# Learn together!

Learning alone is like watching a movie without popcorn. Your perfect learning partner is waiting for you – what are you waiting for?

## **GET STARTED**

## Project Report LETO

In our project, we developed the learning platform LETO which connects students based on their course, learning styles, and personality traits.

The platform is based on a situation analysis for which we interviewed TUM students on their learning procedure. Thereby, we determined that the lack of learning-related interaction among students may impede efficient learning. To encourage collaborative learning we created LETO.

By May 2022, we had matched more than 100 TUM students.

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## Preface by the Supervisors Prof. Dr. Holger Magel and Prof. Dr. Jürgen Pfeffer

Social interaction is at the core of human behavior. We interact with others to exchange information and discuss ideas. With the help of others, we learn and we grow. From the study of personal networks, we know that people with larger and more diverse networks are more likely to solve problems and to overcome professional and personal challenges in life. Being alumnus of a university is a key variable for having successful personal networks because student life offers many opportunities to make the acquaintance of new people. But also for short-term academic success, networks of learning partners and study groups are indispensable. And often, university learning partners will stay acquaintance or friends for life.

The opportunities to meet new people and to broaden one's personal network have been reduced dramatically due to the pandemic situation over the last two years. Many students have found it difficult to switch from face-to-face interaction in seminars and study groups to an online teaching environment. Moreover, our academic institutions are not prepared for pure online education and cannot support students with satisfying online networking alternatives. In particular, students in the first semester who have just come out of school have not been able to connect to the university and their peers through online seminars or have had no opportunity for social interaction. Here, a platform like LETO is a very good option for finding learning partners who are studying similar courses and who may also have similar preferences and characteristics. With the LETO matching tool, students have the opportunity to find like-minded people to fight their way through the learning jungle, to motivate each other, and, after many months of social distancing, maybe even find new interesting people for social interaction.

But even in a perfect university world without pandemic constraints, LETO can be an interesting opportunity structure for getting in touch with new people outside of one's own social circles. And last but not least, LETO can be an important tool in terms of increasing equity and inclusion since the online offer can be utilized independently from individual constraints.

### Supervisor insights

Prof. Dr. Holger Magel, Professor emeritus since April 2012 The research activities of Prof. Magel (b. 1944) center on theories, methods and processes for forward-looking village renewal and participatory landscape planning. He also examines conflict-resolving land management in public infrastructure schemes (hydraulic engineering and road construction, residential planning, nature and water conservation, etc.). He is especially interested in analyzing land management and land administration in an international context. He set up the international postgraduate masters program "Land Management and Land Tenure in Urban and Rural Areas for Professionals" to examine this and other topics.

#### What is your research interest or motivation for science?

"There is the famous saying: Nothing is more practical than a good theory. This means that theory must be known if one wants to work practically. The theories that underly practical work emerge from science but should always be close to practice. As a full professor coming from a big engineering administration who was curious about building theories, I always tried to ground my own academic activities in practice. Grounding theory makes it possible that every researcher's dream becomes reality: scientific results are put into practice. I was fortunate enough to witness this several times."

#### What special experience from your studies/career would you like to share with the scholars?

"I would like to tell all young people at TUM: Junge Akademie the same I already told my own students and employees. During careers in the administration, the university and in Bavarian, federal and international professional associations, and NGOs, I made positive and negative experiences that let me conclude: Please never betray or deny yourself and your values; when it becomes difficult, try to think of the great Goethe, who in his educational novel Wilhelm Meister said for eternity: ,Dir frommt an jedem Ort, zu jeder Zeit Geradheit, Urteil und Verträglichkeit'"



The team discusses its findings with their supervisors Prof. Magel and Prof. Pfeffer.

## LEarning TOgether – Platform out now

LETO, as LEarning TOgether, is a new educational platform that was launched in February 2022. The team behind it (Lu, Luca, Philipp, Valentin, Wolf) found that it was becoming increasingly more difficult to find suitable learning partners in study courses at universities. Over the years, courses have become larger and with the introduction of many new study courses, the number of students with which a person shares multiple courses has been reduced. Higher costs of living and lack of free student apartments have also made it necessary for many students to rent apartments outside the city center, making it more difficult for them to get to know their fellow students in classes. Finding the right people became even more complicated when the pandemic made it necessary to learn from home. While video recordings and online conference tools have enabled students to keep on learning, the members of team LETO have experienced first hand how much the interaction with other students has diminished within weeks. Whether it is homework groups that barely manage to reach their minimum size, a Zoom meeting full of people who have never heard of each other, or students feeling left behind in a lecture, students are not collaborating as much as is necessary for successful learning.

