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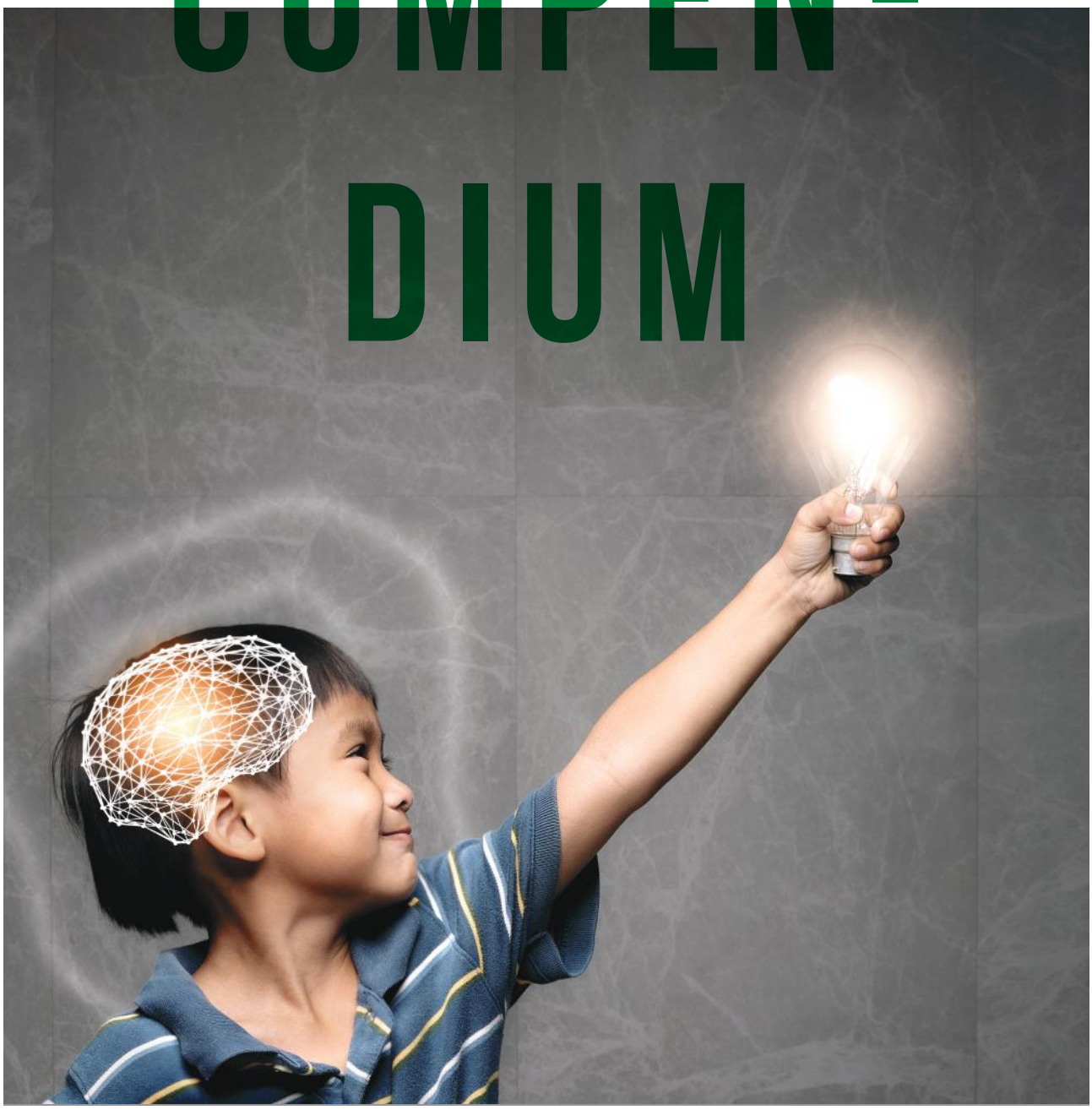
ERASMUS+

GROWTHMIND

An intellectual output of the
ERASMUS+ project GrowthMinds

COMPEN-DIUM



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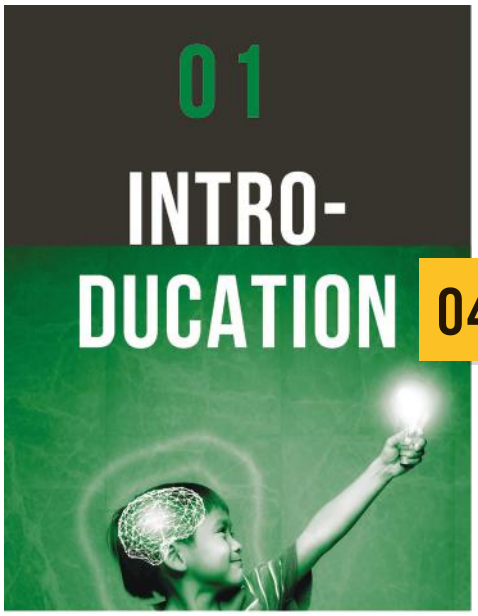


TO

01

INTRODUCTION

With this compendium, we summarize one part of the intellectual output of an ERASMUS+ project called GROWTHMINDS. In this project, which lasted from 2020 to 2022, five institutions are involved: The University of Medicine, Pharmacy, Science, and Technology of Târgu Mureş (Romania), the University of Primorska (Slovenia), the STEP Institute (Slovenia), the Balıkesir University (Turkey), and the University of Klagenfurt (Austria). The purpose of this project is to develop and disseminate an understanding of the many advantages of a growth mindset. It aims at the development of a growth mindset by the teaching staff in universities and consequently by their students. A growth mindset is an evidence-based teaching method that improves the quality of teaching regardless of the level of education. According to psychologist Carol Dweck, there are two basic mindsets: fixed and growth. In a growth mindset, individuals understand that their talents and abilities can be developed through effort, good teaching, good strategies, and persistence. They don't necessarily think anyone can be Einstein, but they believe everyone can improve their abilities if they put enough effort into it. In contrast, individuals with a fixed mindset believe their basic abilities, intelligence, their talents, are just fixed traits or innate gifts carved in stone. They possess a certain amount and that's that, and then their goal becomes to look smart all the time and never look dumb. Dweck summarizes: "My research has shown that the *view you adopt for yourself* profoundly affects the way you lead your life. It can determine whether you become the person you want to be and whether you accomplish the things you value." (from her book *Mindset: The New Psychology of Success* (2006)). The good news is: mindsets are changeable, meaning that everybody can adopt a growth mindset. Especially teaching can play a pivotal role in forming and changing mindsets.

What is growth mindset-oriented teaching?
A growth mindset can be fostered in many differ ent ways, e.g., by giving students extensive feedback to help them understand and learn from their mistakes, or setting up smaller goals throughout a course to encourage students' consistent, incremental progress, or implementing meaningful cooperative activities, rather than competitive or individualistic work.

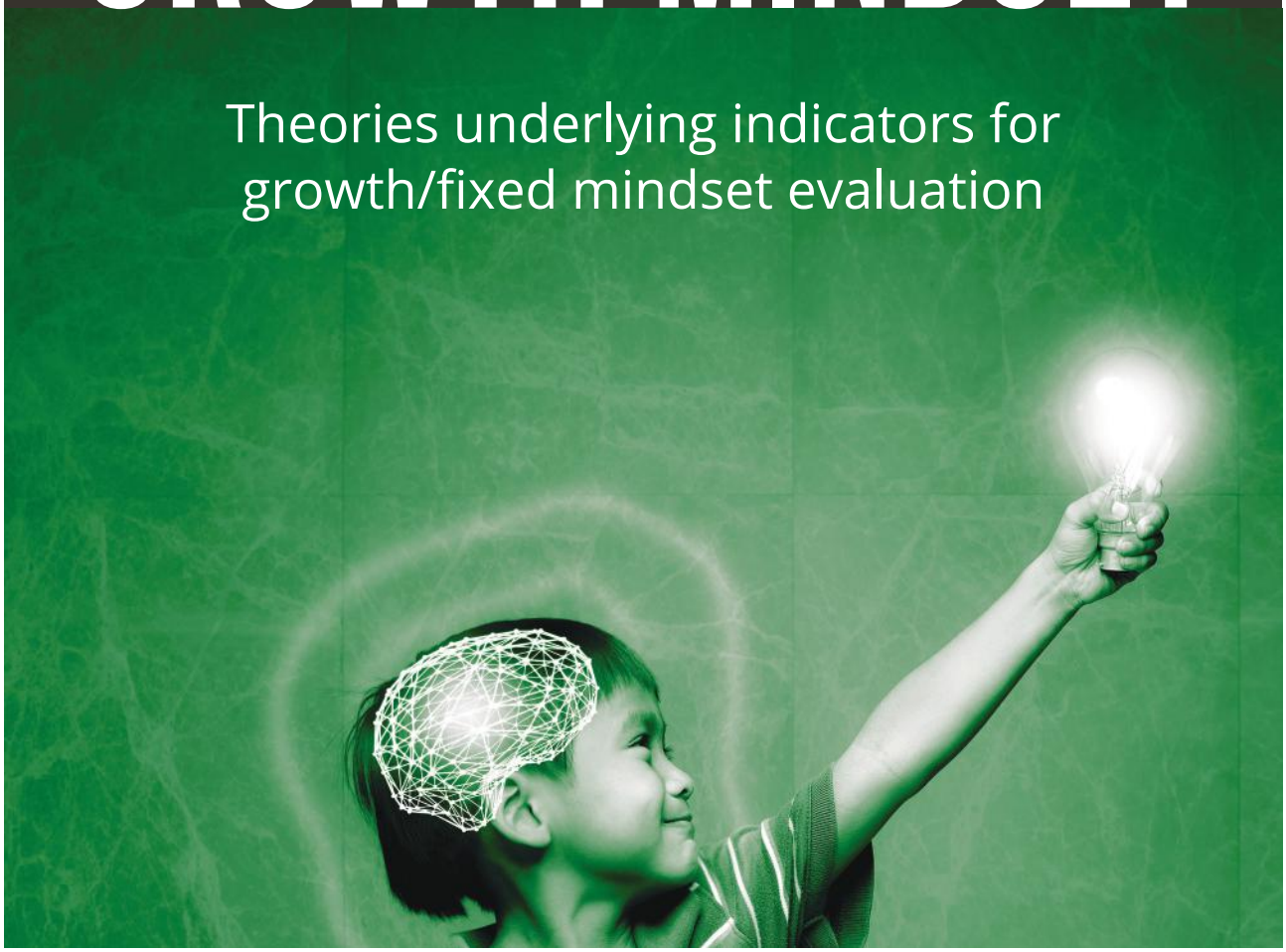
This compendium is intended to provide interested teachers with a guide for implementing growth-oriented teaching. It consists of four parts. In the first part, we present psychological theories that form the basis for a growth-oriented mindset. From these theories, we deduced indicators that make it easier to orient ourselves on those theories. In the second part, we provide a collection of best practice examples. These examples were submitted by our team and further colleagues, some of whom have had experience teaching growth mindset for several years. They provide insight into what concrete growth-oriented classroom practice might look like and are made available to try out in your own classroom. We collected examples from several disciplines: Mathematics, computer science, business, education sciences/ pedagogy, psychology, and English. The third part consists of several information sheets on the subject of a growth mindset. They summarize different aspects of growth mindset-oriented teaching with connections to empirical evidence, reflections on our own teaching practices, and tips on how to implement growth mindset-oriented teaching in our own classroom, for example, the impact of the use of a growth mindset-oriented language, or how to deal with failure. The fourth part consists of reflections on the impact of the project from all project members showing what they have gained from the project on the theory of the growth mindset.
Our aim is to provide a grounding for better teaching, which helps to encourage students to believe in their own strengths and competencies, and how they can foster these aspects for a successful life.

Further information can be found at the project's website at: http://www.unigrowthminds.eu/

02

GROWTH MINDSET

Theories underlying indicators for growth/fixed mindset evaluation



Barbara Hanfstingl, Samuel Hafner and Gertraud Benke

In order to better understand, categorize, and structure a growth mindset, several indicators of a growth mindset have been identified, based on a number of specific psychological theories from motivation and self-regulation research. Altogether, we found eight indicators:

INDICATOR 1

primary focus on developing students' skills and competencies instead of letting them demonstrate their skills and competencies.

INDICATOR 2

information about effective learning strategies, and on how to effectively regulate and evaluate learning.

INDICATOR 3

information about neuroplasticity (i.e., the inherent capacity of the brain to form new neural connections throughout life).

INDICATOR 4

support of the belief that success is controllable by the students and dependent on their efforts.

INDICATOR 5

support students' need for autonomy, i.e., they can feel free and self-determined.

INDICATOR 6

make students aware that they have learned something and help them experience their newly acquired competence.

INDICATOR 7

support of students' need for feeling significant to others and connecting to others.

INDICATOR 8

support of students' process-focused thinking.

These indicators are based on the following theories: Achievement Goal Orientation (indicator 1), Beliefs about mindset/metacognition (how does memory/the brain work?; indicators 2, 3), Attributional Style and Locus of Control (indicator 4), and Self-determined motivation (indicators 5, 6, 7). Indicator 8 focuses on students' understanding that learning is a process, not just a product with an endpoint.

ACHIEVEMENT GOAL ORIENTATION (INDICATOR 1)

Achievement goals are self-regulatory commitments that provide direction to individuals as they interpret and respond to competence-relevant situations. Student behaviors may vary in learning depending on the type of achievement goal being addressed. The pursuit of achievement goals can be divided into two distinct orientations that are qualitatively different from each other: *mastery goals and performance goals*. Whereas mastery goals focus on developing one's skills, performance goals focus on demonstrating that one's skills are superior to those of others (Dweck, 1986; Nicholls, 1984). Students pursuing mastery goals are more likely to seek challenges, are intrinsically rather than extrinsically motivated, and show more stamina after failure, while students who pursue achievement goals are more inclined to avoid challenges and are prone to failure (Dweck & Leggett, 1988; Nicholls, 1989). (Sommet & Elliot, 2020; Song et al., 2019)

For example, people with a performance goal view the exertion of effort negatively, often avoid challenges, and seek tasks at a level of difficulty where they are confident of success, while people with a learning goal view exertion positively and seek challenging tasks regardless of whether they expect to succeed (Elliott & Dweck, 1988). The mastery-oriented learning style seen in people who have a growth mindset is beneficial to learning in many ways. It attracts people to challenging situations where they can develop new abilities and leads them to work with greater effort, persistence, and effectiveness. Because people with a growth mindset view effort to be positively related to success, they are also more likely to take steps to improve in areas where their own performance is currently lacking (Hong et al., 1999). (Hallahan, 2020)

Thus, as the second theory underlying the growth mindset indicators we argue to use the achievement goal theory for our purpose (e.g., Elliot & McGregor, 2001). Best practice examples that foster a growth mindset are learning goal-oriented, performance goals usually are associated with a fixed mindset.

In addition to attribution theory and achievement goal theory, we argue to take up certain beliefs about our minds that deal with how our memory and brain work (metacognitive competencies; e.g., Mok et al., 2007), but also beliefs about neuroplasticity. Those beliefs are not crucial for indicating best practice examples for growth mindset, but they foster a growth mindset on a science base: The more I know about my cognitive functioning and neuroplasticity, the more growth mindset is natural for my worldview.

BELIEFS ABOUT MINDSET / METACOGNITION (HOW DOES MEMORY/THE BRAIN WORK?; INDICATORS 2, 3)

Mindset: Implicit theories (or implicit beliefs) of intelligence are deeply held perspectives about intelligence, competence, and ability that impact individuals' motivation, engagement, and achievement. People vary in the degree to which they believe these capacities have the potential to change. Accordingly, some people hold the view that they are bound to particular abilities (entity theory), while others believe that their abilities can develop (incremental theory). Our mindset influences how we think, what tasks we choose for ourselves, our resilience and adaptability, our task engagement and enjoyment, our goals, our persistence, and our attribution styles. Consequently, these implicit beliefs have effects on important outcomes throughout an individual's life – including through their academic life. (Martin et al., 2020)

Metacognition: Metacognition is frequently defined as "knowing about knowing" or "thinking about thinking." Highly developed metacognitive skills are associated with good academic performance. A student with greater metacognitive awareness is better able to effectively regulate and evaluate his or her learning, for example, because he or she can select the learning strategy that is most likely to improve learning and memory. Metacognition is comprised of two essential processes: *monitoring* and *control*. Monitoring refers to people's ability to assess their own learning, while control refers to the way in which they regulate their learning using the information acquired through monitoring. (Higham et al., 2020)

Neuroplasticity: Brain plasticity or neuroplasticity is the inherent capacity of the brain to form new neural connections throughout life (Kania et al., 2017). Initially, neuroplasticity was thought to manifest only in childhood, but in the second half of the 20th century, research showed that many aspects of the brain can also be altered in later life (Rakic, 2002).

Last but not least, we want to add self-determination theory because it emphasizes the role of motivation and personality and, more important, it shows how much attention must be paid to fulfillment of basic psychological needs. Thus, in addition to the upper three points, we need to focus also to which an environment is able to promote or indicate a growth mindset.

ATTRIBUTIONAL STYLE (INDICATOR 4)

Attributional style refers to the ways how people explain to themselves the cause of events and behaviour. These causal inferences impact a person's feelings, perceptions, and behaviour (Weiner, 2010). A person's mindset indicates what the cause of success or failure is attributed to (Dweck, 2000). Moreover, the adaptive function of a growth mindset in light of failure can be related to a person's attribution. (Diener & Dweck, 1978; Dweck, 1975; Dweck & Reppucci, 1973; Hong et al., 1999). (Leighton & Terrell, 2020; Song et al., 2019).

Attributions have three causal dimensions (1) the locus dimension describes whether the cause is internal or external, (2) the stability dimension describes the source of the cause is something stable or variable over a period of time, and (3) the controllability dimension describes the degree to which a person can control the cause. These dimensions are distinct from actual causes of failure themselves (e.g., effort, ability, task difficulty, and luck). Dweck and Leggett (1988) regarded controllability as key to explaining the positive function of mindset in a failure situation. growth mindset increases the perception of controllability of a failure cause, which helps students overcome difficulties or failures. (Song et al., 2019)

In our opinion, attribution style dimensions could be clear indicators for reviewing instructional materials on growth mindset: (1) internal locus of control, (2) variability over time, and (3) the conviction that something is controllable by myself is associated with growth mindset. Contrary, external locus of control, stability over time, and the conviction that something is not controllable by myself is connected to fixed mindset.

SELF-DETERMINATION THEORY (INDICATORS 5, 6, 7)

Self-determination theory (SDT) is a theory of motivation and personality that addresses how the individual interacts with and is dependent on the social environment. SDT defines intrinsic and several types of extrinsic motivation and outlines how these motivations influence situational responses in different domains, as well as social and cognitive development and personality. The basic psychological needs of *autonomy* (the need to feel free and self-determined), *competence* (the need to feel effective), and *social relatedness* (the need to connect closely with others) and their role in self-determined motivation, well-being, and growth are at the core of SDT. It describes the critical impact of the social and cultural context in either facilitating or thwarting people's basic psychological needs, perceived sense of self-direction, performance, and well-being. (Legault, 2020) The more the three psychological needs are fulfilled, the more students can develop autonomous motivations.

