

Out of Class: AN Intuitive Email Design to Increase the Delivery of Effective Information for Online Courses

Master Thesis

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Abstract

Communication between lecturers and students is indispensable. It is intimately related to students' performance. Hence, effective communication is essential, especially in online courses where there are limited face-to-face communication opportunities. In online teaching, the communication between teachers and students happens usually through specific digital tools or platforms. How to achieve effective message delivery to keep students on track has always been a problem worthy of attention. This paper mainly focuses on email as the means of communication in online learning. The researcher presents a design solution based on email content design. Based on the interface design, the email content was reorganized and designed, finally the email would be sent to students periodically in the form of email reminders. By doing an actual case study, this study evaluates the effectiveness of email communication through several methods of user research, such as interviews, surveys, and A/B testing were used in the user testing session. The findings in this paper propose an email content design to support students' self-learning through email reminders in online courses. Email reminders cannot completely replace the communication between teachers and students, but well-designed email can potentially increase students' motivation in online courses.

Keywords

Communication; self-paced online learning; self-study; email design; information organization; information interface design; information acquisition; user research;

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1. Introduction

Students' experience in online classes is significantly different from that of the off-line ones. Students are able to receive feedback timely in off-line classes. In addition to this, contents can be delivered by lecturers more vividly. On the contrary, in online education, in online learning systems, in general, it takes more time for students to receive feedback. While in certain cases, some online courses adopt so-called hybrid teaching modes in which the researcher had been through during the studying career. That is, students still have a chance to discuss with their teachers in person, who can provide sufficient guidance to these confused learners. Teachers usually settle the meeting at a regular time. It is mainly built to provide adequate feedback to students so that they receive information related to their learning progress and performance, which motivates them to continue studying. However, the educational model could be unexpectedly derived from external circumstances caused by some force majeure factors, such as natural disasters, epidemics, etc. The outbreak of COVID changed the hybrid model of online teaching into a teaching activity with no physical contact between lectures and learners at all. Moreover, the possibility of information loss could be more significant due to the lack of communication means and the limitation of the carrier of information transmission. Thus, how to keep students on track in certain ways during the online teaching process needs to be considered.

Since the appearance of massive open online courses in 2013, more and more types of online education have appeared in different fields. Nowadays, university students have taken more or less online courses during their studies. The number of enrollment taking online classes has tripled in the past two decades(Allen & Seaman, 2013). The current situation is that there are more students and few teachers in online classes, which leads to an unbalanced communication. Especially in self-paced line classes, such communication imbalances are common. Under such a circumstance, online learning requires students to have high independence in self-learning. Students need to find more support and study resources through various platforms to enhance their efficiency and performance. It is quite necessary that relevant institutions or educators provide specific means to help students learn. One vital thing is to increase students' engagement in online classes.

In another aspect, some online courses usually last a relatively long period (e.g., more than half of a student's total program duration). Moreover, more situations accordingly require students to have the ability to learn mostly independently. Thus, it is crucial to have certain external tools to support and assist students in contributing to their self-directed learning performance, especially in an extracurricular setting. Moreover, the teaching platform, official websites, and authoritative emails should be the most convenient and reliable way to deliver study information. In terms of information delivery, email is better communication between lecturers and students. Users could extract the right information from the organized text and proper interface design(Chandra et al., 2008). And then, with certain supplemental education tools, deliver information intuitively so that the receiver can catch the point more efficiently. However, in previous cases, many examples of designed information in email concentrated in the field of Email Direct Marketing.

Fariborz(2017) summarized that Email marketing has the highest return on investment of any marketing method. There are fewer studies on the application of Email marketing in higher education. In such circumstances, the researcher has a certain motivation to carry out this study so that this study may be able to contribute to the application of interdisciplinary knowledge of business tools in the education and communication industry. More importantly, in the context of research in human-machine interaction, it is also an excellent opportunity to practice user interface design and some user research methods based on user-centered design methodology.

Previous research shows that poor communication or interactions may lead to the isolation of students. Meanwhile, excessive communication causes overload differently (Willging & Johnson, 2004). After that, Rhode(2009) explored participants' preferences for different forms of interactions in self-paced online learning. The ranking list of participants' scales shows that the top five interactions are more related to specific elements, including instructions, comments, feedback(emails), and communications. Except for physical interaction or real-time meetings between lecturers and students, those interactions of high rank can be equivalent to transmitting adequate information through certain practical tools. Among the tools related to self-learning and engaged learning used in many online courses, email between teachers and students in teaching activities benefits education in the long run(El-Sabban,2009). Thus, the paper herein mainly focuses on assessing the effectiveness of email in a reminder format as a communication means in a self-paced online course. It explores how participants in a real case of online courses acquire information through email under the influence of different design elements.

It is a challenge for students when facing an online course that will take a relatively long period, especially since the course has a high demand on students' independent learning ability. For instance, a career-related course can provide professional guidance to students. Rotterdam School of Management, Erasmus University, provides the course Your Future Career(YFC). This course usually lasts for the entire study period to systematically provide valuable knowledge to students. Also, the requirement for students to pass this course is to complete sufficient tasks independently. Currently, the teaching staff is using the communication means of email reminders to keep students on track. The periodic email reminder contains simple information in plain text to update students on their learning progress.

Therefore, there is one key to support students in self-study in an online course, which is to ensure the efficiency of emails, and the satisfaction of students by using corresponding emails. A question accordingly worth exploring arises. That is, how to make the efficient use of emails to the greatest extent possible of delivering information. Put aside the external factors of email, such as the best delivery time, the frequency of delivery, etc. Since these factors can be adjusted or improved in a timely manner. Considering email as a carrier of information, this study starts from the perspective of information design itself, for example, to improve the legibility of content and to distinguish the weight of specific information. A superficial goal is to change the structure of the information to better fit the delivery mode of the communication tool. But in a

long run, the ultimate goal would be resulting in more positive feedback from the recipient and making faster and more accurate information acquisition for recipient.

Problem Statement

According to the previous learning experience of participating in online teaching activities, the researcher has some opinions on supporting students' learning progress through email reminders. There were only a few real-time lectures for some online courses but more unsupervised self-study. Under these conditions, learning can be productive when a regular due or meeting requires regular presentations or completion of tasks. Moreover, the lecturers would give timely feedback through communication. If the condition of certain online courses does not permit a regular meeting, it is necessary to have a reminder in different formats. Under the circumstances of the pandemic, a more convenient interactive way was transferring to online platforms. The quality of online conversation accordingly is dependent on network conditions. So in most situations, to make sure the information delivery is effective and understandable, it is inevitable to complete information delivery in other formats of media(e.g., text, videos, voices) besides real-time communication. Hence, a big challenge in lectures is to consistently and effectively support students to complete a series of learning tasks during the course that lasts a relatively long period.

Before discussing and defining the specific problems that this case study needs to address, some questions should be mentioned to explore the possible answer from this study in a holistic way. The information is inadequate in the delivery process. There is no further guidance or reminders to students, which is useless or not significant enough to motivate students. Subsequently, it potentially causes some cases, such as the reading experience is not friendly; students will feel that they deviate from the track constantly, or partly students feel less motivated by the whole teaching process.

In this study, the researcher proceeds to seek the potential solution for the above points through a case study. The updating email in YFC course is currently in plain text format. At the same time, the efficiency of existing email is not ideal. Furthermore, based on the information provided by Dr. Maciej Szymanowski, a professor at Rotterdam School of Management. Feedback from previous students' evaluations of this course was extracted and provided. There are certain valuable evaluations from the student's perspective in previous learning experiences in this course. Two constructive comments are as follows 1) The symbols or colors representing the progress of assignments or tasks should be kept consistent with other learning platforms that the progress of assignments in email; 2) The overview of certain types of information and data is needed. The feedback inspires the researcher to consider whether email efficiency is associated with the information composition of the email content.

How to support students by sending emails in the perspective of design. From this perspective, refer to the field of user interface design, designers and people in related professions design specific content under individual requirements and tasks while refer to existing unified design

principles(e.g., Nielsen's Heuristics). In other words, design principles has good acceptability, feasibility, and universality which can be used in different projects to better display content and transfer information. Design principles are used exclusively in a particular field of study. There are certain fixed structure or elements in those principles which can be applied under various circumstances depends on specific requests in projects. The generalizability in these design principles is what the researcher aims to look for in this study.

There is an inevitable problem that the patience and motivation of students are lost over time. That needs to consider more holistically how to support these online courses within a relatively long time(e.g., more than three months, which is usually an academic module for college students). It is always necessary to ensure that sufficient information after class is sent periodically to students to help them plan their learning progress. However, miscommunication between lecturers and students has existed for a long time, especially for courses that last relatively long. For example, students miss deadlines, keep asking how many points they need to pass, or forget to finish their assignments. During *Your Future Career*, corresponding progress updates will be sent to students so that they have sufficient information to adjust their study plans accordingly. More specifically, the main **research question(RQ)** is tentatively identified as the following, which should be ideally addressed in this study:

"How to use email as an effective means of communication to keep students on track in online courses?"

And a number of sub-research questions are raised to produce the final results of this study better:

1. What formats of the email reminder design would elicit more positive feedback from students?
2. Do the color elements in the email content influence the information acquisition of recipients?
3. Are the email design's graphic elements helpful to students in highlighting important information?
4. To what extent does a periodic update through email in online courses increase students' engagement?
5. To what extent does periodic communication(or information transmission), based on any means, affect students' learning in online courses?
6. Is there any difference between online courses in the short term and in the long term in terms of the need for the email reminder?

Objectives

By answering this research question, the results of this study will improve the consistency of information delivery and therefore improve students' learning efficiency in online courses. Generally, this study aims to explore the potential value of how email marketing can be used as an effective tool in online career education. The ultimate goal of this study is to find a relatively intuitive way to display information, to effectively deliver information to ensure that it can help

students complete their learning tasks reasonably and efficiently. In detail, several objectives are also expected to be addressed:

1. To propose and present a solution based on email design to intuitively present information that can improve the effectiveness of information delivery;
2. To review previous and current research on career service and information delivery concerning education objectives;
3. To understand better how to use different methods in the multidisciplinary research environment correctly;
4. To implement practically the human-centered design approach in the complete project;
5. To evaluate the efficiency of the new design solution;
6. To validate if adding certain design elements can increase students' initiative of self-learning.

Next, to different design processes, using multidisciplinary knowledge such as User Experience Design, Marketing Research, and Service Design is necessary to conduct this study. During this study, the researcher aims to improve the effectiveness and practicality of information delivery as an educational service. In this study, the main user group had been specifically determined, which is the students who have been attending the YFC course. On the other hand, from a more practical and general point of view, it can be potentially applied to more online courses differently. Therefore, the target group can be extended to the students attending several online courses related to career-building at university. Based on this potential objective in four further research, the methods of personas and scenarios will be considered in the design stage, which can extract a general and representative image for the target group. This study can contribute to potentially analyzing learning behavior and psychological activities.

The researcher argues that the results of this study can contribute to answering the questions mentioned in previous sections. It should be adopted in most situations, including in more restrictive circumstances. It is necessary to find out if there are more convenient tools that can be used to support most online classes. And this study is essential to explore how to utilize email as an educational tool to effectively convey relevant information, rather than using email to communicate between instructors and students to exchange information.

Eventually, in the stage of displaying the outcomes, this study will provide an intuitive information format to display an overview of students' learning progress. Moreover, the design solution will include a relatively student-friendly email distribution solution to be more comprehensive. For example, to determine the frequency of notifying students via email, to know if there are more types of notification emails students need, and to find out the suitable timing of sending the update email. That could be applied to help tutors or lecturers easily give learning tasks and feedback to students regularly. Furthermore, a sustainable, iterative design that can also be used in different courses will be expected. More specifically, to explore the feasibility and generalizability of the solution in this study, there are certain elements which will

be assessed to see their possible effects. For instance, the design of text organization in the email, the division of information hierarchy, and the addition of graphic elements. It is more valuable to research only if these design elements which will be evaluated in this study can show the possibility of applying to other cases.

2. Related Work

2.1 Communication in Online Education

It is particularly crucial to keep students engaged in or out of the class and their learning progress in the course. The challenging part is to ensure that after-class information is communicated correctly and effectively. Harrison(2002) mentioned that students do not learn in a lecture. However, somehow, students' learning process is progressing during this course. He introduced a way to classify information being delivered in his previous research. This study clarified that information encapsulation is crucial for effective delivery on the web platform.

Similarly, a study(Fuad et al., 2020) focused on making students engage in teaching content even after the classroom. The outcome is a mobile-based platform that encourages students to participate in the interactive study exercise. Significantly, it also allows students to self-reflect on their performance through participation. If we refer to this study, the reflection would be shown by how students will take action after getting points and receiving progress updates on the course. In terms of teaching, Duță et al.(2015) conducted case research to explore the effective communication between teachers and students. That research gave more importance to teachers' communication skills during the process between teaching and learning. Alawamleh et al.(2020) explored what exchanging information brings to both sides of students and instructors. It clarifies the definition of effective communication, which is the process of exchanging ideas, ideas, knowledge, and information in such a way as to accomplish a purpose or intent perfectly. In other words, it is the sender's thoughts in the message in a way that the recipient best understands. In the case of this study, it would be exchanging information in which instructors give an overview of students' current progress, and students can submit and ask what they are missing or confused about based on the overview.

In the study of Alawamleh et al.(2020), researchers surveyed students' points of view to know how effective the communication was between instructors and students in online learning. It found that online learning negatively impacts the effectiveness of communication between students and instructors. Making the extra effort in verbal and non-verbal communication will significantly support the learning process(Wahyuni,2018). Similar studies have shown that instructors need to use more means of communication in the teaching process, whether formal or informal, to make teaching more effective(Alawamleh et al., 2020). Humans convey information every day by exchanging all types of content, either orally or non-verbally. This is the basic definition of communication(Velentzas & Borni, 2014). It listed different types of communication by function, format, hierarchy, etc. Email as a tool contributes to internal and formal communication. Velentzas and Borni(2014) emphasized the importance of

communication. Also, they mentioned that realizing the established intention effectively is supported by effective communication, which is supported by building shared views, changing behaviors, and gaining insights.

Email for communicating in teaching activities

Online courses involve not only instructors' teaching but also the efforts of students' learning. More importantly, students' motivation in self-regulated learning is driven and initiated by goal-directed activity (Schunk & Barry, 2008). In chapters 6 and 7 of Schunk and Barry's book (2008), researchers state the essential effect of achievement values on achievement norms by discussing goal planning and formulation. Specific educational strategies were proposed to support instructors or teachers to help students enhance self-regulation by developing effective learning habits. For example, through regular updates and feedback on the learning process, students can get a more clear learning plan. Bangert (2006) summarized four factors related to satisfaction and effectiveness in online teaching. Four factors were explained: Student-Faculty Interaction, Active Learning, Time on Task, and Cooperation Among Students. With a view to Student-Faculty Interaction, Dickenson (2017) talked about the impact of email tone on online students from the instructor's perspective. The study showed that students would feel more supported by the tone of communication and their success in online courses.