The general university setting and the pandemic restrictions together resulted in a severe lack of social and learning-related interaction among students. And this is where team LETO has come up with a solution that tackles exactly this issue, while keeping students' data privacy at its core.

The platform is an easy-to-use website, that matches students based on their personality traits and learning styles. To access matching based on these two categories, users answer a brief questionnaire during the sign-up process. The collected data is only used for the matching service and the scientific evaluation of the project but are not shared with any third parties.

Once the questionnaire is filled in, users can search for a study buddy or match while using a filter. At the moment, there are two major filter settings above all:

The most basic one matches two peers that are as similar in their personality traits and learning styles as possible but without any additional similarities. It can be accessed by clicking the "Match" button without any prior adjustments. The second major setting allows users to filter for courses within which they intend to find a study buddy. Peers are then matched by their personality traits and learning styles within a given study course. For this, the platform requires the user to set up a profile page that includes a list of courses a user participates in. LETO also recommends filling in the other fields on the profile page, like writing a short introduction for future matches. It is also noted that there are privacy settings for each field, so the user has full control over who can see what in their profile.

**LETO, as LEcture Time Over,** stands for the integration of the platform into day-to-day learning. Whether users only attend their lectures or use many learning organization tools, LETO is designed to easily fit into students' individual learning styles. It enhances the learning process in between established group chats, internet tutorials, sharing platforms, and cloud storage solutions. LETO focuses on providing a solid platform to find a learning partner which enables users to support each other mutually, provide peer-to-peer feedback, and motivate each other for learning goals.

LETO, as LEarn TOgether!, is the founders' appeal to all students which they base on two major arguments. The first argument is that learning together is more effective than learning alone. Studies have shown (cf. scientific report) that studying in collaboration is generally more effective than individual or even competitive studying, also when measured against outcomes for the individual. This applies to peer-to-peer learning and does not require, e.g., a mentor-mentee relationship. And even when two peers work through learning materials for the first time, they are likely to learn more effectively than both working by themselves. For the LETO platform, there might be the limitation that it cannot guarantee that two matched peers will automatically start learning together. This is why the team has planned to distribute motivational posts on social media and on the platform itself, to help lower the barriers to getting to know another person for the first time so that the two newly matched students can engage with one another more guickly. The second argument for the founders' appeal is that going through lecture materials together helps to prevent and overcome mental health issues. Many students experience high workloads from university while simultaneously working on the side which can impose a significant mental burden on them. Feeling left alone with this burden might cause more serious health issues but can be prevented or mitigated by talking with fellow students. The core goal of LETO is to enable students to learn more effectively and support each other.

**LETO, as LEverage TOgetherness,** stands for the future goals of Team LETO. Not only for LETO users, but also for the team behind LETO, matching is only the first step. The compatibility between two people is important. Making sure two students speak the same language (literally as well as figuratively) is a useful first step when

establishing a cooperative environment. This environment again needs to be fostered actively. To provide all the important tools for the users, LETO is intended to benefit from additional, digital features to simplify and encourage online and offline collaboration. The first step is all about enhancing the matching algorithm as the fundamental base of LETO. For this, the team looks forward to evaluating detailed feedback from students of various faculties and schools to tailor the algorithm to the requirements of all students. In parallel, the team plans to launch motivational reminders via the platform and social media. The second step focuses on improving the design of the platform to make it more aesthetically pleasing and to add further matching and connecting features. These can help users to specify more concretely what they are looking for in a study buddy and to enrich their communication with the peer. Furthermore, additional motivating features like progress bars or badges might be added depending on the feedback. And finally, the third step aims to spread LETO to more user groups instead of focusing only on TUM.

**LETO, as LEad TOmorrow,** is the goal the team imagines for LETO users. Of course, there are many factors to the trajectory of a human life and LETO does not aim to single-handedly change everything. Rather, its goal is to be a noticeable part in a larger effort to make higher education more social. Currently, there is a strong but maybe somewhat misguided culture of competitiveness in education, but also in many other aspects of everyday life. While healthy competition is not inherently bad, a lack of healthy cooperation is. This is the exact gap that LETO intends to fill. And maybe LETO can—one day—even support users after their studies, in a new chapter of **LETO, as Let's Earn TOgether**.