Growth mindset promotes self-determined motivations, while fixed mindset promotes controlled motivations (Dweck & Leggett, 1988). So, we argue to include self-determination as a further theory for the construction of indicators for best practices examples: If an example - in addition to other indicators - promotes the fulfilment of one or more basic psychological needs, it should be considered a best practice example.

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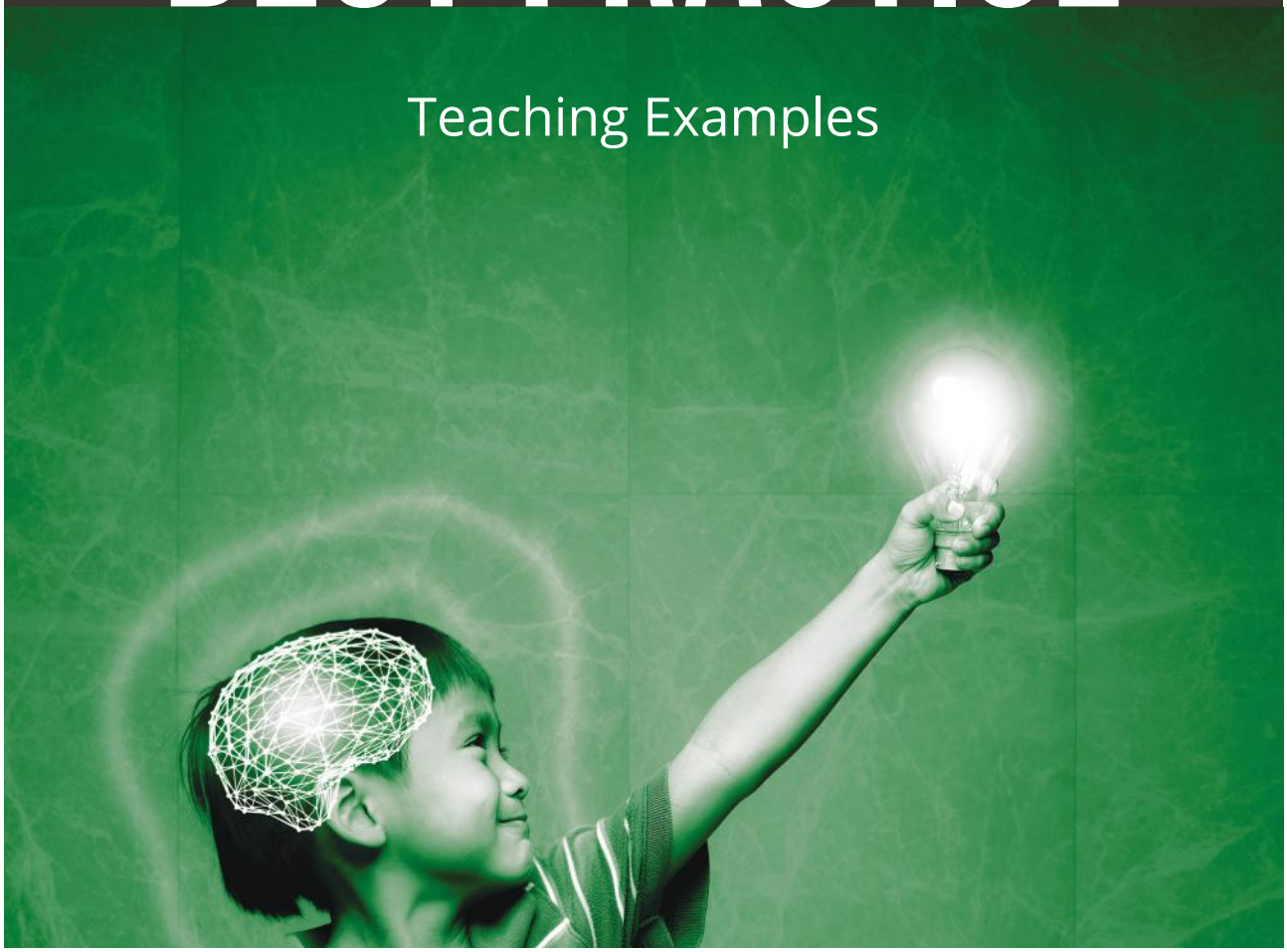
03

BEST PRACTICE

Teaching Examples



This chapter represents the heart of the compendium. Here, you can find a collection of growth mindset teaching activities. These examples were submitted by the project team and further colleagues, some of whom have had experience teaching growth mindset for several years. They provide insight into what concrete growth-oriented classroom practice might look like. We collected examples from several disciplines: Mathematics, computer science, business, education sciences/pedagogy, psychology, and English.

Author(s)	Topic	Title of the example
Business		
Mihaela Kardos	Leadership - change management	Leaders of change – developing a growth mindset by learning from examples
Daniela Stefanescu	Statistics - Tool in the social and business environment	Teaching Descriptive Statistics for first-year students using growth mindset
Blanka Tacer	Entrepreneurship	Teaching design thinking using growth mindset
Computer Science		
Caner Börekci	Computer Science - Material Development	Developing computer science course material with non-computer activities
Caner Börekci	Computer Science - Physical Computing	Physical Computing with Arduino
Ileana Ștefan	Designing a database	Defining the component tables of a database using growth mindset
Education Sciences – Pedagogy		
Gertraud Benke	Learning theory	Engaging students in a lecture class
Kutasi Réka	Best practices in learning English	Teaching Present Simple/Present Continuous using growth mindset
Anita Sila	Writing lesson plans for teaching foreign languages to very young language learners	Teaching lesson planning using growth mindset
English		
Samuel Hafner	Writing academic essays	Developing and improving one's writing competence - writing academic essays
Mathematics		
Ebru Ersari	Probability	Solving Probability Olympiad Problems using Growth Mindset
Carina Spreitzer	Introduction to R	Teaching the statistical program R
Psychology		
Ana Bardorfer and Maja Lebeničnik	Learning of learning	Mastering learning strategies in higher education
Ugur Gurgan	Empathy skills	Establishing empathy in the field of supervision
Ugur Gurgan	family counselling (pre-marriage and marriage training)	Developing family counsellor candidates' conflict resolution skills between couples
Barbara Hanfstingl	Development of teaching examples to foster a growth mindset	How can I develop a teaching example for my own classes and subjects?
Katarina Kocbek	Goal setting, Self-regulation, Motivation	My semester goals – Developing and evaluating my individual action plan
Maja Lebeničnik	Mindset	Mindset and motivation in a pre-school setting
Irina Mihaela Trifan	Social and emotional intelligence, resilience, well-being	Well-being education / Positive education

Business

LEADERS OF CHANGE – DEVELOPING A GROWTH MINDSET BY LEARNING FROM EXAMPLES

Mihaela Kardos, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania

FACT BOX

Study/degree programme	Human Resources Management
Degree level	Master
Course type	Seminar
Topic	Leadership - change management
Duration	more than 120 minutes

DESCRIPTION

Description of the overall course:
The unit is part of the Change Management course which aims to introduce students to the main concepts needed to understand and manage organizational change: nature and cause of change, change policies and strategies, perspectives of changes, diagnosis of change, change planning, change leader, implementation and evaluation of change, application of techniques, tools and models of change, success factors in changes.

Learning goals
My students should be able to understand that
- Setting high goals and working permanently towards achieving them in spite of obstacles and failures can be rewarding
- Making mistakes is acceptable in a development process
- Persistence, tenacity and effort are the keys to success
- It is more important to focus on the process, rather than on immediate results.

Description of the teaching activity
To prepare for this seminar the students were given a project as an assignment: each student has to choose a person/leader who, according to them, changed the world and describe him/her, stating the reason for their choice, accomplishments, personality features, characteristics.
In the first part of the seminar, each student presents the project. Usually, the students refer to personalities such as Einstein, Steven Jobs, Obama, Marie Curie, Ford, Napoleon, or Bill Gates. During the presentations, based on discussions, we extract keywords identified as common features of these personalities and write them on the whiteboard, aiming to build a personality profile of successful people, e.g.: vision, ambition, strength, determination, passion, innovation, hard-working, intelligent, never give up despite many failures, courage.
Then a general discussion takes place. The students are asked to give their opinion if they consider these qualities something that you are born with or most of them can be developed and improved during one's lifetime. The common idea that results is that they can be developed in time and specific examples support it: the analysed personalities focused on progress, on doing things better, never stopped pursuing their dream or working for the ideas they believed in, they felt accomplished for what they were and did, not for what the others thought about them.
The teaching example is closed with the conclusion that the examples can be considered inspiring models for others.

INDICATORS

This activity meets the following indicators.

Indicator 3: Metacognication
Examples presented by students, as well as the discussions, highlight the idea that the brain develops throughout life. In order to emphasize more on this topic, I provide them with neuroplasticity theory elements, such as their possibility of becoming more interested in learning how to get smarter by rewiring their brains through study and practice, as demonstrated by the analysed role models. By integrating information about brain plasticity, growth mindset will be more influential in their adulthood. Thus, students will be able to associate throughout life successful examples in society with the examples studied in this discipline and will make connections with the characteristics identified at the seminar, being able to associate real successful examples with a growth mindset.

Indicator 4: Controllability about success
All examples presented by students, as well as the discussions, highlight the idea that success is determined by continuous, individual effort, perseveration and hard work.

Indicator 8: Process-focused thinking
All examples presented by students, as well as the discussions, highlight that all aspects in life, both personal and professional (objectives, activities) should be approached from a process-perspective.

PERSONAL EVALUATION

The teaching practice offers students the opportunity to learn/get reminded about growth mindset principles, as well as to change their behaviour accordingly. Learning from real-life successful examples of leaders who have a growth mindset is a very good teaching technique as the examples chosen and presented by students are inspiring and imitation stands at the base of human nature. Thus, students better understand the true values of success: focus on progress, personal effort, determination, hard work, self-trust in their own development.
The students received this teaching example with enthusiasm.

At the end of the course the students were asked to give feedback by filling in a form:
Some of the relevant answers for this unit/teaching examples are:
At this course I learned that:
- everyone can always become more adaptable
- the main ingredient of success is self-trust.

I remembered that:
- failure is temporary
- if we think positively we get positive results, if we think negatively we get negative results.

I realised that:
- everything is possible as long as you stay focused
- the key to success is the capacity to adapt yourself.

I was glad:
- because I used change to my personal benefit.

FURTHER WORKSHEETS

Business

TEACHING DESCRIPTIVE STATISTICS FOR FIRST-YEAR STUDENTS USING GROWTH MINDSET

Daniela Stefanescu, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania

FACT BOX

Study/degree programme	Bachelor (first-year students)
Degree level	Administration, Management, Finance, Accounting
Course type	The chosen example refers to remedial activities within the EVRICA project[1].
Topic	Statistics - Tool in the social and business environment
Duration	a whole semester

DESCRIPTION

Description of the overall course:
This module is about adding examples, solving application, giving more explanations, using examples from social and economic area regarding descriptive statistics for students from first year of studies in order to help them to discover by themselves the particularities of statistics, to be able to link realities from social economic environment with statistical concepts, methods, indicators, to interpret correctly the reality through statistical tools and concepts.
This module aims to support students in developing better skills in understanding and using statistics in addition to regular schedule of courses and seminars.
The remedial activities do not end with grades, but each student receives feedback after each learning unit completed and for each topic solved. Therefore, the assessment takes place during the learning process. After each learning unit the students have the opportunity to assess the degree of improvement of knowledge and the level of understanding and interpretation of economic and social phenomena.

Learning goals
My students should be able to

- understand they may learn from their own mistakes, that making mistakes in interpreting statistical indicators related to economic or social activity it is acceptable
- understand the statistical notions taught for the first time is not an issue, as learning is a continuous process
- realize that based on constant hard work, by numerous exercising they will improve their knowledge and skills
- understand that process is more important than results
- realize that understanding is more important than memorizing theory

Description of the teaching activity
The remedial activity takes place in an online environment, using the learning platforms Teams and Blackboard. This module is structured according to the curricula for Descriptive Statistics. The students had already attended regular courses and seminars for 2 – 3 weeks before the remedial activities started.

[1]Remedial activities are intended to improve students' ability to understand Statistics, especially because most of them find it to be difficult. Thus, remedial activities are taught as a mixed formula between lecture and seminar, but they could be also associated with tutorial activities. Being based in a great extend on conversation, explainations, remedial activities are more orientated to seminar form. The project is aimed at first-year students, who are part of vulnerable groups, from disadvantaged backgrounds, from rural areas, special social situations… to help them overcome the difficulties of adapting to the university environment and implicitly to reduce the dropout rate.

Throughout the module, there are exemplified all the basic statistical notions and statistical indicators used on the same set of initial data that presented a concrete situation taken from the surrounding reality. The basic example is taken from everyday life, such as data on the pandemic situation, taken from official sources: total number of cases worldwide, at the level of known countries, including one's own country, and other data on the number of cures, number of new cases, the total number of tests, the total number of population of each selected country
First, students need to understand the general context, the part of reality presented in that application. Subsequently, through successive questions, students are guided to make the connection between the real situation presented and, one by one, the basic notions of statistics. If the answer is uncertain, wrong or correct, the opinion of the other students is requested, and if no consensus is reached, similar examples used in the classes and seminars already taken are repeated, so that through associations, students discover the correct answers themselves and the question is repeated. If the answer is wrong, the student is told: "It is very good that you gave this answer. Why do you think this is the right answer? " After a direct dialogue with the student, through successive questions, he will find out for himself if the initial answer was correct or wrong, understanding each situation separately.
Each remedial activity is based on the same approach, using the initial example (in this case, the one related to the pandemic situation). Based on the same data, each group of statistical indicators is exemplified. Thus, students will get an overview of the example analyzed in terms of all the basic concepts and statistical indicators studied.
After each remedial activity, students receive a topic to solve individually: the topic is checked and each student receives personalized feedback, in which expressions such as: "Congratulations! You understood correctly how to apply the arithmetic mean and more than that how to interpret it correctly! "; "I appreciate the effort you put into solving the application! I advise you to read the part about ... again and then resume the application. I'm waiting for a new version. If you need help, please contact me! " "I appreciate how you solved the problem!"
In the last meeting, the example used throughout the semester is resumed and it is allowed to create an overview both on the analyzed reality and the role of statistics in understanding that reality.
At the end of the semester, before the session, students will see how the initial situation can be analyzed with different statistical indicators, highlighting the specifics of each and interpreting / expressing in words the meaning of the results obtained by choosing the appropriate formula and understanding the meaning of each calculation.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Through the examples from the surrounding reality, through individual communication and customization of each student's feedback, the atmosphere is created in which everyone discovers new sides of reality with the help of notions, statistical indicators, at their own pace and with the permanent support of the professor. As to remedial activities are not given grades, students are encouraged to focus on understanding the subject, gradually assimilating knowledge during the semester and not just around or during the session of exams, without the pressure of assessment through grades or parts of the final grade.

Indicator 2: Learning strategies
Remedial activities are based on repetition, on discovery, on connections with reality, using real-life examples in order to support understanding statistics. They are guided the entire period, and they have an evaluation after each learning module. As they are advised to learn in small pieces each type of indicators, we consider they are taught to use Space Practice learning strategy, concentrating only on one topic at a time. Another learning strategy used during remedial activities is Interleaving, meaning that instead of giving them to solve out the same indicator type many times, they have to try different indicators, in different orders, one time for each problem. If they consider practicing more, they may

repeat the same indicator for the same problem individually.

Indicator 5: Feeling of autonomy
From one meeting to another, the student works at his/her own pace, evolves/understands/ assimilates proportional to the degree of involvement, not being pressured by marks and strict control. They may choose when they need help and they decide how much they practice. Based on the sequential evaluations (without taking into account for the final mark of the discipline), they may appreciate how much they need to work in order to get their own level of knowledge and understanding.

Indicator 8: Process-focused thinking
The students are encouraged to concentrate on understanding the meaning of each statistical concept or indicator, and not on the results or grade, taking into consideration that remedial activities do not include evaluation based on grades. Thus, the students focus on the process of understanding social and business environment through Statistics as a tool, in order to be able to give a proper answer to the question: "Why is it (reality) like this and isn't otherwise (as could seems to be)?". Thanks to the way remedial activities are leaded, students could focus on the process because they are not receiving grades.

PERSONAL EVALUATION

Students can assess the extent to which the effort made during the semester helped them to clarify aspects considered difficult and incomprehensible at the beginning of each learning unit. Students have the opportunity to identify in what context each type of indicator can be applied and especially what the significance of the result is. In the last meeting there are discussions with the students about how they evolved, how they overcame the difficulties encountered, if they managed to understand what seemed difficult at the beginning of the remedial activities.

Students followed the guidance they received and they could develop during the semester, not only regarding their knowledge and skills, but they become more courageous to express their opinions, more confident in themselves. Following discussions after the completion of the remedial activities, the students stated that they learned much more systematically, thoroughly, that they understood how to use statistical notions and especially that the activities helped them to prepare better, in time for partial and final assessments, to be more confident on themselves.

Not all the students responded to this method as we expected, not all of them had enough patience to go through the entire process.

Although there was no formal evaluation, from the recorded data, it is found that the number of students who took the exam in the discipline of Statistics increased compared to other years in which there were no remedial activities.

Business

TEACHING DESIGN THINKING USING GROWTH MINDSET

Blanka Tacer, STEP Institute, Slovenia

FACT BOX

Study/degree programme	Business Administration
Degree level	Bachelor, Master
Course type	Lecture and seminar
Topic	Entrepreneurship
Duration	half a semester

DESCRIPTION

Description of the overall course:
The course *Projecting and implementing an entrepreneurial idea* provides an overview of the entrepreneurial process and is designed to give students an in-depth understanding of different aspects of design thinking. The issues addressed in class focus on the identification of opportunity, researching users' needs, idea creation, prototyping and business modelling. Students are co-creators of the course. Their active participation in discussions, exercises and case studies is warmly welcome.

Learning goals
My students should be able to
- see how their effort is connected with the quality of the outcome
- research users' needs with qualitative methods
- create new business opportunities
- define the problem based on data from different sources
- experiment with different ideas
- experiment with different business models

Description of the teaching activity
The remedial activity takes place in an online environment, using the learning platforms Teams and This is an example of project-based learning. At the beginning of the semester, we asked local companies to give us their open problems which students would be able to use as cases for their study. Usually, we received many interesting cases such as how to adapt bank offices to be more accessible for older people, how to go to the market with electrical scooters, how to create a community of users of phytopharmaceutical products etc. Students also have the possibility to work on their own business idea.
The final grade in this class is comprised of different components, namely writing two essays, testing a prototype, final presentation, final report and final exam. Different components of the final grade are designed in order to:
- encourage students to study throughout the whole semester and not just in the end,
- ensure multiple exposures to more or less the same topic,
- give students an opportunity to correct mistakes and
- provide them with an experience of gradual development of their knowledge and skills.

In order to pass the course, students are required to achieve at least half of the points on each assigned activity. Class participation consists of both regular attendance in class and active participation during

the lectures. Students are expected to read all the assigned readings before class and contribute their viewpoints and share their ideas in class.

