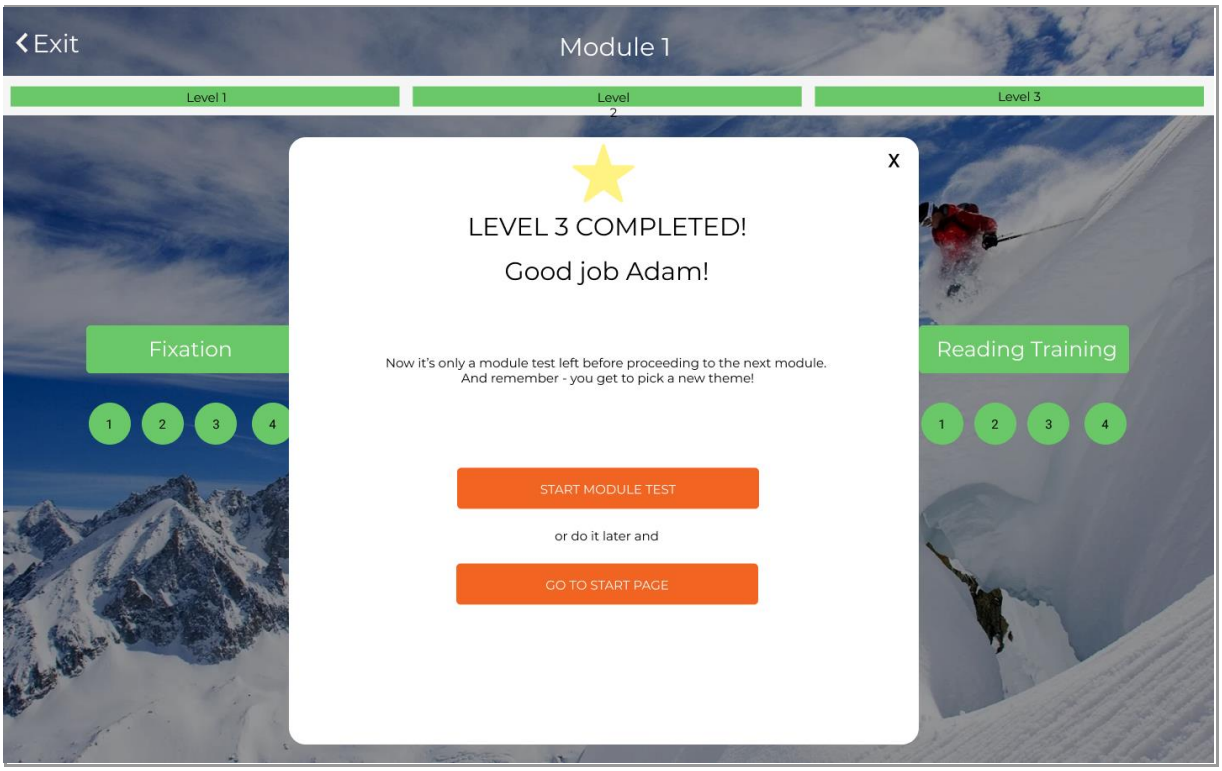


**Image 4 -** *The user gets the choice to go directly to the next level*

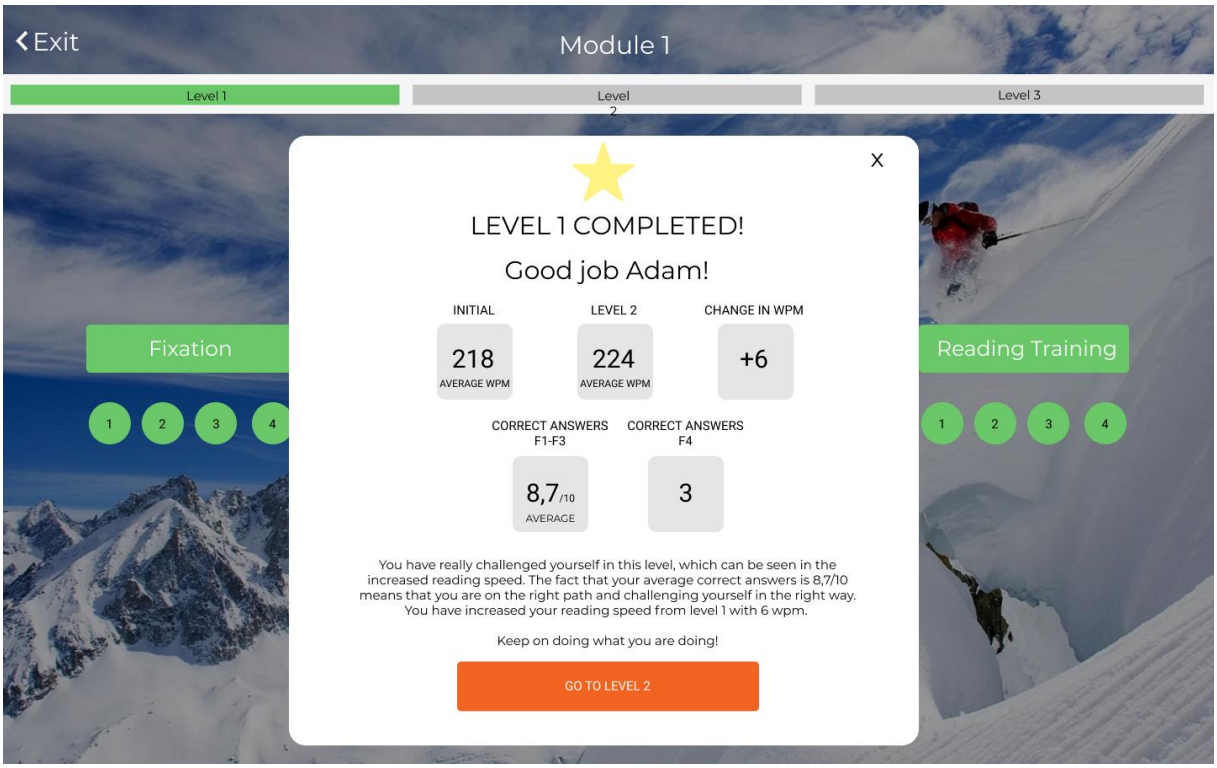