## LEarning TOgether – Counteracting deficits of online learning

#### Abstract

The COVID-19 pandemic has challenged established educational frameworks. Self-isolation made online learning ubiguitous and put its strengths and weaknesses into focus. Quick adaptations of existing lecture concepts for online learning environments increased the importance of individual and self-regulated learning. However, group work is a major success factor in learning and might be lacking due to the pandemic measures. It is unclear, though, which exact deficits university students experience during online learning and which potential solutions they propose. We conducted semi-structured interviews to discover patterns and deficits of online learning. We found that lack of group work and collaboration are one of the main deficits of online learning environments. Hence, we present the online matching platform LETO<sup>11</sup> ("LEarning TOgether"), which aims to increase collaborative learning among students by suggesting learning partners based on their character traits and learning styles. Further, LETO may be used to investigate and improve our matching approach by relating similarity scores to students' perceived quality of the enabled collaborative learning experience.

#### **1** Background

Due to the COVID-19 pandemic, established educational frameworks had to be changed to online formats. An essential issue in integrating an online learning environment within COVID-19 is addressed by Hodges et al. (2020). According to them, the key to an effective online learning environment from an educator's view is the long-term planning and re-adjustment of digital teaching. However, measures taken in the course of the pandemic are largely enforced by governmental decisions without the possibility to fundamentally rethink a lecture concept. Thus, the actual situation regarding online learning at universities is not well understood, as changes to employed teaching methods happen rapidly and dynamically. Also, there are no standardized approaches to the new teaching methods, making them dependent on the specific institution and even specific lectures. This challenge on the side of educators simultaneously creates additional requirements for students. As identified in a systematic review regarding self-regulated learning by Wong et al. (2019), students in online courses rely more on individual needs to maintain academic success. Therefore, the adjustability of online learning material according to individual needs is a major challenge for providers of educational content. Another challenge identified by Azevedo (2005) is the lack of a learning strategy for online learners. Without a self-regulated online learning strategy, many students struggle to maintain their academic success achieved in face-to-face classes.

Moreover, research regarding the effectiveness of group work shows that working in groups is more effective compared to entirely self-regulated learning environments (Gillies, 2016). The availability of group work in an online learning environment thus represents a possibility to overcome the challenges of self-regulated learning. This diversification of learning may play an important role in maintaining academic success despite an online learning environment.

Nevertheless, there is only little research about collaborative learning sessions in digital learning set-ups. Due to the COVID-19 pandemic, the idea of learning groups aroused greater attention among students and teachers at universities. One question is how to group students for effective learning.

As a first step to achieving deeper insights into this field, we investigated what deficits online learning at universities introduces and how those can be addressed.

#### **2 Goals and Methods**

Our goal is to investigate to what extent students demand changes in universities' online learning environments. More precisely, we aimed to answer the question *What are the main deficits of online learning at universities and how can they be addressed*?

Without strong theoretical foundations for digital collaborative learning to build on, we concluded that conducting semi-structured in-

1 LETO was developed in the context and with the support of the TUM: Junge Akademie (TUMJA)

terviews would be the best approach to discover patterns in the online learning situation at universities, including its deficits. The open-ended guiding questions of this format allowed us to gain deeper insights into students' perceptions of online learning and its experienced shortcomings.

During the interviews, we encouraged the interviewees to elaborate different points of view to get diversified status-quo descriptions of their online learning environment. To achieve that, we structured the interview to find out participants' different experiences with online learning at university around the main topics below:

- What does your learning process look like?
- What tools do you use?
- What does your typical learning day look like?
- What do you like about your approach and what works well?
- What frustrates you or does not work about your approach?
- What are some problems that arise during studying/watching/ lectures or revisiting notes?
- What would you like to happen that does not happen now?

We conducted nine interviews with students from different faculties at several universities. All answers were given with the background of recent switches to an online format of many universities in response to the first outbreak of COVID-19. Of those, seven were students at the Technical University of Munich (TUM); four were in their master's, and five in their bachelor's. The interviewees were distributed among six courses of study in six faculties and ranging between the 1<sup>st</sup> and 5<sup>th</sup> semester.