In the field of pedagogy, educators usually use emails as a supplement to teaching (Hassini, 2006). Hassini explored the role of email as a teaching tool used by instructors to mediate between knowledge to students. Furthermore, in his research, researchers focused on the case email only as the tool to pass knowledge instead of exchanging information during teaching activities. It concluded that email offers a means of communication and arouses potential association between email technology and students' communication of learning. There is relevant research highlighting the advantages of email as an educational tool. El-Sabban (2009) outlines certain advantages of utilizing email as a teaching tool to disseminate information through a case study somewhat similar to the case study herein. Two uses of email in teaching activities were discussed disseminating information and communicating mutually. From a teacher's perspective, the author perceives several advantages of investigating students' experience with email. For instance, there are some as following as advantages that are potentially related to delivery efficiency:

1. Flexibility in time
2. Students receive information even out of class
3. Students are aware of important information after reading the message
4. Communicating with instructors with anything contained in the email at any time
5. Specific information can motivate students to study

In previous research, researchers concluded that email is a viable alternative means of course delivery (Smith, Whiteley, and Smith, 1999). Email also supports sufficient convenience for certain self-learners under the condition of distance education (Sadat, 2008). Bangladesh Open University (BOU) is the only university that offers distance higher education to learners who are

expected to have self-learning abilities. Researchers delved into the use of email by learners of different programs at BOU, which shows that email can contribute to creating a good learning environment under the condition of better interaction between learners and teachers.

2.2 User Experience Design

Some background information about the specific YFC course will be used to conduct a case study in this research. From a certain point of view, universities provide services to students, so the curriculum as a critical product directly impacts students. All of the support is potential for students to develop skills and abilities to help them better navigate the transition to work life as Bridgstock et al.(2019) stated that it makes sense to integrate Career Development Learning with higher education courses. This allows students to gain good benefits of learning and employability that Career Development Learning confers. There is no doubt about the importance of improving career support courses for college students. Therefore, thinking and researching like a designer is valuable and can change how we develop products, services, processes, and strategies(Brown, 2008). Creative ideas can create a new dramatic form of value. It is possibly helpful to solve students' pain points and provide a better side service to students from the side of faculty with creative design thinking in this project. Creative design thinking can potentially help solve students' pain points and provide better lateral services for students from the perspective of teachers in this project.

Considering that meeting the target group's needs is undoubtedly an essential part of the design of this project. There should be a scientific basis for experience designing or information designing. From user experience researchers' perspectives, this study can introduce and reference certain methods. Gupta(2016) concluded that user-centered design as a theoretical framework makes users' needs, wants and constraints for products, services, and processes in every design aspect receive special attention.

2.3 Email Marketing

Unlike the ways of information delivery in the studies mentioned above, this study will primarily focus on communication by email. Although what the researcher found are more cases of commercial campaigns in the marketing field. They will be valuable in organizing and designing the content structure. The key points of email marketing have been elaborated on by Fariborzi et al.(2012). This research organizes and lists the pros and cons of email marketing, and more importantly, it supports certain strategies to increase the efficiency of information delivery. Moreover, according to SABBAGH (2021), the most essential advantages of email marketing include ease of use, low cost of use, the effectiveness and speed of marketing campaigns, and the correct approach to customer positioning. On the other hand, regarding the disadvantages of email marketing, Fariborzi(2012) proposed corresponding tactics to improve email marketing performance. Such tactics include but are not limited to focusing on email design and content, improving delivery through personalization and more, improving relevance, etc.

There are more exquisite email designs in the market, primarily used in marketing. However, the researcher also found some examples of designing emails used in education as a function of regular reporting or reminders. We can see some examples in *figure 1* showing the partial content

of the weekly report email, and *figure 2&3* used to update learning progress(on Duolingo). There are some standard features in these update emails. First, displaying the progress for specific assignments or tasks is intuitive and conspicuous. Next, information is organized and structured in different blocks of the email.

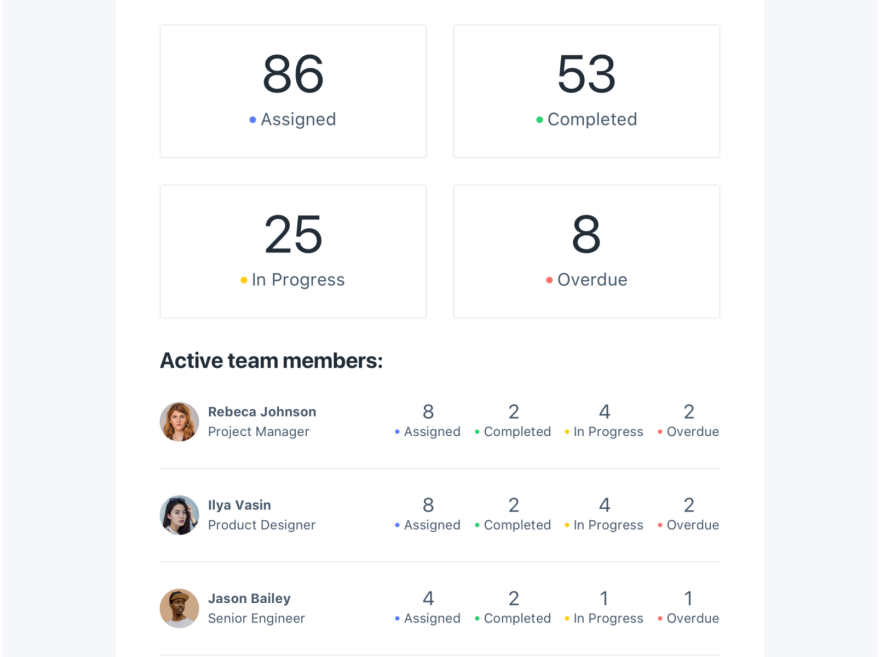


Figure 1. 'Weekly Report Email Template' by Sherif on Dribbble.

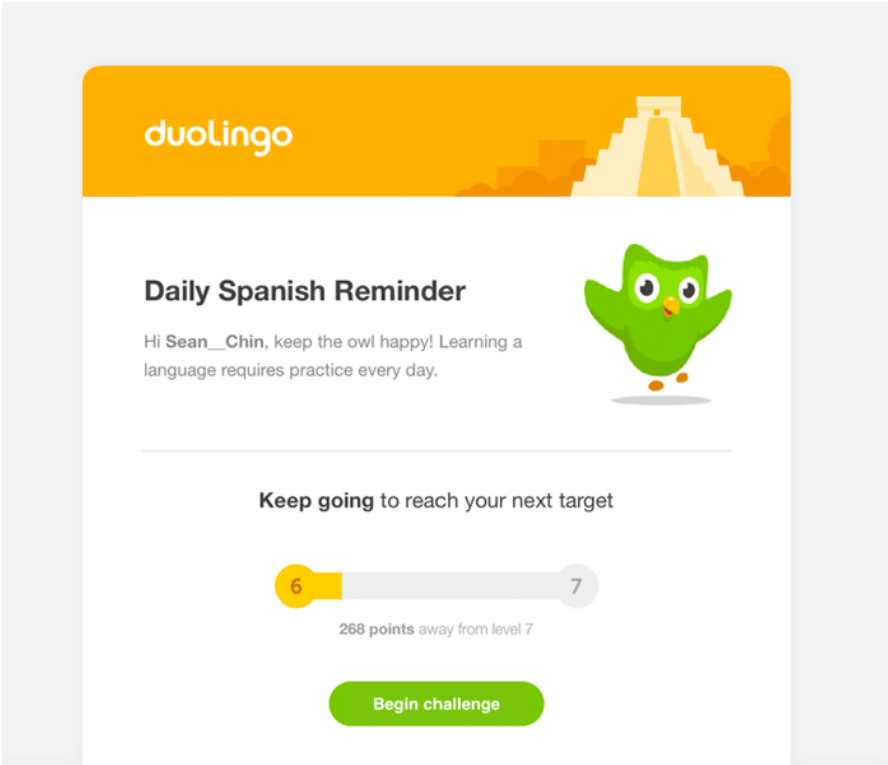


Figure 2. Learning reminder from Duolingo.

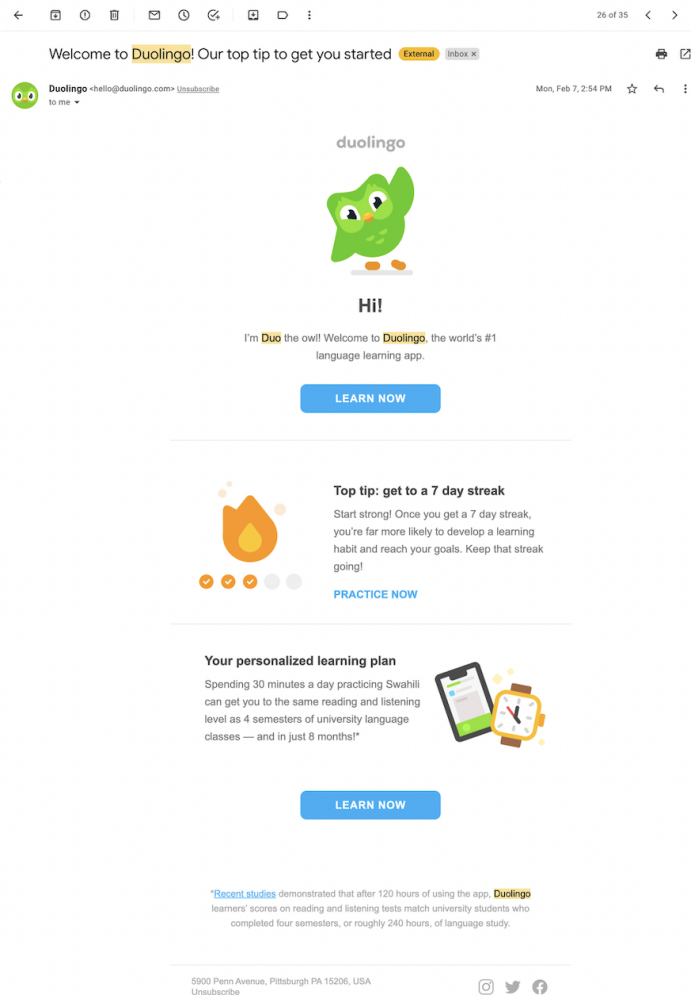


Figure 3. An example of email marketing from Duolingo.

Considering the potential value of the career support the career course could offer students, it is essential to use some effective marketing techniques to help improve the efficiency of information communication.

2.4 User Research

Survey

Survey, as an important method to directly collect the user's opinions and needs, is convenient and easy for researchers. In the early stage of this project, a survey will be conducted to collect students' basic needs for after-class communication. Additionally, it is helpful to glance at students' expectations for displaying the email content before getting to the design stage. Thus, several questions related to the course content and general information have been included in this survey. A study(Mirta et al., 2009) showed that the longer the questionnaire length, the lower the respondent's willingness. In an ideal situation, and also considering that recall from memories takes a relatively long time for a respondent, this survey would take no more than 10 minutes for a respondent in this project.

Scientific guidance has been provided from the research of Schwarz et al.(2001), and questions in the survey have been made. As Schwarz et al. mentioned in the research, to respond to a question, respondents usually experience five steps before they give the final answer as we can see in figure 4 below. By reviewing the previous studies related to questionnaire construction, researchers elaborated corresponding strategies for each step respondents would take.

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- Step 1: Understanding the question
 - Step 2: Recalling relevant behavior
 - Step 3: Inference and estimation
 - Step 4: Mapping the answer onto the response format
 - Step 5: “Editing” the answer for reasons of social desirability
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Figure 4. Respondents' Tasks in Responding to a Question[Schwarz et al., 2001]

The point of an effective survey is to make respondents spend less time being through these corresponding steps. A frequency question should be given a specific time slot that could be some numerical options instead of a vague unit of time since vague quantifiers are inadequate to assess an objective frequency(Schwarz et al., 2001). Furthermore, more specifically, different ways that researchers ask questions could lead to a completely different understanding of respondents. Referring to Sudman et al. 's(2015) research, the limitations and advantages of questionnaire surveys were pointed out. It also provided guidance for making a good questionnaire, which requires researchers to define the research topic in advance and ask themselves repeatedly before writing down a question. Moreover, by following the research made by Tourangeau and Yan(2007), which mainly expresses the information on how to integrate specific sensitive topics into questions properly.

A/B Testing

In the late 1990s, with the growth of the Internet, online controlled experiments, also called A/B tests, began to be used. In a controlled experiment, users are randomly divided into two groups, showing two different contents. As the following step after the final email design has been completed, having sufficient user data is important to improve the final outcome. A/B testing will be adopted in this stage. A/B testing is often applied to compare two versions of something to determine the one that is better in terms of availability, usability, efficiency, or performance. The survey results are recorded to know participants' basic expectations for the update email used to support the course they are taking. The questions in the survey are some basic questions based on participants' learning experience in YFC course, their habits of studying by email during the course, and their expectations for the course. The results of this survey will be analyzed more qualitatively to obtain users' initial needs. That will be seen as a reference to give the researcher some design inspiration rather than expecting to obtain a precedent pattern by adopting a statistical method to analyze.

In the questionnaire session of A/B testing, the questionnaire will be referenced by the [User Evaluation Questionnaire \(UEQ\)](#). The 11 closed-ended questions in the evaluation form are the 7-point scale questions used to assess the display of emails regarding the aspect of readability, effectiveness, understandability, etc. Two closed-ended questions are related to the content of

emails used to check if the information delivery efficiency is good. By filling out the evaluation form, participants using experience to email will be recorded. Additionally, the designed emails will be sent via Mailchimp, which is an email marketing platform. A quantitative report will be produced at the end that includes specific data such as open rate, clicked rate, bounce rate, etc. In the interview session, regarding the follow-up questionnaire and general questions, participants' reading will be timed, and the recorded time will also be analyzed as a reference. The participants' answers to the questionnaire will be a reference to know how much information participants can receive from the email. Next, this will be seen as participants' performance on how much information they can remember from the emails by combining the two references. For example, the average reading time of two email versions will be compared, and the correct answer rate to follow-up questions will be compared. This questionnaire references the content of the email as a check criterion for respondents. It does not collect the specific information which seems study-related in the questionnaire.

