

# How do I design an appropriate nudge for an educational context?

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A research document created by:

*Beeck, Thomas T. van*

*Lousberg, Hans J.C.E.*

*Smits, Brend B.P.G.*

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## **Preface**

In this research we will try to answer the main research question: How do I design an appropriate nudge for an educational context? We will do this by subdividing it into multiple sub-questions. These sub questions should help us define what a nudge is and how to create our own nudges that we can use in the educational context. This research paper will also include definitions that are important to our project. We will also be discussing the history of nudges by zooming in on nudges that succeeded/failed. We will be trying to find out why these succeeded or failed and we will try to learn from them.

This research is conducted because we want to nudge students to improve study performance, this will be done by applying machine learning algorithms to biometric data, open data and data from learning management systems.

## What is nudging?

The concept of "nudging" was introduced by Richard Thaler and Cass Sunstein who defined a nudge as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (*Thaler & Sunstein, 2008*). The choice architecture is the context in which people make decisions. It includes, for example, the order in which options are presented, how information is provided and how default options are chosen (*Mette Trier Damgaard and Helena Skyt Nielson, 2017*). Nudging should be used in a subtle manner, so that it does not come across as obtrusive. It also should not be seen as method to constrain choice. Humans are not rational in all regards, nudges can be used to change the irrational behavior.

However, not all scholars agree on the definition of nudging. Some argue that only so-called "noneducational" nudges that do not teach people to make decisions are true nudges because these policies instead exploit systematic biases in behaviour to achieve behavioural changes without promoting active decision making. Examples of non-educational nudges are defaults and framing. In contrast, so-called "educational" nudges such as information provision (e.g. disclosure requirements and warnings) and reminders potentially induce better active decision making. Policies that deliberately aim to improve decision making capabilities e.g. by targeting "the individual's skills, knowledge, the available set of decision tools, or the environment in which decisions are made" (Grüne-Yanoff & Hertwig, 2015) are sometimes referred to as "boost" (Grüne-Yanoff & Hertwig, 2015) or "educate" (Katsikopoulos, 2014) policies (By: *Mette Trier Damgaard and Helena Skyt Nielson, 2017*)

## How is nudging used in the digital world?

In a digital environment, nudging is also used to push a user in the right direction. This is usually done by making changes to the UI design. A good example of a nudge with UI design is setting the button to accept cookies on a website to a bright noticeable color by default. You will have to decline the cookies if you do manually not want them. You can still decline the cookies, but it's just more likely that someone clicks a bright and highlighted button over a non highlighted button.

People tend to stick to the default, and because of that a common nudge in digital applications is to have the default option be the option that is best for most people, or most desired by the platform.

Nudges are also widely used in the smart mobile workspace, mostly with push notifications. There are quite some examples of these push notifications going well, but also some of it going wrong. Let's walk through some examples and see what went good and what went wrong.

## The well made nudge

### Busuu

Busuu is an application where the user can learn languages in a smart way. This language app sends personalized notifications based on the words the user recently studied. The question can engage the user immediately, this helps reminding the user about learning their language. The message is also not too long, which is a good thing. Long messages often get ignored, because they take too much effort or time to read.

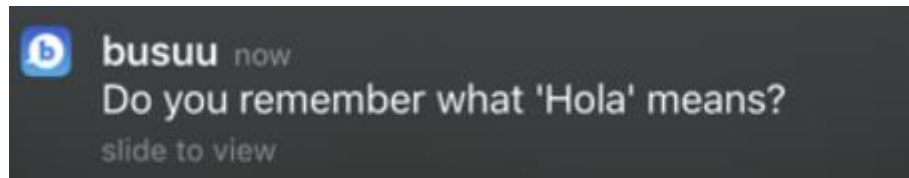


Figure 1

### Argus

Argus is a smart fitness application. It combines functionality from apps like Runkeeper, Foodzy and Sleep cycle.

This notification highlights a feature of the application that has not been used yet. It made the user aware of a feature which the system thinks might be useful for the user. The timing of the notifications was also on point because it's a sleep related feature and the notification was sent at 9:30 PM. Besides this the message in the notification is quite short and makes the user curious.