To analyze the interview answers, we ran a summarizing content analysis. First, we used a coding scheme to reduce statements that addressed the same or similar issues in the participants' answers. Hence, we iteratively aggregated key elements of the extensive interview protocols by condensing their contents from raw data themes to higher-order themes and eventually main categories. Additionally, we considered the origin of frequently mentioned statements to gain an in-depth understanding of the online learning situation and potential improvements.

#### **3 Results**

Results showed that the interviewees thought about several issues relating to online learning, which we split into three main categories: Firstly, poor instruction or organization, which was mentioned five times. Secondly, a lack of interaction, mentioned eight times. Thirdly, personal deficits, with eight occurrences as well. The following chapters will discuss the primary insights for each category.

#### 3.1 Poor instruction

Of the five points raised in this category, four were about organizers being inexperienced with the new formats of their lectures. For instance, interviewees noted that online classes often exceeded their allotted time or were held too quickly. One interviewee said that "[the instructors] give a lot of input very fast and they don't even realize it." Another criticism was the lack of the instructors' adaptability and their use of unsuitable formats for an online environment. The last comment in this category mentioned lecturers not understanding questions during online lectures or poorly answering them. This suggests that communication in in-person lectures is more effective.

#### 3.2 Lack of interaction

The second category could be split into two sub-categories: a lack of interaction between students and instructors (two mentions) and a lack of interaction among students (eight mentions). One interviewee expressed that when students do not know their instructors, they are often afraid to ask questions or voice criticism. As a result, they concluded, "bad practices or ways of instruction or behaviors are not pointed out and will continue to happen for the next cohorts." Regarding peer-to-peer interaction, answers describe missing social interactions, group work, discussions, and collaboration. The wish to have learning partners occurred three times (e.g. an interviewee said "[...] it is frustrating to not be able to call someone for help [...]"). One specifically described an outline for a system that would match students within the same lecture if they signed up for it to create an initial contact. They called it a "'I'd just like to not work alone, but don't know anyone'-bin." Another interviewee explained what such a matched partner would ideally look like to them as such: "Ideally [I would] have a study buddy that's a smarter clone of myself." Three mentions stated that a significant source of stress comes from students not seeing the struggles of their peers and thus feeling left behind. One interviewee explained in this regard that they "[...] don't know whether [their] efforts make sense or are effective."

#### 3.3 Personal deficits

For this last category, interviewees mostly explained their struggle with procrastination and developing good work habits when studying at home. One interviewee described their problem as "[...] if there is not a pressure or clear deadline given [...], my tendency goes towards procrastinating." Another point is technological difficulties, such as being forced into a more computer-based workflow. One interviewee said that "[...] in e-learning everything happens very fast [...], so being concentrated on the screen and at the same time taking notes is not easy." Other than the lack of time-management skills, interviewees described being subjected to a distracting and poorly structured environment at home, as well as having difficulties concentrating when only studying in front of their computers. One interviewee said that "despite using a separate device for work, being in [their] room still maintains a danger of being distracted." A similar problem was explained by another interviewee with the words "putting the smartphone away, I can resist temptation, but my apartment is too small for that to work perfectly."

#### **4 Discussion**

These results show that both instructors and learners were struggling with the new learning environment. This is in line with a recent publication by the TUM Senior Excellence Faculty describing the opportunities and challenges of Digital Teaching (Hutschenreiter et al., 2021). According to the authors of the article, it is a challenge for the future to make teaching at universities more enriching and give students the best possible preparation for their future as young researchers.

Of course, there is a need to involve several actors who deal with this challenge. It is uncertain which of the different approaches may succeed or not. In the current phase, it seems to be appropriate to try out several ideas and evaluate them scientifically. One such idea is the project LETO ("LEarning Together"), which we implemented with the support of TUMJA. The project focused on the lack of interaction reported by some of the interviewees. It will be further explained in the next section.

#### 5 A new approach: LETO

With LETO, we aimed to establish a platform to match students into effective learning tandems. To provide a solution for the issues mentioned in the category of missing social interaction, users can sign up and find other learners based on their active courses. Going beyond this goal, we attempted to optimize the resulting matches. To this end, we used a metric described in the following. However, it is unclear what an ideal learning partner would look like based on students' character traits and to what degree the availability of such a learning partner influences the success of collaborative learning efforts.

