

Teaching Students to Learn

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Abstract: The classical model of higher education studies is the sink-or-swim model, where some students are born with certain skills or inherit them and become swimmers, whereas students without good study strategies will not be able to keep up with the teaching in higher education and ultimately fail (they sink). This is no longer a valid model, as it cannot handle the large amount of students enrolling despite poor study strategies. The paper discusses how students can become swimmers in the context of higher education through teaching them study strategy, thus enabling them to take more responsibility for their own progress. In addition to explaining and showing examples of good study strategies, the focus is on the teaching of good study habits and the ICT tools required for achieving good results in doing so.

1 INTRODUCTION

“We have a problem.” In an article published in August 2013, the head of the PISA program, Andreas Schleicher, elaborates on problems in the Norwegian school system. For too long the focus has been on lowering the number of students in classes instead of focusing on good teachers and the teaching of basic skills and good study habits (NRK, 2013). Traditionally, students that choose higher education were the best students; they already had an understanding of which skills were necessary in order to achieve their goals. They were the swimmers. Not only did they have an interest for higher education, most of them also came from families with academic backgrounds, which in turn, equipped them with good study skills or even an overall study strategy from an early age. After major changes in the education system in Norway in 1997, a new curriculum for primary and lower secondary education was introduced (Veiteberg, 1996). Now everybody should take higher education, which resulted in a high number of unqualified students with no basic study strategy whatsoever. These students relied on the teachers for their accomplishments instead of taking responsibility themselves. They were the sinkers. The result was a changed learning environment. With a sufficient number of motivated and autonomous students, the few inexperienced students would be pulled up by the other students. Currently, the situation is

reversed. This became even more apparent with the introduction of ICT. We, as educators, are lifesavers in this context, using most of our energy trying to save the ones that used to sink and hope that the swimmers will manage on their own. This image has been looked at through surveys made by Per Einar Garmannslund in Norwegian senior high schools where the results shows that the level of procrastination increases each year as well as we see a drop of motivation (Garmannslund, 2012). There is reason to believe that this trend manifests itself even more as one moves up in the educational system.

The issue we address is not about saving the ones who cannot swim and protecting the swimmers. The issue is to look into how we can teach everyone to swim and how to further enhance their swimming skills as they continue the race towards their final goal. Transferred into an educational setting that means to teach good study habits, thus enabling students to understand what they are doing and continuously try to improve. It prepares students for lifelong learning. If all students possess these skills, studying would become easier. In order to make this happen, we need to identify and teach study habits. The basis for teaching study habits is of course teaching study skills, because habits are repeated skills. In our context, the skills are often trivial, so we focus on how to turn skills into habits. In terms of the brain, the main way to learn habits is through repetition. Actions and thoughts that are repeated will turn into habits after some time (Lally et al.,

2010). The important thing to have in mind is that we need to make sure the habits we teach are the correct ones, because once they are internalized, they will stick (Petri and Mishkin, 1994).

This paper addresses the need for a good study strategy in general and gives suggestions on how to teach the skills needed to acquire such a strategy, as well as a few tools available to do so. We also take a peak into the future and possible technical improvements for achieving our goals.

The paper consists of six sections, where the first is an introduction to the topic. The second section explains why the teaching of study strategy is crucial. In section 3, we will look deeper into study strategies, while section 4 discusses how to teach habits. Section 5 focuses on implementation: which study habits to teach, how to do it, and how to support it with ICT. Section 6 provides a summary and our conclusions.

2 WHY DO WE WANT TO TEACH STUDY STRATEGY?

We base our work on the idea that there are two distinct areas of teaching and learning involved. The first area is the classical area of content, defining the knowledge and skills the students should acquire. The second area is the area of method, defining strategy and approaches to study. This meta-area can be combined with the teaching of content, since content has to be acquired using a method and a method needs to be explained using a sample content. This way, we envision a two-folded path for the students consisting of content and method taught in parallel and dependent on each other. As content cannot be detached from the method, an average progression of method is built-in to the content. Students that have not yet acquired sufficient results in their methods will get extra support to learn the missing parts. This way, methods are taught with a mastery learning approach, where students move to the next level once they have mastered the previous one.