Thematic analysis

For the method to analyze qualitative data, the most commonly used is thematic analysis, which will be adopted accordingly in this study. Thematic analysis can be used to identify, organize, and conclude the pattern of c from common things that people have said in the dataset of interview results(Braun&Clarke, 2012). It is a flexible method that can discover new patterns or validate the hypothesis in an interview's results. Researchers explain six phases of Thematic analysis, which will produce several concrete themes. And then analyzing these themes if there is the opportunity to contribute to the research questions satisfactorily.

2.5 Design

In addition to elaborating on scientific and practical approaches applied to support the designing phase, this section also aims to explore possible solutions for 1)which kind of information should be included and how to combine the different types of information to make it be delivered efficiently to capture students' attention, 2)how to put the knowledge of User Experience Design into practice in the design phase. Moreover, the use of Persona and Scenario in the early stage of design can help the researcher better understand the user context in various research contexts. Next, based on the design guidelines in research, in the field of information visualization, Engelbrecht et al. (2015) generally gathered the design guidelines and principles of Information Visualisation. It explained the definition of Visualisation, Information, and Knowledge which gave the researcher a clearer understanding of all kinds of information and their scientific presentation. This paper explores the presentation of Information Visualization principles in various studies. Moreover, considers the premise of different aspects, such as the perspective of users, and the profile of the user. The contents of Information Visualization are elaborated for readers in Engelbrecht et al.'s paper. Finally, a summary of key points can guide and support researchers or designers to realize information visualization under different requirements. The following are excerpts from some of the more relevant principles to my study. To visualize the data scientifically based on Ware's book(2004).

Table 1. Some key points of data visualization.

1. The type of information to be visualized should be considered.
2. The purpose of the visualization format should be considered.
...
5. The visualisation format should be considered.
...
11. Consider what the user can see, needs to see and would like to see.
...
19. The organisation of the visual layout should be considered.
.....

Information Hierarchy Design from the industry of User Interface Design

The prior knowledge required in the design session in this study is more related to information hierarchy design in the field of Human-computer Interaction. In the book *Web Form Design: Filling the blanks* (Wroblewski, 2008), two concepts are mentioned: Inside Out and Outside In, which are two perspectives on things. 'Inside Out' requires users to provide information needed by the system from the perspective of the system. While 'Outside In' is from the user's perspective, demanding efficient information dissemination and operational interaction from the system.

The primary goal in the study herein is to improve the delivery effectiveness of email. In other words, improving the efficiency of information acquisition from recipients' perspective is the key the researcher needs to explore in this study. The researcher intends to introduce and apply the concept of 'Outside In' in my study. When users browse information in daily life, the following problems occur, potentially affecting the efficiency of information acquisition. 1) The content is not organized logically. Users browse information in a chaotic order, resulting in poor logic of information flow in their understanding. 2) The overly full information. A large amount of information is displayed in one area, the hierarchy between information is blurred, and the sense of boundary is missing. 3) The different alignment between elements. That makes the information flow of the overall page lack stability. 4) The lack of focus. When too much information must be presented simultaneously, users are likely to miss the point.

From the perspective of Outside in, some related information design principles were acquired and summarized from the book *Web Form Design: Filling the blanks* that can be used to improve the information acquisition for readers, which may prevent the situations mentioned above from being happening. To improve the efficiency of information acquisition, after sorting out the function and analyzing the information of the target case, there are four main principles that we can use:

1. Telling **the information in a simple, straightforward way**. In other words, if there are no special requirements, just display all needed information in order instead of hiding or folding too much information.
2. Keeping **the alignment**. Especially when a large amount of information needs to be shown in a limited area, keeping aligned is a cost-effective design to guide the visual flow.
3. To **hierarchize information**. This refers to the proximity principle in visual design. Reducing the information complicity in a single page by displaying information in a reasonable hierarchy can help users differentiate focus.
4. Make **it simpler**.

To possibly use similar structures and modules to reduce the impact of the difference in information structures on users.

Color and Typography

Then consider other fundamental visual elements, color, and typography, which will be discussed based on design principles. Pettersson(2010) expounded on the principles of information design which provides theoretical guidance for design-related cases. Based on Pettersson's summarization, there are seven aspects we should consider in information design. Regarding legibility, readability, emphasis, aesthetic proportion, attention, perception, and processing. For instance, use a color appropriate to the content and with good contrast for the figure or text; Avoid too distinctive graphic design; Use clear contrasts to cause emphasis; Never mix the decorative use of color with cognitive importance. Furthermore, the hierarchy of text parts is an important factor in determining whether this page's overview will be perceived as hierarchical(Kong, 2020).

3. Method

3.1 Design Framework

The project is offered as a career-related service as part of the university education program and will eventually support students in developing their career design. Design thinking is a human-centered design approach that will be needed in this study to improve the service experience throughout the different stages and explore different marketing possibilities.

Several practical methods will be used in the research process to achieve this study's final goal. This study will mainly consist of four phases, partly referring to the IDEO process(see figure 5). That will be Discovery, Design, Developing, and Final. At the early stage of this study, survey and interview methods would effectively contribute to collecting user needs and client requirements. In the design phase, the researcher will use the results after analyzing user needs and client requirements collected earlier to produce corresponding sketches that can be converted into prototypes. Next, it is essential to use the usability study to do a series of user testing. Surveys and interviews will be used as the popular research methods to obtain more user data.

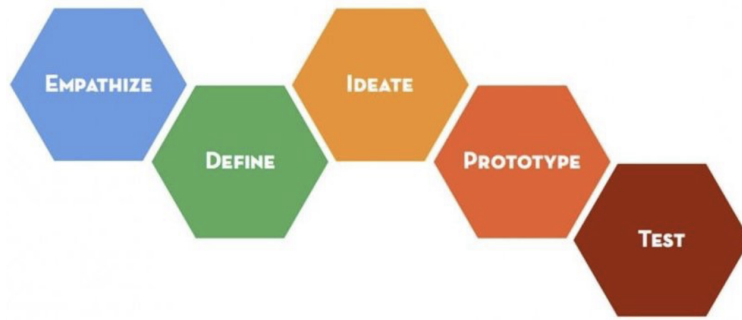


Figure 5. The IDEO process.

In addition, consider the diagram in figure 6 that the area of the objectives of this study is more in the fourth quadrant. Then, at the testing stage in the developing phase, the method of A/B testing will be adopted to conduct the user testing session. Two samples(A and B) will be sent to two different user groups. For example, comparing text-only information and information with added design to see if the target user groups have differences in the completion of the learning tasks. In terms of data analysis, both quantitative and qualitative measures will be considered to analyze different results, such as the click-through rate to target links. Moreover, after the session of A/B testing, the method of focus groups can be accordingly conducted to analyze the user experience qualitatively.



Figure 6. The dimensions of UX research methods.

3.2 Design

To evaluate which design can perform more effectively in delivering information. Two versions of the update email have been designed, which will be used to distribute in the following steps of user research. The participants' feedback is the key to assessing the effectiveness of the update emails. The overview of the two versions can be seen in figure 7. The right one is version A, while the left one is version B. Both emails convey the same information, such as the upcoming deadlines, progress points, tasks details, etc. All the information is specially made for this case study, which is irrelevant to their real learning progress in the YFC course. The scenario section of the email is specifically added for this study to engage participants more. The screenshot of real email examples can be found in Appendix B. The inspiration and the details of designing the email will be elaborated on in the following paragraphs.

First, to determine the color scheme, the researcher reviewed the related comments in previous course evaluation from students, that was provided by the teaching staff of the course. The design-related comments mentioned that they are familiar with the existing color-schema on Canvas(e.g., red for incomplete, green for complete, and yellow for in-progress). Take that into account, the color-schema was selected to keep in line with the way the course information showed on Canvas to the greatest extent. That is, to make students be more familiar when they read the content of email. And in order to more clearly display information, keeping the clarity for the whole page is essential. Therefore not many colors were used. For instance, the blue associated with efficiency(Messapps, 2020) was used in the design. And purple was used as a color which closes proximity to blue to keep the consistency of the whole design. Next, literature shows that fonts used in app design is an important element impacting user experience and that text provided should be readable in order to satisfy users (Yeeply, n.d). Given the readability is the key factors of information acquisition, Sans Serif Typeface would be a better selection of fonts without redundant decorations. The font, Inter, as one of Sans Serif features a tall x-height. That aids in readability of different cases text. And to emphasize information in different hierarchy can be shown by changing the diversitive weight that the font includes.

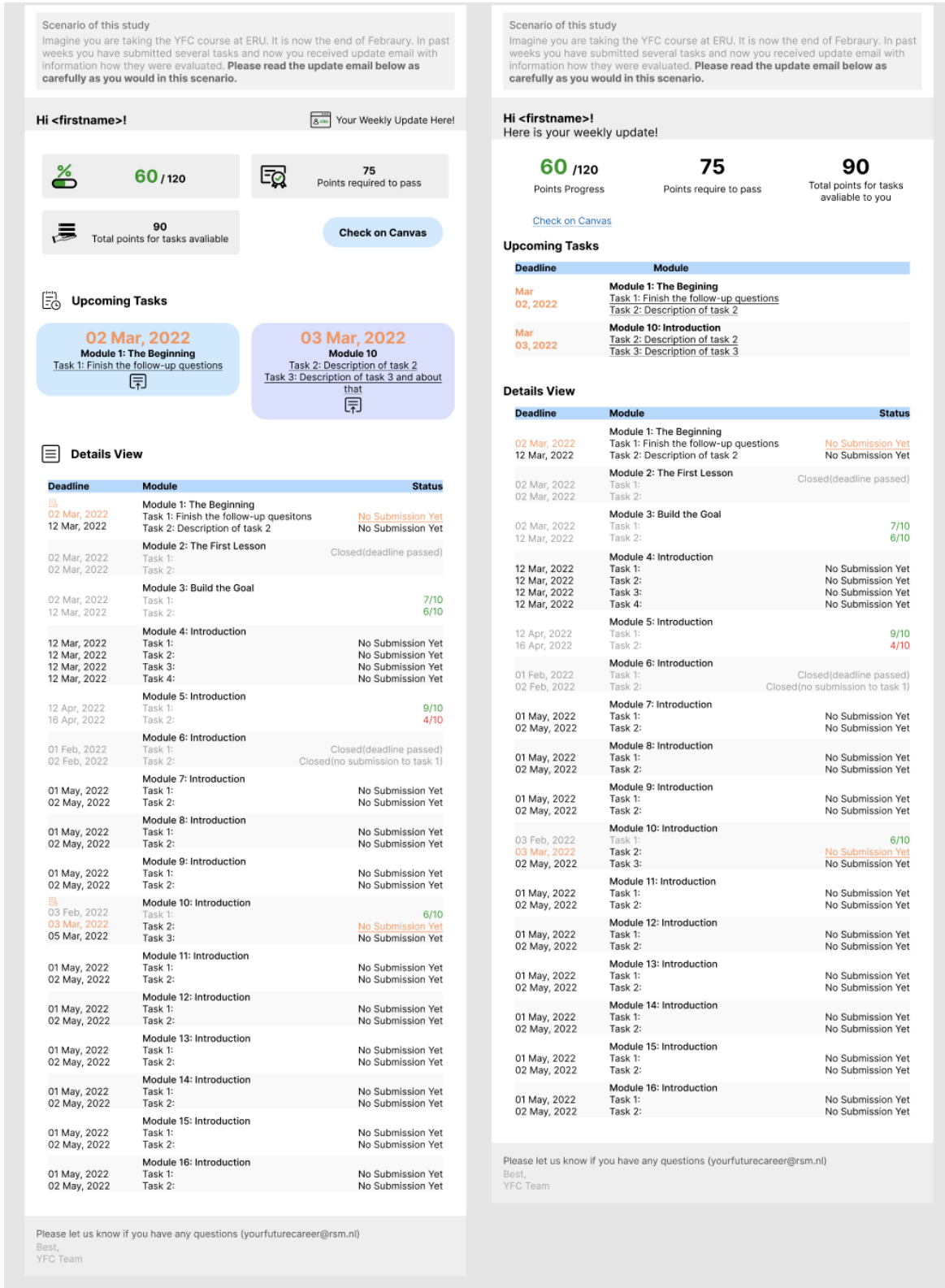


Figure 7. The initial design of update emails.

Lastly, to visualize the information with wireframing. Based on the requirements of the teaching staff, the overall content structure was designed to follow the information flow required to be

included. The teaching team of YFC course has provided a document that requires the necessary information to be included in the email. In short, there are two main sections, and the start section is the overview of the student's learning progress; the next section is a complete list of all tasks which can be done in this course. After analyzing the survey results, there was a brief communication with the teaching team of YFC course to reconfirm the information they wanted to disseminate and determine the design format in the next step. The teaching staff showed that the previous notification email consisted of short text, which is used to inform students about their progress and to motivate them. The information in the early notification email is insufficient for students according to their previous evaluation of the course. The email content has been determined based on the survey results, as discussed in the above section. The content is currently divided into three main parts to deliver to students: points, upcoming deadlines, and task details. In addition, the hierarchy of relevant information would depend on the survey results. Thus, the initial structure has been determined.

On the other hand, students also mentioned certain design expectations for new update emails, such as colors and symbols. Particularly worth mentioning is that some previous studies(Starch, 1966; Shepard, 1967) point out that pictorial(visual) information is superior to textual(verbal) information in recalling and recognizing information about people. Rather than using a new textual email to compare with the previous one, it is significant to make some specific redesigns to the email content based on the expectations of students. Moreover, images and text are two common ways of conveying information in everyday life. Moreover, the visual difference between pictorial and textual information is relatively noticeable. It is meant to explore whether the textual or visual information is a more evident element to influence the delivery effectiveness in this study.

The specific variants in detail are shown in figure 8 and 9. The design of version A(figure 8) was based on a conventional style of a plain text email but with more hierarchical organization. The information in the design of version B(figure 9) is partitioned by the color block and matching graphic elements, especially in the head section design. In addition, the Call To Action(CTA) button is designed differently in different versions to see if the flat design can achieve a good effect in disseminating email information compared to the traditional style of jump link. There were two links in the emails: one was to jump to the learning platform homepage, and another was the latest upcoming task(task 1), which was filling out the evaluation form in this study.

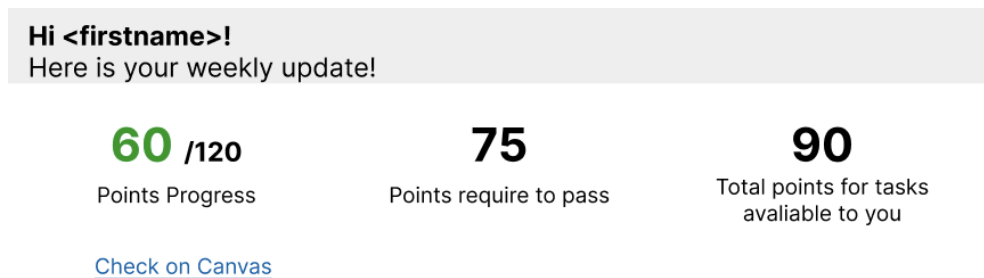


Figure 8. The head section of email version A.