Grade distribution:
1. Essay 1, individual assignment, 10 % of the final grade: the lecturer sets a topic, provide reading material and prepare essay questions;
2. Essay 2, individual assignment, 10 % of the final grade: the lecturer sets a topic, provide reading material and prepare essay questions;
3. Testing prototypes, team assignment, 6 % of the final grade: students develop a prototype for a new service or product, they use simple material for building a prototype such as bricks, paper etc., they present the prototype in front of the class;
4. Final presentation, video and final report, team assignment, 44 % of the final grade: students record a video presentation in form of a commercial for their new product or service, they also present the improved version of the prototype in front of the class, they present their business model and send a written assignment to the lecturer in which they describe the whole working process and results;
5. Final exam, individual assignment, 30 % of the final grade: exam with questions about the theory of design thinking and business modelling.

The schedule comprises 7 sessions of 4 pedagogical hours each:
1. Introduction: course objectives, course schedule, course assignments, grading.
   - Entrepreneurial process (Entrepreneur/business idea/business opportunity).
   - Design thinking overview.
   - Formation of teams of students
2. Researching users' needs
   - Deep understanding of users
   - Demand-side vs resource-side of value creation
   - Qualitative research methods: interviews, ethnographic approach, observations
3. Problem identification
   - How to understand and interpret data from the field, mind maps, creating common ground, creating "How might we" questions
   - Idea generation
   - Creativity techniques: brainstorming, random entry, SCAMPER
4. Prototyping
   - How to connect more ideas into a holistic new product or service
   - Testing the ideas
   - How to build a prototype made of simple materials such as lego bricks, paper, clips etc.
   - What is rapid prototyping?
   - How to present a prototype to potential users and how to ask them for feedback
5. Business model generation
   - The long tail in business modelling
   - Canvas business modelling
6. E-business model application testing
   - Consultations before the final presentations
7. Final examination and presentations

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Students have to train different skills such as conducting interviews, experimenting with different ideas and business models, consulting with their professor on several issues. In order to develop their skills, we first demonstrate an effective interview, which is followed by a lecture and discussion about conducting interviews. After this, students prepare a questionnaire for their case. All of them prepare a list, but we present and comment only on a limited number in the classroom due to time constraints. In case they feel competent enough, they conduct an interview with a potential customer. However, they are also encouraged to conduct interviews in pairs. There are several reasons to do so. The first reason is, that students feel more comfortable if they have another student as support when having an interview with an entrepreneur they meet for the first time. They can also share the work, for instance, one is asking questions while the other writes everything down. Doing this task as a pair also brings an opportunity for peer feedback and brainstorming about the questions might be more fruitful.

Indicator 4: Controllability about success
As stated in the course description students have to show their improvement several times throughout the course. It is formally organized because their grade depends on that. But also informally they have to discuss their improvement each time on the class session.

Indicator 5: Feeling of autonomy
They can choose the problem on which they will work, they can choose the working method, people to work with, try out different strategies of problem-solving and replace them if they find that the strategy does not work.

Indicator 6: Feeling of competence
Each session involves a consultation with their professor who proved immediate feedback on their work without any consequences if they make mistakes or failures. Moreover, students also receive a written feedback on their contribution and not just the grade.

Indicator 7: Social connectedness
At least half of the work is done in a team. But also they are able to solve real problems for the companies. So they have a feeling that they do not just study and learn but also work on something real. The teamwork here is important because of the connection with real life. When later in career students want to start their own company, the likelihood of success is higher if they do so as a team. So, if they have this first experience, it is more likely they will realize how important working in a team is. It is experiential learning. The lecturer could have told students about the importance of teamwork and show them statistics about the start-up survival rate, but it is different when they experience it for real. During the innovation process, students realize that team members have different skills to contribute. Even if they do not enjoy teamwork, they get information on strong and weak points so they can think more about the importance of teamwork for their career.

Indicator 8: Process-focused thinking
The whole course is structured in phases of design thinking. Students have to gradually move from phase to phase. It is impossible to continue if they miss one phase. They have to go back, complete that phase before they are able to continue.

PERSONAL EVALUATION

Several elements of a growth mindset are presented: step-by-step learning, multiple exposures to learning material, sooner or later students make mistakes and learn from it, deliberate practice with idea generation, researching and business modelling, real-life challenges which are quite difficult, open and with several solutions. The whole course is process-oriented and it guides students through business thinking. Student motivation was high because of real-life challenges but they also felt a huge workload because they had to be active all the time.
The challenge was how to motivate students to read in advance. They usually came to class without pre-reading so we have to explain some things instead of focusing on the discussion.

We received several emails which encouraged our work. Students felt important and involved in the process.

Computer Science

DEVELOPING COMPUTER SCIENCE COURSE MATERIAL WITH NON-COMPUTER ACTIVITIES

Caner Börekci, Balıkesir University, Turkey

FACT BOX

Study/degree programme	Computer Sciences
Degree level	Bachelor (more experienced students)
Course type	Seminar
Topic	Computer Science - Material Development
Duration	More than 120 minutes

DESCRIPTION

Description of the overall course:
Course: Computer science material development course
Audience: Teacher Candidates
Course description: Students' understanding of the characteristics of various instructional technologies, their place and use in the teaching process, and the ability to develop instructional materials through instructional technologies and use them in in-class activities.
Course Unit: Developing course material with non-computer activities

Learning goals
My students should be able to

- explain the conceptual and theoretical foundations of instructional technologies and material design.
- explain the process of preparing instructional material.
- explain the tools and materials used in teaching environments according to their characteristics.
- design instructional material.
- evaluate different teaching materials.

Description of the teaching activity
The primary goal of the course activity is to develop a computer science (and computing in general) course activity for young people as an interesting, engaging, and intellectually stimulating discipline.

In the course, pre-service teachers will learn how to develop lesson activities by taking into account the needs and characteristics of the students, the physical condition of the school they will work in, and the technological opportunities through hands-on activities.

At the end of the course, pre-service teachers are expected to develop a computer-free computer science course activity.

Lesson stages:
Examples of activities available in the lesson are shown and pre-service teachers are asked to complete these activities. They are asked to write down the strategies they used while solving the activities. They are asked to write down how these strategies they use can be transferred to computer science. Example solutions are shown. A class discussion is conducted about the strategy used to solve the problem asked

in the activity and the transfer strategy. Discussion results are displayed on the board as a concept map. Then, pre-service teachers will be divided into small groups and expected to develop an alternative activity to teach a subject (sorting algorithms, error detection, binary numbers etc.) in computer science without using a computer. The activities developed by the groups are presented in the classroom, and each group tests the activities developed by the other groups. The results are discussed in class, necessary improvements are made regarding the activities. Pre-service teachers are asked to share what they have learned in the lesson with the class.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
In the lesson, activities were carried out with sample materials, and then, it was tried to gain new competencies for pre-service teachers to develop practical and original materials by using creativity, critical thinking, cooperation, observation and discussion skills. The given task in the classroom activity to the pre-service teachers is one of the hard tasks about CS teaching.

Indicator 2: Learning strategies
The activity provides information on effective learning strategies and how to organize and evaluate learning effectively.
The stages followed in the lesson (show-and-show, individual study, discussion, group work, individual presentation, evaluation) also include the steps that prospective teachers can follow in their own lessons in the future. By monitoring and developing these strategies, they can use them in the organization of lesson activities when they become teachers.

Indicator 4: Controllability about success
During the classroom activities, the pre-service teachers became aware of their own potential with the activities they did individually and in groups. They learned what can be done to develop an effective classroom activity.
Pre-service teachers learned the importance of working more carefully and incorporating different ideas and perspectives into the process to develop an effective activity.

Indicator 5: Feeling of autonomy
Pre-service teachers were given autonomy for the materials they would develop, so they worked on subjects they knew better or needed.

Indicator 6: Feeling of competence
A summative and formative evaluation was made at the classroom activity. While making the evaluations, self-assessment and peer evaluation were used in addition to direct feedback.

Indicator 7: Social connectedness
In the material development process, pre-service teachers interacted and communicated with their friends during the group work process to develop a product. Working in a group supports the development of pre-service teachers' taking initiative, leadership and cooperation skills.

Indicator 8: Process-focused thinking
Although it is expected from pre-service teachers to produce a product (course material) at the end of the lesson, all the steps of product development are followed in order. The formative assessment methods (self-assessment, peer assessment, presentation-discussion) applied in the course showed the pre-service teachers that their performance in the process determines the quality of the product.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?

Factors supporting mentality development in lesson activity:
- Doing individual activities from easy to difficult (note-taking, problem-solving strategies and transformation strategies, creativity)
- Group activities that increase interaction and communication (cooperative work, leadership, communication)
- Providing feedback to improve the process with different methods (product-oriented and process-oriented / self-assessment, peer review, group discussion, presentation-discussion)

What went well?
- To increase the motivation for the lesson with applied activities,
- The emergence of different products (course materials)

What didn't work as expected?
- Activities with large groups take longer than expected,
- Difficulty of all groups to complete their work at the same time

FURTHER WORKSHEETS

Computer Science

PHYSICAL COMPUTING WITH ARDUINO

Caner Börekci, Balikesir University, Turkey

FACT BOX

Study/degree programme	Computer Science
Degree level	Inservice Training for Teachers
Course type	Workshop
Topic	Computer Science - Physical Computing
Duration	2 days * 8 hours a day = 16 hours

DESCRIPTION

Description of the overall course:
Workshop: Physical Computing with Arduino
Audience: Teachers
Workshop description: The workshop provides professional development for K-12 teachers on electronics, sensors, and physical computing.
Physical computing refers to the use of tangible, embedded microcontroller-based interactive systems that can sense the world around them and/or control outputs such as lights, displays and motors. Assembling the hardware elements of a physical computer and programming it with the desired behavior provides a creative and educational experience.

Learning goals
Teachers will learn

- classroom-friendly robotics and making technologies and how to bring them to the classroom or afterschool programs.
- working principles of various sensors for physical computing
- building circuitry using a breadboard for Arduino
- using physical computing to interface electronic components like LEDs, buttons, and photo-resistors etc.

Description of the teaching activity
The aim of the workshop is to show teachers how they can benefit from physical programming in classroom activities. At the end of the workshop, teachers will be able to organize activities in their classrooms that focus on solving real-world problems and support the development of students' cognitive/psychomotor skills.
During the workshop, teachers will learn about micro-controllers, sensors, electronic components (motors, led lights, buzzers, etc.) and the software to control them. They will measure real-world data with sensors and use the data to control other parts. At the end of the workshop, they will be asked to do a group project and present their project to other teachers.

Workshop stages:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino

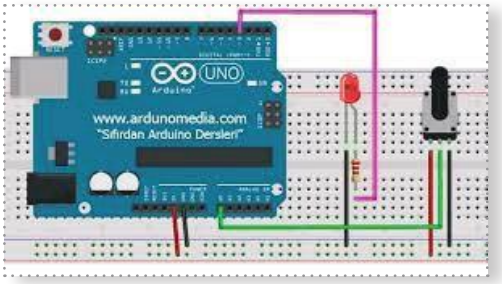
boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Overview Lecture:
- What is a microcontroller?
- Presentation and discussion of project examples.
- The possibilities and limitations of the Arduino.
- Basic terminology.
- Outline and expectations of the workshop.

The technical tutorials: (Hands-on Activities)
Each teacher is given an Arduino starter kit. This set contains materials for developing simple projects. Kit (1 Arduino Uno, 1 USB cable, 1 Breadboard 400 points, 70Solid core jumper wires, 1 Easy-to-assemble wooden base, 1 9v battery snap, 1 Stranded jumper wires (black), 1 Stranded jumper wires (red), 6 Phototransistor , 3 Potentiometer 10kOhms, 10Pushbuttons, 1 Temperature sensor [TMP36], 1 Tilt sensor, 1 alphanumeric LCD (16x2 characters), 1LED (bright white), 1 LED (RGB), 8 LEDs (red), 8 LEDs (green), 8 LEDs (yellow), 3 LEDs (blue), 1 Small DC motor 6/9V, 1 Small servo motor, 1 Piezo capsule [PKM22EPP-40], 1 H-bridge motor driver [L293D], 1 Optocouplers [4N35], 2 Mosfet transistors [IRF520], 3 Capacitors 100uF, 5 Diodes [1N4007], 3 Transparent gels (red, green, blue),
1 Male pins strip (40x1), 20 Resistors 220 Ohms, 5Resistors 560 Ohms, 5 Resistors 1 kOhms, 5 Resistors 4.7 kOhms, 20 Resistors 10 kOhms, 5Resistors 1 MOhms, 5 Resistors 10 MOhms)

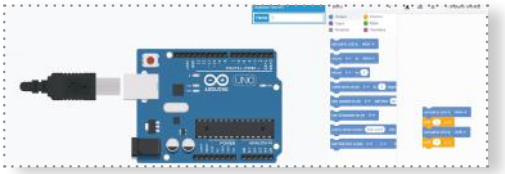
- Using the Arduino System (led, Potentiometer, cables)

Practices:
Analog Read Serial: Read a potentiometer, print its state out to the Arduino Serial Monitor.
Blink: Turn an LED on and off.
Digital Read Serial: Read a switch, print the state out to the Arduino Serial Monitor.
Fade: Demonstrates the use of analogue output to fade an LED.
Read Analog Voltage: Reads an analogue input and prints the voltage to the Serial Monitor.



Sample Project (Use potentiometer to adjust the brightness of the led)

- Arduino Programming with Block Coding



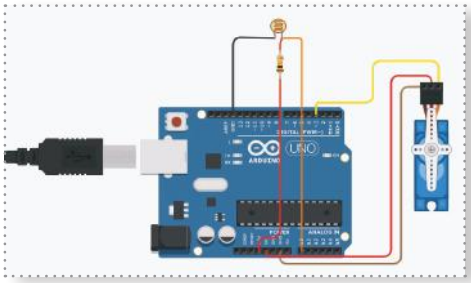
Use Blokly or Scratch to code an Arduino microcontroller.
Sample Project (Bilinking board led (Pin 13) with block coding

- Elementary Electronics

Use a potentiometer to understand Ohm law, Analog and Digital Inputs/Outputs

- Analog versus Digital Signals (Used LDR, Humidity,)

Understanding the signals and using them with sensors, lights, motors etc.



Door Automat Project (Controlling the position of a servo motor using LDR (light dependent resistor). As the value of LDR increases the position of servo motor increases.)

- Mapping Input to Output

The map function is intended to change one range of values into another range of values and a common use is to read an analogue input (10 bits long, so values range from 0 to 1023) and change the output to a byte so the output would be from 0 to 255.

Developing a Project Idea (Group Activity)

Project Samples For Beginners:
https://circuitdigest.com/arduino-projects
https://create.arduino.cc/projecthub.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
During the workshop, teachers will use their collaborative working skills and creativity skills to plan a lesson activity with a newly learned method. They will experience this activity development process.

Indicator 5: Feeling of autonomy
Teachers were given autonomy for developing a project idea and implementing it.

Indicator 6: Feeling of competence
In the workshop, they can see whether the process they have done in the applied activities is working or not. For example, by making a correct connection, they can see whether a led lamp is lit or whether they are measuring correctly. In addition, group projects will be evaluated by all participants. The feedback they receive will contribute to the development of their projects.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?
The workshop gave teachers the opportunity to learn how to prepare a lesson activity with a new method. Learning new topics and continuing to learn will support a growth mindset.

What went well?
Group activities and collaborative work.

What didn't work as expected?
Technical problems.

Computer Science

DEFINING THE COMPONENT TABLES OF A DATABASE USING GROWTH MINDSET

Ileana Ștefan, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania

FACT BOX

Study/degree programme	Economics, Business, Law, Public Administration, and other fields as well
Degree level	Bachelor (more experienced students)
Course type	Seminar
Topic	Designing a database
Duration	180 minutes

DESCRIPTION

Description of the overall course:
The teaching unit presented in this example is part of the course theme Designing a Database. At present, databases are used practically everywhere, in all fields of activity, civil or defense, financial, administrative, educational, informational, communications and, last but not least, computers. The use of databases allows the efficient organization of information and fast, secure, local and remote access to it. A properly designed database provides access to up-to-date and accurate information. Because a correct design is essential to achieve the objectives in working with a database, the principles of good design must be known. In the end, it is much more likely to choose a database that meets the needs and can easily allow retrieval and modification of data.
The necessary instructions for planning a database will be presented. It teaches how to make the decision about the information needed, how to distribute that information in the appropriate tables and columns, and how these tables relate to each other.

Learning goals
My students should be able to
- determine or identify all the information they need to solve the problem of interest by analogy with the examples presented;
- determine the fields that will be part of the database tables by reflection, by test, by discovery;
- define the fields through which the link between the database tables will be made;
- reproduce, from the tables obtained, all the information in the initial table through the induction process.

Description of the teaching activity
I chose this example, creating a database for a faculty because students are beneficiaries of the application; they manage a faculty database and for the most part, know how to use the application but do not know what is going on behind this application.
The beneficiaries of this application will be students, teachers and support staff. Students will want to extract from the database information regarding the grades obtained, schedule, exam planning, fees paid, etc. Teachers will also want to consult their timetable online, write the grades obtained by students in the database or calculate group averages. The secretary will enter in the database the personal information of the students, the number of scholarships, the fees paid by them and will want to extract reports on the school situation of each student, the average grades obtained by them in the session, rankings of students in descending order and accumulated number of credits, without being able to

write or modify students' grades.
For the best possible example, we chose the design a database that contains only the data related to students. For example, a faculty database, users (students) asked the following questions:
STUDENTS: What time do I have? What grade did I get on an exam? What scholarship do I receive?
The techniques used in the design process can be likened to a set of tools, each tool (technique) is used for a specific purpose. The idea is that once you have learned how to use a tool generically, you can use that tool in any situation. The focus should be on the technique, not on the data domain used.

The design process consists of the following steps:
a) Determining the purpose of the database;
b) Finding and organizing the necessary information - all the types of information you want to record in the database are collected;
c) Division of information into tables - the information elements are divided into major entities or subjects;
d) Transform information elements into columns - decide what information you want to store in each table. Each element becomes a field and is displayed as a column in the table.
e) Defining the primary keys - choose the primary key of each table. The primary key is a column that is used to uniquely identify each row;
f) Defining the relationships in tables - each table is studied and it is decided how the data in one table are correlated with the data in other tables. Add fields to tables or create new tables to clarify relationships as needed;
g) Refine the design - Analyze the design to detect any errors. Create the tables and add some sample data records. See if you can get the desired results from the tables. Make design adjustments as needed;
h) Normalization of tables - the data normalization rules are used to see if the tables are structured correctly.

It is essential to analyze in detail the model created, to eliminate all redundancies and elements that can create ambiguities and errors in data processing or updating. Table adjustments are made as needed.
A relational database stores data in relationships, which the user perceives as tables. Each relationship is composed of records (rows) and attributes (fields or columns). Each record in the spreadsheet is identified by a field that contains a unique value.
Following the dialogue between students and teachers, a dialogue consisting of successive questions and answers, came to establish the structure of the tables, the relationships between the tables and the definition of the link fields. In the situation when the answer given by the student was incomplete or hesitant, in order to encourage the person to continue and be stimulated, the following forms were used: "I understood; And further; But after that.. ". During the dialogue, the opinions and answers of all students were also taken into account. In the situation where the students failed to give a correct answer, the procedures used during the teaching activity are explained again.
At the last meeting, we reviewed an overview of the entire database design process. In order to see the level of understanding of the topics covered, the students had as a theme: designing a database of their choice. Following the debates after the presentation of the bases designed by each student, a series of notions were clarified that were not sufficiently understood and it was concluded that any student who participated in the seminars accumulated the information necessary to solve the problem discussed (at least it seems to have understood).