Existing literature examines the effects of character traits on job satisfaction (Therasa & Vijayabanu, 2014) and academic performance (Feyter, 2012). Komarraju et al. (2011) introduced learning styles as a variable to character models and Thanh et al. (2019) investigated character traits and learning styles in collaborative learning. The latter team identified 13 factors for participation in collaborative learning and used them in a recommender system. Yet, their matchings rely on what users are looking for in their peers. They did not further investigate what combinations of character traits and learning styles are favorable in learning partners. To address this gap in existing literature we aim to use LETO to investigate the effects of factors identified by Thanh et al. (2019) in the future.

LETO matches students based on personality, learning style, persistence, and time management. We use the Big-Five (Kessler, 2015) personality model and the Felder-Silverman model for learning styles (Felder & Spurlin, 2005). To establish a degree of trust in the matching, we intend to investigate the relationship of our matching inputs with users' perceived quality of the resulting collaborations. We will use a questionnaire developed and validated by Cohen & Manion (1990) to assess this perceived quality. Such an analysis could also be used to better understand how single factors used in a matching correlate to the perceived quality, rather than analyzing the matching procedure in its entirety. This information has an immediate practical use for improving the matching. Currently, LETO has attracted too few users to draw statistically sound conclusions from such an analysis. It will therefore be delayed until the platform has had time to establish itself.

In addition to selecting the factors for the matching and its validation, there also is a trade-off between the immediacy of the matching and its quality. By delaying the matching, a pool of interested students could be maintained and would guarantee an optimal matching within that pool. Optimal here means that the matching maximizes the average guality<sup>2</sup> across all matches. This approach is especially viable if the user base is sufficiently large and delay times can be kept relatively short while still guaranteeing large pools. However, we chose a different approach to start with to account for smaller user numbers. As users will expect a certain level of interactivity, we present matches as soon as possible. This means the matches are only optimal with respect to the single user issuing the match and only at the time of the matching. The approach may be changed as the size of the user-base increases. In this regard, a further research question could be posed regarding how a delay in the matching of a certain length affects the users' perceived quality of the match.

Similarly to the delay considerations, matching groups of people makes sense with many users. Therefore, we chose to only match pairs of two at the beginning. To address the wish by some interviewees to find peers within their course, we allow a user to only match themselves among the students who participate in some user-defined selection of courses.

We currently have little support for post-matching interaction between the students. We mainly allow them to establish a means of contact on our website. A major reason for this design decision was that there already exist established services students can use to maintain contact. Examples are instant-messaging services or collaborative productivity tools.

Our main goal while designing the platform was to help students to find learning partners in an easy and promising way. We realized, however, that only enabling collaborative learning (e.g. by establishing contact) will not automatically guarantee it (Kreijns et al., 2003). Even though collaboration is shown to be generally more effective for learning than isolated studying (Gillies, 2016), students may be reluctant to pursue a joint effort. Therefore, a future goal of the LETO project is to help learning tandems create a constructive and fruitful collaborative environment.

Project-wise, LETO has only just started and therefore will offer more potential for future studies. After the matching aspect, more social networking features are a promising direction (Dabbagh & Kitsantas, 2011). Currently, the participants are expected to regulate their learning independently. This is problematic, as not all students have a high degree of self-sufficiency and might be less likely to benefit from each other without some guidance. Therefore, a short help document and regular reminders may already be helpful. A more involved approach could offer interactions on the platform that guide users to a fruitful collaboration. A current idea is to offer regular challenges that act as reminders with an incentive. We also consider social media features like an update feed that keeps users aware of their peers' activities. This should encourage positive competition. However, more research is necessary to gauge whether this kind of competition is productive. More specifically it would be important to understand when a competitive aspect is beneficial for a collaborative setting and when it is a hindrance. Any competition should increase motivation, but it should not reward sabotage. Thus, it is important to find a balanced incentive that

<sup>2</sup> Quality is measured by a score assigned to a match. The score is based on the Euclidean distance of the characteristic vectors of both students. A characteristic vector is a vector in the Cartesian space where all dimensions (Big-Five (five dimensions), Learning Styles (four dimensions), time management (one dimension), and persistence (one dimension)) are measured as values between 0 and 1.

is desired by students without being actually significant enough to lead to anti-social behavior. A specific first research direction would be to determine whether such a balance can be struck. Another simple update that could increase collaboration between students is to allow study groups of more than two people. However, with larger groups, students also need better self-regulated learning abilities. The number of inter-personal relationships in a group grows exponentially with the size of the group, thus quickly leading to increased complexity. This complexity introduces new potential conflict areas that students need to navigate. Thus, a first research question in that direction would be optimal group sizes in an online collaborative learning environment. The results from this research should then be integrated into the platform as additional guidance.