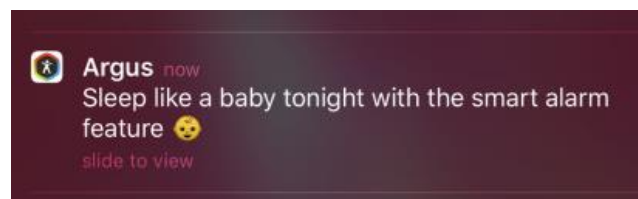


Figure 2

### Netflix

Netflix sends personalized messages that are based on the users watch history. Netflix found out that sending a message about a show or film that a user has watched in the past, improved user engagement. Netflix will also use this watch-history to give new recommendations to the user.

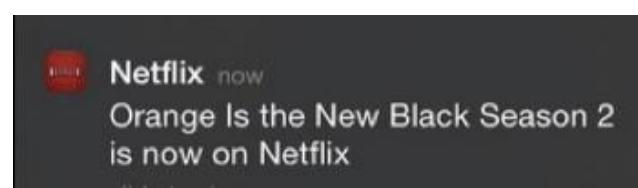


Figure 3

## The badly made nudge

### Clippit (Clippy)

Clippy is Microsoft's animated, talking paperclip avatar, that can assist in various tasks. This attempt at helping the user navigate and use Microsoft Office in a fun way only worked like it was intended, when first using the software. The problem was that Clippy repeated the same suggestions even if the user already experienced that part of the program. It kept interrupting the user while they were working on something, this was extremely frustrating.

### My Pet

My Pet is a mobile application that lets you have your own virtual pet, you need to feed it, hug it and train it. It is generally directed towards a younger audience. The problem here was that the nudge was not adjusted properly to the target audience. The push notifications contained dark humor, this is not the way to go if you are targeting a young audience. Besides this the notifications were send out too frequently and the messages in some of them were far too long. If the application sends too many notifications, the user will more likely ignore them.

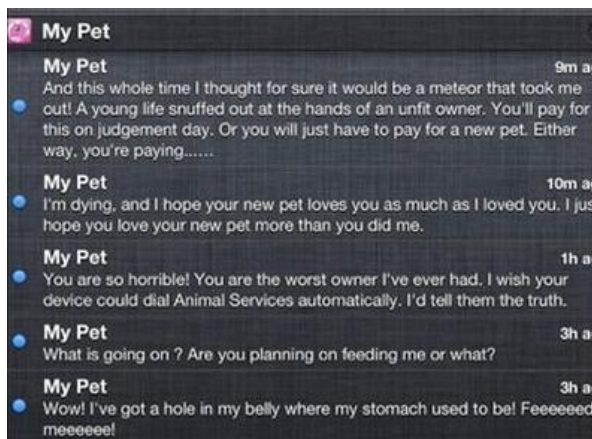


Figure 4

## Duolingo

Duolingo is an application which will help the user to learn specific languages. Duolingo has an interesting feature which allows the user to set personal goals, these goals work based on experience points. Each task that you complete, will add experience points and will count towards completing your goal. These goals are great for sending nudges, and should have been used more to interact with the user. Duolingo recognizes when practice reminders are not having the intended effect and does the work of turning them off, anticipating a user's' needs and preventing a frustrating situation. This is a great feature, especially if you can apply the same feature for nudges. We should be transparent about the use of nudges and should give control to the user if they want to receive them or not.

The bad thing about this application is that the notifications that are being sent are mostly the same every time. This is a killer if you want to get users to do something or if you want to change their behavior.