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Following the notions accumulated at the seminar, the student can solve database design problems using the reasoning, analysis, interpretation and synthesis of the information taught in class. Students know what all the stages of the process are to get the desired result.

Indicator 2: Learning strategies
The activity provided contributes significantly to the development of a student's ability to encode and extract key information, which is of interest from any database that has the main features of the teaching example. The presented material was developed and structured in such a way that the student can understand and learn the notions related to database design, reflection, testing, discovery, using and developing applied learning strategies to acquire knowledge and to form specific skills.

Indicator 4: Controllability about success
The students managed to assimilate, during the course, the notions taught and demonstrated the ability to successfully address the topics received. The results were largely positive, depending on the efforts of each of the students.

Indicator 5: Feeling of autonomy
The students had the opportunity to apply the assimilated notions, in different fields of activity, depending on the field of interest of each one. Using the example presented during the seminars, which is a general one and following the design stages, the students can adapt at their own pace and according to their way of thinking the requirements for creating the database in the field of interest: for example, in the field of business to keep clearer evidence of stocks, in the public administration for the record of collecting taxes from citizens, etc. The steps are the same, but the content is of a different nature and the database can be created by choosing different paths, depending on the students' way of thinking.

Indicator 6: Feeling of competence
Going through this learning unit that is based on logical, interconnected, and well-defined elements, is a structured learning process facilitating the assimilation of the process stages for creating the relational database. Thus, students gained the necessary skills and experience to design a database on their own. By applying the learned techniques, students practice their knowledge and manage to transpose what they have learned into their field of interest and to obtain the expected results.

Indicator 8: Process-focused thinking
As we presented in the description of the learning unit, a relational database is designed through a process consisting of techniques that must be applied in successive stages, correctly linking the components of the structure to each other. The students' attention should be focused on the techniques used and not on the example used in the seminars, so through the content and the way of the learning unit is carried out, students' process-focused thinking is fostered.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?
I believe the teaching practice was successful in fostering a growth mindset because students did individual activities passing from easy tasks to complex ones. This example is largely based on communication, discussions, self-assessment.

What went well?
The knowledge and the skills formed can be applied in various fields, only the nature of the data being different.

What did not work as expected?
The different level of student involvement creates different rhythms of assimilation that affect the time allocated to each phase of the learning process.

Education Sciences – Pedagogy

ENGAGING STUDENTS IN A LECTURE CLASS

Gertraud Benke, University of Klagenfurt, Austria

FACT BOX

Study/degree programme	Any study/ degree programme
Degree level	Bachelor and Master
Course type	Lecture
Topic	Learning theory
Duration	A whole semester

DESCRIPTION

Description of the overall course:
I use the method in two courses, one of which is an introductory course on theories about learning. It is a survey of pedagogical psychology focusing on learning and motivation theory.

Learning goals
My students should be able to
- apply the taught concepts to real-life learning and teaching situations
- define the central concepts taught.
- infer possible challenges for student learning from the presented theories

Description of the teaching activity
The main point of the teaching example is the use of a flipped classroom format. All lectures were videotaped and uploaded to the class Moodle course alongside the slides for that lecture. Students are expected to watch the video beforehand.
The main activity is jointly playing a quiz about the information from the video lecture in class. I use whatever free quiz program is available (or offered by the university). (More on the requirements I have for the quiz system below.)

I start each class by clicking through the slide – without comment – to help students arrive in the classroom mentally, remember the video lecture, and offer the chance to raise questions about individual slides.
After going through the slides, I start the *anonymous* quiz. The first time (and infrequently afterwards), I stress that learning theory says testing is one of the most effective learning methods. From a learning theoretical point of view, testing yourself without watching the video beforehand increases the readiness to learn. In other words, I want to encourage them to come to class (lecture class attendance is voluntary in our system) and to participate even if they did not watch the lecture video beforehand.
I try to prepare at least one question for each learning objective or slide for the quiz.
In the quiz software, we will see a breakdown of answers. I see how many students understood the question(s) correctly from that. Sometimes (for more complex questions), I first make a poll on all options (if the software allows for that) and ask them to discuss their answers with each other (pairs or three people). Next, I will do the same question as quiz question (which displays the correct answer(s) after everyone put in their choice). Afterwards, I will discuss why the correct option(s) is(are) correct and

why the incorrect choices are not valid. Of course, the quality of this discussion depends on the quality of the distractors and how much they take up subtle distinctions. For the discussion, I try to have students reason why the correct answer is correct and why the wrong answers sometimes might make sense under certain conditions.
Example of a quiz question (from a research methods course):
What are tasks one has to do in every literature review:
(a) Determine, which theories were used (no)
(b) Determine, where one will search for literature (yes)
(c) Analyze articles according to self-chosen criteria (yes)
(d) Summarize the findings of the found studies. (no)
Note, in this case the distractors (a) and (d) make sense in many situations, but they are e.g. not needed in a literature review, which wants to determine how many studies for a particular question use non-random sampling or a particular research method.

Usually, we can cover about 10 – 14 questions in 90 minutes. During this discussion period, I also get feedback on the (lack of) quality of some questions or (more rarely) answering options, leading to a revision of the quiz after class.
I try to use software that allows students to replay the quiz after class in preparation for the final exam. (The exam contains only open questions and not the closed format quiz questions which take up the discussions we had.)

Requirements for the software (at present, April 2022, met by quizizz.com):
- Free (or a free basic version, which offers the necessary features)
- Allows for anonymous participation (no login or email address required)
- Allows for up to 40 players to join the quiz (or even more)
- Allows individual plays after class
- Preferred option: Allowing multiple-choice questions (so that students have to think through all options, instead of finding just "the right" one.)
- Preferred: Easy interface for setup and later for joining the quiz by mobile phone, clicking through the quiz and setting up the individual access, e.g., by making the quiz publicly available.
- Preferred: No restriction on the number of characters for each question and option
- Preferred: Flexible time for each question (I use 20 seconds for short questions, sometimes 30, and 45 seconds for more elaborate questions, in which they have to deliberate about each option. To my surprise, this is not too long.)

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
I try to make them think more deeply about the central concepts and get them to reason with the concepts by quizzing them with likely alternatives. Playing the quiz anonymously, I strongly encourage everyone in the room to participate, regardless of whether they have prepared for the lecture, or if they feel, they do not know enough. I repeatedly tell them, that realizing where one's conjectures go wrong might be just as valuable as realizing where one is right and might prepare them for better learning.
Also, the discussions sometimes lead to change in the determination of whether an answer is correct or not. In developing questions everyone has a particular perspective on the topics under discussion, and sometimes this might hinder the instructor to see how questions might be understood differently. The discussion might sometimes show that things can be seen differently when perceived from a different position.

Indicator 2: Learning strategies
Indirectly: In playing the quizzes in class or after, they get immediate feedback on whether they learned the objectives. Learning strategies are an element of the lectures.

Indicator 4: Controllability about success
Through the possible repetition of taking the quizzes, they can see their progress.

Indicator 5: Feeling of autonomy
They can choose not to attend and watch the videos at their own pace/time; they can do the quizzes independently. The quizzes are anonymous during classroom time; students can refrain from participating or choose to watch only.

Indicator 6: Feeling of competence
Again, through the quizzes. It provides immediate feedback, as all answer options, both the correct and incorrect ones, are discussed.

PERSONAL EVALUATION

I think this format is playful, allows for making errors and working towards "getting it right." I discuss answering options, and sometimes students convince me to change questions or accept answers. It shows that one can reason about the presented content and that there is no expectation of getting things correct right away. Instead, it offers a discussion on the lecture content.
Students generally like the format and a very engaged.
They ask too few questions by themselves (at the beginning, when going over the slides). Generally, students' attendance could be better. The format is very beneficial for attending students (usually, students who attend regularly pass with good grades), but I do not reach students who choose not to attend. At the same time, I see this as their choice.

Was there any formal assessment (e.g. a test)? What were the results of this assessment?
Final exam. The quizzes can be seen as assessments. Usually, students answer about 50% correctly – and students mostly use almost all of the distractors as answers.

Further comments:
While it takes some time to set up the material, this format works very well to curtail the courseload if instructors have to teach the same course for several terms. It allows for high-quality discussions while allowing to use of previously developed materials.

Education Sciences – Pedagogy

TEACHING PRESENT SIMPLE/PRESENT CONTINUOUS USING GROWTH MINDSET

Kutasi Réka, "George Emil Palade" University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania

FACT BOX

Study/degree programme	Teacher education
Degree level	Bachelor (first-year students)
Course type	Seminar
Topic	Best practices in learning English
Duration	30 to 60 minutes

DESCRIPTION

Description of the overall course:
The English language course is an optional course designed for students from the Primary and Preschool Pedagogy study program. It is a course in which I decided to include some grammar elements, teaching the present, past and future tenses, by using simple texts in which the mentioned verb tenses can be found.

Learning goals
My students should be able to
- identify the two verb tenses by correlating knowledge.
- use the two verb tenses correctly in simple sentences.
- use correctly the forms of the two verb tenses in speech.

Description of the teaching activity
English grammar is not easy at all. There is a rule for each grammar sequence, but there are a few exceptions to each rule. During the years I have observed that shy or beginner students do not interact with those around them because they are afraid of failure.
The two verb tenses are taught at the first seminar as I know that students will need them /will have to use them correctly in order to interact with their classmates.
At the beginning of the seminar I ask my students to write sentences using the two verb tenses, sentences that will highlight their expectations from this course (I want to learn English because……/ I do not want to learn English because…..), the advantages and disadvantages of learning a foreign language (English is useful/useless because……), how they feel about learning English (I like learning English because……./ I do not like learning English because…….), and last but not least why do they think that learning this language is necessary (the sentence must begin as „I believe that learning English is……").
I chose to go from abstract to concrete precisely to encourage students to be independent and to adopt a positive attitude towards learning English.
After the sentences have been written each student is asked to read one or two examples that are written on the board. Besides analysing the grammar part (mistakes, correct verb use, correct auxiliary verb use, negative formation etc.), I also analyse students' feelings and fears towards learning a foreign language. The positive but also the negative aspects are discussed together with the students. Examples like: "I do not like English because of my result from high school.", "I like English because my teacher explains the rules clearly.", "English is hard because I do not understand the rules." These sentences show

me what can I expect from my students and how can I manage to teach them the language in an attractive way. So, instead of telling them that it will be a hard semester and English is hard I always encourage them that in the end everything will be OK, and as they can see from the positive examples there are other people who have learnt the language and they will learn it as well. More, seeing the examples they will know that nobody is perfect and perfection can be achieved by anybody. Giving them the chance to formulate their own examples I also give them the impression that I am sure they know the grammar rules and I have confidence in their knowledge. At the end of each seminar, I praise my students and tell them how proud I am of their results.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
By giving my students the opportunity to form sentences that reflect real-life issues, I also give them the chance to develop their own skills and competences without just simply applying the rules that they have learnt.

Indicator 5: Feeling of autonomy
By giving students the chance to write their own examples and not imposing my examples in teaching English grammar, by conducting the activity from concrete to abstract, by asking them to write real-life examples I believe students will feel that the teacher gives them a certain degree of autonomy and in this way they become self-determined.

Indicator 6: Feeling of competence
By praising their activity after each seminar, by giving them feedback on what they have achieved on that specific day and by discussing the examples they have given (whether correct or incorrect ones) students will certainly acquire new information during the seminar. The following seminars include exercises that help students experience their newly acquired competence. For example, one favorite task is gap filling. The teacher gives students only the first part of several sentences and they have to fill them in with real-life, everyday events in order to practice the newly acquired competence.
For example:

1. Every day I…… .
2. Usually, I …… .
3. I never…….
4. Me and my family sometimes…….. .

Indicator 7: Social connectedness
As students observe that there are others who are not good at using/speaking a foreign language, they are more open to talk and have more self-confidence.

Indicator 8: Process-focused thinking
Process matters far more than the outcome. If you don't enjoy the process, you will never ever be satisfied with the result. Students are obsessed with the outcomes but hopefully after completing this seminar they will understand that the process is more important than the outcome.
We set some priorities (a map of the situation) and we follow the "map" to success. By doing different types of exercises (sentences, texts) in which I include everyday situations (even sentences that refer to success, changes that one has to make in his/her life) I also teach my students the fact that they have to take everything step by step and finally they will succeed. Hopefully, at the end of the seminar, all my students will be able to use the correct forms of the verb tenses in different situations.

PERSONAL EVALUATION

By asking students to formulate sentences using the present simple/continuous tense and letting them share their personal beliefs with the teacher and their peers I believe I give them the chance to see that each of us has failed sometimes, each of us needs help in learning and that we are there to help and not to judge them. Students have more self-confidence, and they are more engaged in the activities as they know that even if they make a mistake, there is always somebody who can help them. I believe I managed to demonstrate to students that being confident in your own power is the key to success.

Education Sciences – Pedagogy

TEACHING LESSON PLANNING USING GROWTH MINDSET

Anita Sila, University of Primorska, Slovenia

FACT BOX

Study/degree programme	Preschool education
Degree level	Bachelor (first-year students)
Course type	Seminar
Topic	Writing lesson plans for teaching foreign languages to very young language learners
Duration	60 to 120 minutes

DESCRIPTION

Description of the overall course:
Course: Teaching English to Very Young Language Learners
Students learn about different dimensions (the process of the lesson, difficulty of the activities, different learning styles, different support, tec.) they have to consider while planning a foreign language lesson for very young learners. Thus they learn how to design appropriate learning activities for very young foreign language learners.
Course Unit: Lesson planning

Learning goals
My students should be able to plan the activities for very young language learners with different learning styles. They should also choose the aim of the lesson and explain the process of learning (what the teacher and children do) and prepare instructional material and other tools. They should also evaluate different teaching activities, materials, tools (games, videos, music …).

Description of the teaching activity
First, the professor presents the form of a lesson plan (topic, aim, vocabulary, language structure, materials, phases: 1. Motivational part, 2. The main part, 3. Checking understanding part). The professor also explains that the activities should be designed for children who learn English as a foreign language and that the teacher is supposed to speak only in English. The teacher presents a lesson plan for teaching about zoo animals in English.
After the introduction students are asked to write their lesson plans in groups for different topics (e.g. Teaching about colours/numbers from 1-10/pets/fruit in English. They can choose their own topic).
Students discuss their ideas in groups and try to follow the plan presented by the professor. The professor listens to their discussions and helps each group just with questions if needed. The professor does not give the solution, but helps the student understand and find the solution by themselves. The professor motivates students to come up with creative and interesting ideas.

The key points of the teaching example are that students learn how to write the aim of the lesson, which words to include, what materials are appropriate. They also learn which activities are appropriate for the beginning of the lesson and which for the end. What is more, they learn which activities facilitate children's thinking and learning. For the presentation of lesson planning the teacher showed lesson plan templates, different materials and tools (toys, games, handouts, flashcards, videos).

When students are done with lesson planning, each group presents their own lesson plan. Students listen to all presentations and then together with the teacher evaluate the appropriateness of the activities. For better understanding, they sometimes have to do the activity they planned in the classroom with their colleagues (thus they find out if the activity they planned also makes sense in practice). During the discussion at the end, students get ideas for improving their lesson plan. At the end of the lesson, students are asked to share what they have learned and how – what made them think of other strategies and ideas.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Students are encouraged to discuss their own creative ideas, to evaluate them and then to improve them by themselves in groups.

Indicator 4: Controllability about success
The students eventually managed to plan the lesson by themselves, as they were just encouraged by the teacher to find the strategies.

Indicator 5: Feeling of autonomy
Students choose their own topics and share their own ideas for lesson planning. They are creative as they can add whatever they think is appropriate.

Indicator 6: Feeling of competence
Students present their lesson plans and then evaluate them at the end. If needed, they also present their activities with their colleagues in order to see if they make sense in practice.

Indicator 7: Social connectedness
When students present the activities, the roles in the group are divided (one of them presents the stages of the lesson and the others each lesson separately in details), so no one is excluded. Group work is emphasized here.

Indicator 8: Process-focused thinking
During the lesson, the students learn that even when the task seems difficult at the beginning, it can be solved with the help of others and by thinking out of the box, by finding new ways.
The lesson offers students the opportunity to plan and evaluate their own learning and teaching. Through different stages of the lesson, students have the opportunity to exchange ideas and discuss among groups. Afterwards, they have the opportunity to evaluate their plans and improve them. This lesson offers the students the possibility to think out of the box and to come up with ideas that are not provided by the teacher. The students have also seen the process of teaching that can be used with preschool children as well.

PERSONAL EVALUATION

In my opinion, it is successful because students have learnt how to plan the lesson for teaching foreign languages to very young language learners on the examples they planned and carried out in groups on their own. Through evaluation, they found out what is good and what should be improved.

Students say that this lesson is very useful for other subjects as well.

English

DEVELOPING AND IMPROVING ONE'S WRITING COMPETENCE - WRITING ACADEMIC ESSAYS

Samuel Hafner, University of Klagenfurt, Austria

FACT BOX

Study/degree programme	English Studies
Degree level	Bachelor (more experiences students)
Course type	Seminar
Topic	Writing academic essays
Duration	A whole semester

DESCRIPTION

Description of the overall course:
This course is part of the English study programme and focuses on the development of the student's writing ability, especially writing academic essays. There are three courses devoted to developing students' writing competence and this example represents number 2. Part 1 focuses on writing individual paragraphs and the correct use of language, linking devices etc. Part 2 focuses on writing essays with an introduction (incl. thesis statements), main body and conclusion. Part 3 focuses on doing research for assignments, using quotations appropriately, avoiding plagiarism, and organizing writing.

Learning goals
My students should be able to
- know about proper essay structure (esp. thesis statement, supporting paragraphs, and conclusion)
- write a proper introduction to an essay
- write appropriate thesis statements
- write appropriate supporting paragraphs
- write proper conclusions to an essay
- write in academic style

Description of the teaching activity
The first lesson begins with a short revision of the basic types of a paragraph (topic sentence, supporting sentences and a concluding sentence). This includes an exercise where students have to identify good/bad topic/supporting/concluding sentences in examples. In case of the assessment "bad", they have to explain and provide a better alternative. This is done in small groups. As homework, students have to write a paragraph on a given topic and upload it to the learning platform Moodle. This assignment is not graded, but since the students uploaded the examples online, the lecturer has a chance to look through them and collect examples of good and bad aspects of the paragraphs.

In the next session, these are then discussed (anonymously) in the group. The students always have the chance to ask questions and explain what they thought when writing their paragraphs. The students then get a chance to correct their writing until the next time, where the writing is then graded. The idea is then to put the original work, the text with the lecturer's feedback and the corrected version based on the feedback into a writing portfolio. This makes sure that the students see their progress and all the work they have done. Additionally, the final grade is also based on the portfolio, especially on the corrected versions and how much effort they put into the corrections and how much they improved.

The same logic is then applied to writing the introduction (including the thesis statements), the conclusion, and the main paragraphs. In addition, for most topics, a peer-review process was also part of the session. This means that the students writing are not only looked at by the lecturer (to distil the bad/good parts), but also by a peer, a student of the class. This means that before the grading, the examples are discussed in the group and got feedback from another student. The peer-feedback process is guided by feedback forms that include the most important parts of the subject (e.g., for the conclusion: Does it summarise?, Does it introduce a new idea? etc.). It is important to note that the form also prompts the reviewer to highlight things that the text does well (in the form of "What I liked most …")

An important part of some lessons is a discussion part after introducing something new. When new aspects are introduced, e.g., what is a thesis statement, existing examples (e.g., from last year's class) are reviewed and students have to first discuss in pairs why a certain sentence is a good/bad thesis statement, provide a better alternative and then share their results with the group. This ensures that they have to think to assess why a certain example is good/bad and also hear what others think.