**Image 5** - *Feedback after a complete level*

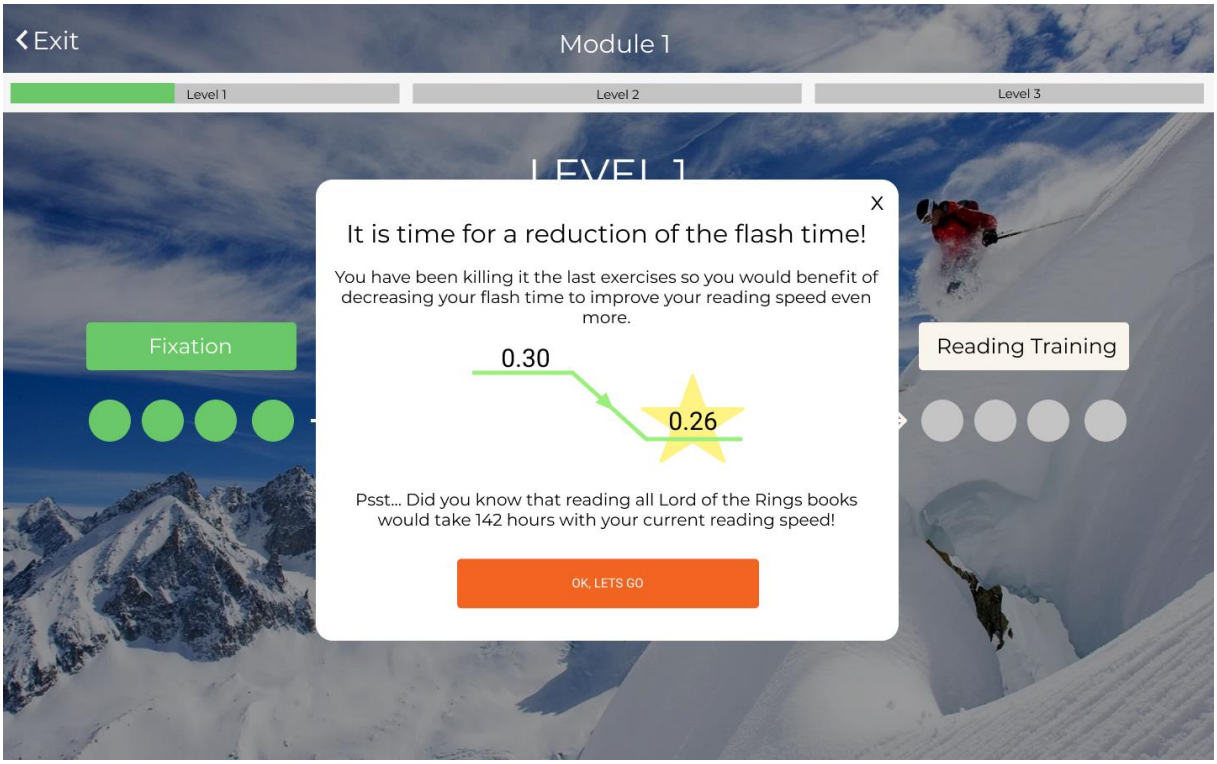


**Image 6** - *Information when the system changes the