2.1 Responsibility for Learning

Teaching in higher education has come a long way. First, the challenge was to transfer knowledge from experts to students, which meant to go to the best experts and to learn from them. The main entity to be handled was knowledge (content). In this *teacher-centered content-focused* situation, the

teacher defines the content and the teaching method. The teacher does not take into consideration whether the students are actually able to learn the content. The student is responsible for the learning. This model is still used by many high-ranking professors and universities (Parsons, 2015).

Based on students without sufficient study skills, a stronger focus on teaching methods evolved together with standardization of curriculum. The important person in this *teacher-centered student-focused* scenario is still the teacher. The teacher will define the content, and the teaching method will be adapted according to the students. This way, the teacher is responsible for the learning. Currently, many higher education institutions are based on this understanding, in particular university colleges. The main problem with this approach is that students are different, while the methods remain the same. Moreover, it is a problem that the teacher is responsible for the learning and not the student.

In order to take care of that, it is possible to go one step further and place the responsibility for studies on the student. This results in a *student-centered* approach where the student takes responsibility for the learning content and the teacher facilitates the learning through learning activities. This approach has the same problem as the first, which is that students are not prepared for that approach to learning. The question is what skills and methods the students need to be prepared for a student-centered learning based on learning activities. These skills must be taught before the student can utilize them.

2.2 Individual Learners

In order to take responsibility in a student-centered approach, students need to have a choice when it comes to both content and method. This means that the teaching has to be personalized. The introduction of the computer and other digitized tools came to the rescue, enabling students to learn in a way more suited to the individual's learning style. This is also emphasized in the "Roadmap for Educational Technology" published in 2010 (Woolf, 2010).

The use of computers can also facilitate the learning of habits that benefit the learning process. In an article in the Bangor Daily News in 2002, Seymour Papert (2002) states: "*My whole career in education has been devoted to finding kinds of work that will harness the passion of the learner to the hard work needed to master difficult material and acquire habits of self-discipline.*" With a more student-centered approach, focus turns to multiple

intelligences and different learning styles. Acknowledging that students are different made us understand, that in order to achieve better results, students needed to be able to learn in ways better suited for them.

The term *multiple intelligences* as introduced by Howard Gardner in 1983, looks at differences in cognitive abilities which in turn make us learn in different ways (Howard, 1983). The term *learning styles*, however, refers to individual differences in the habits, preferences, or orientation towards learning and studying (Grabner, 2012). Felder and Silverman elaborate on how students learn in different ways using different styles in an article published in 1988. Their article compares students on a number of scales pertaining to the ways they receive and process information (Felder and Silverman, 1988). The best approach for an educator is to address a variety of learning styles with their teaching plan in order to reach the largest amount of students. In the book “Disrupting Class” it is pointed out that students who succeed in schools today do so not because of great teaching, but largely because their intelligence happens to match the dominant paradigm in use in a particular classroom (Christensen et al., 2008). The author goes on saying: *“The need of the hour is a more student centric model. Computer based learning holds great promise in this context. Computer software can enable students to learn in ways that take into account their intelligence types and speed of learning. Software can combine content in customized sequences and in the process also help teachers move towards more value adding roles.”*

2.3 Teaching Study Strategy

We know we need to address each student differently. This can be done through explicitly teaching study strategies, enabling students to learn in their own pace, based on their own learning style.

Education in Information and Communication Technology (ICT) is changing rapidly, and it is essential to be able to follow new developments at all times. This means that the ability to learn is an implicit learning outcome of all ICT study programs. However, this is unaccounted for in the description of the study, nor taken seriously in the forming of the study. In the descriptions of IT related studies in Norway, very few mention study skills explicitly as learning outcomes.