After every single aspect of the essay has been discussed (around 7 sessions á 90 minutes), students start writing complete essays on given topics. An important aspect here is to always discuss the task in the group and think about ideas that we can write about (basically a brainstorming session). The first essay is written with a partner. The other 2 essays are written individually. Each essay gets reviewed by a peer and is provided with feedback from the teacher.

The course is completed by an exam where students have to show what they learned during the course. The grade is based on this exam and the portfolio.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
The aim of this course is to develop students' writing skills. It is made clear from the beginning that writing is a complex task that takes time to develop. Students get many opportunities to improve their writing and the final grade is partly based on the portfolio and how much they improved on their original writings.

Indicator 4: Controllability about success
Since the portfolio was an important part of the grade and the students, it was very clear that putting effort into their writings, looking and thinking about the feedback and revising their texts accordingly, it was clear effort is key to success here.

Indicator 6: Feeling of competence
Students get feedback on all their writings: from the teacher and from peers. The peer-feedback form also includes parts that went well. Moreover, since they start with the individual elements of an essay, they later see how the individual parts that they have learned fit together to form a complete essay. So they can experience how they can use the things learned.

Indicator 7: Social connectedness
The students give feedback to others and receive feedback from peers. They experience how others see their work and what they things is good/bad. Moreover, students also give feedback to others and so help them become better. They can share what they know to help others.

Indicator 8: Process-focused thinking
Students are explicitly made aware that writing is a skill that takes time to develop. Writing is a process. This is also reflected by the design of the course. Not only do the students learn to write an essay step-by-step, but they also get the chance to correct their writings based on the class discussions and the lecturer's and peers' feedback. The process focus is then also reflected in the grade by incorporating the portfolio and the progress students made.

PERSONAL EVALUATION

I think the design of the course really helps to emphasize that writing is a process and takes time to develop. Students gave the feedback that the step-by-step design, as well as the constant feedback, really helped them in learning how to write an essay. Even students who struggled at first with writing said that they cannot write had the feeling that they improved considerably during the course – which was also reflected in their final grades.
I really believe that the course helped students see that if they put enough effort into it, they can succeed.
The discussion of the good/bad elements at the beginning of the sessions worked really well. Students had very constructive ideas. Moreover, they reported that it was very helpful to see positive examples and get explained why something is not considered good.
The peer-review part sometimes also did not work so well because some students did not put that much effort into the feedback.

Mathematics

SOLVING PROBABILITY OLYMPIAD PROBLEMS USING GROWTH MINDSET

Ebru Ersari, Balıkesir University, Turkey

FACT BOX

Study/degree programme	Teacher Education (Mathematics)
Degree level	Bachelor (more experienced students)
Course type	Seminar
Topic	Probability
Duration	approximately 180 minutes

DESCRIPTION

Description of the overall course:
Course Name: Problem Solving in Mathematics
Participants: Middle school preservice teachers
Course Description: The purpose of this course is to develop preservice teachers' problem-posing and problem-solving strategies.
Course Unit: Developing preservice teachers' problem-posing and problem-solving strategies on Probability Olympiad problems.

Learning goals
My students should be able to
- explain problems and related concepts in mathematics education
- explain problem types
- explain the importance of problem-solving
- explain teaching problem-solving and its purpose
- explain the relationship between problem-solving and other factors relevant to mathematics education
- explain problem posing and related concepts
- explain problem-posing strategies
- teach problem-posing
- prepare problem-solving activities
- use problem-solving and problem-posing together.

Description of the teaching activity
The purpose of this activity is to develop preservice teachers' problem-solving skills as well as their problem-posing skills on TÜBITAK's (Scientific and Technological Research Council of Turkey) Olympiad probability problems for middle school students (https://bilimolimpiyatlari.tubitak.gov.tr/tr/gecmis-sinav-sorulari). These Olympiad questions are selected since they are challenging for not only middle school students but also for preservice teachers. First, preservice teachers are asked whether they are familiar with Olympiad mathematics problems and whether they solve the problems before in order to have some understanding of their familiarity with the Olympiad problem types. Then, preservice teachers are asked to solve some Olympiad probability problems by themselves first in order to understand their problem-solving skills. Preservice teachers share their solution strategies with their classmates. Their classmates make comments on each other's solutions. Possible other solution strategies are dis-

cussed as a whole class. Then, how middle school students can solve the problems is discussed. Possible middle school student solutions, as well as their possible mistakes and misconceptions, are discussed. Then, preservice teachers discuss how they can pose probability problems to middle school students. In the end, preservice teachers are asked to share their thoughts on the similarity and differences between their problem solving and posing strategies as well as middle school students' possible problem solving and posing strategies.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
First, they have to show what they can solve, but the focus is very much on developing their problem-solving and posing strategies as well as developing their understanding of possible middle school student reasoning. This is done by letting them discuss their problems.

Indicator 4: Controllability about success
Preservice teachers recognize their own content knowledge in probability problems when they work individually. When they spend some time on the problem and try to figure out how to solve the problem, they recognize the value of effort. When they discuss their problem solving and posing strategies, they try to figure out their classmates' strategies. Figuring out their classmates' strategies also value the impact of effort in learning.

Indicator 5: Feeling of autonomy
Preservice teachers can solve the problems with any strategy they want. Their solution strategies vary depending on how they want to solve the problem. They are free to use technology, hands-on materials or constructing their own materials when solving the problems.

Indicator 6: Feeling of competence
Self-assessment, peer feedback as well as instructor feedback are provided during the activity. With the help of self-assessment, they compare their old knowledge with their new knowledge and assess how much they have learnt. Since Olympiad problems are challenging and require deeper knowledge of content and strong mathematical reasoning, they recognize how much they have learnt. Also, getting feedback from peers about their strategies help them reflect on their newly acquired competence. Similarly, getting feedback from the instructor on their reasoning help them make sense of the extent they have learnt, which parts are confusing for them, and why they are confusing.

Indicator 7: Social connectedness
When preservice teachers get stuck on solving and posing problems, they can get help from their classmates and the instructor. They have a chance to share their work with their classmates as well as learn from their classmates different strategies regarding problem-solving and posing. They recognize the critical impact of sharing their work and getting feedback from them.

Indicator 8: Process-focused thinking
Even though preservice teachers share their product (their solution and posing strategies), dealing with how to solve the problems and understanding different ways is emphasized. Rather than finding the right or wrong answer, how preservice teachers solve the problem and what type of problem-solving strategies they try are important. When they get stuck on their solution, they can get help from their classmates and the instructor. They can also use online and offline materials as they need during the activity.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?
1. Giving them challenging task provides them learning opportunities.
2. Learning various strategies rather than one single strategy provides them deeper understanding of the content.
3. Getting help from significant others help them continue to solve the problems and try different ways of solving and posing the problems.

What went well?
1. Discussion and making comments on each other's work go well.
2. Using technology to explore different ways goes well.

What did not work as expected?
1. Problem-solving and posing tasks take longer than expected.
2. Discussion time takes longer than expected.

Mathematics

TEACHING THE STATISTICAL PROGRAM R

Carina Spreitzer, University of Klagenfurt, Austria

FACT BOX

Study/degree programme	Psychology/Applied Statistics
Degree level	Bachelor (first-year students)
Course type	Lecture – Proseminar (combined)
Topic	Introduction to R
Duration	A whole semester

DESCRIPTION

Description of the overall course:
The course "Statistic exercises I" takes up the contents of the course "Statistics I" and concentrates on their implementation in statistical programmes. The programs used are the open-access program R (R Core Team, 2021) and the paid SPSS (IBM Corp., 2020). The course should enable the students to understand the basic syntax of both statistical programmes. As a foundation course for further advanced courses, it is important to convey to the students that learning two new programmes ("programme languages") is an ongoing process. In terms of content, the focus is on descriptive analysis and graphical representation of data.

Learning goals
My students should be able to
- apply basic syntax in new situations to model more complex contexts.
- carry out descriptive analyses on different contexts (be aware of scale level etc.).
- adequately produce graphical representations to show analyses carried out

Description of the teaching activity
Before a specific unit of the course is described the general structure of the course " Statistic exercises I " is explained. The participants of this course are mainly students of the Bachelor's programme in Psychology who are in their first semester. For this cohort, learning a computer programme or its syntax is new. It is extremely important in the course to activate process-thinking from the students. Programme code is not something that can be reproduced, but must be used and written according to the situation and the application. Therefore, in the first unit, the students are presented with a problem from a current context (e.g. in the pandemic year 2021 - Corona data) and shown how helpful the programmes are in order to be able to carry out various analyses. The content presented deliberately exceeds the students' knowledge in order to make it clear that learning a new programme is made up of countless small parts. The foundations for this are, on the one hand, the knowledge of basic commands and, on the other hand, their application in new contexts, for which the commands are repeatedly reassembled. These two fundamentals are reflected in the course structure. During the respective course units, new commands and syntax elements are presented to the students, which they can then apply independently in exercise sheets. Students receive feedback on the exercise sheets in order to be able to learn from possible mistakes. This builds up their knowledge of the programming language in a process.

The following unit relates to the graphical representation of a linear regression example with one predictor variable in the statistics programme R.

In this lesson, the following topics are covered:
- Read data into R
- Visualisation of the data - distributions etc.
- Linear regression analysis with one predictor variable
- Graphical representation of a linear regression

Plotting a regression line including residuals in a scatterplot requires some prior knowledge and preparation. This is a first, more complex application example for which it is necessary to combine code elements learned in earlier units and to generate knowledge from them. In the first step of the lesson, the students' prior knowledge is activated by posing a question, which is answered by regression analysis. In each step, the students are encouraged to come up with solutions on their own. They should build up self-confidence in dealing with the programme code. The code for regression analysis is already known to the students (e.g., lm(y~x)). In the second step, another part of the prior knowledge is activated - drawing a scatterplot (plot(x,y)). Now the known knowledge should be linked. The students are asked to consider and discuss with their partners how the regression line can now be drawn into the scatterplot. It is important to realise that an already familiar command for expanding graphs (abline() - drawing lines in graphs) is necessary. This command was deliberately not repeated in advance in order to solve a novel application independently. Volunteer students can present their solution approach. The respective approaches to the solution will be discussed. The enriching thing about this phase is that the students provide different suggestions, which, however, all mostly arrive at the correct solution. This should make it clear that there is no "one" correct solution when working with programme code, but that a wide variety of approaches lead to the solution. However, not only "correct" examples are discussed, but also examples in which an error message occurred. This should encourage students to continue to work actively and to learn from their mistakes. Through the discussion of error messages, misconceptions about a programme code are often revealed and can be corrected. The discussion of error messages is just as important as the discussion of correct solutions, as knowledge about the programme code can be built up step by step through this. In the last step, the residuals and their deviations are plotted on the scatterplot.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
The questions on the exercise sheets require the students to apply their knowledge in new contexts. Reproduction knowledge is hardly asked for because it is only through the comprehensible application of the commands that the students are able to use the programmes later for their required analyses.

Indicator 4: Controllability about success
Learning a programming language lives from trial and error. The students are encouraged to try out new ways because there are various approaches to be able to carry out an analysis. Furthermore, the students are trained in dealing with error messages and warning messages. An error message does not mean that you have done something wrong, but that you need to rethink your approach. Regarding error messages and warnings, there is a large community in Internet platforms that helps in solving problems independently.

Indicator 5: Feeling of autonomy
In most cases, there is not one way to solve a problem. Students are encouraged to provide different suggestions in the learning phase. This should make it clear that there is no "one" correct solution when working with programme code, but that a wide variety of approaches lead to the solution.

Indicator 8: Process-focused thinking
The learning of a new syntax is subject to a process, which shows itself in the linking of individual commands to chains of commands for the required analysis.

PERSONAL EVALUATION

Through application-oriented questions on the exercise sheets, it was made clear to the students that they can develop their skills independently. They were able to show that they could apply the newly learned knowledge in new situations after only a short time. At this point, it is of course important to make sure that the questions correspond to the students' prior knowledge and understanding. If too little attention is paid to this, it can lead to frustration and dissatisfaction, which has a negative effect on the process. As long as the examples correspond to the students' level of demand, this can increase the students' motivation and willingness to perform. Contrary to the expectation, it took the students a few units to see error messages or warning messages as learning opportunities and to use them. Initially, these led to increased frustration. More attention should be paid to the importance of error messages in the learning process.

Psychology

MASTERING LEARNING STRATEGIES IN HIGHER EDUCATION

Ana Bardorfer and Maja Lebeničnik, University of Primorska, Slovenia

FACT BOX

Study/degree programme	Study programmes related to education
Degree level	Bachelor (first-year students)
Course type	Tutorial
Topic	Learning of learning
Duration	360 minutes

DESCRIPTION

Description of the overall course:
Psychology for social pedagogues is a course in which students are taught topics from developmental, educational and social psychology. The described topic is a part of the 'educational psychology' part of the course.

Learning goals
My students should be able to
- understand the theoretical underpinnings of the concept of self-regulated learning as in Zimmerman's model (concept, phases, strategies of learning)
- understand distinction between cognitive (learning), metacognitive and motivational strategies for learning
- knows the procedures for using three specific learning strategies: complex reading strategy, note-taking and learning by listening
- use presented learning strategies in their actual learning
- reflect on the use of learning strategies
- support school children in learning of learning

Description of the teaching activity
Firstly, a short theoretical introduction is given regarding the concept of self-regulated learning. Students become familiar with different phases and different strategies as presented in Zimmerman's model of self-regulated learning. Further we present them with some of the most common strategies, relevant in the context of higher education (in our case: note-taking, mind-mapping, learning by listening and use of a complex reading strategy).
We give students several tasks in which they can practice the use of the presented strategies in a real and relevant learning context. The learning material for activities is related to learning topics, covered in the course.

Tasks involve:
1. taking notes while listening to any lecture of the course,
2. taking notes, using a complex reading strategy, when using printed material for learning (we provide them with adequate material about a specific topic, e.g self-concept – (handbook chapters about self-concept, articles about self-concept)
3. preparing mind-maps while reading from printed material (from the same material as in the previous

point).

The time frame for performing these activities is two to three weeks.

At the end students prepare a written assignment in pairs in which they present produced material (notes and mind-maps) and write a reflection on the following: What strategies work for me? Why? What have I learned? Did knowledge on self-regulated learning and learning strategies somehow change the way I learn or think about my learning process? What were the obstacles I encountered while using strategies? How useful do I find these strategies for my further learning?

Detailed feedback is provided on a written assignment.
- Feedback on the effectiveness of produced mind-maps will be provided by a teaching assistant.
- Feedback on the use of a complex learning strategy will be provided by a teaching assistant.
- Students of each pair will provide a critical evaluation of lecture notes of a colleague, answering the following questions:
  - Are the notes of your colleague readable and understandable? How yes/no?
  - Which method of note taking did your colleague use?
  - Are the main points separated from supporting information? How?
  - Do the notes make sense? How yes/no?
  - Are recall questions provided? Are the answers in the notes highlighted? How?
- Is the summary provided? Is the summary correct?

Could you study efficiently from these notes? Why yes/no?

Formal assessment (no grade)
- At the end a knowledge test for evaluating recall, understanding and usage of attained course knowledge is applied.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
With this activity students actively develop skills related to self-regulated learning by practicing how to use organizational learning strategies (making notes, mind-maps).

Indicator 2: Learning strategies
The whole activity is teaching students how to use learning strategies more effectively.

Indicator 4: Controllability about success
By explaining the process of self-regulated learning and presenting efficient way of using learning strategies, we encourage students to take control over their learning.

Indicator 6: Feeling of competence
The strucutred feedback provided by a teaching assistant and by a colleague will give students feedback regarding the process of using different learning strategies. The knowledge quizz will give them information regarding how much they learned, using these strategies.

Indicator 8: Process-focused thinking
Students begin to understand learning as a process that happens in phases and critically think about their learning process and way to learn in a more efficient way.

PERSONAL EVALUATION

Because higher education in comparison to high school environment is less structured learning environment, students gain higher autonomy, control and responsibility for their own learning. Students who are not good self-regulated learners may therefore experience many problems and even failure at the higher education level. If students have a fixed mindset, then encountering problems or failures during learning, at first exams, may lead them to believe that they are not good at learning, they can't learn this kind of material, they have never been good at remembering learning material, they should change the study course etc. By demonstrating, practising and reflecting on the use of several learning strategies they can actually use in their learning process, we support students in the understanding of their learning and give them tools for more effective learning. Hopefully, skills and competences gained with this activity will support them in more efficient preparation for studying from literature and learning from lectures, which are both very important parts of learning at the university level. Having positive experiences with the use of learning strategies, we hope, that students will be able to transfer their learning competences and form a growth mindset about learning into their future work with children, who may be experiencing learning difficulties.

Psychology

ESTABLISHING EMPATHY IN THE FIELD OF SUPERVISION

Ugur Gurgan, Balıkesir University, Turkey

FACT BOX

Study/degree programme	Educational Sciences and Counselling and Guidance
Degree level	Bachelor (more experienced students)
Course type	Seminar with exercises
Topic	Empathy skills
Duration	480 minutes

DESCRIPTION

Description of the overall course:
Course Name: Individual Counseling Practices
Participants: Educational Sciences and Counselling and Guidance candidates
Course Description: In this course, it is aimed that students develop their counseling skills, learn how to provide the helping relationship and therapeutic cooperation, develop case conceptualization skills, use basic counseling interventions and techniques, and increase their awareness as an individual and as a counselor. This course is carried out on theoretical issues and psychological counseling practices.
Course Unit: Establishing counsellor candidates' empathy skills

Learning goals
My students should be able to
- know counselling skills and conditions
- develop case conceptualization skills
- gain proficiency in the use of therapeutic skills and conditions and basic interventions and techniques in individual counseling sessions
- develop individual counseling experience with real clients
- develop their professional identities and sensitivities to legal/ethical issues related to counseling.

Description of the teaching activity
First, counsellor candidates are asked to define what empathy is and what the types of empathy are (cognitive, emotional, and physical empathy). Then, the levels of empathy are introduced (levels from 1 to 5) (Acar Voltan, 2010; Carkhuff, 1969) . Then, practices about the application of empathy are given to students as homework. Then, the candidates interact with clients from Counselling Department at the university. The sessions are videotaped with the consent from the clients. Candidates transcribe their sessions. They also provide an explanation on the type of empathy and the level of empathy. Then, they get supervision from the instructor. Counsellor candidates ask open-ended questions to explore the problem. Some questions are: What happened during the last week? Wat were your emotional problems recently? What did you feel when a problem happened?
The goal was to help the clients to reflect on their emotions and understand whether the candidates understood their emotions correctly. They need to listen to their clients to understand their problems. They develop to empathize their feeling and problems. They also develop their social skills and communication skills, pre-social skills. They also have chances to apply what they learned from the lesson session. They also have a chance to get feedback from the instructor. They are motivated on their jobs

by recognizing the value and necessity of their jobs.