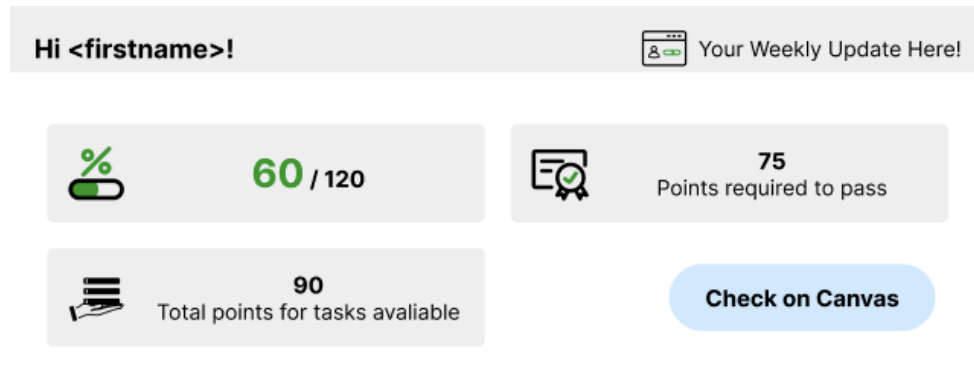


Figure 9. The head section of email version B.

All in all, both email versions used the same color scheme as the control variable, making the overall visual sense of the two versions likely the same. In addition, the information flow remains consistent for both versions.

3.3 Procedure

This section highlights the concrete steps of user research which contribute to acquiring sufficient data to assess the feasibility of the design solution so that it potentially answers the research question of this study. It describes potential participants, specific experimental procedures, and detailed materials used during the user research.

Participants

In short, user testing will be conducted separately to assess the design solution more comprehensively. There will be two groups of participants. One group will be the students in YFC course who have prior experience in assessing the design. The target user group in this case study will be expected to participate in a survey and the questionnaire session of A/B testing. Another group will be made up of 10 students from the University of Twente who did not study in YFC course to assess the design. As the potential user group, they will be expected to participate in the interview session of A/B testing.

Survey

The survey in this study is mainly a questionnaire that aims to preliminarily know students' impressions and needs of updating email. In this way, the researcher obtained a general situation of how students feel about the current update email from the course, which helped the researcher to integrate the overall information that the emails convey. This session also is the way to achieve the goal of the empathize stage in the IDEO process (figure 5). That is to get a deep understanding of students' needs and expectations. The questionnaire would be validly filled out within a certain period, after which the final results would be collected and analyzed. The questionnaire takes approx 5 to 8 minutes. It consisted of seven questions with mainly closed-ended questions. The open-ended question is shown in one question. There is no question involving personal information, so these questions will be conducted and analyzed.

The researcher made the survey questionnaire(see Annex1) and sent it to the personnel of YFC course. Since it is a specific context of this project it requires certain basic conditions for people participating in this survey. The sampling frame will select the survey sample. The potential participants were the students who are taking YFC course. The lecturers of YFC course distributed it via Canvas to 63 students. Moreover, there were 63 responses recorded(see Annex2). By answering some questions about the usual frequency of checking emails, the ideal frequency of receiving updates on the learning progress, their specific needs for updated information, etc.

Table 2. The Summary of Survey

Topic	Choice
Participants	63 participants by sampling frame
User Profile	Be a student taking the YFC course at Rotterdam School of Management
Number of Questions	7
Cognitive Effort	Low - Many closed-ended questions
Format	Online survey via Canvas

A/B Testing - Questionnaire

The purpose of this section is to determine whether the design of emails with certain visual elements is more positively associated with efficiency than plain text emails. That is, to explore if there is a more intuitive and easier design to receive messages from the email content. Two emails will be distributed after the initial design has been completed. Therefore, two versions of emails will be designed, which will then be sent to two sets of users who are two groups of students in this study. Subsequently, set A as the control group, which will receive the plain text email. On the other hand, the designed email will be sent to set B defining the variant group. The process diagram is shown in Figure 10.

For the final results of the A/B test questionnaire, quantitative measures will be used to analyze the data. The seven-point Likert scale will be used in the research survey. More specifically, the questionnaire session will be conducted. The target participants in this session are 1456 students currently taking YFC course. They will be randomly divided into 2 groups which include 728 students. And then, two versions of the email will be separately sent to 728 students' email addresses. Next, after participants have read it, they can be redirected to an evaluation form powered by Google Forms by clicking on the corresponding link in the email. The evaluation form will take approximately 5 minutes. The main form consisted of 14 closed-ended questions, one subjective question, and one optional open-ended question. It will also compare the main effects between the groups, answering the research question and confirming or rejecting the initial objectives. Moreover, additional qualitative data can also be considered for collection. That will be the interview for random students from the total sample.

Table 3. The Summary of the Evaluation of A/B Testing

Topic	Choice
Participants	Around 1456 participants by sampling frame
User Profile	Be a student taking the YFC course at Rotterdam School of Management
Number of Questions	14
Cognitive Effort	Low - Many closed-ended questions
Format	Online questionnaire via Google forms

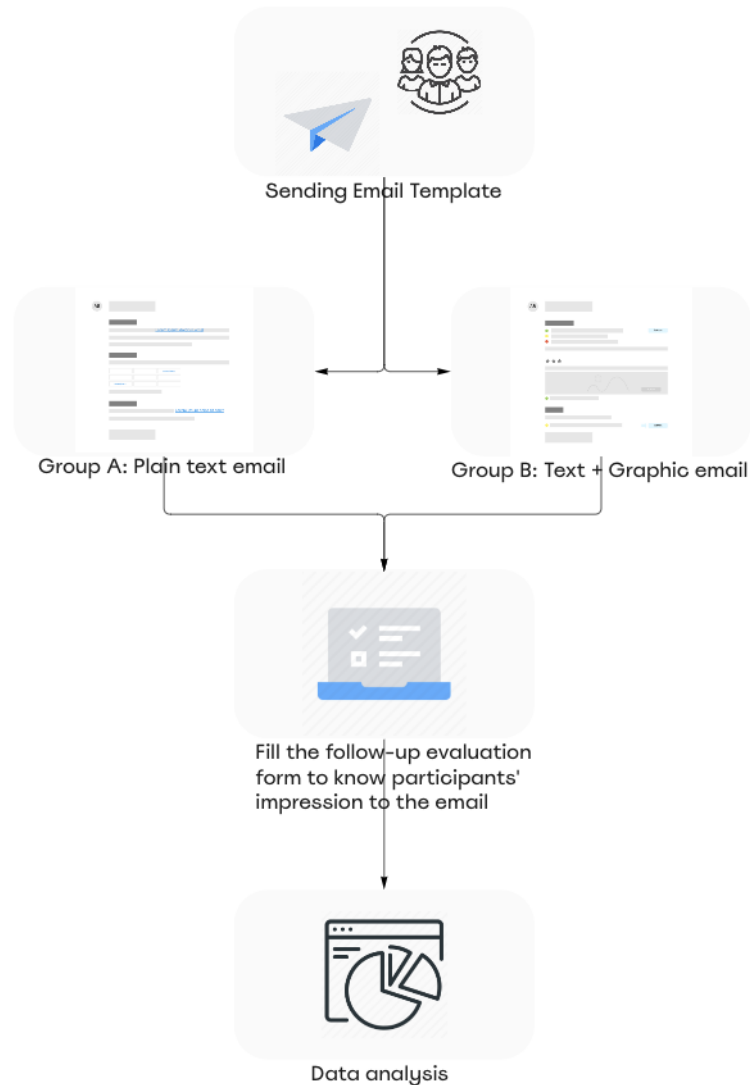


Figure 10. The procedure of the questionnaire session of A/B Testing

A/B Testing - Interview

By conversing with the participants and observing them through the online interviews, the researcher will understand more directly how the participants handled their study emails. And to know whether delivering information via the designed email will be more effective.

This interview will be an online meeting via Teams. The whole process takes about 10 minutes.

The interview session will be conducted among ten students at the University of Twente. They will also be randomly divided into two groups to receive the different versions of the email. After getting their approval, the researcher will send a designed update email to their email address.

Then they can start reading the email according to their usual reading habits, and the researcher will time it for the participants. And next, they will fill out a follow-up questionnaire related to the content of the email to check if they got the information through their reading in the last step.

Finally, this interview will end with a few general questions about their impressions of this

email. To know if participants had similar experiences of long period online courses, to see what they think about the design, and to explore if there are more specific things that need to be improved in the participants' opinion, etc.

Table 4, The summary of the interview

Topic	Choice
Participants	10 participants through convenience
User Profile	Be a student who has the experience of taking online courses at University of Twente
Number of Questions	10
Medium	Online meeting via Teams
Duration	10 ~ 15 minutes
Format	Semi-structured interview

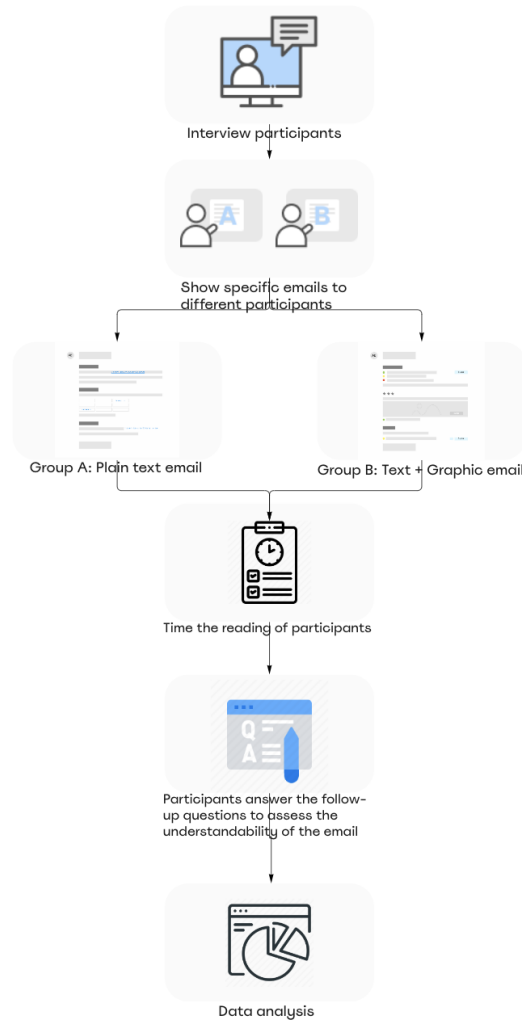


Figure 11. The procedure of interview

4. Results

4.1 Survey

Sixty-three students in total participated in this survey. See the full version of the results in Annex 1. Through the survey, the researcher has collected feedback from students about their expectations of the content of update emails. From the results of the survey, we can see the corresponding diagrams below.

First of all, as we can see in figure 11, the data manifest that most participants are used to tracking their study on the unified learning platform commonly supported by institutions. Email updates occupied approximately 31.7% as a learning tool to receive the learning progress(as shown in figure 11). Moreover, according to figure 12, the frequency of students using email to know their studies is relatively high. Based on the usage habits of most participants obtained from the results. It surfaces that email serves more as an auxiliary teaching tool to remind students, while most students still rely more on the given learning platform. Therefore, email

content design should be expected to be simple and concise, so students can spend less time understanding the email.

In what way do you usually keep track of your learning progress in this course?

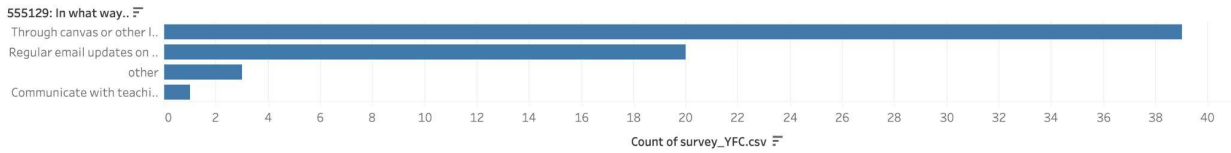


Figure 12. Result of the way to track learning.

How often do check your email related to your studies?

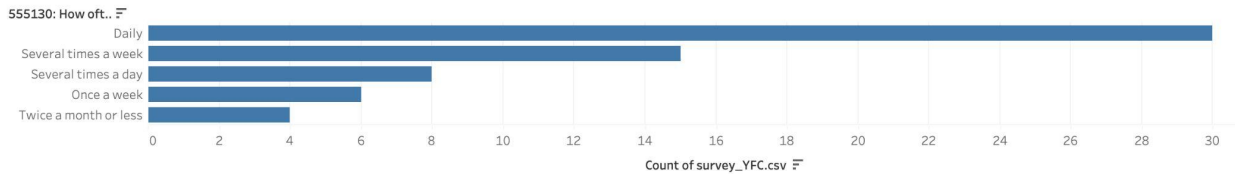


Figure 13. Result of checking frequency.

Next, the researcher went into more detail about the email contents. For the specific intention of the case, it would be contributive to know what information students need to track their learning progress. In the related question(as in figure 14), the researcher mentioned five major items of course-related information required from the teaching team that will be contained in the email content. The majority of students are interested in the points of their individual progress in the course.

Students expressed their expectations and opinion about the email in the open question of this survey(as in figure 15). From the requirements of the teaching team, the most representative information expected to be included in the update email is summarized as specific keywords: personal points progress, Deadline reminders, An overview of tasks, and students' corresponding status on tasks.

Please choose the most important items that might be included in the email in order of what you most want to know about your progress.

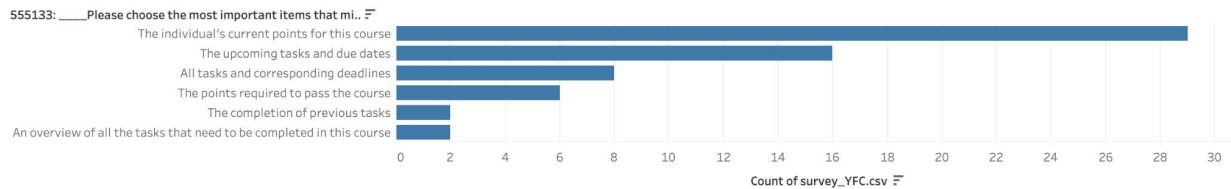


Figure 14. Result of course-related information.

What missing information is in the progress information you receive in this course and what can we add to meet your learning needs?