It is assumed that students will learn these learning skills along the way. Experience shows us that this is not the case, and an explicit focus on study strategies is needed. Experiments referred to in the article “Motivation and Study Habits” experiments show that students will adopt systematic study methods when taught about them, even if the systems are not particularly efficient (Entwistle et al., 1974).

Generally, all these skills enable students to take responsibility for their own learning. Many of them will also enable people to work effectively in teams as well as managing projects. As it turns out, the explicit focus on study skills will not only improve learning, but also provide the skills needed in a changing work reality, as also acknowledged by (Davies et al., 2011). We are moving from a fact based hard skill system into a system where soft skills such as teamwork, project-based work, communication, making presentations, collaboration and learning to learn are important factors as well. We often refer to many of these skills as 21st century skills (Rotherham and Willingham, 2010).

3 WHAT IS A STUDY STRATEGY?

There are many study skills and techniques that are essential to a student’s learning process. An overall strategy combines these skills and techniques. In this

Table 1: Overall Study Strategy, based on article by Per Einar Garmannslund (Garmannslund, 2012).

The Main Phases in a Learning Process (with key process and selected skills)		
Plan	Execute	Reflect
Task analysis Make goals Plan Motivation Expectations Goal-oriented Attribution	Use of strategy Self-discipline Task oriented focus	Evaluation Reflection Attribution Success Strategy assessment

section we take a look at the common study skills and how we can combine these to form an overall strategy that can be used throughout the learning process.

Based on Self-Regulated Learning (Zimmerman, 1990) and the online study technique course (Bjørke and Øysæd, 2011), the following skills and techniques are essential: setting goals, making plans, following plans, managing time, working in groups, reflection (meta-cognition), reading techniques, self-discipline, memory techniques, and self-evaluation. These skills match the ones in (Landsberger, 1996), (Burns and Sinfield, 2012) and (Rose and Nicholl, 1998).

3.1 An Overall Study Strategy (PER)

Students often use study skills in an ad-hoc way to improve their memory, reading, time management or goal setting. Unconsciously, every student uses a learning strategy (Garmannslund, 2012), but a good strategy will be conscious. The combination of the study skills and the learning process will lead to an overall study strategy. The key element for every student is to find the skills that are right for them, use them and incorporate them in an overall strategy based on the following three phases: Plan, Execute and Reflect as shown in table 1. We later in this paper refer to this study strategy as PER, an acronym derived from the different phases. Such a strategy makes sure that assignments are approached in the best way possible and that the chances for failure are minimal.

By developing their ability to plan, execute and reflect, students will learn how to learn. Each of the three main phases has essential processes that can be achieved using a variety of supportive skills and techniques. The students select the skills and techniques for each process matching their individual learning style. The different phases do not necessarily occur in a strict order, but to teach the different phases it is needed to emphasize how planning, executing and reflection work together and that phases can have sub-phases containing more planning, executing and reflection on a different scale or for a more specific subject, as illustrated in Figure 1. Once the students developed their adapted strategy, the process starts again on the next assignment.

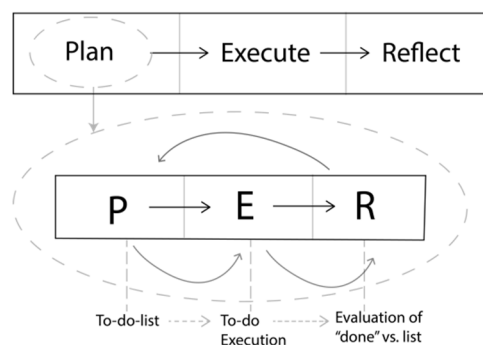


Figure 1: Main Steps of Study Strategy with an example.

Students choose the skills and techniques matching their learning style and the learning activity at hand, based on the toolbox of their own study skills and techniques.