blinking time*

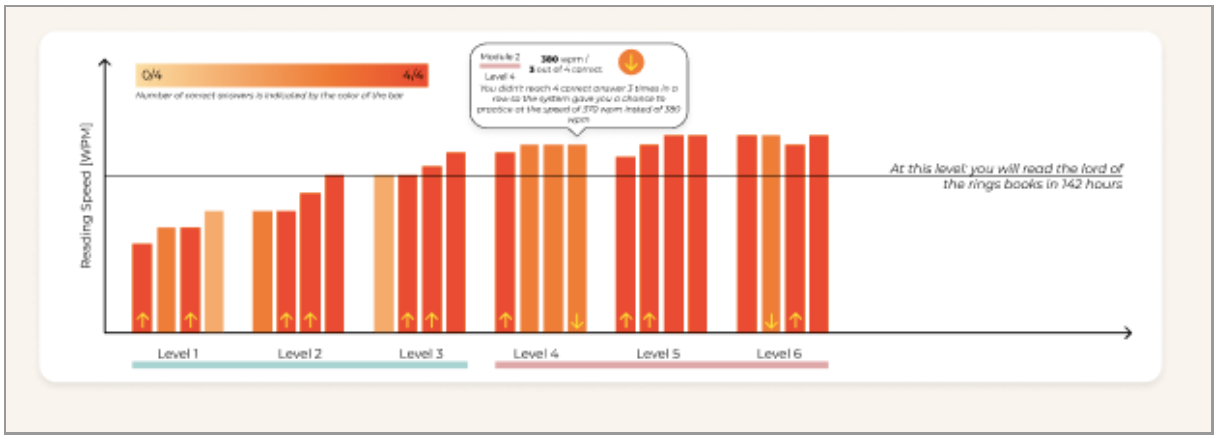


**Image 7** - *Visualization of the users' result from the reading training*

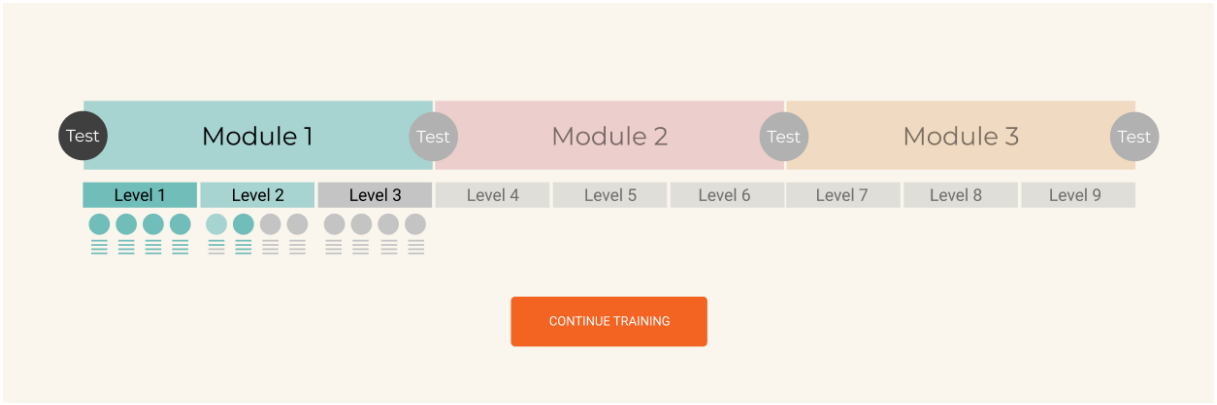