	Could add some deadlines reminders	I think it would help me to know which tasks are left to do, also, when not all	It would be nice if you can see via Canvas how many points you have gathered	It would be nice to be able to check how many points you have on canvas.	Last deadlines for when you can complete points	Make what I should do and when	Maybe add the amount of points you currently have at every	More clarity in deadlines	More often point progress updates and stating clear that you have
	Deadlines reminder	I think that it might be nice to have some feedback as well on how good we do	More reminder	No missing	Non	None	None!	Perhaps an up-to-date overview of how much points are obtained,	Point progress weekly
	Feedback on the received points.	I would like to get a reminder each week, of the assignments/tasks							
	Further notify deadlines	I would like to know which modules are still possible to conduct for me.	More up to date information regarding the points obtained.	Points needed to pass	The progress	Their could be	We only receive the current amount of points after each deadline. It	Weekly point progress	
			More updates about point progress and more reminders about deadlines						
	A clearer overview of the tasks that can still be finished to	How many tasks I can still do in order to gain the necessary points. Many tasks	More updates on the upcoming deadlines sent directly via email.	Send an email with an overview of current points more often,	Since doing the resit, it would be nice if it were made clear which of the	Would be nice to have an overview of which tasks were completed successfully (points)	open tasks that still can provide points	to know how many points we have	
	A few reminders and wake up calls of all the material that is	I dont know actually	My point progress	Some of the deadlines in modules are not clear enough					
	A reminder if you're not on schedule to meet the	I hope I can receive a confirmation latter immediately when I complete the course.	Next upcoming deadline	The point progress overview and task with sub-deadlines that are	Zien hoeveel punten je hebt	upcomming deadlines	which tasks i have done, and what are the next tasks based		
	An overview of the tasks left to complete (of the okes still	I miss seeing what assignments have been completed and which ones haven't. A		maybe a rubric that shows which points or grades are still in the 'tunnel' as they					
	Comparison to other students								

Figure 15. Students' personal needs for email content.

And then, the researcher showed three versions of schematic diagrams to demonstrate potential design as in a question to the participants. These formats are plain text, text with links, and text with certain graphic elements, respectively, to see if they have specific expectations for the display format of email content. The result(in figure 16) shows that most students prefer one text with links. At the end of the survey, based on students' answers to how often they expect to receive the update email(as in figure 17), it presents that the weekly update is more acceptable to students.

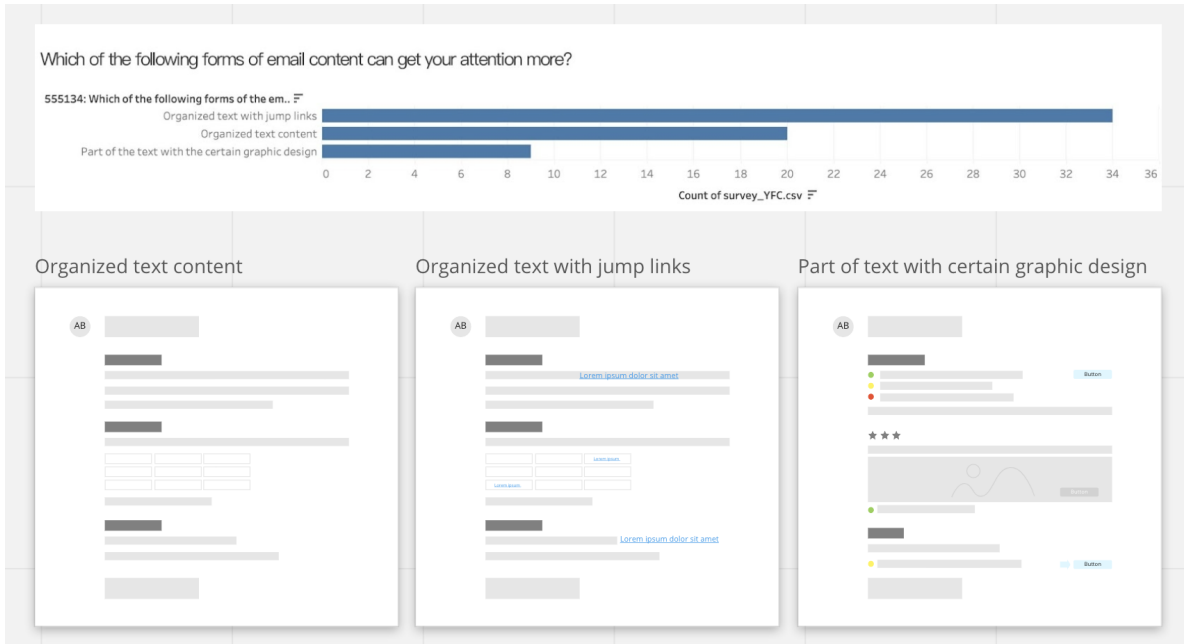


Figure 16. The preference of students to the email format.

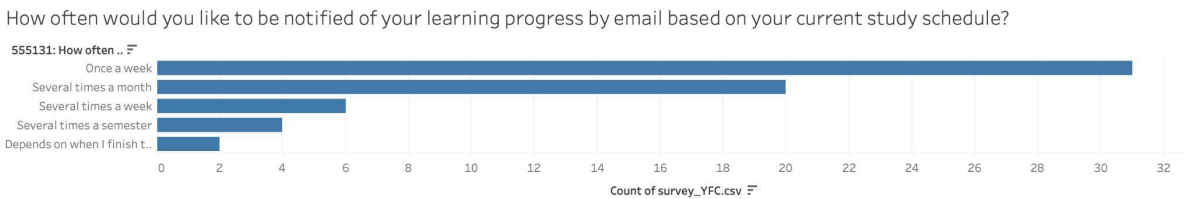


Figure 17. How often students expect to receive the update email.

4.2 A/B Testing

In the questionnaire session, the participants were 1456 students from YFC course; they were divided equally into two groups. After two versions of the update emails have been separately sent to two groups of students. The result was obtained and analyzed.

First, focus on quantitative analysis of the results. According to the report from Mailchimp, which is used as a standard marketing tool in the field of email marketing, the deliverability rates of emails A and B are both 100%. Nevertheless, there are some differences in open rates, clicks, and other specific items. The percentage of clicks and opens of version B is higher than that of version A.

Completed Campaign • Jul 13

YFC Update
Email • Tags: B_Students

Clicks 16.2% • Opens 29.8%



Completed Campaign • Jul 13

YFC Update
Email • Tags: A_Students

Clicks 12.4% • Opens 22.3%



Figure 18. The data of the questionnaire session in A/B Testing

Some more detailed data are as follows in figure 19 and 20. At this moment, the more helpful information in both reports is the opens and clicks. It shows that version B got a greater number in clicks or opens than version A. Similarly, version B also had higher clicks to the questionnaire. The major clicks on the links in version A are jumping to the learning platform. However, judging from the response rate of the evaluation questionnaire, the final results of the user testing are not consistent with the data discussed above. The response rate of the version A questionnaire is 59 out of 728, while that of version B is 22 out of 728. It can be reasonably speculated that version B did catch the attention of email recipients more than version A, but more participants were lost during the process of task jumping.

162 Opened	90 Clicked	0 Bounced	2 Unsubscribed
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Successful deliveries	728 100.0%	Clicks per unique opens	55.6%
Total opens	278	Total clicks	305
Last opened	9/19/22 8:29AM	Last clicked	9/19/22 4:17AM
Forwarded	0	Abuse reports	0

URL	Total clicks	Unique clicks
https://canvas.eur.nl/	117 (57.4%)	96 (75.0%)
https://forms.gle/5swoWJMQ6CrCdV7d9	87 (42.6%)	32 (25.0%)

Figure 19. Details from Mailchimp for version A

217 Opened	118 Clicked	0 Bounced	0 Unsubscribed
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Successful deliveries	728 100.0%	Clicks per unique opens	54.4%
Total opens	323	Total clicks	204
Last opened	9/19/22 10:27AM	Last clicked	9/9/22 4:23AM
Forwarded	0	Abuse reports	0

URL	Total clicks	Unique clicks
https://forms.gle/qJao1PV8rSMcfNTbA	235 (77.0%)	75 (73.5%)
https://canvas.eur.nl/	54 (17.7%)	21 (20.6%)

Figure 20. Details from Mailchimp for version B

Next, the analysis of the UEQ results from the questionnaire was conducted to produce the corresponding charts and tables below. The evaluation questions referenced the UEQ while adaptively using some of the items to assess the design of the update emails. Only 11 relevant items are reserved from UEQ in this study. By comparing the distribution charts of answers from two versions(as in figure 21), the specific impressions in different aspects pointing to the two

versions can be observed generally. As shown in the charts, different colors correspond to different points. These green colors represent the better performance of corresponding items, which means that the more proportion of green, the higher the appraisal of the email. Therefore, if the delivery effectiveness is viewed more comprehensively from the data obtained, version B gets a better evaluation.

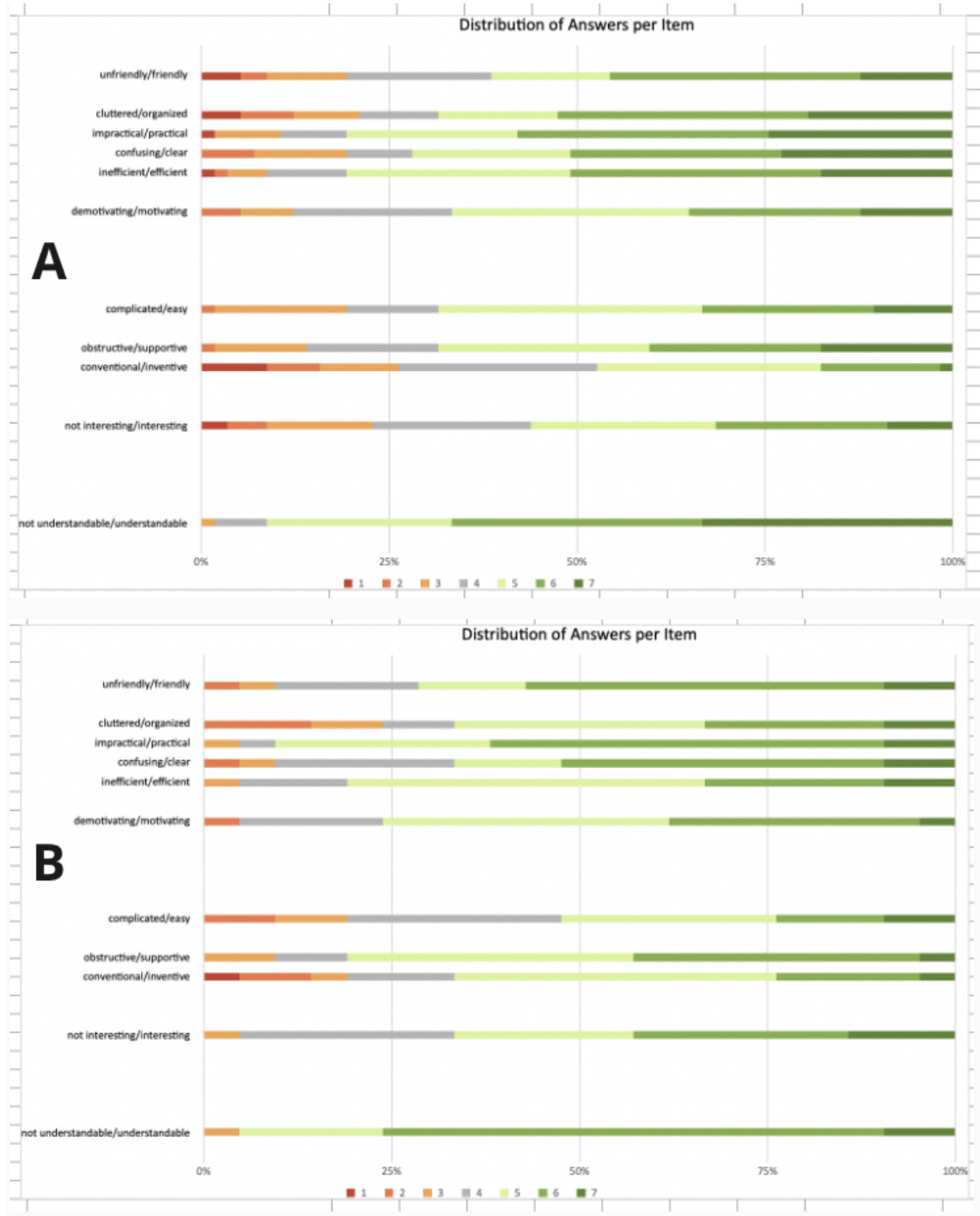


Figure 21. The distribution of answers for version A and B

The data analysis tool for the UEQ results is downloaded from the UEQ official website. The analyzed results are shown in the following tables (Tables 5 and 6). The measured proportional average is set relative to an existing value from the benchmark dataset. The dataset contains 21,175 people from 468 studies on different products (business software, web pages, online stores, and social networks) (User experience question, 2022). The final six items used to scale the performance are deduced from the questionnaire's assessment items. Generally speaking, in the UEQ evaluation, version A did not perform as well as version B. Four items are above average in Version B's results, compared to only two in Version A's results. From a detailed standpoint, the result of version A is more extreme. In contrast, the scale points in version B present a relatively steady performance.

Table 5. The benchmark table of Version A.

Scale	Mean	Comparison to benchmark	Interpretation
Attractiveness	0,84	Below average	50% of results better, 25% of results worse
Perspicuity	1,33	Above Average	25% of results better, 50% of results worse
Efficiency	1,29	Above Average	25% of results better, 50% of results worse
Dependability	1,11	Below Average	50% of results better, 25% of results worse
Stimulation	0,79	Below Average	50% of results better, 25% of results worse
Novelty	0,16	Bad	In the range of the 25% worst results

Table 6. The benchmark table of Version B

Scale	Mean	Comparison to benchmark	Interpretation
Attractiveness	1,24	Above average	25% of results better, 50% of results worse
Perspicuity	1,16	Below Average	50% of results better, 25% of results worse
Efficiency	1,16	Above Average	25% of results better, 50% of results worse
Dependability	1,19	Above Average	25% of results better, 50% of results worse
Stimulation	1,14	Above Average	25% of results better, 50% of results worse
Novelty	0,57	Below Average	50% of results better, 25% of results worse

The comparison in detail between the two emails below (figure 22) informs that even though the general situation in version B is relatively better than that in version A. The two more critical items, perspicuity and efficiency, obtained superior data in version A. More specifically, in the perspective of email transmission, clarity and efficiency are the keys to ensuring the effectiveness and accuracy of information delivery. Therefore, it can be stated that version B had a better performance holistically in the comparison. However, taking into account the specific needs of email in online courses, it potentially has a higher demand in terms of pragmatic quality. Version A obtained higher scores on perspicuity and efficiency.