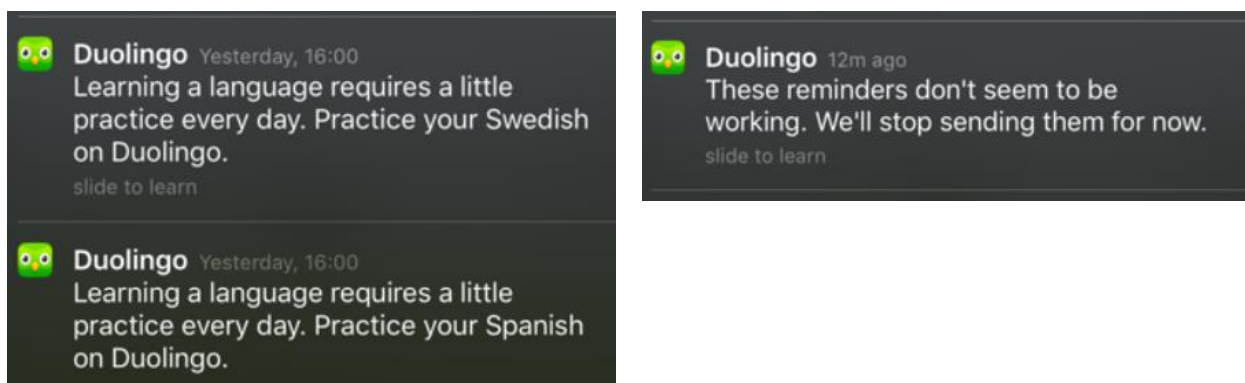


Figure 5

## How do you effectively design a nudge in a push notification?

Now that we know how and why the above nudges either failed or succeeded, we can take a closer look on the characteristics of an effective nudge in a push notification.

### Personalize the notification

To create an efficient push notification you need some kind of thought process behind it. You want to personalize the message of the notification. First you need to identify your target audience. In our case the target audience are (university) students. You will send a different message to a student than you would do to a teacher or a parent. Keep this in mind when drafting the message.

### Showcase that you understand the user

Show that you understand the need of the user. Show a message in which they are interested in, if you are providing feedback, make sure the feedback is constructive. Simply inserting their name is not enough to indicate you understand them, but it does help to personalize. Do not command a user to do something, make them understand on why they should do something.



A study from Blueshift showed that when sending a notification to a mobile user based on events particular to that user, rather than a notification to every user at the same time, you'll get a 2,770 percent increase in engagement. As we showed earlier, Netflix does this really well.

### Mind the frequency and timing

It is important to regulate the frequency that you show the push notification. Push notifications can be very useful, but if they become annoying they can be ignored or even despised. This can result in turning off the notifications or uninstalling the source of the notifications.

It is also important to know when to show the user a notification. As a general rule of thumb you can take 6 - 8PM to be a sufficient timing, but think about the urgency of your notifications. It is also important to take the type of notification into account, it might not be the best idea to send a nudge about school related work when the student is relaxing with friends or doing some kind of sports as an example. If you have the information on when a student is doing these kinds of things, take them into account.

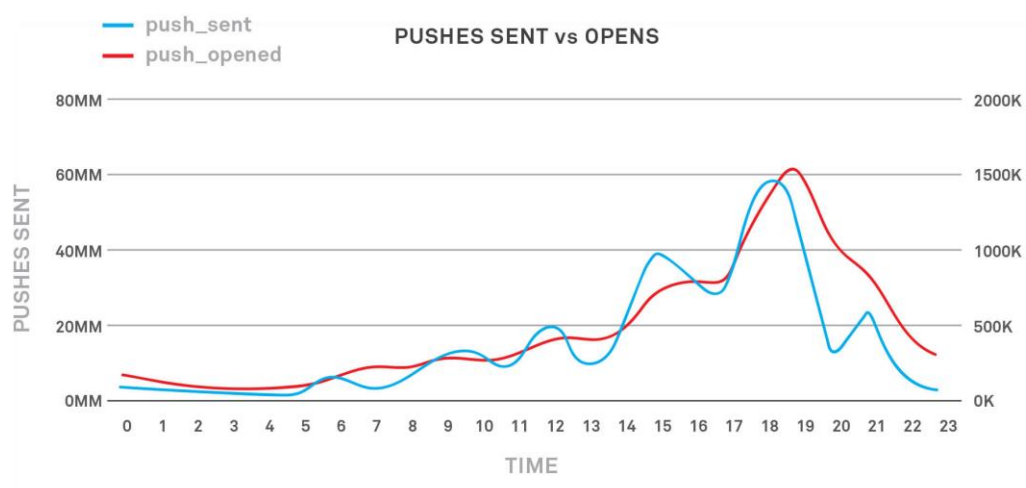


Figure 6 – Shows how many pushes are opened vs amount send

As you can see in the graph above, at some point, users will open more notifications than they actually receive. This is because the user has a backtrack of notifications that are still waiting to be opened, in the evening, users often have more time to spare and spend more time on their mobile devices. This also means that they are more likely to open remaining push notifications. It is clever to take this into account when sending your push notification, if your push notification belongs to the backtrack of notifications for the user, it's often a sign that something is not right. Why are users not immediately opening your notification?