Some resources related to empathy that are discussed in the class are as follows:
https://www.researchgate.net/publication/316582875_Empathy
https://www.researchgate.net/publication/277951031_What_is_empathy_for
https://embrace-autism.com/the-different-types-of-empathy/

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Students developed their empathy skills and competences by applying and giving supervision. Also, their learning is supported with assignments. They have chances to apply their learning in their jobs in their lives.

Indicator 4: Controllability about success
The instructor emphasizes that anyone can improve their empathy skills and those skills can be learned by practice and appropriate guidance.

Indicator 5: Feeling of autonomy
People who develop empathy for others gain awareness of their own emotions as well as their autonomy. The interviews are semi-structured rather than structured. Counsellor candidates can ask interview questions depending on clients' responses.

Indicator 6: Feeling of competence
The instructor plays role as a supervisor and provides feedback while watching the videotaped interview sessions individually. When the candidates provide correct feedback to the clients on the interviews, their responses were reinforced by the supervisor by stating that they did a good job on the interview. By giving feedback, the candidates' interview strategies and responses to clients are corrected until reaching the required competence level.

Indicator 7: Social connectedness
The topic is related to empathy which is directly related to connecting to others. They understand how understanding others is valuable. They are capable of solving other people's feelings. Empathy provides connecting emotions with each other and helping others. Counsellor candidates become satisfied with their job when they help other people.

Indicator 8: Process-focused thinking
First, students are given theoretical background. Then, they apply what they learn. Then, they analyze their application under a supervisor. They develop their
counselling and empathy skills during the activity.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?
1. They learn new skills by applying them in the field. They develop their empathy skills.
2. They empathize not for grade concerns but helping other people and know them further.
3. When they help other people as counsellors, they also develop their own skills.

What went well?
1. They correct their mistakes.
2. They used application under supervision.

What did not work as expected?
1. Counsellor candidates needed more time depending on the problems.
2. Finding suitable clients takes more time than expected (the type of cases are chosen based on counsellor candidates' level). Every client was not matched to counsellor candidates.
3. Because of the pandemic, the face-to-face interviews had to be switched to online interview sessions.

Counsellor candidates shared that the course session was helpful for learning other people's emotions as well as their own emotions. They were happy to apply their knowledge in the field. They feel enthusiastic to help others. They shared that as part of their jobs, helping others is very satisfying. They also shared that getting supervision was helpful for them to correct their mistakes.

Psychology

DEVELOPING FAMILY COUNSELLOR CANDIDATES' CONFLICT RESOLUTION SKILLS BETWEEN COUPLES

Ugur Gurgan, Balıkesir University, Turkey

FACT BOX

Study/degree programme	Educational Sciences and Counselling and Guidance
Degree level	For adults who got their undergraduate degree (The training was given at Balikesir University Continuing Education Center for sociologists, psychologists, doctors, nurses, psychological counsellors, social workers between the ages of 23 and 50)
Course type	Training (Psychoeducation program)
Topic	Training to family counsellor candidates on the topic focusing on pre-marriage and preparation for marriage training for couples
Duration	600 minutes

DESCRIPTION

Description of the overall course:
Course Name: Family Counselling Training program
Participants: Sociologists, nurses, social workers, child development specialists, psychologists, psychological counsellors, doctors
Course Description: Training for family counsellor candidates about resolving psychological problems faced by couples who apply to family counselling.

Learning goals
My students should be able to
- develop their psychological problem-solving skills.
- help couples solve psychological problems they face.
- give trainings to couples on psychological problems.

Description of the teaching activity
First, students are given theoretical background on psychological problem-solving skills and strategies. They are given slides on psychological counselling techniques. They do homework on psychological counselling techniques by writing scenarios. Some techniques are Hills' ABCX model, reframing technique, and reflecting emotions techniques (Gladding, S. T., 2014; Nichols and Davis, 2017) . The instructor reads the scenarios and selects the suitable scenarios in the class. Students make comments on the shared scenarios. They play roles and imitate in the class as if they are couples as well as family counsellors. Two students imitate as if they are couples and one student imitate as if they are family counsellors. The counselling techniques were applied when students imitate. The feedback is given by the instructor as well as the other family counsellor candidates until they gain the correct use of the techniques.

The books that are used in the class are as follows:
Erford, B. T. (2015). *40 Techniques every counselor should know.* Pearson.
Gladding, S. T. (2014). *Family Therapy: History, Theory, and Practice*, 7th Ed., Pearson.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Family counsellor candidates develop their knowledge and skills related to psychological counselling. They improve their skill training competences. They learned new counselling techniques throughout the training.

Indicator 3: Metacognication
At the beginning of the course, for two class sessions, the instructor explained that it's all about neuroplasticity to see the basics of their own learning and to gain new skills. It is stated that they have a synaptic bond while learning new family therapy techniques. The scientific information provided to the trainees related to the development in the brain emphasizes the value of learning new techniques for trainees.

Indicator 4: Controllability about success
Trainees realized that they improve their family counselling skills by learning new techniques. The training is given to volunteers in relevant fields (Sociologists, nurses, social workers, child development specialists, psychologists, psychological counsellors, and doctors). These trainees are people from different disciplines who are more interested in learning new things and techniques.

Indicator 5: Feeling of autonomy
Trainees chose their roles themselves. They wrote scripts as they want. They have the flexibility to give feedback and share their ideas. They have the flexibility to use whatever family counselling techniques they want.

Indicator 6: Feeling of competence
Family counsellor candidates got feedback from the instructor as well as from other trainees on their roles as married couples or family counsellors. Their mistakes are corrected and more suggestions on possible counselling techniques are provided. Reinforcements are given for their correct techniques and strategies.

Indicator 7: Social connectedness
Different roles in different scripts are given. They see different techniques related to family counselling. They get training with people from different occupations and get their opinions. In the era of increasing divorce rate, trainees recognize the importance of the family once again.

Indicator 8: Process-focused thinking
They learn that problem-solving skills and their own vocational training are also a process. By getting into this process, they themselves learned new techniques. They improve their problem-solving skills by focusing on the process. They develop their problem-solving skills that they would encounter in the future. They participate in this training voluntarily, they have no financial gain.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?

1. They work with people from different disciplines
2. Growth mindset can be applied not only for students but also for experts.
3. It can also be applied in different disciplines.
4. Growth mindset can also be gained during in-service training. Trainees see that they can develop themselves and that they can learn new techniques when they focus on the process.

What went well?

1. Different problem-solving suggestions come from different disciplines
2. The importance of interdisciplinary studies is emphasized
3. Class participation is high with giving trainees chances by practising and role-playing. Their learning is reinforced by feedback.

What did not work as expected?

1. Some trainees have difficulties imitating and role-playing.
2. Some trainees have difficulties writing a scenario.

Psychology

HOW CAN I DEVELOP A TEACHING EXAMPLE FOR MY OWN CLASSES AND SUBJECTS?

Barbara Hanfstingl, University of Klagenfurt, Austria

FACT BOX

Study/degree programme	Program for Master of Education Individuality, difference and social dynamics in learning communities
Degree level	Master
Course type	Seminar
Topic	Development of teaching examples to foster a growth mindset
Duration	Half a semester

DESCRIPTION

Description of the overall course:
The course titled "Individuality, difference and social dynamics in learning communities" is part of the Master's program for teacher students who are already working in schools. It focuses on the field of tension between institutional tasks and social expectations and to develop personal strategies in order to act professionally even under hard conditions. Further issues are social networking for teachers, the reflection of diverse learning groups, and the fostering of personal resilience and pedagogical knowledge.

Learning goals
My students should be able to understand the core idea of growth versus fixed mindset on the basis of some theoretical background. Furthermore, they should have an idea of how to implement these strategies to promote a growth mindset in their own classes and subjects, with an emphasis on reflecting on their own thinking in relation to their students, perspective-taking with their students, and using the right language to promote a growth mindset.

Description of the teaching activity
The course is blocked, and this example takes two of four sessions of three to four hours each.
First unit: At the beginning, the students get an introduction to the idea of having a growth versus a fixed mindset. They see parts of a film by Carol Dweck (https://www.youtube.com/watch?v=J-swZaKN2Ic) to understand how Dweck is talking about the difference between different mindsets. After this, I give an overview of the theoretical background to the growth mindset approach (attributional style, achievement goal orientation, beliefs about mindset/metacognition, and self-determination theory. From these theories, we deduce indicators for a growth mindset fostering instructional style.

Key points: 1) Reflecting on the own mindset and the mindset of students, 2) Understanding theory and approach of a growth fixed mindset.

Between the first and the second unit, students are asked to produce their own small vignettes they can use in their own classes and subjects, e.g., mathematics, languages, science, or history.

Key points: 3) Finding a way to implement the things heard in the own teaching practice.

For the second unit, there are two possibilities: Either students can enhance the quality of their instructional examples by peer-reviewing, or, they can try it out with their own pupils. Of course, these two possibilities can be used during the same class.

Key points: 4) Trying it out and/or reviewing examples of others.

I concluded the second unit by a shared reflection on the impact a growth mindset might have for students, the extent to which it helps them reach their potential, and what teachers can do to enhance that impact.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
Providing information about the impact of learning goals in contrast to mastery goals:
Performance (ability, ego) goals: Focus on gaining favorable judgement or avoiding unfavorable judgements by others.
Mastery goals: Concentration on the content to be learned, the focus is on wanting to understand.

Indicator 2: Learning strategies
Presenting and discussing different learning strategies, such as elaboration strategies, organization strategies, self-control and self-regulation, motivation and emotion control, and cooperative learning strategies.

Indicator 4: Controllability about success
Providing information about attribution theory and attributional style, and how attribution retraining work in classes.

Indicator 5: Feeling of autonomy
Students learned a) about self-determination theory and b) could choose freely which example in which subject they want to develop.

Indicator 6: Feeling of competence
This indicator was met through two activities. First, through the peer review portion, in which students peer reviewed their own teaching examples. Second, through the collective final reflection on what practical impact a growth mindset has on their own work in the classroom.

Indicator 7: Social connectedness
Through peer-feedback students experienced that their colleagues benefit from good and constructive feedback.

PERSONAL EVALUATION

1. I was really surprised about the relevance the topic had to my own students. The class began with information about demotivated pupils who did not want to learn, thinking that they are not smart enough for some school stuff. When I introduced the idea of growth versus fixed mindset, my students had a real aha moment. They experienced to what extent the beliefs about fixed intelligence, future perspectives and missing future aspirations influenced their own students' feelings, emotions, and motivation.

2. The general understanding of how a growth mindset works went well. The implementation in the own classes ran also positively.

3. The peer-review process ran suboptimal since we were forced to change from a planned face-to-face unit to an online format. In my experience, teacher students here need a little bit more support.

Psychology

MY SEMESTER GOALS – DEVELOPING AND EVALUATING MY INDIVIDUAL ACTION PLAN

Katarina Kocbek, University of Primorska, Slovenia

FACT BOX

Study/degree programme	Psychology, Educational sciences - with some modification for other studies as well (but you would need to explain Bloom taxonomy, Self-regulation etc)
Degree level	Bachelor (more experienced students), Master
Course type	Seminar
Topic	Goal setting, Self-regulation, Motivation
Duration	A whole semester

DESCRIPTION

Description of the overall course:
Educational psychology (masters) – the students deepen their knowledge in the field of educational psychology with topics such as cooperative learning, social belonging, goal setting and motivation, self-regulation, summative and formative assessment.

The teaching example was carried out with master students, but I believe it can be done with bachelor students in the final year as well, especially psychology/educational sciences students (who should be to some degree already acquainted with these topics).

Learning goals
My students should be able to
- Set learning goals/objectives for themselves according to Bloom taxonomy;
- Set specific learning objectives with SMART method of goal setting;
- Determine and specify examples of levels of knowledge they wish to obtain (e.g., factual, conceptual);
- Explore and determine their intrinsic motivation for the course;
- State concrete steps to achieve set goals (using mostly self-regulation strategies);
- Determine possible obstacles to achieving goals and devise a plan to overcome them;
- Reflect and evaluate the success of their prepared individual plan.

Description of the teaching activity
The teaching example was a part of the Educational psychology course but the individual plan that the student devised for themselves could pertain to other courses they had in that semester (eg. Methodology, Clinical psychology). For a better understanding of the teaching example, please take a look at the attached worksheets to see the exact content and how the process is structured.
In the beginning of the course, the task to devise this individual semester plan was presented to the students. Knowledge of Bloom taxonomy, Self-regulation strategies etc. was first renewed with the students. The idea behind the task was explained to the students – to prepare individual study goals-objectives for the semester and to use this plan to help manage their studies in general, their learning and to help them find meaning in their course work. An additional goal of this task was to help them use theoretical concepts from Educational psychology in practice and in their everyday life (e.g. the students think about specific learning strategies and how they will implement them in their studies; the

students look at the curriculum/content of the course they chose for their individual plan and try to set learning objectives for themselves based on the curriculum/content).
The students were given worksheets in two parts – the first part was to be done in the first two weeks of the semester and the second part was to be done in the last week of the semester.
The first worksheet guides the student in determining different parts of the individual plan from goal setting to self-assessing the probability of success. They start with choosing a study area/course covered by their plan, then they set learning goals and specific knowledge they wish to obtain in the course, think about their interest in the course and how the course will help them professionally/personally (this is meant to help increase their intrinsic motivation). In the next stage, they write concrete steps they will take to achieve their set goals, the focus here is on self-regulation strategies they will use to achieve the goals and they need to also think about which strategies they already have developed sufficiently and which they need to develop. In the last part of the worksheet/plan, the students think about obstacles they will probably face when trying to achieve their goals and they develop a concrete plan on how they will try to overcome them. Lastly, the students self-assess their chance of success on a scale from 1-5 and write and justify at least 5 reasons why they can succeed with a focus on their strengths that can help them with this.
The second worksheet guides the student through self-evaluation and reflection of how the plan was carried out during the semester. The worksheet starts with an assessment of progress (which goals were (partially) achieved), they reflect on the obstacles they faced and how/if they addressed and overcome them. They specify what was most helpful/effective in achieving their goals (concrete strategies, ways of working etc.). The second worksheet ends with another self-assessment on a scale of 1-5 and a plan on how they will continue if their goals were not achieved yet.
The example was "closed" with providing individual written feedback to each student along with grading.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
The plan the students devise should be carried out during the semester (e.g., Using self-regulation strategies in their studies) and also their skills are developed through the preparation of the plan with guided steps.

Indicator 2: Learning strategies
This indicator is incorporated in the content of the task (the students must think about self-regulation / learning strategies and provide a plan on how to use them to achieve their learning objectives).

Indicator 4: Controllability about success
In the plan, the first reflect on and state why they are interested in the course they have chosen for this individual plan, they write down why they wish to achieve their goals, then they reflect on how the acquired knowledge will help them in their career paths/personal life with the goal of recognizing and increasing their intrinsic motivation for this course, then they reflect on the strategies they plan to use – do they already have them or should they develop the strategies necessary for achieving their goals? In the next step, they reflect and state which obstacles they could face when trying to achieve the stated goals and they have to list concrete ways on how they can overcome them. At the end of the individual plan preparation, the student must self-evaluate the possibility of success (how likely they think they are to achieve the goals stated in the plan?), state and explain at least 5 reasons why they believe they can achieve the goals and lastly, they have to list their personal strengths that can help them to achieve the goals.
So the activity, developing the individual plan itself, is meant to guide the student in reflecting on and recognizing the skills, strengths they need to succeed in a specific study course and empower them.

Indicator 5: Feeling of autonomy
The student can choose the study course for which he/she wishes to prepare the individual plan. The plan is structured, but the students are mostly free in preparing the content (they choose the strategies they think they will need etc.).

Indicator 6: Feeling of competence
The second part of the individual plan is done at the end of the semester and is designed to guide the students through self-reflection of different parts of the individual plan (which goals they have (partly) achieved; which obstacles they have faced and how they have overcome them; what was most effective in achieving their goals.

Indicator 8: Process-focused thinking
With this teaching example, the students were guided through the process of designing and evaluating their individual action plans. They set goals, thought about and set concrete plans on how to achieve them, thought about what obstacles they may face, why they can succeed and lastly evaluated/reflected on different parts of their plan. The structure of this teaching example follows the process of achieving set goals from the beginning to the end and examines this process from different perspectives, helping the students organize their thoughts.

PERSONAL EVALUATION

The students were in a way forced to really think about what they wish to achieve in terms of acquiring knowledge (and they were especially encouraged to choose a course for the individual plan they find difficult or boring). The whole process is meant to help the students break down the process of obtaining specific goals, think about the steps they need to take to be successful, determine obstacles in advance and plan on how they will overcome them, their intrinsic motivation is explored and hopefully developed through the process of developing this plan. When they read the document as a whole it is a concrete and operationalized plan on how they themselves can achieve their study goals.
The students mostly put the expected effort into the preparation of the plan and they achieved the learning objectives for our course – Educational psychology. They used the theoretical concepts in a more practical way.
One problem was that our course was finished a couple of weeks before the end of the semester, so some of the students had to evaluate their plans prematurely. The other problem was general work overload for the students and decreased overall motivation for their studies because of the Covid situation.

FURTHER WORKSHEETS

Psychology

MINDSET AND MOTIVATION IN A PRE-SCHOOL SETTING

Maja Lebeničnik, University of Primorska, Slovenia

FACT BOX

Study/degree programme	Preschool education
Degree level	Bachelor (more experienced students); part-time (In part-time study programmes are enrolled students who are already working in the kindergarten as teacher's assistants but are enrolled in formal education to become pre-school teachers.)
Course type	Tutorial
Topic	*Mindset*
Duration	180 minutes (4 pedagogical hours)

DESCRIPTION

Description of the overall course:
This unit is taught in a course called Pedagogical Psychology. In this course students learn about:
- forms and principles of learning
- cognitive factors affecting learning (e.g. intelligence, learning styles etc.)
- non-cognitive (e.g. motivational, social, emotional) factors affecting learning

The topic of mindset is included in the course as one of the factors, affecting children's learning motivation.

Learning goals
My students should be able to
- understand the difference between growth and fixed mindset
- understand the connection between mindset and people's motivation
- reflect on their own mindset
- reflect on the connection between their mindset and their work motivation
- shape praises and critics in a way to support the development of growth mindset in children

Description of the teaching activity
The activity has different phases, described below.
1. Self-assessment of the mindset (20 minutes):
- students fill out a self-assessment questionnaire by C. Dweck that measures mindset about personality
- students are presented with the key for calculating the score on the questionnaire
- each student calculates his/her score on the questionnaire

Resources: Slovenian version of the questionnaire can be found in Dweck, C. (2016). *Moč miselnosti.* Tržič: Učila International.

2. Lecture (60 minutes):

- The concept of the mindset: description of fixed and growth mindset, domains of mindset, the mindset of preschool children
- How mindset and motivation are related in mindset theory: how people with different mindsets cope with and interpret failures, setbacks, criticism, how they face new challenges, how they persist in difficult tasks…
- The role of praises and critics in forming mindset: Praises and critics that are directed towards the process (e.g. effort, training, using different strategies, finding help etc.) support growth mindset, and those directed towards the person or merely towards final achievement support fixed mindset, even if they are formed in a positive way.

Resources for the lecture:

- Dweck, C. (2017). Mindset – Updated Edition: Changing The Way You think To Fulfil Your Potential. London: Robinson.
- Dweck, C. (2017). The Journey to Children's Mindsets – and Beyond. *Child Development Perspectives, 11*(2), 139-144.
- Haimovitz, K. in Dweck, C. (2017). The Origins of Children's Growth and Fixed Mindsets: New Research and New Proposal. *Child Development, 88*(6), 1849-1859.