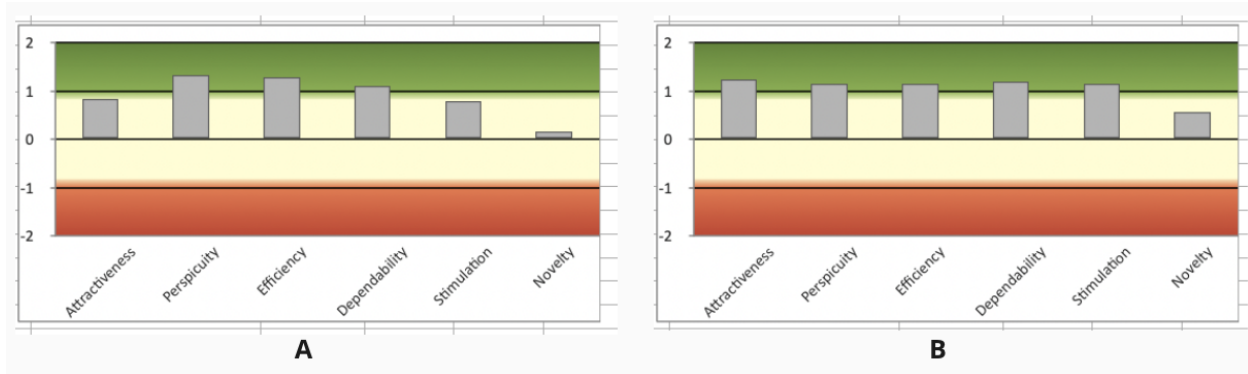
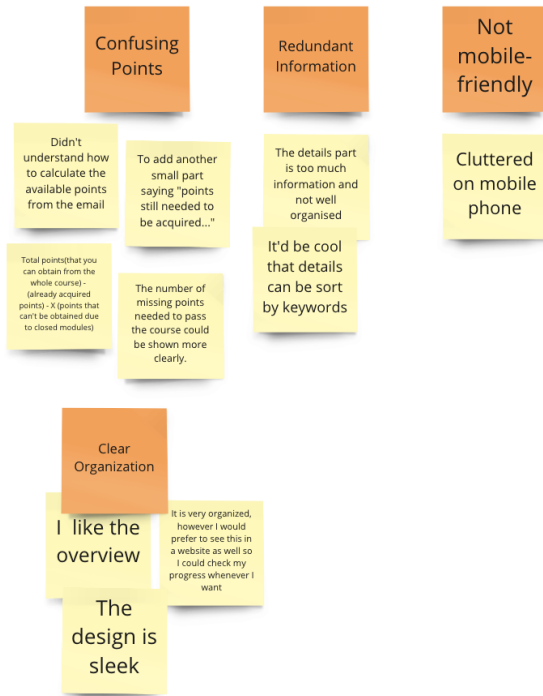


Figure 22. Comparison between version A and B.

Subsequently, the researcher focused on qualitative analysis. However, few participants expressed their personal opinion on the update emails. Given the context that these students are taking the actual course, their expressions are essential for the further improvement of the email design. Their answers are still valuable to be analyzed in the study herein. The answers to the open question about students' impressions of emails were analyzed, referring to the thematic analysis method. From the results of the open question, certain main points have been summarized as follows shown in figure 23. The impressions about these student emails principally include positive comments, constructive suggestions, and personal needs. On the one hand, the layout design of the two versions both acquired more positive feedback. To sum up, these key points show that the testing session participants, whether in version A or B, were primarily concerned with the information itself rather than anything else. On the other hand, participants were given much attention to the complexity and redundancy of information. Some common problems exist in both two versions. Such as the confusion to points progress and over many details. There is also a unique problem that relates only to the design of version B, the colors used in the email. At the same time, it was not raised in the comments of version A. Since the same color scheme has been adopted in both versions, there is room for improvement in the use of color.

Email A -- Plain Text



Email B -- Text and Graphic elements



Figure 23. The qualitative analysis of A/B testing

In short, participants prefer to read the more straightforward information, which allows them to know the progress at first glance. And more concise information, which helps them to understand it without undue effort, is also needed. For instance, based on the results either from version A or version B, students' feedback shows that they would like to see their own points progress at first sight and also pay some attention to the available points of left tasks. These information points should be used as encouragement, not to confuse participants.

4.3 Interview

Through the interview with 10 participants individually(transcription in appendix E & F), some results are obtained from the interview. There were only 3 participants who had received periodic course feedback or updates via email before. Most of the participants used to check their progress irregularly via study platforms by themselves. They did not go through an online course within such a long term as the same as the case in this study. That is, they basically do not have the experience of receiving periodic update emails of an online course. Therefore, these participants read the update email very carefully.

The average reading time of the two groups of participants is calculated below in table 7. There is only a slight difference in milliseconds between the two groups of participants, which can be ignored since there was a small sample of participants in the interview session. In the interview session, a few questions needed to be answered based on the email content after participants read through the email. And the results of answers from two group participants are recorded as shown

in table 8. The participants who completed the interview session of version A made a better grade.

Table 7, The data of the interview

	Mean of Reading Time
Version A	01:06:82
Version B	01:06:84

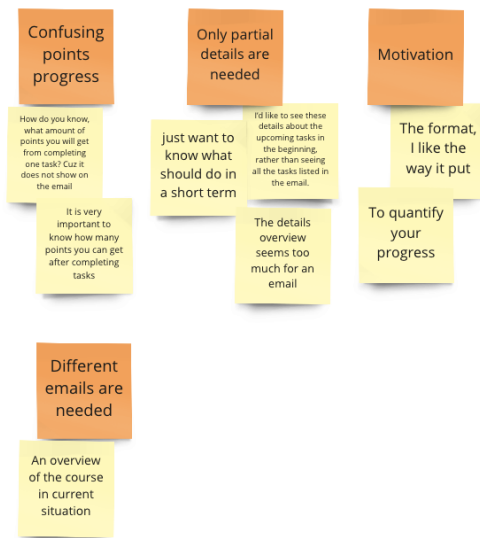
Table 8, The result of answering the interview

	Version A	Version B
Q1 How many points do you have so far in this course?	5/5	5/5
Q2 How many points do you still need to collect to pass YFC ?	2/5	3/5
Q3 How many points from available tasks you can still get now?	5/5	4/5
Q4 How many upcoming deadlines do you have?	4/5	3/5
Q5 When is your next deadline?	2/5	5/5
Average scores per participants(5 in total)	4	3.6

In addition, the researcher obtained certain information to evaluate the new designs of update emails in more detail. The researcher transcribed the conversations with the participants from the interview session to facilitate subsequent qualitative access to the results. As shown in figure 24, the results of the interviews were organized to extract key information. Thus some specific codes are extracted, as shown on the orange stickers. For version A, four codes are confusing points progress, and only partial details are needed, motivation, and different emails are needed. Similarly, four codes in version B include motivation, only partial details are needed, different emails are needed, and communication.

Interview

Email A -- Plain Text



Email B -- Text and Graphic elements



Figure 24. The qualitative analysis of Interview

Generally, by observing and talking with participants during the interviews, the analyzed data of interview results can be simplified in certain themes summarized from these conversations, as shown in figure 25. The codes in the information acquisition theme are similar to the impressions participants expressed in the questionnaire session. Looking through the other two themes, the researcher has found that comments give more perspective on the design only when the email design is different from regular emails, such as using more graphic elements and colors in the content in this case.

Define Themes in General Based on the results of interview in A/B testing

	Information Acquisition	General Design	Additional Demands
A	<ul style="list-style-type: none"> The points progress is confusing Too much details Only need certain details for upcoming tasks The information is sufficient It is clear Saving time to read since there is clearly focused text 	<ul style="list-style-type: none"> I like the way the information be put The format is clear 	<ul style="list-style-type: none"> An overview of the course in the begin is needed To know the points as soon as completing a task
B	<ul style="list-style-type: none"> Only focused on the details with the latest deadline For a long period course, all information in the email is needed Makes you get info much faster It is helpful to students to make time plan Detail list confuses me 	<ul style="list-style-type: none"> It is quite straightforward Different from regular emails I like the highlight in the email 	<ul style="list-style-type: none"> The first email of the course should be the interview or instructions A channel to chat with teachers directly To generate a conversation window Being competitive to rank students progress

Figure 25. The general themes of Interview

To sum up, through the interview session, there are some relatively objective comments since the participants are students who are not taking YFC course and have not experienced an online course with such a prolonged duration. The feedback given by participants talked about the communication means, which refers specifically to an update email in online courses. The feedback comes more from participants' own experience and understanding of online education in general. The design-related comments are generally positive from participants. There is a noticeable problem that once the case occurs in a particular course that is different from any online course they have taken before, there would be an amount of confusion generated during the participation. So that is why many participants have additional demands. They want to understand the message that the email is trying to convey as simply and efficiently as possible. According to the participants' performance in different versions, version A had a better efficiency of information delivery in this testing.

Discussion

Through the survey results, the researcher found out there are several problems that are worth discussing here:

1. The researcher noticed the low percentage of responses in the user testing session. The response rate of the user testing was actually low compared to the total number of students taking the course.
2. There were very unbalanced responses to the user research in this study.
3. The fake information conveyed in this study was designed imperfectly, leading to several confusions, which should be avoided by delivering accurate email content.

In addition to these three main findings, there are also other details observed in this study. There was also a lack in the questionnaire sessions, which did not detect the jump rate through the link in the email. It could be beneficial data to verify to what extent students receive the information effectively. Moreover, the points in the designed emails were miscalculated. The available points should have been calculated and displayed in another way. Based on user testing analysis, students' concerned points progress (e.g., personal current points and the passing points of the course) can be shown respectively, which would be noticed easily. And it is also crucial to avoid situations where students need to double-count.

On the other hand, certain details have unexpected effects, possibly useful to further research. For instance, in the follow-up questions in the interview session, the wrong answers are also recorded to evaluate the effectiveness of the update emails. It shows that the participants were influenced by certain information, such as the points progress and the two deadlines which are too close to each other. The researcher can accordingly consider adjusting this information to be more differentiable from each other.

Furthermore, regarding the certain comments which relates to the design from the participants in the sessions of A/B testing, there are several points which is worth mentioning and discussing. There were relatively few comments which mentioned the design of the email. And most of these comments were positive. Only a few participants proposed specific adjustments of the design. Such as the selection of the colors. However, in this study, the sample size is not enough to tell

whether such comments appear due to the differentiation of individuals or the common feelings of masses about the design. Therefore, the initial design will remain based on the current testing results. If there are more feedback on the design, these comments will be considered as the direction for the future optimization of this study.

The Final Solution

Based on the results of user testing, the final solution through email design could be improved. From the perspective of human-centered design, it would be holistic to have a more comprehensive solution rather than only focusing on improving details, such as content design or information organization. These adjustments can be included in the second section to establish the final solution.

- First, as the first email, A general overview of this course will be sent to new students, which includes exhaustive instructions to help students understand the necessary study steps for the course.
- Additionally, with the course's official start, the designed update email will be distributed to students individually. The final layout solution through this study will mainly be divided into three sections to deliver information and improve information acquisition on the side of recipients. The personal progress is placed at the first level, followed by the next tasks and provides jump links, and finally provides a detailed overview of the details of the recent tasks. The whole design will be applied based on the text basis, as shown in version A. However, the color scheme will be adjusted accordingly, and certain graphic elements will be added to necessary parts(e.g., Failed tasks, urgent tasks.) to get attention.
- Finally, there could be a special email to notify students of their achievements, especially at some important point as a milestone.

Unlike the traditional email format, two new content design was made in this study. And then from the stage of user testing, the visual format of the update email has been assessed. This study establishes several design concepts through specific activities of user research, which can be applied to other cases of online courses as corresponding design components. In general, these concepts can be used to contribute to solving similar problems with email communications that occur in other online courses.

- 1) The details of the content visualization, such as clearer way to present information (e.g., lager differentiation between modular information, define the title of each module, and clear presentation of data);
- 2) Use a custom color scheme, i.e. only for update emails in a certain course. Make students aware at first glance at the content of the email that it is the progress reminder from a particular course;
- 3) Distinguish the hierarchical structure of information by visually modularizing and centrally displaying text content according to the course content.

More specifically, in the email design of this study, it is different from regular emails that only display text information in order. If a course more requires students to submit a final assignment

in the end, and there is no fixed schedule of other tasks, then the focus of the course email could be shift to the reminder of time, instead of on the progress display.

Limitation and Future Research

On the other hand, this study has certain drawbacks which could be extracted in the process of the testing stage—first, the time limit. The case in this study mainly focuses on a relatively long-term course while highly required students have to learn independently during the whole term. It would be better if the research is conducted midway through the course. This will be more engaging for students to get more practical feedback. Moreover, the number of students completing the survey and questionnaire is not balanced enough. Part of the reason could be that the timing of the research was not reasonable. Most students were on summer vacation, resulting in a relatively low response rate. Next, the authenticity of the information. As connected to the last sentence, the actual information of the course would be easier and faster to understand for students. Then they can focus more on reading and acquiring information.

For further research, some details could be developed to solve the user's pain points in this study case more practically. As some participants mentioned in the user testing, it would be clearer and more intuitive if the email could be designed responsively. This means, through interacting with the email, feedback would be provided immediately. For example, in the overview, students would like to know more details about their upcoming tasks. Expandable buttons can be provided to display some details, which also saves space for the whole visual appearance and reduces redundant information by clicking or pressing these buttons. Lastly, in terms of communication, there is a debatable opinion that some participants mentioned that they would be more motivated if they could know other students' task fulfillment.

Furthermore, to be more generic, there are certain points worth mentioning to do further research that can contribute to more research supporting students' learning in online classes. One specific direction is to see to what extent students can feel motivated by their personalized email content. For example, the email reminder can be personalized so that the information in this email will be displayed according to students' own learning progress. On top of that, regarding the effectiveness of updating emails, it is meaningful to know whether the auxiliary communication based on the email content is significantly helpful for both lectures and learners. Since the lack of mutual communication always exists in self-paced online learning, it is crucial to know if the lecturer can also clearly perceive the progress of delivering information to learners.

Conclusion

This case study aims, first, to contribute to the knowledgebase for improving the effectiveness of email, which is a means of online communication in online teaching activities; next, to provide design solutions to this supporting email to students in the process of online education; and also to encourage students' self-regulated learning outside of the classroom. The survey data to distribute to students was analyzed to finally achieve the purpose of the survey to provide referenced feedback for determining the efficient information design. The corresponding graphs and diagrams are generated based on the survey results. A part of the outcome is designed to be

an organized email under a certain visual format, which includes modular information structured for efficient delivery to recipients. According to the user testing analysis conducted in this study, the evaluation of the update email designed in a new format is relatively delightful. And in terms of effectiveness and visual performance, the update email received more positive feedback from participants.