In the image above you can also see when majority of push notifications are send and when majority are also opened. It's good to take this into consideration as well, you do not want to just be another notification, you want the user to actually make use of the nudge. It might not be the best idea to send it during the peak time in that case. After all, you want the student to act upon your nudge.

#### Consider where the notification should be shown

Imagine you have developed a suitable push notification for you purpose. It is important to consider where the notification is shown and how the user interacts with it. For example in android you need to interact with every notification to clear them whereas in IOS you only need to interact with one notification to clear everything.

## Nudging In E-commerce

E-Commerce is the industry in which probably the most nudging happens. And a fairly easy to analyze, because the goal of E-commerce is well known. to sell you more.

A great example is amazon.com (as an example: <https://www.amazon.com/Nintendo-Switch-Neon-Red-Blue-Joy/dp/B01MUAGZ49>)

when you view a product on Amazon, the most attention grabbing button is the “Add to Cart” button. There is still an “Add to list” button, but it is separated from “add to cart” with a divider so that it is not interpreted as an alternative to buying, but merely an action that customers can do when they already wanted to do that.

If that isn't enough to get the customer to purchase the product, they will show you the advantage of buying it now.

In this case. If you want to have a switch on thursday, you have to buy it within 4 hours.

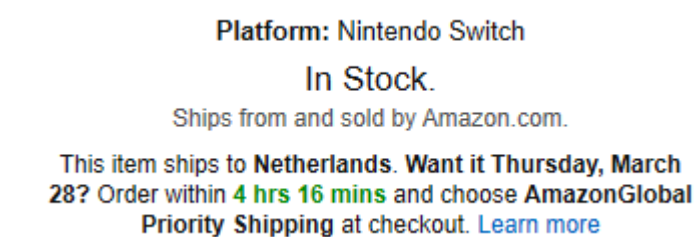


Figure 7

For e-Commerce it is really important that you buy the product now, because if you look around on different sites. the chance that you buy that product on their site diminishes. If you also take in account that people tend to stick to websites they already know. A sale now can increase sales in the future.

Below that, they show the next nudge. “Frequently bought together” it is quite obvious that this nudge tries to make you buy more products. but on top of that: it does not ask you to trust amazon what to buy together, it asks you to trust the wisdom of the crowd.

Underneath that it shows “Sponsored products related to this item” and “customers who viewed this item also viewed”. Most people won't actively search for sponsored products. but by placing them together, with the same look. They are now equal, which increases the chance that somebody buys a sponsored product.

## **What appliance does Nudging have for our project?**

Nudging can be widely used in the educational context, it just has not been done often yet. Our goal is to improve study performance by having a student subtly change their behavior because of these useful nudges. Nudges can vary, here are some examples: Send a student a reminder about an important assignment coming up, or analyzing biometric data from the student to pre-emptively let the student know that they should start working on assignment X because in the past they have shown that starting late would increase their stress levels, having negative effect on other biometrics such as sleep patterns. Further research will need to be conducted to decide on how to actually show the user these nudges, they could be send in the form of a push message if a certain condition is met, however, there might be alternative preferred ways to show the nudge instead.

## **How do Nudges work?**

As mentioned in “What are nudges”, nudges try to exploit biases in our decision making we humans have.

This is done by designing the (digital) environment in such a way that the biases in our decision making are inline with the desired outcome.

Because nudges just take advantages of biases, they are just as strong as those biases.

Therefore when somebody actively thinks about what they want to choose, the nudge hardly works.

## Nudges in education

The following 2 pieces are added to get a better idea how nudges can increase academic performance.

### Social belonging nudges

The following piece comes from the meta-research “Economics of education”. It discusses a few interventions that are targeted to increase social belonging (4).