However, a study strategy is more than just a toolbox. It is a habit. To establish such a habit in all students means to create habits for the study strategy as a whole, and for the phases as well as for some of the main skills and techniques (tools). The students should establish a habit of selecting the best tools from their toolbox based on their own way of learning, which leads to a less difficult learning process and ensures focus on learning. Whenever an assignment is given, the student will know how to attack the issue and use the required skills and techniques from the overall strategy. John H. Yeager (2007), Director of the Center for Character excellence at The Culver Academies, explains the importance of habit formation. *“Habit formation allows the student to venture beyond the world of skills to the world of meaning and purpose.”* In other words, what you do makes sense, and you do not have to think in order to do the right thing. It just happens.

Of course, this ideal situation is difficult to achieve, and has to be approached in steps. We want to select a basic set of skills and processes that can function as a basic toolbox that invites for adaptation and extension. By teaching these skills and making them habits for all students at the beginning of their higher education, there is a better chance that they will understand and use the overall study strategy thus enabling them to study in a more efficient and better way.

4 HOW TO TEACH HABITS?

Independent of study strategies, the teaching of habits is an important issue in education, as detailed

in (Andersen et al., 2015). Let us assume that good study skills can, and should, be taught. A first step would be to establish habits as learning outcomes. In the Norwegian education system, learning outcomes are described using the national qualification framework (Kunnskapsdepartementet, 2011), which again is based on Bloom's taxonomy. This taxonomy identifies three domains of educational activities: the cognitive, the affective and the psychomotor domain. For this article, the cognitive domain is most relevant, because it relates to categories of knowledge including *Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation*. When it comes to the teaching of habits, the cognitive domain seems to have little place for mental habits. However, we have found that mental habits should work similar to physical habits, which are included in Bloom's taxonomy in the psychomotor domain as *Mechanism* (a skill that has become habitual). A similar category would also be needed in the cognitive domain in order to capture mental habits, e.g. related to study strategy, see also (Andersen et al., 2015).

4.1 Learning Habits

Basically, there are two ways of learning habits, either through *repetition*, or through *transfer*.

4.1.1 Learning Habits using Repetition

Actions and thoughts that are repeated will eventually turn into habits (Lally et al., 2010). Teaching habits via repetition is discussed at length in (Fogg, 2009). Fogg identifies three elements of making habits work, *motivation, ability* and *triggers*. Motivation is the element that describes the drive behind the work to establish a habit, the power that establishes the habit. Ability relates to the possibilities to bring the habit to life, and is generally more related to the underlying skills for the habits. Ability is also the element most described in Bloom's taxonomy. Finally, Fogg claims that there needs to be trigger to create a habit, such that the starting of the skill is connected to something that will enable it in reality. The trigger is the element that starts the repetition, like a certain time (every evening) or a certain event (at the start of every lecture).

In terms of study strategy, the *ability* is often the easiest element, as the skills needed are very basic: reading, explaining, asking questions, finding questions, etc. Still, some of the more intricate study skills might need some exercise before all students

are familiar with them, for example summarizing a lecture. Learned study skills will provide positive reinforcement for the use of the acquired skills in order to develop a good study strategy. In this paper, we swiftly move over the skills since their teaching follows the usual teaching patterns.

Motivation can be extrinsic or intrinsic. In the extrinsic case, both negative and positive reinforcement can be used, suggesting a behaviouristic approach. Intrinsic motivation, where the learning itself is the reward, is often preferable, but as long as habits are established, the end result is the same: The habit is established and is done so without conscious thinking (Stone et al., 2009), (Pink, 2011). In the behaviouristic approach, the idea is to use (external) stimulus in order to make students do the repetitions. Negative reinforcement is easier to apply, but has limited success. Still, the pressure may lead to the desired result (the habit). On the other hand, positive reinforcement, by using positive group pressure towards the habit as well as teacher feedback and peer review is recommended. Lately, gamification (Deterding, 2012) has been pushed as a good framework to provide reinforcement and thus enable repetition.

Finally, the *trigger* can be provided by the teacher in the teaching process, or it could be provided by a supporting system notifying the student that the next repetition is due. This is also related to the gamification approach discussed in the last paragraph.