There are some findings from this study to answer the research question proposed at the start of this study. Specifically, from a design perspective, compared to conventional styles of emails, the adequate addition of graphical elements attracts more attention from users. While in this study, the results show that the text information is more likely to have high delivery efficiency with the hierarchical structure. Depending on the educators' intentions or the course's nature, teaching staff can implement different formats of email reminders to achieve corresponding teaching goals. The exact aspects assessed in this study can be applied in online courses in different fields as the teaching tool for supporting and assisting students.

Meanwhile, the content's understandability and availability affect recipients' information acquisition efficiency. It is essential to consider more holistically to save recipients' effort by providing additional support as a complete service. It is helpful to give the recipient an early idea of what to expect through an early introduction instead of sending designed email reminders straightforwardly to students from the beginning. This possibly makes students very confused to a certain extent and does not help them to make an overall study plan.

Lastly, keeping emails sent regularly is also critical. Apart from the design, effectively delivering information in an update email related to personal learning progress, which requires more comprehensive support, is needed to help students better receive regular email updates.

More broadly speaking, the results of this study obtained through the user testing sessions provide a practical design solution to help educators support students' self-learning process, especially in most self-paced online courses, where such support is critical. In addition, this study evaluated specific communication tools based on student feedback and impressions. The importance of effective information transfer in the online teaching process is again highlighted in this study. These online teaching courses, which require learners to have certain autonomous learning abilities, are also inseparable from the necessary support of the teaching team. Through the continuous and regular transmission and reception of practical information, learners can more reasonably arrange learning plans to complete learning tasks.

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Appendix

Appendix A: Questions of initial survey

Default Question Block

Hello everyone,

The Your Future Career course lasts for the entire study period to systematically provide valuable career-related knowledge to students issued by Rotterdam School of Management, Erasmus University. Our goal is to prepare students for future career development. Currently, the teaching staffs would like to know more about student's views and needs in this course. Now, how to consistently and effectively support students to complete a series of learning tasks during the course is a big challenge to lectures. Ideally, we want to improve the learning experience of students by providing timely updates of individual learning progress in the form of email.

This questionnaire will spend you 5 to 8 minutes. During this survey, there will be a series questions related about this course. Your answers will potentially help us improve our teaching.

Are you a student of Rotterdam School of Management?

- Yes
 No

What is your program/major?

Are you taking the course "Your Future Career" currently?

- Yes
 No

In what way do you usually keep track of your learning progress in this course?

- Through Canvas or other learning platform
 Communicate with teaching personnel by email, and message etc
 Regular email updates on learning progress
 Other, please specify

How often do check your email related to your studies?

- Several times a day
- Daily
- Several times a week
- Once a week
- Twice a month or less

How often would you like to be notified of your learning progress by email based on your current study schedule?

- Several times a week
- Once a week
- Several times a month
- Several times a semester
- Depends on when I finish the latest tasks

Do you think the progress information you receive in this course meets your learning needs?

- Yes
- No, the missing piece of information you think you should know is

Please rank the following key items that might be included in the email in order of what you most want to know about your progress. (Drag and drop the options)

- The individual's current points for this course
- The points required to pass this course
- An overview of all tasks that need to be completed in this course
- All tasks and corresponding deadlines
- The upcoming tasks and due dates
- The completion of previous tasks
- The brief introduction of each task
- Anything else needs to be added

Which of the following forms of the email content can get your attention more?



Organized text content



Organized text with jump links

 Part of the text with the certain graphic design

Powered by Qualtrics

Appendix B: The screenshot of designed update emails

Version A on Outlook(Computer)

Focused Other Filter

Hao
[Test] Untitled 11:50
 Scenario of this study Imagine you a...

P [Blurred] 08:41

CN [Blurred] 08:15:50

P [Blurred] 08:08:01

RS [Blurred] 14:01:13
16

R [Blurred] Thu 15 Sep

P [Blurred] Thu 15 Sep

TT [Blurred] Thu 15 Sep

[Test] Untitled

H

To: [Blurred]

Mon 19 Sep 2022 11:50

Scenario of this study
 Imagine you are taking the YFC course at ERU. It is now the end of February. In past weeks you have submitted several tasks and now you received update email with information how they were evaluated. Please read the update email below as carefully as you would in this scenario.

Hi !
 Here is your weekly updated

60 /120
 Points Progress

75
 Points require to pass

90
 Total points for tasks available to you

[Check on Canvas](#)

Upcoming Tasks

Deadline	Module
Mar 02, 2022	Module 1: The Beginning Task 1: Fill the evaluation form Task 2: Description of task 2
Mar 03, 2022	Module 10: Introduction Task 2: Description of task 2 Task 3: Description of task 3

Details View

Version B on Outlook(Computer)

Focused Other Filter

Hao
[Test] Untitled 12:01
 Scenario of this study Imagine you a...

[Blurred] 11:50

P [Blurred] 08:41

CN [Blurred] 08:15:50

P [Blurred] 08:08:01

RS [Blurred] 14:01:13
48

R [Blurred] Thu 15 Sep

P [Blurred] Thu 15 Sep

[Test] Untitled

H

To: [Blurred]

Mon 19 Sep 2022 12:01

Scenario of this study
 Imagine you are taking the YFC course at ERU. It is now the end of February. In past weeks you have submitted several tasks and now you received update email with information how they were evaluated. Please read the update email below as carefully as you would in this scenario.

Hi ! Your Weekly Update Here!

60 /120
 Points Progress

75
 Points required to pass

90
 Total points for tasks available

[Check on Canvas](#)

Upcoming Tasks

02 Mar, 2022

Module 1: The Beginning

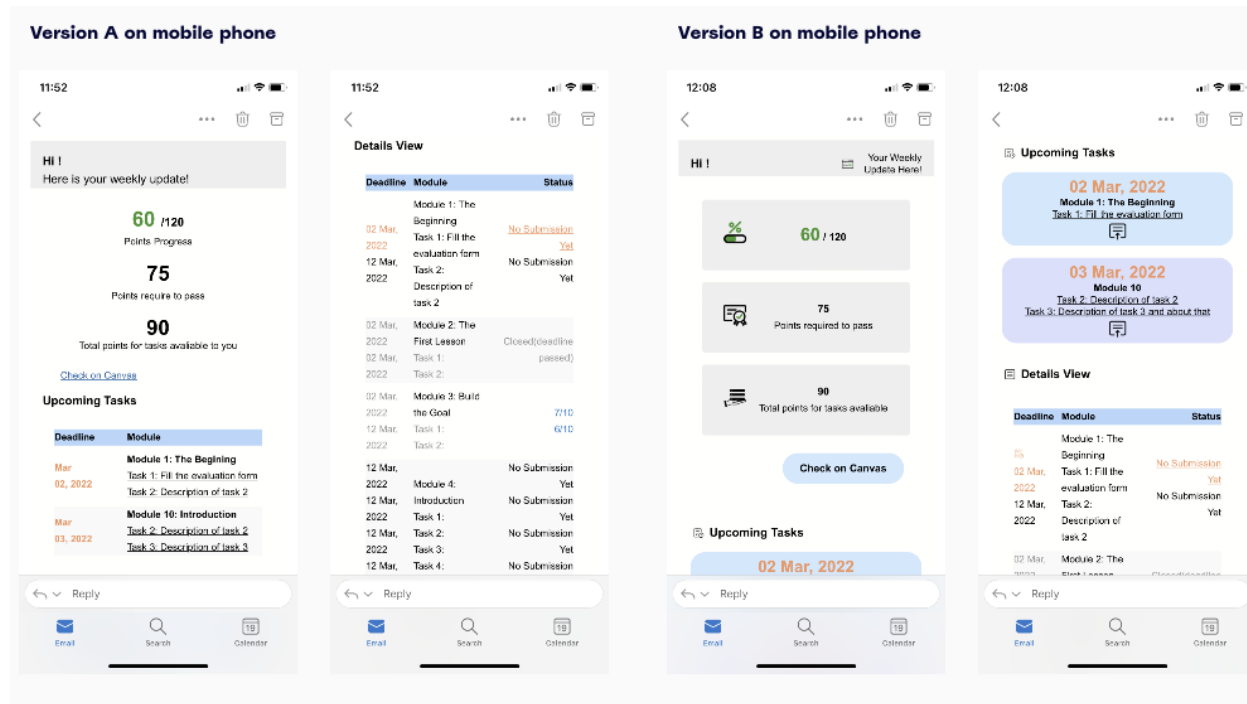
[Task 1: Fill the evaluation form](#)

03 Mar, 2022

Module 10

[Task 2: Description of task 2](#)

[Task 3: Description of task 3](#)



Appendix C: Questionnaire of A/B Testing

Appendix D: Questions of Interview

Appendix E: Transcription of Interviews (Version A)

R refers to Researcher, participants are represented by codes.

Meet with A_01

Email A sent... Time the reading of A_01... Fill out the questionnaire...

Conversation recorded below.

R: Are you a student?

A_01: Yes, I used to be a student at UT, I just graduated.

R: Have you taken any online courses before?

A_01: yes.

R: What are the longest online courses you have taken? What is the usual communication means you use?

A_01: around 10 weeks or 3 months. Normally, we use email. And mostly we also use Canvas. And I subscribed to the email notification on Canvas, so that I can receive the email about any updates on Canvas without searching it proactively.

R: What do you think of the communication in those courses?

A_01: Based on my experience of using Canvas, well, it is normally not a periodic reminder, I receive the notification only if there is an update on Canvas. So that kind of information delivery depends on the progress of the teacher's plan.

R: Did you receive a periodic update of your learning progress through email?

A_01: No, Normally it doesn't include any progress-related information, the email just shows what is my next step and where I should get through. It'd be good if the important information could be displayed in the email content. I could only search by myself by clicking on the links in the email in the past.

R: If yes, what do you think of it? (e.g. The format, the content, the efficiency, etc)

A_01:

R: If no, do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

A_01: It is indeed necessary if the duration is so long to like a year, otherwise, I will continuously forget some study-related things. And I think, I more like to have a specific overview. For example, next week I need to finish tasks 3 and 4. Then I'd like to see these details about the two tasks in the beginning, rather than seeing all the tasks listed in the email. Like that I will feel more motivated to do the task which has the latest deadline, or I feel like I already know these tasks info will be listed there, and I just feel like they are the same, no priority for any of them.

R: Do you have any specific information/expectations about this kind of update email?

A_01: I hope this weekly email could remind me of the specific steps for current tasks I need to do. And there is no need to put all the information at once, I just want to know what I should do in the short term or at that moment.

Meet with A_02

R: Are you a student?

A_02: yep.

R: Have you taken any online courses before?

A_02: Yeah, I have

R: What are the longest online courses you have taken? What are the usual communication means you use?

A_02: One quartile, about 3 months.

R: What do you think communication means in those courses?

A_02: We normally use emails to communicate with the teaching team. One funny thing before, there was a teacher who just put all slides on Canvas, then updated it every week, we only needed to do the final online exam at the end. There was just a little feedback from the teacher. The course mainly requires us to finish an individual essay in the end. So we needed to determine our topic in the beginning, and then did some literature review, self-learning, etc. We just sent our essay to the teacher via email in the end.

R: How do you like email communication?

A_02: Not that good. I didn't get enough feedback actually.

R: Did you receive a periodic update of your learning progress through email?

A_02: No, I just searched for deadlines or information by myself on Canvas or some other platforms.

R: If no, do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

A_02: If I was in that situation, I'm the kind of person who really needs deadlines to give me some pressure to motivate me to study. Otherwise, most of my plans would be delayed. And I feel like it is very helpful that there is the periodic reminder of deadlines, and the time between is not very long. First off, the latest deadline could be more obvious, like super urgent things you need to do. And reminds you how many days you only left. Also, the points progress could make people get the feeling of accomplishment, it is such a good thing. That you don't need to check the points in the system every time.

And I feel like **the details overview seems too much for an email**, maybe you can just put a link instead. Moreover, only put the most urgent deadline on it.

Meet with A_03

...

R: Have you taken any online courses before?

A_03: Yes, I have.

R: What are the longest online courses you have taken? What are the usual communication means you use?

A_03: It's like. Hybrid online classes. Mm-hmm is half online is half in person. It lasted for one year.

R: What do you think communication means in those courses?

A_03: We have an online studying platform. Called Moodle. We communicate with our teacher's via Moodle message. You can directly message your teacher via the website versus small icon that you can click on, and you will direct you to different content information of the teachers. So through that, Icon, you can communicate with a teacher, but sometimes that icon does not work. So we usually just send emails directly to our teacher. If we cannot reach them, we will reach our student support office.

R: Did you receive a periodic update of your learning progress through email?

A_03: Not really. We just contact our teachers if we have anything from them or need any help from them. We really just contact them with our, um, by using our emails. Like if we have like a new problems, we would directly like email them and they are supposed to, um, give us like a response within three business days.

R: If no, do you think it is necessary to receive the update email, why?

A_03: I feel like it's very necessary, like to have, like, to **quantify your studying progress**, which is like a great idea. I have a question, like how do you know how many points that you will get? Like how do you know, like, um, which task can, um, wait for? How many points? Like, how do you know, like, um, what amount of points you will get from completing one task? Cuz it does not show on the website.

R: I don't exactly know that. Right. You know, I also got this, uh, kind of feedback from the students. But I think it is a good thing to mention. And do you have any expectations/ any specific information needed for the email? (e.g. The format, the content, the efficiency, etc)

A_03: like what I said, like the, the point that you will ha uh, you will get after completing each task, which is like very important. , based on my understanding, like if it's module 10 supposed to be like, oh, like may, but here is like February and March. Does it mean like while you are completing module 10, you will still have to complete your task from like previous months?

Meet with A_04

R: Are you a student?

A_04: yeah, I mean I was.

R: Have you taken any online courses before?

A_04: Yeah.

R: What are the longest online courses you have taken? What are the usual communication means you use?

A_04: six months,. Yeah, one semester.

R: What do you think communication means in those courses?

A_04: We use zoom for the lessons, uh, for the lectures. And then we use our model platform to submit the task. And then we do oral exam via zoom as well. And we need to finish a project together with our teammate and then we present the project.

R: Did you receive a periodic update of your learning progress through email?

A_04: we have, so for the homework we have to do, the teacher publishes it on our module platform. Then when he publishes the task, we will automatically get an email from there. Saying what is our next task, what are our deadlines, and where we need to submit.

R: If yes, what do you think of it? (e.g. The format, the content, the efficiency, etc)

A_04: I think it's quite efficient because we can always submit the homework on time and we are aware of all the announcements.