**Image 8** - *A detailed progress bar*

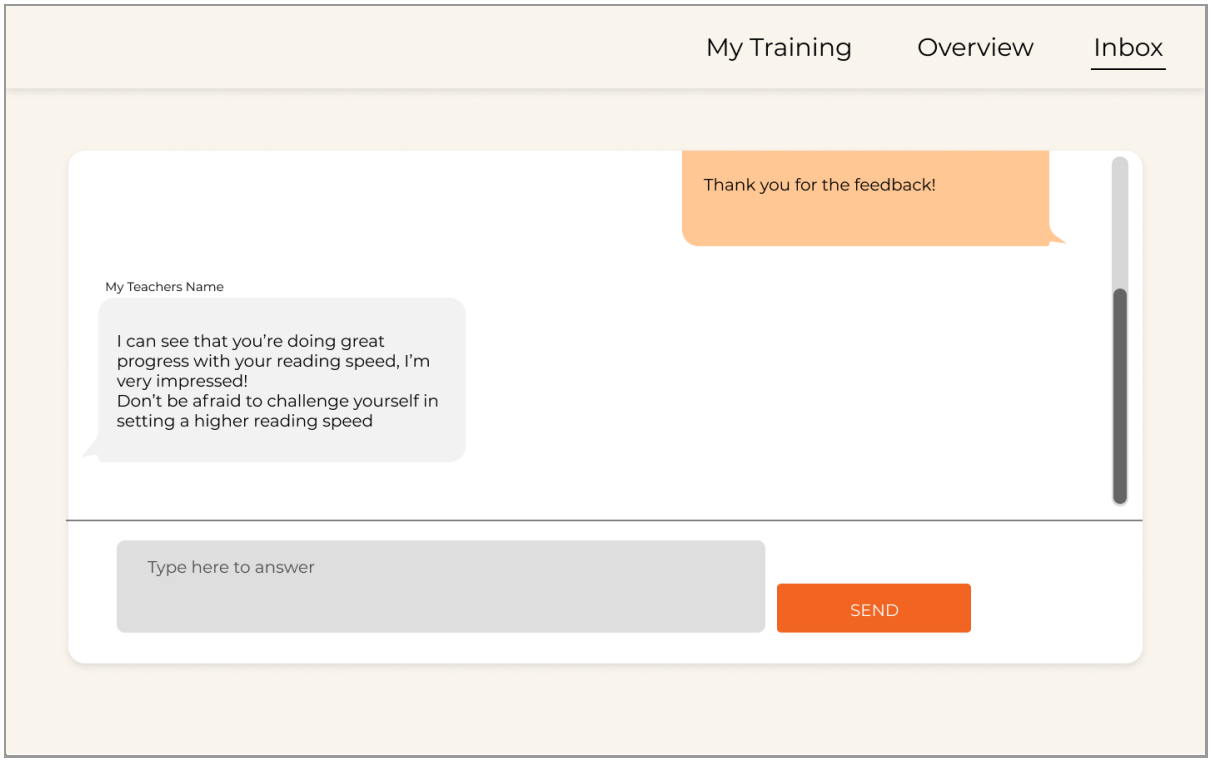


**Image 9** - *The user can chat with their teacher*