#### 6 Summary

In our project, we performed a situation analysis based on semi-structured interviews to find common issues students have with online learning at universities. We determined three categories of issues that were commonly mentioned: poor instruction, lack of interaction, and personal deficits. We chose a project based on one of them. The issue we address is a lack of interaction among students. To address it, we created LETO, a web-based matching platform for students at TUM. Specifically, it addresses the common desire of students to easily find peers in their courses who are looking for a learning partner. Furthermore, we used personal characteristics to improve the matching beyond a random matching procedure. In the future, LETO could be used to measure the effectiveness of specific matching procedures.

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## Self-reflection

"Learning Together" has been a theme throughout our past months in the scholarship and has ultimately manifested itself in the form of our matching platform LETO – Learning Together. In November 2020 and after some initial changes in the team, we started out as Team Education, a team consisting of eight students from diverse study backgrounds: Education, Health Science, Informatics, Medicine & Bioinformatics, and TUM-BWL. As it turned out later, this specific mix of backgrounds was ideal for our project.

From day one, we had a relatively clear idea of what we wanted to do: match students into learning tandems. We all longed for more social interactions in our learning process after months of online learning and wanted to change something about this! Our clear goal allowed us to move forward with our project and saved us valuable time in the beginning. Assigning roles from the very start also proved helpful to bring structure into the team and made our efforts more efficient.

We decided on Notion as our main platform for storing notes and documents and, in a first step, split our team into three sub-teams that conducted research on the theoretical background of learning, and on solutions already provided to tackle collaborative learning at universities/MOOCs (massive open online courses) and companies, respectively. Looking back, Notion significantly helped us with structuring the information we collected over time and the outputs we produced, but in our opinion, it is far from perfect. Reflecting on our initial progress, we are glad that we were lucky to agree on the same platform and final goal and that the three sub-teams turned out to be such a good solution to researching wider information while also continuing to work together and stay time-efficient.

As our second step, we planned and conducted interviews with fellow students. We wanted to check how our fellow students learned and prepared for exams and what they were missing in their learning process. After we had prepared the interviews, we faced the first hurdle: distributing our sign-up link and motivating students to participate. Back in December/January we mainly based our marketing on student group chats, RocketChat, and mouth-to-mouth propaganda, which did not return many students as a result. We learned from this, and stepped up our game in spring 2022, when we marketed our final platform, LETO. For starters, we created yellow posters and sent them to all TUM chairs and professorships and also hung them up ourselves on the TUM campus. We also visited lectures, which turned out to be probably the most effective marketing method for us, as we saw our numbers of participants almost doubling after the first two weeks.

After we had finished the interviews and confirmed that our idea could be popular among TUM students, we started working on the platform itself. Summer 2021 was spent mainly deciding on the features that we wanted to include in the website and programming it. Until then, the workload had been shifted more towards general research and the interviews, and now it changed more towards the informatics part of the project. We have been meeting weekly, almost throughout the entire period of the scholarship, and all decisions have always been taken democratically. Whether weekly meetings were always necessary can be questioned, but it might also be said to have helped with maintaining motivation and continuity on the project.

And yet, by fall 2021, we had to face a major hurdle. We had hoped to finish a first version of our platform by the start of the winter semester but were confronted with difficulties in setting up a server and finalizing the programming. By the time we were ready to launch the platform it was February already, and most students were already through with their exams or right in the middle of them.

This issue was exacerbated by the fact that we had not finished all marketing materials and social media posts in time for the semester start. If we could go back in time and motivate ourselves to work harder in summer and fall 2021, we might have been able to successfully launch the platform earlier. Of course, it would have also meant a higher workload for everybody involved, not to mention everybody's commitment to university, work, and other TUM-JA projects.