3. Group Activity and discussion: Recognising mindset (30 minutes)

- First students work in small groups (3-4 students). Students are provided with several statements and they have to identify if those statements are related to fixed or growth mindset.
- Further, each group has to discuss if they have encountered children's statements that reflect a fixed or growth mindset while working at the kindergarten.
- Each group then share several children statements with the class.

4. Interpretation of self-assessment questionnaire results (15 minutes):

- Students interpret their results on self-assessment questionnaire: do they have a fixed mindset, a growth mindset or no predominant personality mindset?
- In the discussion that accompanies the interpretation of their results, we point out that people can develop a different mindset for different areas, and that there are interventions for changing mindset, telling them in which situation personality mindset may be important, we also discuss the limits of using self-assessment questionnaires.

5. Reflection (10 minutes to present instructions for reflective report):
At home, each student has to prepare a short reflective report in which (s)he: presents his score and interpretation of the score on the questionnaire and reflect on that; is the way they normally respond to difficulties, critics, setbacks and failures on the workplace, consistent with their mindset?

6. Group activity (45 minutes): forming praises and critics supporting a growth mindset
In this activity, students work in small groups (3-4) and try to apply the theoretical knowledge learnt. Their task is to form as many as possible praises and critics, adequate for pre-school children in various contexts (e.g., when drawing, participating in learning or physical activities…) that support growth mindset or find alternatives for praises, oriented towards the person or achievement. Each group presents their cases to the class and we discuss them as a group.

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
One of the activities is aimed at developing competence for forming praises and critics, that support the forming of a growth mindset.
In the last activity, students are practicing how to form praises and critics that support growth mindset of children with whom they are or they will be working with in the future. In that way, students develop their skills for communicating with children. Also, this may affect how they criticise or praise themselves.

Indicator 7: Social connectedness
This activity includes several stages where students work in teams. They share personal details from their lives and from their workplace (e.g., what children said), which helps them connect to the topic and to each other.

Indicator 8: Process-focused thinking
With the presentation of the topic of mindset students become aware of the beliefs affecting their motivation (at work, while learning). They acknowledge that their motivation is a process and that by changing the mindset they can regulate their motivation, e.g., they may identify that their non-persistence or not taking new challenges at work may be related to their mindset.

PERSONAL EVALUATION

Why do you think the teaching practice was successful in fostering a growth mindset?
As As Carole Dweck said in her book, even just gaining knowledge about the concept of the mindset can make students act and think differently about the learning process. Within our tutorials, students learned to recognize beliefs and statements, consistent with each type of mindset and realized connections between mindsets and their motivation.

What went well?
Practice of the recognition of different mindsets and practice to form growth mindset-supporting praises and critics was effective to gain deeper knowledge on the concept and develop competences, supporting growth mindset in children.

What did not work as expected?
Some students developed the understanding that growth mindset is the same as 'positive thinking', believing you can do everything or that everything will be just fine. It is important to address such misunderstandings of the concept.

When discussing the topic of mindset, several students expressed the opinion that the topic is very interesting and important. Some of them were prepared to share personal information about their experiences with the teachers (especially negative experiences with teachers that supported fixed mindsets).

Psychology

WELL-BEING EDUCATION / POSITIVE EDUCATION

Irina Mihaela Trifan, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania

FACT BOX

Study/degree programme	Bachelor's degree programs
Degree level	Bachelor (first-year students)
Course type	Seminar / practical applications
Topic	Social and emotional intelligence, resilience, well-being
Duration	60 to 120 minutes

DESCRIPTION

Description of the overall course:
The teaching practice example is part of a course entitled "Well-being Education" which takes place in the first semester of the academic year. The semester encompasses 14 weeks.
The well-being of students or their well-being is a complex construct that can be approached from a psychological, physical and social perspective that involves an increase in the quality of student life.
Students' well-being also includes their resilience to cope with all personal and professional challenges in the healthiest way possible.
As such, Well-being Education / Positive Education addresses elements regarding social and emotional development (self-image, affective feelings, identity, trust, emotional balance, emotional self-regulation, emotional self-affirmation) of prosocial and relational behaviors (empathy, responsibility, goodwill, friendship, respect, etc.), collaboration and relationships (equity, prosocial attitudes, respect).
The aim of the project is to build lasting connections in the student environment, generating performance in learning by creating and promoting an education model that focuses on improving emotional knowledge and optimizing social behaviors.

Learning goals
My students should be able to
- achieve an adequate and balanced appreciation of actions and emotional states from the perspective of regulating one's emotions in order to initiate and maintain a dynamic balance in interpersonal relationships, ensuring emotional well-being and the success of these relationships.
- apply in a flexible and optimal way, the skills of control and persuasion, correct management of conflicts and difficult socio-emotional situations, the skills of teamwork in all formal and informal activities.
- build meaningful and lasting relationships with others using effective internal and interpersonal communication skills to meet future personal and professional challenges.

Description of the teaching activity
This course intends to provide students with theoretical and applied guidelines on the issue of emotional well-being and emotional stability in order to maintain a dynamic balance in their personal and professional development.

MODULE 1: SELF-CONSCIOUSNESS
The development of self-knowledge skills provided students with the leverage to form those metacog-

nitive strategies that will help them in the learning process, developing their self-regulation and emotional resilience. The students who participated in the course practiced strategies and self-knowledge techniques through which they managed to become aware of their own emotions and to learn how to regulate them in maintaining an optimal level of emotional stability, for a growth mindset. The students were divided into groups of 3 people and had to draw on a flipchart sheet as many emotions as possible for each piece of music they listened to. Students had 25 minutes to complete the task. During this time, they listened to 6 pieces of music and could use colored pencils, crayons, colored paper, glue and scissors. At the end of the activity, each group had 10 minutes to present their work to their colleagues. Next, we played the Mime game, in which 2 volunteer students were involved. One of them sat on a chair with his back to his colleagues and the other, using the blindfold method, extracted from a bag an image representing an emotion that he had to mimic in front of the group. We insisted that the students who described the situation do it in the most objective way possible, especially when it involves emotions.

An important aspect was the practice by all participants in the seminar of understanding the other's perspective and also of developing emotional expressiveness in order to facilitate communication with others. The game aimed to develop the skills of awareness of emotions to manage interpersonal relationships in the most effective way. The techniques and strategies practiced in this module are aimed at training internal control for the purpose of emotional self-regulation.

At the end of the seminar we discussed with the students about:
- How did they feel during the games I played?
- How hard was it for them to express the emotion through the game, and for the other colleagues to guess what they mimicked?
- How important is it to present the situation in as detailed a way as possible?
- In what way did these activities/games contribute to the understanding of emotions?

INDICATORS

This activity meets the following indicators.

Indicator 1: Competence development
The example presented above has the purpose to develop student’s ability to properly recognize their own emotions, thoughts. Moreover, it helps them to understand how all these have an impact on their behaviour in order to become better and to make progress.

Indicator 7: Social connectedness
Using techniques and strategies aimed at regulating one's own emotions and those of others will be particularly important for initiating and maintaining social relationships.
The development of social and emotional skills in students will optimize social behaviors, emotional stability, resilience, emotional well-being thus ensuring a good functionality of relationships between colleagues by opening to their needs and goals;

PERSONAL EVALUATION

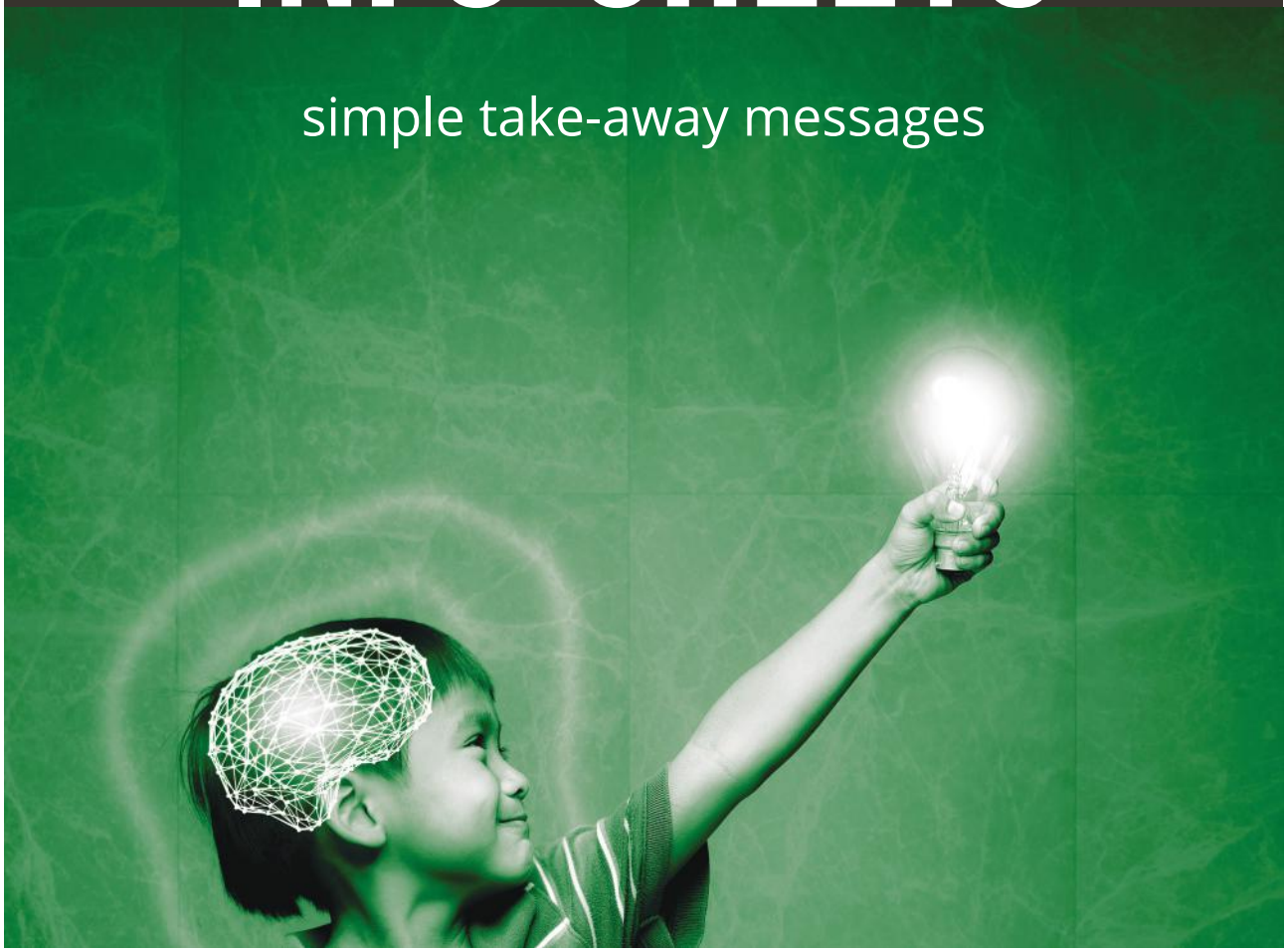
Why do you think the teaching practice was successful in fostering a growth mindset?
The topics discussed in the seminars contributed to the development of self-control skills, correct management of difficult socio-emotional situations, cooperation skills.

What went well?
They were constantly encouraged and reminded of similar experiences in which they succeeded by giving them feedback ("You are doing great!", "We will succeed together!" "Your presence is important to us!", etc.).

04

INFO-SHEETS

simple take-away messages



This part consists of several information sheets, composed by Maja Selič and Blanka Tacer, on the subject of a growth mindset which were developed as part of the project. They deal with various aspects of growth mindset and of growth mindset-oriented teaching. They each include a summary of the aspect with reference to empirical evidence, reflection questions for our own teaching practices, and tips and recommendations on how to implement growth mindset-oriented teaching in our own classroom.

All information sheets can be downloaded for free on the project's homepage under http://www.uni-growthminds.eu/index.php/infographics/. There, translations into German, Romanian, Slovene, and Turkish can be downloaded as well.

Here is an overview of the information sheets:

- Neuroplasticity: Brain's superpower
- Learning for success: Patience is important
- Failure is success if we learn from it: Oops! Let's celebrate mistakes.
- Change your words! Use Growth Mindset language
- Encouraging positive perseverance: Just keep swimming!
- Challenging but realistic expectations: Rise higher!
- Break down learning goals: There's nothing wrong with starting small!
- Process-oriented feedback: Mastering the art of feedback
- Encouraging positive self-talk: The power of thought
- Sense of purpose: What gives students meaning?

To credit the authors of these information sheets, please name Maja SELIČ and Blanka TACER.

NEUROPLASTICITY

BRAIN'S SUPERPOWER

GROWTHMINDS

Did you know?

Neuroplasticity is the **capacity of the brain** to **shape** and **reform new neural connections** throughout life in response to experiences and changes in the environment (Kania et al., 2017). Up until the 1960s, researchers believed that changes in the brain could only take place during infancy and childhood. As the study of modern neuroscience flourished, a body of research has demonstrated that **people are not limited to the mental abilities** they are born with. The brain continues to create new neural pathways and alter existing ones during the whole life (Demarin et al., 2014).

Ask yourself this...

1. Do I act like I'm in a hurry, during lectures?
2. Do I let students know that they can change their brains by studying?
3. Do I give students a sense of trust in them?
4. Am I sure my explanation is understandable?

Fun facts

1. MRI imaging of London taxi drivers revealed increased brain volume in the area responsible for memory (Maguire et al., 2000).
2. Research identify important functional and structural changes in the pianists brains (Pascual-Leone, 2001).
3. Teaching neuroplasticity has a positive overall effect on motivation, achievement, and brain activity (Sarrasin et al., 2018)

What can you actually do in the classroom?

- **Use revision constantly.** At the beginning of the lesson, have students briefly repeat the material from the previous lesson. Allow them to engage on their own, either in the form of complementarity brainstorming or individually, whatever they feel like. Remember, you are the one who guides them through memory. Resolve any problems vaguely along the way. Recalling a memory and going over material again helps the brain form stronger connections.
- **Don't be in a hurry.** Provide additional help to students with problems or just questions. When a student begins to get extra help and exercise more often, this causes literal changes in neural pathways and strengthens their abilities, and consequently also their faith and self-confidence.
- **Put new information into context.** When teaching new information, we encourage them to find a connection with the previous substance of the connection between the concepts. Whenever new content is given in such a way that students recognize relationships between concepts, they create higher brain cell activity and accomplish more successful long-term memory storage.
- Pay attention to the student's statements: »I can't« Remind them to use the words **»yet«** or **»currently«** instead of »can't«. When lecturing on topics they are not yet familiar with, include this words into your vocabulary as much as possible.

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LEARNING FOR SUCCESS

PATIENCE IS IMPORTANT

GROWTHMINDS

Did you know?

Students who understand that s**uccess does not come easily,** yet **continue to work** hard, are **more likely to succeed** (Tough, 2012). Also students who **know** and can **articulate how they learn best** and the **support they need** to succeed, are more successful through their academic careers (Tanner, 2012). As a professor, it is critical to understand that **success is an outcome of the student's effort**, rather than one's natural ability or talent (Dweck, 2006).

Good example

»The goal isn't to get it all right away. The goal is to grow your understanding step by step. What can you try next?«

Fun facts

A study that used interventions: a 75-minute presentation on what mindset is, how it relates to learning, and strategies for students to learn statistics with a growth mindset, found that students' mindsets became more growth-oriented, as well as a reduction in anxiety and an increase in course grade (Smith & Capuzzi, 2019).

A self-fulfilling prophecy: is in the beginning a wrong definition of a situation that provokes new behaviour, that causes a primarily wrong assessment of the situation to come true.
Research in the school: Teachers' expectations work on the principle of self-fulfilling prophecy. They have a direct effect on the intellectual development of students (Rosethal, 2002).

What can you actually do in the classroom?

- **Truly believe in the success of your students.** Your expectations influence students' achievements, both positively and negatively (Rosenthal & Jacobsen, 1968).

- **Encourage them in difficult situations.**
  - All right, so it didn't go the way you wanted, let's consider this as a way of learning.
  - Perhaps you're struggling, yet you're succeeding and I can see your growth.
  - I appreciate your perseverance and your hard work, that's going to pay.

- **Encourage them when they succeed.**
  - Compared to _____ (time period), you are really making progress, you grew up.
  - I notice you're using your problem-solving strategies and I find them great.
  - Your hard work is really noticeable in the finished projects/assignments.

- **Invite them to think about their own thinking and learning.** Encourage students to reflect on their thinking and learning, as they progress through the learning process. This is beneficial to help students link certain strategies with success.
  - Hey, that is a difficult task that you've been working on for quite some time. What strategies are you using?
  - Do you see any patterns in your learning?
  - Were the methods and skills you utilised for this project effective?
  - How does your mindset influence your approach to work?
  - When it comes to learning, what are your strengths and weaknesses?
  - How can you make your learning environment better?

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FAILURE IS SUCCESS IF WE LEARN FROM IT

OOPS! LET'S CELEBRATE MISTAKES!

GROWTHMINDS

Did you know?

People with a growth mindset intentionally push themselves, so that **errors have a high learning potential to support future progress. Failure** is an **opportunity**, not a punishment, and the key to success is effort (Dweck, 2014).

Failure may be unpleasant even for people with growth mindset. The difference is in how they deal with it. It is important that the failure is **addressed** and **learnt from it** (Dweck, 2017).

Fun facts

In one study, seventh-graders described how they would react if they received a failing mark on an exam. Those with a **growth** mindset said they would **study more** for the next test, while those with a **fixed** mindset stated they would **study less** and seriously consider **cheating** (Dweck, 2017).

After all, **intelligence isn't that fixed**. It turns out that perseverance and effort might help students do better on intellectual tasks. Students who see intelligence as something that grows with work and difficulties are far less limited by rigid thoughts and feelings of powerlessness and frustration, compared to those with a fixed mindset (Dweck, 2006).

Powerful quote

»We haven't failed. We now know a thousand things that won't work, so we are much closer to finding what will.«

- Thomas A. Edison

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1. Dweck, C. (2014). Teachers' Mindsets:"Every Student has Something to Teach Me" Feeling overwhelmed? Where did your natural teaching talent go? Try pairing a growth mindset with reasonable goals, patience, and reflection instead. It's time to get gritty and be a better teacher. *Educational Horizons*, *93*(2), 10-15. DOI: 10.1177/0013175X14561420
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FAILURE IS SUCCESS IF WE LEARN FROM IT

OOPS! LET'S CELEBRATE MISTAKES!

GROWTHMINDS

What can you actually do in the classroom?

- **Create a risk-free classroom climate.** Make it clear to your students that you value trying new things, thinking outside the box, trying again and again, and confronting a challenge full on. Create a classroom climate that promotes a growth-oriented learning environment in which students feel safe, supported, and comfortable taking risks. Make it clear to students that failure is not a punishment, but rather a source of learning.

- **Teach them resilience.** The ability to recover after failure is referred to as resilience. Failure's stress response is enough to cause some students to stop and give up. On the other hand, students who have established a healthy resilience to challenges, have the ability to re-strategise and rebound from failure. As a professor, it is critical to model resilience. During lectures, give examples of your own errors, their effects on you, and how you learned from them. Model the skill of reframing a situation or finding a new strategy or approach to a problem.