*Student performance may also be inhibited by the students' underconfidence in their own ability or more broadly by biased or suboptimal self-images. Interventions targeting students' mindsets and beliefs may thus potentially improve self-confidence, benefit students' self-image and ultimately improve student outcomes. A number of (brief psychological) interventions fall in this category. An important aspect of students' self-image concerns is potentially feelings of social belonging. Wilson and Linville (1982) is an example of an early small-scale intervention trying to influence feelings of social belonging. First-year students at a US university were informed that grades typically improve from the first year to later years. This information could strengthening the student's sense of belonging to the university student group and address insecurities about their own abilities. The sample in the study was rather small (40 students in total), but the study nevertheless suggested that information about the academic performance of peers positively influenced grades and reduced the drop-out rate.*

*Yeager et al. (2016b) implemented a large scale online social belonging intervention teaching participants that early struggles at university do not necessarily translate into a permanent lack of belonging. They found positive effects on college enrolment for US secondary school students from high performing schools who have been admitted to college. In addition, they found positive effects on student outcomes such as enrolment and grades for disadvantaged incoming university students at private and public universities. There were no effects for advantaged students.*

*Another set of interventions have tried to influence behaviour through identity activation nudges. Lin-Siegler, Ahn, Chen, Fang, and LunaLucero (2016) provided 9th and 10th grade students in the US with information about the struggles of famous scientists. One treatment provided students with information about the academic struggles of Albert Einstein, Marie Curie and Michael Faraday over a five-week period. Another treatment provided students with information about the same scientists' personal struggles, while the control treatment provided students with information about their scientific achievements. The intervention led to an increase in science grades for students in both struggle treatments.*

To increase study performance the nudge itself does not have to have “increase study performance” as an end-goal. In part because a poor study performance has a plethora of different underlying issues. If a nudge is designed to diminish the effect of one of these issue you can already improve your vague end-goal.

## Goal setting

The following part of the meta-research “Economics of education” has been added how small changes in a nudge can drastically alter the outcome of said nudge. as an example when telling students to write down a goal for the class, if you tell them to raise their goal the effect of the nudge decreases. It is also theorized that when people carefully think about their choice, a nudge does not change the outcome.

*A number of recent studies have investigated another type of commitment device: goal setting. Theoretically, present-biased agents who invest too little effort in their education can benefit from self-set goals as internal commitment devices. Once set, goals become salient reference points that students (and parents) will be motivated to reach in order to avoid psychological costs (due to loss aversion) of not reaching the goals (Jain, 2009; Koch & Nafziger, 2011; Clark, Gill, Prowse, & Rush, 2017). Therefore, asking students, parents and teachers to set a specific goal for task completion or task performance may help alleviate self-control problems by subconsciously nudging individuals towards behaviour that enables them to meet the goal. Clark et al. (2017) tested the effect of self-set, task and performance goals for US university students. They found that task-based goals led students to engage more with the task and, ultimately, perform better on exams. In contrast, performance goals for exams and the overall course grade had little effect. The authors argue that task-based goals involve less risk, making the outcome more controllable for students. At the same time, performance goals are more long-term and procrastination might therefore reduce the effectiveness. However, in contrast van Lent and Souverijn (2017) found positive effects on grades of a performance-based goal where Dutch university students set a target grade for a course. The effects were strongest for students who initially performed poorly, and there were no negative spillover effects to other courses. Interestingly, van Lent and Souverijn (2017) found negative effects of suggestions by others to raise the goal, meaning that such suggestions may reduce commitment to the goal or render it seemingly unattainable. Moreover, Karlsen and Varhaug (2016) consider a very subtle task-based goal setting intervention in Norway and find no effects. Applicants and teacher colleges were asked to send a text message stating their intent to enrol or not if accepted to college. Simply stating the intent to enrol could provide a goal-setting mechanism and at the same time serves as a way to make a promise to enrol which applicants might feel uncomfortable breaking (Charness & Dufwenberg, 2006; Vanberg, 2008). However, Karlsen and Varhaug (2016) find no effect on enrolment. Survey evidence suggests that the choices not to enrol were due to careful consideration and that ultimately other factors than procrastination were more important for the decision not to enrol.*

# Giving the student constructive feedback

If we would like to change the behavior of a student, we need to be able to send them some kind of feedback. It's best to do this in a constructive way. There have been a lot of studies on how to do this properly. We will be describing what we think is the proper way to get information across to the students without them losing interest.