Using repetition and practice to teach habits has a long tradition with learning by doing, as indicated in (Andersen et al., 2015). Learning by doing as presented in (Dewey, 1904) and (Alevan and Koedinger, 2002) focuses on establishing patterns of action that come about by repeated exercise in a life-like environment. This transfers skills into habits. Robert Schank presents an approach using GBS (Goal-Based Scenarios) in (Schank et al., 1999). We suggest a similar approach in section 5 when we look into the teaching of specific skills we want to turn into habits.

4.1.2 Learning Habits through Transfer

It is possible to avoid the tedious process of repetition, if a similar habit is already in place. Then the new habit is learned through transfer. Transfer of learning is defined as something that occurs when learning in one context enhances (positive transfer) or undermines (negative transfer) a related performance in another context (Perkins and Salomon, 1992). However, the authors emphasize,

transfer only becomes interesting as a psychological and educational phenomenon in situations where the transfer would not be thought of as ordinary learning. They also show that the chance of transfer occurring is most likely when the learning situation is as contextualized as possible, meaning as similar to previous practice as possible. This indicates that students having used project management strategy or other strategies in other contexts have a higher chance of learning good study habits through transfer. Transfer of learning is often connected to intrinsic motivation and an understanding of the relevance of the habit.

5 IMPLEMENTATION

When working on the implementation of PER, we looked at essential skills for the students to look at and acquire. After selecting skills that fit their own learning styles, we introduced a concrete way to utilize these skills.

5.1 Selection of Skills for PER

As the main focus is on establishing the aforementioned three phases and their underlying processes, we need to select at least one skill for each process. The skills are chosen as independently as possible based on a particular learning style and therefore beneficial for later usage in different classes as well.

- Planning phase
 - Task Analysis: We have chosen the two skills *goal setting* and planning using a *TODO list* with action points for task analysis. The students should set a goal according to the SMART criteria. For the *TODO list*, the students chose which study skills they want to use on the learning activity, a timeframe and dividing larger tasks into smaller ones.
 - Motivation: The majority of students will be motivated in the beginning of the semester because they want to attend the program. We do not select skills for this process, but it is partly supported by goal setting.
- Execution Phase
 - Use of Strategy: Until the students have mastered several skills it is hard to use strategy, which is why the use of strategy is not selected for the basic skills. The task analysis and evaluation processes will help

getting focus on the chosen skill and how to improve its use.

- Self-discipline: We select an important skill for self-discipline: *time logging*. Time logging is a learning activity that helps students to stay focused on the task and that supports self-discipline.
- Time logging also supports focus on tasks. The same skill is used for both processes.
- Reflection Phase
 - Evaluation: The students use *reflection* by comparing their result with their goal and their chosen skill. Based on the outcome of the comparison, the study strategy can be adapted and documented using an action plan.

Focusing and improving on the following four skills: goal setting, *TODO list*, time logging and reflection, will make the students better suited to swim in a learning society. Repeating the use of these skills in several learning activities will turn those skills into habits.

For each of these skills we introduce optional ICT tools for the students, which they can use. For goal setting we offer the goal tracking system 42goals.com, for the making a *TODO list* we propose notepad as a simple tool or the more specialized tool trello.com. For time logging we recommend the project management system Jira.com or Microsoft Excel spreadsheets. Students may use other ICT tools in addition or in exchange to the tools we suggest.

5.2 Introducing PER for the Students

To teach the essential processes we need to create learning activities that correspond to the skills the students require in order to learn PER. We also have to make the learning activities available for many students. This indicates the need for a learning platform.

In order to achieve our goal for teaching PER, we have developed a simple pilot system named Student 2.0. In this system, we have focused on the learning activities for PER. In combination with the Student 2.0 system, we also used regular lectures to explain the theory of study strategies and techniques in a blended learning environment. We are currently implementing these methods for the students.