While we have been working on LETO for the past months, we could always count on strong support from our tutors, Elena Tangocci and Dr. Matthias Lehner, as well as from our supervisors, Prof. Holger Magel and Prof. Jürgen Pfeffer. Both our tutors joined us for almost every single meeting, provided us with helpful feed-



back whenever we needed it, and brought us back to focus whenever we got lost in details or other possible pathways we imagined for LETO. Our supervisors helped us tremendously whenever we sought their support and opinions on our next steps and where to go with our website. A huge "thank you" to you for the continuous support and the time that you dedicated to us and LETO!

## LETO - Learning Together

#### Mission

MEMBERS

SUPERVISORS

TUTORS

We aim at encouraging self-regulated learning, plus social interaction and peer-to-peer support in a learning environment. With our platform we connect students based on their courses, learning styles, and personality.

#### Intermediate Goal

By September 2021, we will have validated our questionnaire and set up a prototype to collect initial feedback from 10 pairs of platform test users.

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#### POSTER 1:

Right from the beginning, we wanted to work on a project about online collaborative learning. To find out which struggles students face during online university, we interviewed nine students in the scope of a survey in December 2020. Furthermore, we conducted an extensive literature research about online learn-ing, collaborative learning, self-regulated learning and learning platforms. Both the interviews and the literature research pointed out the importance of collaborative learning. However, it was not clear how to determine a suitable learning partner. As a tool for our research, we decided to create a platform, which connects students based on their courses, learning styles and personalities. Thereby, we aimed at encour-aging self-regulated learning, plus social interaction and peer-to-peer support in a learning environment.

From December 2020 till March 2021, we split the team in three subgroups: research, platform design and implementation.

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POSTER 2:

Our research team tried to find scientific approaches to selecting effective learning tandems. Afterwards, for each suggested criterion, we selected the appropriate measuring instrument. Finally, we derived a questionnaire for matching learning tandems.

Meanwhile, the platform design group reflected on a suitable name, logo, color palette, and font for our platform. In the end, the team decided on the name LETO, which stands for LEarning TOgether, but also occurs in Greek mythology, as Leto was the mother of Apollo and Artemis. Furthermore, the platform design group devised the frontend (user interface of the platform) and relayed their ideas to the implemen-tation group.



#### POSTER 3:

We employed the React-framework for our frontend. To program the corresponding backend (server) we chose Django, a Python-based web framework. We used an agile approach to coordinate additional fea-tures and priorities. During the development process, the platform design team evolved into our marketing team. They prepared the steps necessary to address a large user base with our platform. To realize this goal, they designed flyers and posters that could potentially be distributed physically or via online plat-forms. We ended up having a first prototype for our platform, which we used to test the features with a small number of user accounts.



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In the final stage of the project, we continued improving the online platform and launched it to a web-server with the domain https://leto.ja.tum. de. Having launched the platform, we started visiting lectures, distributing posters and flyers, and talking to other students to make people aware of LETO. This way, we were able to attract 150+ users to join our platform to find their learning partners. Between those us-ers, over 230 registered matches occurred on our platform. Our background knowledge from the initial research together with insights from the interviews and the attention that our platform gained, we can draw the conclusion that LETO indeed addresses a market gap that was previously unfulfilled. The high interest that LETO garnered from students at TUM poses the question of whether the high demand is transferable to other universities and research institutions to foster collaborative learning. Therefore, LE-TO's stakeholders include language centers, student associations, faculties, universities, and possibly even schools.

LE TO learning together

#### SUMMARY

In our project, we developed the learning platform LETO which connects students based on their course, learning styles, and personality traits.

The platform is based on a situation analysis for which we interviewed TUM students on their learning procedure. Thereby, we determined that the lack of learning-related interaction among students may impede efficient learning. To encourage collaborative learning we created LETO.

By May 2022, we had matched more than 100 TUM students.



#### **RESULTS** - MAIN DEFICITS OF ONLINE LEARNING

- 1 Poor instruction
- 2 Lack of interaction
- 3 Personal deficits

#### **IMPACT & SUSTAINABILITY**

- 1 LETO addresses a hitherto underserved market gap by connecting peers into learning tandems
- 2 LETO raises high interest from the student body at TUM
- Also at other universities, there might be high demand for a platform to connect students randomly, within lectures, seminars, and in language courses
- 4 Future stakeholders might include language centers, student associations, faculties, and universities

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LETO

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