Feedback is a useful tool for indicating when things are going in the right direction or for redirecting problem performance. Your objective in giving feedback is to provide guidance by supplying information in a useful manner, either to support effective behavior, or to guide someone back on track toward successful performance.

When making feedback constructive you have to keep a couple of things in mind.

## **1. Focus on description rather than judgement.**

Describing behavior is a way of reporting what has occurred, while judging behavior is an evaluation of what has occurred in terms of "right or wrong", or "good or bad". By avoiding evaluative language, you reduce the need for the individual to respond defensively.

For example: "You demonstrate a high degree of confidence when you answer customer questions about registration procedures," rather than, "Your communication skills are good."

## **2. Focus on observation rather than inference.**

Observations refer to what you can see or hear about an individual's behavior, while inferences refer to the assumptions and interpretations you make from what you see or hear. Focus on what the person did and your reaction.

For example: "When you gave that student the Financial Aid form, you tossed it across the counter," rather than describe what you assume to be the person's motivation, "I suppose you give all forms out that way!"

## **3. Focus on behavior rather than the person**

Refer to what an individual does rather than on what you imagine she or he is. To focus on behavior, use adverbs, which describe action, rather than adjectives, which describe qualities.

For example: "You talked considerably during the staff meeting, which prevented me from getting to some of the main points," rather than "You talk too much."

## **4. Provide a balance of positive and negative feedback**

If you consistently give only positive or negative feedback, people will distrust the feedback and it will become useless.

## **5. Be aware of feedback overload.**

Select two or three important points you want to make and offer feedback about those points. If you overload an individual with feedback, she or he may become confused about what needs to be improved or changed.

For example: "The number of applicants and the time it takes you to enter them are both within the expected ranges. The number of keying errors you are currently making is higher than expected."

Here's a step-by-step plan on how to create constructive feedback

**Step 1: State the constructive purpose of your feedback.**

State your purpose briefly by indicating what you'd like to cover and why it's important. If you are initiating feedback, this focus keeps the other person from having to guess what you want to talk about. If the other person has requested feedback, a focusing statement will make sure that you direct your feedback toward what the person needs.

For example: "I have a concern about."

"I feel I need to let you know."

"I want to discuss."

"I have some thoughts about."

**Step 2: Describe specifically what you have observed.**

Have a certain event or action in mind and be able to say when and where it happened, who was involved, and what the results were. Stick to what you personally observed and don't try to speak for others. Avoid talking vaguely about what the person "always" or "usually" does.

For example:

"Yesterday afternoon, when you were speaking with Mrs. Sanchez, I noticed that you kept raising your voice."

**Step 3: Describe your reactions.**

Explain the consequences of the other person's behavior and how you feel about it. Give examples of how you and others are affected. When you describe your reactions or the consequences of the observed behaviors, the other person can better appreciate the impact their actions are having on others and on the organization or team as a whole.

For example:

"The staff member looked embarrassed and I felt uncomfortable about seeing the episode."

"Shouting at our students is not acceptable behavior in this department."

**Step 4: Offer specific suggestions.**

Whenever possible make your suggestions helpful by including practical, feasible examples. Offering suggestions shows that you have thought past your evaluations and moved to how to improve the situation. Even if people are working up to expected standards, they often benefit from ideas that could help them to perform better. If your feedback was offered supportively or neutrally, in the "for your information" mode, or depending on the situation's circumstances, suggestions may not be appropriate. Use your common sense and offer an idea if you think the other person will find it useful. Don't drum up a suggestion for improvement just for the sake of it.

For example: "Jennifer, I sometimes write myself notes or put up signs to remind myself to do something." "Jill, rather than telling Ed that you're not interested in all the details, you might try asking him specific questions about the information you are most interested in."

**Step 5: Summarize and express your support**

Review the major points you discussed. Summarize the Action items, not the negative points of the other person's behavior. If you have given neutral feedback, emphasize the main points you have wanted to convey. For corrective feedback, stress the main things you've discussed that the person could do differently. End on a positive note by communicating confidence in the person's ability to improve the situation.



For example: "As I said, the way the group has figured out how to cover phone calls has really lessened the number of phone messages to be returned. You've really followed through on a tough problem. Please keep taking the initiative on problems like that."