The students are confronted with the selected skills in the first week of the study and later on through the basic engineering course (TFL115). In the first study week, the importance of study strategy

was explained together with the general PER model as presented in section 3. In the TFL115 course, an incremental teaching strategy was used. The students got an explanation of the skills, and they were given the task to choose a traditional learning activity (lecture, exercise, homework) in the first week to train the study strategy approach as follows.

P (Planning Phase): The students would pick their favourite activity, and set a goal and make a plan for this learning activity.

E (Execution Phase): During the week, the students would use time sheets for registering hours with their selected tool.

R (Reflection Phase): Finally, students were encouraged to reflect on their plan, goal and how their execution of the plan had worked. They used their time sheets to describe their results in the learning activity and suggested improvements.

Both the planning and the reflection phase were peer-reviewed by the other students using the platform NovoEd.com.

These PER learning activities will be the same for the students each week for one semester. By doing this for 10 or more weeks we hope that the students will create habits for the essential processes in the PER strategy.

So far, more than 100 students have handed in their plan and reflection each week for 7 weeks and more than 80 of the students have peer assessed more than 5 of their peer's plans and reflections. The exercises have been mandatory for the students.

We ran a survey similar to the one by Garmannslund after the first week. The 167 responses show that the students lack execution skills that are necessary for them to be able to work on their studies efficiently. This corresponds with the findings Garmannslund have had for kids in senior high school mentioned in the introduction. We are going to perform another survey at the end of the semester to establish that our PER approach had an impact on the student's execution skills and study strategies.

5.3 Future ICT Support for PER

In the pilot implementation of Student 2.0 we have only implemented the basic learning activities for PER. In the future, we would like to extend the Student 2.0 project and develop a platform with more functionality to better support both students and teachers. Additionally, we would like to include gamification elements in order to make it even more

motivating for the students to get started and continue to use PER.

Apart from supporting learning activities in the scope of PER, a future Student 2.0 system should also contain learning objects related to PER, making it self-contained. This also makes it natural to further develop Student 2.0 to include videos and documents explaining the PER phases and processes.

It is important that we devise an ICT framework, which can help support the teaching of a study strategy. The main contributors should be the students since they should be responsible for their own progression. Therefore, the students are the main users with the teachers being observers with the opportunity to supervise and to contribute in terms of goal and task setting.

After creating a new project (which can be a course as well as a project within a course, or a task) students go through the three different strategy phases. First they do the planning. In the planning phase students define their goal and create a TODO list. These steps are system-defined tasks that are handled like any other task. Being active in the system creates a log entry for the day. The students can see when they did which activities in which project and if they do well according to their plan.

The system will give feedback on the different work phases the students complete, regardless if it is a course, project or a single task. Frequent feedback and redoing of the PER phases will provide the needed repetition that is needed in order to create habits. For feedback, the systems should also provide the possibility to use peer evaluation on goals and reflection.

Means of gamification (the use of game elements in non-game context (Deterding et al., 2011)) will then be used to motivate the students to use the system more frequently. This can include gamified feedback layers, game based structure, interaction concepts as well as story design and flow. Hidden achievements and encouragements can support the effect of building skills and habits through positive reinforcement.

6 SUMMARY AND CONCLUSION

The ability to master a study strategy based on skills suited for the individual student is important. In order to achieve this ability we need to look into how students learn and which skills might be the right ones for each student. This enables them to internalize the study strategy pattern identified

through its three phases: planning, executing and reflection (PER). In this paper we have looked at the importance of a good overall study strategy. We have identified basic skills, which make it possible for a student to create an individual study strategy. We have suggested how to teach these skills and ways to work with them to the point where they go from being basic skills to becoming habits. A good study strategy will make studying easier as well as include more students in the process.

The important part will be to focus on training students how to swim from the first moment we meet them and make sure they are able to manage on their own from the start. Then the future work for educators will be to perfect the swimming techniques. When the study strategy becomes habitual, we have finally contributed to the learning goal we all have: teaching the students how to learn.

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