R: Do you think it is necessary to receive the update email in the situation of this case in my study, why?

A_04: If this is just a reminder of the, of the assignments, I think yeah.

R: And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

A_04: I would say like, this is enough because for these details real, I don't really see it. I don't really read it. Because if, if it's necessary to read it, I would just go directly to this task and see the details there. The deadline of the date and the task to complete. Mm. And, and my current condition it's enough for me. Okay. Okay. Um, yeah, I don't maybe one thing is that about this, uh, Dateline it's only the date now. Maybe it would be more helpful if you have the time, like specifically like before 24 mm-hmm before 12:00 PM. Yeah, maybe here, because 60 out of 120 points progress. I don't know here. The, the unit, um, for, for this, for, for us if we count like 60 out of, uh, 120. And I didn't understand this total point for task available to you. Because here I can see, I achieved this amount of points and I still have this amount of point to, to be achieved, but I don't know what's this for. I need to know like how, how, how much amount of, uh, points I need to gain in order to pass the course.

Meet with A_05

R: Are you a student?

A_05: yeah

R: Have you taken any online courses before?

A_05: yeah, during the corona, we always take the online course.

R: What are the longest online courses you have taken? What are the usual communication means you use?

A_05: just one quartile, around 3 months. And for these courses, some of them are hybrid, and others is totally online. I think by email or just like a message through canvas, also, maybe some video conference, something like that.

R: What do you think communication means in those courses?

A_05: Yeah, it was efficient. But like sometimes I think, um, the way they put the information, because they really put a lot of information and the format, or like the way they put, maybe it's not that, uh, clear, I mean, it's clear, but you need to pay a lot of time to read through and focus, so yeah, sometimes a little bit confusing.

R: Did you receive a periodic update of your learning progress through email?

A_05: well, for my course, I, I don't think it's like this situation, but before we maybe just like had a few times during the whole class, but like in this module last module, we have a course, the teacher really like

to update. it is a physical class, like a physical lecture, but, uh, I mean, he kept updating every week about progress or the next task, something like that.

R: If yes, what do you think of it? (e.g. The format, the content, the efficiency, etc)

A_05:

R: Do you think it is necessary to receive the update email in the situation of this case in my study, why?

A_05: I think it's, it's, uh, it's needed because I mean, you don't have a really good connection in the physical way. So we must do the connection weekly through anyway, like the email or some other ways.

R: And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

A_05: Yeah, I think personally, I think maybe just, uh, my current situation, like, uh, what I'm doing or how I, how I'm doing now for this course. Mm-hmm mm-hmm . like, so I can have a overview of like, um, how, how, how long, how long am I in this? Uh, course and also, um, the tasks. It should be like clear tasks to help me to make the timeline. So like what should I do next step or something like that? Also, maybe, um, an overview of the whole course, so I can have a clear mind. Yeah. With this course. And, um, yeah, like in the end or the, the final goal of this course, for sure. And maybe, also some like personal stuff, like, uh, you know, one, one to one, one mm-hmm some feedback like, like tailored. Yeah. Tailored feedback. Yeah. Okay. But yeah, something like that.

I'm not really sure about like the, the gray part and the, the black part. So yeah. Sometimes there is like no submission yet. So it means you already passed the deadline, right? Or no, but why it's like, and also in the close part is like gray. So yeah, when I'm doing this, I'm little bit confused about this part and oh, you mean the green green part is like you pass the, the, the, the task. I think for the information it's enough, I guess. Okay. Yeah, because you also have it checked on canvas or something like that. Right. So the email is enough, I guess.

Appendix F: Transcription of Interviews(Version B)

Meet with B_01

Email B sent... Time the reading of B_01... Fill out the questionnaire...

Conversation recorded below.

R: Are you a student?

B_01: Yes, I'm doing my master currently.

R: Have you taken any online courses before?

B_01: Yeah.

R: What are the longest online courses you have taken? What is the usual communication means you use?

B_01: I think the longest one lasts for three to four months, three to four months. it's a little bit different from normal courses. Cause for that one, like we just need to do a group project and then submit a report. So we don't need to take any other... Yeah, I do have weekly meetings, like, uh, every week. Uh, we will have like one team meeting and also one meeting with, uh, with our supervisor, cuz we have a supervisor for the project. So every week we will have like. Some sort of communication or meeting with the supervisor, he will give us some feedback for the project.

R: What do you think of the communication in those courses?

B_01: I think the only, the only case that my supervisor will give us feedback by email is only like when we share our report with him and he will give us like some comments. Okay. Other than that, we, just have like a video call and he will give us feedback, uh, in the call. And for, for normal courses. Yeah. We

use canvas and the. Our teacher, just gives us feedback through campus and we can always get, um, for some courses we can always get notification from the teacher. Oh, I can't remember. One course is called like, um, interactive design or something. I can't remember the name, but for that course, like the communication from the teachers are so confusing. Cause they always have notifications for us. Because there's so many notifications, so sometimes I may tend to ignore some of the notifications. Yeah. And for the case, I, I may need like some important information from the teacher. Cause there's so many notifications on canvas. I don't know which to look at. And also like for that course, we have a lot of submissions, so we need to. um, uh, you can, uh, also film a video and we also need to make a demo. And, uh, mm-hmm, there are so many things to do. So sometimes it's really hard to find a template for different deliverables.

R: Did you receive a periodic update of your learning progress through email?

B_01: I do have periodic update, but there are so many updates.

R: If yes, what do you think of it? (e.g. The format, the content, the efficiency, etc)

B_01: So it's a little bit overwhelming for me. okay. Maybe need to app, uh, summarize those information.

R: If no, do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

B_01: I think it's, it's okay for me, based on my experience. Cause like most of the courses I took before I selected the courses, I already know what are the tasks, things to do for the course, but I think it's necessary for me to normalize the deadlines of different, different tasks. Mm. That helps. Because if you send me an email to tell me, like all the details about the course, of course, I only focus on the one, uh, with the latest deadline.

R: Do you have any specific information/expectations about this kind of update email?

B_01: And for that course, at the beginning, the professor told us already you need to write a report and then the report, you have to use four research methods. That's good. Yeah. Yeah. I, yeah. Yeah. To kinda organize when you will write, like which research or yeah, you can organize it before the course starts. That's really helpful. That's good. I think, yeah. I think maybe the first email should be, should be an overview of the course. It would be better.

Meet with B_02

R: Are you a student?

B_02: yes.

R: Have you taken any online courses before?

B_02: yeah

R: What are the longest online courses you have taken? What are the usual communication means you use?

B_02: 3 months. During that course, the teacher would send us an overview of the course before it starts. It tells what the rough time plan of the course, like mid-presentation, final presentation, and deadlines of some assignments. Other details of the time plan, the teacher just let us assign in the study group. The teacher would not care about what we did in a period as long as we complete these mandatory tasks. We usually use Slack. The teacher opened different channels for study groups separately, then we can talk with the teacher through our own channel on Slack. Or we discussed the time of the meeting with the teacher. But we didn't have a fixed time to communicate with the teacher.

R: Did you receive a periodic update of your learning progress through email?

B_02: no, the time the teacher sent us the email was he thought he needed to notify us something, or there was something important that needed to be updated.

R: If yes, what do you think of it? (e.g. The format, the content, the efficiency, etc)

B_02:

R: If no, do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

B_02: Yes, cuz I think, firstly, students need to have an external nudge or push, the email could help students follow the time plan of the course, so that they won't fall behind.

Personally speaking, I'd like to know if I can have a channel to communicate with teachers through this email. Beyond that, I think all my requirements can be obtained from what I read in the existing email you sent. Because this kind of long period for a online course, that is kind of information is all I need. I don't have more needs for it.

Meet with B_03:

R: Are you a student?

B_03: yeah, I'm a postgraduate.

R: Have you taken any online courses before?

B_03: Um, well, I've taken hybrid courses before that were like partly online, partly in person and have taken courses that were online in the sense that all the lectures were video recorded.

R: What are the longest online courses you have taken? What are the usual communication means you use?

B_03: all my courses lasted 10 weeks.

R: What do you think communication means in those courses?

B_03: The communication was not much on email, on canvas sometimes with email, but then more like, um, when I need to write to the professor itself and not through canvas, so like to ask something or whatever.

R: How do you like email communication?

B_03: In my courses, usually the email communication is often like you get an email from like canvas mm-hmm, um, which is very much like, just did leads you back to the canvas page. Um, I really liked, um, like what I really liked about the email that you wrote was how much it really focused on, for example, giving a schedule, so that you can kind of really follow, okay, this is then because that makes it a lot easier to kind of see where you are in the course and how long it's gonna go.

R: Did you receive a periodic update of your learning progress through email?

B_03: Not really.

R: in this scenario, like, uh, what I told you in my case, do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

B_03: I don't know if I think it's necessary. I think that students could mention on their own, but I think it might be a nice addition to just see. Okay. When, um, or how far am I along the course timeline. And am I kind. Keeping up with the, the course load provided and also just to communicate. Oh, okay. By the way, here's your next deadline? Don't forget it. Like, especially if you're working by yourself.

I think it's enough. Um, I think maybe it would be nice to kind of have like a link to the different, like, I don't know if there's task like links to the different tasks mm-hmm and for like the first few tasks, I think,

uh, that, that was there, but the later tasks and like the timeline didn't have that. Yeah. So maybe kind of add also links to that so that it's clearer. Um, like **you can just click on them and go there.**

R: any other things you want to add?

B_03: , **I did like the email, I like that. It was kind of, uh, okay. There, you had some like, kind of highlights,** like you, you know, like the, the next two deadline or so for like, uh, highlighted kind of, uh, like an extra boxes and stuff. I think that was a good choice. And then also with, um, giving the points. I didn't understand the point system so much because I mean, in the, like here at the UT who worked with like the whole, like you get like, uh, uh, either five points or five ECS or something like that, of course, you know, mm-hmm, , um, there's not really this like, oh, so many points of so many, but, um, **I guess if you're in the course and you understand what it means, I think it can be very helpful.**

Meet with B_04

...

R: Have you taken any online courses before?

B_04: More like hybrid courses.

R: What are the longest online courses you have taken? What are the usual communication means you use?

B_04: 2 and half month.

R: What do you think communication means in those courses?

B_04: I assume like one of the disadvantage of the, uh, online courses is like, uh, the interaction between you and professor is pretty weak. And uh, every time, like you mention like the online courses, you can't like put your hand, put your hands on and stuff to like, get a response immediately. Mm-hmm and yeah, and I, I don't think it's a good experience.

R: Did you receive a periodic update of your learning progress through email?

B_04: They do like give us the feedbacks, but, um, it's still since it's online. So like, uh, the feedback you receive is sometimes it's really weak mm-hmm and they just told you some like basic concepts, because they can like really explain the details through the form of the online.

R: Do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

B_04: I think **it's pretty necessary to give a feedback email for like every, every week or like every two weeks.** And first of all, like it's a one year course. So like the period of time is pretty long and it's a long journey. You have to like keep up updated and also, um, Hmm. How to say. uh, like **the schedule of the course should be pretty clear** mm-hmm and because you have, you, you have to like, when you're taking a course, you have to like the first, the first thing you have to do is like, **you have to get a overview of the information,** like what is the course about? And what's the schedules and what, what kind of assignments, uh, should I like hand in and stuff like that. So, uh, it's pretty difficult, like for the individuals to. Uh, do the course result any, uh, help or result any like, uh, **instructions, like, because you have to, like, people are used to like, uh, follow the steps mm-hmm so, like, I think in that case, the, um, updates are pretty important and for like every months or every two weeks, I think they're both fine.**

R: Do you have anything else to add?

B_04: I think the updates are pretty important and it's kind of necessary to adding and okay. And the form of the updates, as you mentioned, is a email mm-hmm . **So, I don't think the regular format of the email is good for this kind of course.** Mm-hmm because, um, the normal, **like emails are just like tons of words.** **You have to like read line to line.** You just get lost time to time. So maybe as some like visual, like graphs

and stuff like that, she make she's, uh, **makes you to get information much more faster.** And, uh, more than that, maybe, um, you can't. uh, catch the keyword, like, like **the key information pretty fast. So you don't have to waste, waste your time on it.**

Meet with B_05

...

R: Have you taken any online courses before?

B_05: Yes, and it was totally online.

R: What are the longest online courses you have taken? What are the usual communication means you use?

B_05: One week, caz before COVID, we never had an online course. Yeah, for the PhD. It's not like a very long term course. We took several courses, but each of them were very short.

R: What do you think communication means in those courses?

B_05: Well, actually we use Canvas that the UT provides and every day the professor will update the PowerPoint slides from today. I have to say if he provides the PowerPoint slide then it's efficient for me because online when I was doing the course I didn't have to pay attention to every single word he wrote. Then later on I can check back to the PowerPoint slides that I can see. What is the point I missed?

R: Did you receive a periodic update of your learning progress through email?

B_05: Yes, it's like every day I get a notification. But it was not really through email, we got the feedback sometimes from our professor on campus.

R: Do you think it is necessary to receive the update email, why? And do you have any expectations for the email? (e.g. The format, the content, the efficiency, etc)

B_05: Yeah, I think it's definitely necessary to receive the update email because sometimes when you get too busy or you have so many courses together, it's easy to forget what kind of task you still have to do and what you have already accomplished.

Ohh I think for me the most important thing is. And like what you've already done in that email, how many points did I already Yeah, finished. And how many points do I still have to get from that course? And also I feel like when **I read the email in the list below or the details are somehow confused.** Because the range is quite long from March until May or even longer than I think, somehow **I got lost in all that detail.**

R: Do you have anything else to add?

maybe there There could be another Point you can directly click then **it generates a conversation window,** then it shows all the form. Basically I don't know if it's realistic that you can communicate like a robot. Then the robot will transfer your message to the teacher. Or there's another way to see what are the comments that your supervisor or your professor gave it to each of the task? **Well, maybe it's good to know. How are the other classmates doing. Like a ranking. Or it can show how many people are actually in these modules at the same speed with you.** So if you have any doubts and you don't want to discuss with your professor directly or he is so busy he couldn't reply to you, then you can discuss with the student together. Because in the end, if some task get too difficult then you cannot do it by yourself. Maybe it's good to ask for your to set-up a learning group.

But in general, **I would say that the email is quite straightforward.** I don't know how many points I did correct. Yeah, because I I noticed some of you use a different color. That's why I understand that will be my next deadline. And there's one choice that asks how many points do I still have to get to make my task available? Something like that.

Annex

Annex Number	Annex Name	File Name
Annex 1	Survey results	Annex1_survey_results.csv
Annex	A/B Testing report A	Annex2_Atesting_report.pdf
Annex	A/B Testing report B	Annex3_Btesting_report.pdf