By summarizing, you can avoid misunderstandings and check to make sure that your communication is clean. This summary is an opportunity to show your support for the other person—a way to conclude even a negative feedback situation on a positive note. For example: "At least we understand each other better since we've talked. I'll do what I can to make sure your priorities are factored into the schedule, and I'll expect you to come straight to me if the schedule is a problem."

## Conclusion

How do I design an appropriate nudge for an educational context?

Nudges are everywhere, on your favorite booking website, on Amazon, on toilets, on the roads and more. In the educational context however, there are very few nudges. This is most likely because designing a nudge for this context is very difficult

Designing an appropriate nudge for the educational context is difficult, but we think it can be done in various ways. When creating a nudge you need to keep in mind who your target audience is and what your goal is for the nudge. This is the most important part, know your target audience and make sure you have the problem defined properly.

Target audience is important to know as you want to design a nudge for this group, you want to know if they have a phone, if they use it regularly, if they have learning management systems, at what time they are most active, at what time they spend time on their devices and when they spend time working on school.

Once you know what the problem is, it's time to think in solutions. What nudge could benefit to a solution for this problem?

To know this you first need to know what kind of nudge you want to make. If your audience mostly uses web browsers instead of applications on phones, then it's obviously better to nudge on the website instead of in a push notification. However, there are multiple ways to nudge on a website. You could make UX changes in the design in the website to indicate that user should make a certain decision. An alternative would be to create some kind of 'recommendation' system. This system could send the student constructive feedback to nudge them into changing behavior. It's critical that a lot of care goes into designing these recommendations, the structure of the sentence and choice of words is extremely important. Having the wrong wording will result in your nudge being ineffective, the difficult part is that there is no one-way to success. Every target audience is different and requires different wording.

Aside from the way that you showcase the nudge, you can also use gamification or methods such as goal-setting or social belongingness to make nudging easier and most likely more effective as well. With goal setting, you can define goals with or for the student following up on these goals you can nudge the student to reach these goals and improve their study performance this way. Nudging based on social belongingness has also shown to work in most cases, to increase study performance the nudge itself does not have to have "increase study performance" as an end-goal. In part because a poor study performance has a plethora of different underlying issues. If a nudge is designed to diminish the effect of one of these issue you can already improve your vague end-goal.

To summarize briefly, in our context there are several ways to nudge the user using the following methods:

- Gamification
- Goal Setting
- Social belongingness

These nudges can be shown by making either subtle UX changes or by integrating the nudges into the design of the website. An example would be by changing the theme of the website depending on how the student is performing. These changes are not subtle but do give the student an indication on how they are performing.

Aside from UX changes, you can send the student notifications in several ways like:

- Push notification on phone
- Recommendation system (tips on the website)

It's important to keep in mind that these kind of notifications are very fragile and sufficient research needs to be conducted in for example when and how the notification should be send.

When the initial design has been created, you are not done yet. It's time to test it with a student from your target audience. This feedback is crucial to designing the nudge, often you need to make subtle changes to make the nudge work, such as changing the wording of a notification or changing the color of a button. If these changes do not end up working after doing new user testing, it's time to get back to the drawing board and design a new nudge.

# Definitions

## **Quantitative data (1)**

Quantitative data is data that can be counted or expressed numerically. for example: how many days did a student miss, or what grade did the student get.

## **Qualitative data (2)**

Qualitative data is descriptive, not based on numbers. It describes the subject in words. for example: student A is often sick, he has a low grade, or Fontys is a great school. It is subjective in nature, and because of that usually less reliable.

## **Bias (3)**

A particular tendency, trend, inclination, feeling, or opinion, especially one that is preconceived or unreasoned. For nudges the important biases are mostly biases in decision making and behavioral biases that are shared across most people. Like loss aversion, and the default effect.

## **Belongingness (4)**

Belongingness is the human emotional need to be an accepted member of a group. Whether it is family, friends, co-workers, a religion, or something else, people tend to have an 'inherent' desire to belong and be an important part of something greater than themselves. This implies a relationship that is greater than simple acquaintance or familiarity. The need to belong is the need to give and receive attention to and from others.

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