- **Take advantage of mistakes.** You must assist students in normalising their mistakes and failures. If they come to you with a problem, focus on asking questions to help them find a solution rather than providing one for them. Also use the following sentences:

  Mistakes are accepted here!
  Mistakes are perfectly normal!
  Mistakes are to be expected while you learn this.
  Your mistakes allow me to assist you.
  Let's create mistakes together!

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CHANGE YOUR WORDS!

USE GROWTH MINDSET LANGUAGE

GROWTHMINDS

Did you know?

Changing your language is one of the **most powerful methods to instill a growth mindset** in your students. Growth mindset language is more than simply the words you speak; it is a full set of beliefs that has to be put in place. **Components of growth mindset language** include how we address failures and mistakes, promote positive self-talk, and how we give instructions, feedback, and praises (Dweck, 2017).

Ask yourself this...

1. How frequently do I recognize and praise effort, strategy, and progress?
2. How do I most frequently compliment my students?
3. How do I deal with and respond to mistakes in class?
4. How do I give instructions to students?

Good example

»A new topic allows us to expand our abilities!«
»This is only the draft, you'll have plenty of chances to enhance it.«
»Today's learning objective is _____. Tomorrow, we'll continue our work and go further by focusing on _____.«

Fun fact

According to research, children who are **praised for their intelligence** learn to **value performance,** but children who are **praised for their effort** and **hard work** grow to appreciate **opportunities to learn** (Sousa, 2009).

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CHANGE YOUR WORDS!

USE GROWTH MINDSET LANGUAGE

GROWTHMINDS

What can you actually do in the classroom?

- **Be aware that your praise language is SPECIFIC, REALISTIC, and praises what students can CHANGE.**

SPECIFIC - specific praise is more meaningful and is more likely to be believed.

✕ That is a fabulous picture!
✓ I really like the way you have drawn the eyes.

REALISTIC - excessive praise can create doubts, and students are less willing to risk failure because they are afraid of falling below the high standard they have been set.

✕ You must be the best mathematician in your school!
✓ I can see how much you have practised, the progress is huge.

Praise what they can CHANGE - praising for qualities they don't have control over, such as intelligence or talent, can demotivate them. You can't try harder at something you can't change, so constantly recognise and applaud a student's willingness to try, and their effort and patience.

✕ You are so smart!
✓ That was really good thinking.

- **Changing your language won't happen overnight, so be patient.** Thinking before you speak, can take a lot of energy, especially because we are used to smooth and quick communication. We suggest that you print out the examples above and keep them somewhere visible as a reminder. Over time, you will internalise it. This will take time, and you will make mistakes, but this is change, and intentional change is good.

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ENCOURAGING POSITIVE PERSEVERANCE

JUST KEEP SWIMMING!

GROWTHMINDS

Did you know?

Perseverance is described as a person's decision **to put out a high level of effort** (Bettinger et al., 2018). When confronted with a challenge, a student with a growth mindset is more likely to persevere because of believing that with hard effort, perseverance and problem-solving, he may change his intelligence and skills (Dweck, 2017). Persistence **does not always mean working harder**, but it means **refusing to give up** just because something is hard (Jaffe, 2020).

Fun fact

Research showed that persistent interventions that shape students' beliefs in their ability to learn, have an **influence on students' perseverance** and **academic achievement in math, three weeks** after the interventions were implemented (Bettinger et al., 2018).

What can you actually do in the classroom?

Awareness of perseverance. We recommend that on the first day of class, you spend time discussing what it means to have tenacity, be persistent, and possess resilience. Let them share their personal experiences about how they persevered in previous years and what helped them in their motivation.
Ask students:

- Can you describe an obstacle that hinders your motivation?
- What do you usually do when you hit an obstacle?
- Why is it worth persevering and getting through this challenging situation?

Remind them of achieving success.
For certain students keeping perseverance is a struggle, so they must always be reminded that they are capable of achieving success. Introduce students to the idea that perseverance is not necessarily always about investing more energy, but a process of not despairing in difficult situations. It is important to explain to students the options they have when encountering problems such as:

- **Asking for help** (professor or colleague).
- **Using online resources**, where they can seek help (YouTube channels, lessons, explanations etc.). These should be provided to ensure suitability.
- **Normalising** the **use of other resources** (not provided by you) and the fact that other paths are also right.

Team spirit helps strengthen perseverance.
A positive group spirit can be easily achieved through group activities. Make students do hard tasks together, as this raises the sense of the importance of each member. Train your class to help and support each other, throughout solving tasks and dealing with problems.

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CHALLENGING BUT REALISTIC EXPECTATIONS

RISE HIGHER!

GROWTHMINDS

Did you know?

Teachers' expectations of their students **have a significant influence on their learning** and **growth**. By having high expectations, professors provide the message to students that they are **competent,** on the other hand, low expectations encourage students to doubt their intellectual capacity (Wagner, 2012).
Students **build a healthy self-concept** when high expectations are communicated effectively and consistently. It also provides the structure for **intrinsic motivation** and generates an effective learning environment for the student (Rist, 1971).

Ask yourself this...

1. Do I have high expectations for all of my students?
2. Do I feel that all students can succeed and accomplish their goals?

Good example

»I know you all can accomplish this, that's why I set the bar high.«
»I'll be pushing you all because I know if I'm going to, you all will do wonderful work!«

What can you actually do in the classroom?

- **Create a positive classroom climate.** Not only can increasing positivity in the classroom result in a more pleasant environment for both the teacher and students, but a good classroom climate is also likely to contribute to increased learning. While teaching, emphasise the importance of cohesiveness, harmony, and positivism.
- **Provide appropriate challenges.** Challenges should be appropriate for all students and it is important that they are not unrealistic, as this would make them feel incompetent. If you happen to misjudge the appropriate difficulty, guide and help the students to come up with the correct answer.
- **Ask open questions.** That way students will be inspired to share their own thoughts more frequently, and you will be showing that you believe in them. Open questions usually start with: **how, what, why?**
- **Rephrase questions when answers are incorrect.** This way students will be given additional opportunities to succeed, and also encourage them to think further.
- **Allow students to choose.** Give students a variety of learning activities to choose from, that will lead to higher motivation, even in students with poor performance. They should choose topics for projects, ways of presentation, use of various interactive tools, etc.
- **Clear success criteria.** Set clear performance and evaluation criteria from which you do not deviate. Clearly present the criteria at the beginning of the semester.
- **Include all students.** We tend to communicate more and give more attention to students we expect more from. Constantly keep in mind that all students are important. We suggest that you make strong eye contact with all students, because teachers are more likely to make less eye contact with students for whom they have lower expectations.

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BREAK DOWN LEARNING GOALS

THERE'S NOTHING WRONG WITH STARTING SMALL!

GROWTHMINDS

Did you know?

Breaking down goals into **smaller**, more manageable steps, encourages students to **move forward**, and it is more **likely they will reach the bigger goals**. Smaller goals help **gain confidence** and **deepen your beliefs**, **encourage action**, **improve concentration** and **form habits** (Dweck, 2013).

What can you actually do in the classroom?

- **Flower method of breaking down learning goals for professors.**

1. Divide the whole learning process into several main goals, which should be **clear** and have a **strong why**.
2. Divide the big goal into 3-5 smaller goals, that are **critical** to reaching the big goal.
3. Divide each smaller goal into even smaller **micropieces**. Add **strategies** for how you will reach those micropieces.
4. Continue the learning process **from the outer parts, towards the centre,** to the big goal. After every smaller goal, check student's progress. This way, you make learning easier for students, and the presentation of the material is clearer and more meaningful.

We prepared an example of breaking down goals into smaller ones, based on the flower strategy (Example 1). The advantage of the flower strategy is that it visualizes smaller goals, which remind you not to rush and skip the material, but strive for the clearest and most meaningful sequence that keeps students motivated and focused, also that makes you a good goal setting model.

- **GROWTH setting approach.** Encourage students to create personal goals for themselves as part of the learning process, and teach them how to use the GROWTH setting approach:

G - GOAL: What precise goal do I wish to achieve?
R - REALISTIC: What specific steps will I take to achieve my goal? When, where, what, and how frequently?
O - OBSTACLES: What obstacles may I face as I work to achieve my goal? How will I transform them into an opportunity?
W - WHERE: Where will I seek help when I encounter obstacles?
T - TRACK: How will I monitor my progress? What methods will I use to track my development?
H - HABITS: What good habits do I need to develop to achieve my goal?

- **Remind students to monitor progress.** An important step is to check and monitor progress. Have students reflect on achieved or unachieved goals during the learning process. Goal setting is a meaningful activity, but only when students regularly reflect on their progress.

- **Don't be rigid.** Each student has a unique personality and set of interests. Allow them to customise their goals to their own needs. Let them know that it is not essential to exactly stick to what is provided, but that it is provided as a guideline only.

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FLOWER STRATEGY

OF BREAKING DOWN GOALS

GROWTHMINDS

Begin your lesson by reaching **microgoals,** always check on students' **progress** and verify that a **smaller goal** is achieved. Then move on to the next **smaller goal,** and so on, until you reach **the main goal.**

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PROCESS-ORIENTED FEEDBACK

MASTERING THE ART OF FEEDBACK

GROWTHMINDS

Did you know?

The messages you provide **affect** what **students believe about themselves** and consequently **how they learn**. It is important to change feedback from one that praises intelligence to one that **praises effort and progress** (Dweck, 2006). The student's technique for spotting mistakes is process oriented-feedback provided by the professor, which is also critical for the growth mindset (Hattie & Timperley, 2007). **Feedback** that is **frequent** and **in time,** is beneficial to long-term memory and reasoning development (Van de Bergh et al., 2014).

Ask yourself this...

1. Do I give feedback that is praising the students' process or praising their characteristics and attributes?
2. Do I give more oral or written feedback?
3. How do students react to my feedback?

What can you actually do in the classroom?

- **Person vs. Process Feedback**

Person: directing praise or criticism at the person. It doesn't matter if the label is positive or negative, both can negatively affect their identity.	**Process**: focusing our praise or criticism on the effort and methods used to complete the process.
YOU are so smart.	I admire how you used a variety of techniques to solve these issues.
YOU are just not good enough.	You didn't achieve your goal, but what did you learn from that?
YOU really messed this up.	This did not seem to work out for you. What are some alternative approaches you might take to this problem?

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PROCESS-ORIENTED FEEDBACK

MASTERING THE ART OF FEEDBACK

GROWTHMINDS

What can you actually do in the classroom?

- **Often use oral information.** It is important that feedback is frequent and in time. This is easier to maintain with oral than written feedback. Such communication is also more personal and less formal, which creates a positive classroom climate.

  When struggling despite great effort. - I admire your persistence and I appreciate your hard work. It will pay off.

  When they make progress. - I see you are employing your strategies, notes etc. Keep up the good work! - Hey! You worked on this for a long time and didn't give up!

  When succeeding with great effort. - I'd like you to recall how difficult this was when you first started. Take a look at how far you've progressed!
- **The chain of strengths.** Maintain a learning atmosphere in which peer feedback is considered normal and welcomed. You want to create a trusting learning environment where students may freely express themselves and support one another. Teach pupils about the FRUS peer feedback idea:

  F - fair
  R - realistic
  U - useful
  S - specific

- **The learning process itself is feedback.** You can include activities in the learning process that give students indirect and ongoing feedback. Let's say an introductory quiz about what they know about a particular topic, or at the end of a lesson as a point quiz (e.g. Kahoot, Quizizz, Mentimeter, Slido).

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ENCOURAGING POSITIVE SELF-TALK

THE POWER OF THOUGHT

GROWTHMINDS

Did you know?

Teachers have the potential to help students use the power of their inner speech to engage in positive self-talk and shift their mindset to growth mindset (Dweck, 2017). **Positive self-talk** helps them **develop** important **skills** and the **confidence** needed to succeed in learning (Robinson, 2017).

Good examples of students positive-self talk

»I will tackle this problem until it is solved.«
»I am a problem solver.«
»I will not give up easily.«
»I can do difficult things.«

What can you actually do in the classroom?

- **Recognise students' negative self-talk.**

  I am not good at this.
  I do not understand this.
  I can not do this.
  It's too difficult.
  I give up.

- **Use a catchphrase.** Teach them to hear their own negative self-talk. We can help students who feel they are slipping into their fixed mindset by becoming aware of their negative self-talk by humorously addressing their self-talk and thus getting them back on the path to a growth mindset. When you notice negative self-talk, you can greet their inner voice: »Hi, Silly. Are you in his head again? We don't need you here.«

- **From negative to a positive.** The next step is to teach students to replace fixed thoughts with growth mindset statements. The first stage is to identify negative self-talk, and then provide a concrete example of positive self-talk.

  What am I missing?
  I'm going to use some of the techniques we studied.
  I'm not finished yet.
  This is something I'm capable of.

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ENCOURAGING POSITIVE SELF-TALK

THE POWER OF THOUGHT

GROWTHMINDS

What can you actually do in the classroom?

- **End student's negative self-talk statement with »yet«.** Pay attention to situations in which pupils receive a poor grade, are unable to complete an assignment or difficult task and/or are more likely to give up.

- **Be a good example.** Your self-talk as a teacher may affect the way you handle situations and consequently affect students' self-talk. Rather than criticising someone, look for methods to help them. Instead of giving up on somebody, think of a new strategy for dealing with the problem. When talking to yourself and to students, practice applying positive thinking skills openly. Positive thoughts in the morning, such as »Today is going to be a great day« or »I'm ready for whatever the day gives me« are great ways to awaken your positive self-talk and optimism, which is often contagious and essential for positive self-talk.

- **Wrapping-up a lesson with positive self-talk.** At the end of a lesson, encourage students to answer two questions:

  1. In our class today, what did you shine at?
  2. What steps did you take to improve our time together?

Students will learn to focus on their own skills and abilities by answering these questions. They will be teaching their minds to think positively about themselves and their abilities.

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SENSE OF PURPOSE

WHAT GIVES STUDENTS MEANING?

GROWTHMINDS

Did you know?

Purpose is a consistent and generalised drive to do something that is both **meaningful to the self** and **significant to the outside world** (Damon et al., 2003). Students with a **strong sense of purpose** are **more engaged in academic activities**, have more **efficient study habits**, and **achieve greater academic success** (Xerri et al., 2018).

Ask yourself this...

1. Are you aiming to provide students with an education that will give them a sense of life's meaning?
2. Do you incorporate the real world into your learning (examples of good practice, important people, companies, etc.)?

What can you actually do in the classroom?

- **The first step is you.** You need to find and become aware of your purpose and passion at work. Why? Because it will also affect your students. Know exactly what motivates you, analyse your personal goals and strive to achieve them. Discover ways you can improve your learning processes and consequently help make your university better.
- **Promote curiosity.** Focus on developing curiosity in your classrooms to assist students discover what they are interested in and what inspires them. You achieve this by exposing students to a wide range of topics, high expectations, appropriate growth mindset language and a positive classroom climate.
- **Be mentor and model.** Have high expectations of your students, but still offer them support. Support should be in the form of mentoring, where you lead them to a solution, and at the same time include your life experiences from which they will be able to extract a sense of purpose. Mentoring is more informal and relational in nature than teaching.

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SENSE OF PURPOSE

WHAT GIVES STUDENTS MEANING?

GROWTHMINDS

What can you actually do in the classroom?

- **Connect to the real world.** Remind them that education is closer to the reality of their lives than they might think. To bridge the gap between the classroom and real life, get students interested in real-world issues and teach them about inspiring individuals. If possible, present the real world to students as often as possible, especially in programs where there is not much practical work during the years of studying. You can take them to companies, institutions, etc., so they can see real-life problems and the dynamics of solving problems.
- **Give students voice and choice.** Students gain a sense of importance and meaning from their capacity to push boundaries and make changes. Allow them to do this by emphasising the importance of their feedback on the learning process. Moreover, you can choose to dedicate an hour for individual or group conversations about the changes they made. Support students to join and participate in student committees because it allows them to see how powerful they are in making a difference for the causes they care about.
- **Learn about inspirational people.** In the learning process include talking about important historical people and their accomplishments, as well as influential people of today who are pushing the boundaries. You may also consider successful former university students. You can also invite guest speakers to give lectures to students.

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05

REFLECTIONS

What the project has changed about our approach to teaching and learning

As part of the project, we asked the project members the following reflection questions:

- **What is your experience with growth mindset teaching?**
- **What have you learned?**
- **Have you changed anything in your teaching practice?**

Below you can find their answers.

Caner Börekci (Balıkesir University, Turkey)
What is your experience with growth mindset teaching?
I started the process by reviewing my own thinking and approach to learning. I first focused on my own learning methods, then I thought about how to apply them in the lessons I teach to my students.

What have you learned?
I gained information on the relationship of GM theory with other motivation theories and its use in educational practices. I learned how praising effort and perseverance and the use of language are important for increasing motivation.

Have you changed anything in your teaching practice?
I now have a different approach to the feedback and evaluations I give to my students. I pay more attention to the words I choose when giving feedback. Educational activities will focus more on the evaluation of the process. I will make the process and the final evaluation together.

Ebru Ersari (Balıkesir University, Turkey)
What is your experience with growth mindset teaching?
After explaining that learning is a process and making mistakes is a part of learning, my students are more willing to try different ways to answer the problems I give them. They also give more feedback to each other and help each other more when I normalize struggle in class. When I told them that it takes time to have a deeper understanding of the content and that they have not fully understood the content yet, I notice they are more patient when they learn new concepts in class.
I think my students are more determined and more engaged with challenging tasks.

What have you learned?
Teachers' constructive feedback is an important component of students' motivation and learning.
The quality of teachers' reflection on students' learning can make a difference in students' mindsets.
The nature of the brain and intelligence is complex, and teachers need to have knowledge of neuroplasticity to understand the process of learning.

Have you changed anything in your teaching practice?
I am more aware of the impact of persistence and motivation in learning. Also, I am more relaxed when students make mistakes and I understand the value of challenging tasks better. In addition, I focus more on how students understand rather than helping them find the correct result.
Before the lectures, I now think more about the parts that could be challenging for students and during the lectures, I spend more time on those challenging tasks.

Samuel Hafner (University of Klagenfurt, Austria)
What is your experience with growth mindset teaching?
Teaching mathematics, I often see students struggling with tasks and believing they just lack mathematical intelligence. Trying to show my students that learning, especially in mathematics, is a process and that mistakes are part of the learning journey has helped a lot. Students are more eager to share their solutions and are less discouraged by mistakes they make.

What have you learned?
I learned a lot about the different theories that the concept of growth mindset is based on. I have also become more aware of how I can implement GM activities in my teaching because of the many teaching activities that we collected. I have become more aware of the areas where I sometimes have a fixed mindset.

Have you changed anything in your teaching practice?
I now tell my students about growth mindset theory. I try to incorporate more growth mindset-oriented teaching strategies into my teaching, and I am more careful when talking about errors and giving feedback.

Barbara Hanfstingl (University of Klagenfurt, Austria)
What is your experience with growth mindset teaching?
When I started talking about the concept of growth mindset and fixed mindset in a seminar, my student teachers were very interested and eager to learn more about it. They wanted to learn how to apply this concept in their own high school teaching. I was very impressed with that.
What have you learned?

I learned how important it is to make students feel that a growth mindset can really make a big difference in their lives.

Have you changed anything in your teaching practice?
I have integrated the growth mindset approach into my teaching of student teachers in a fixed way.

Mihaela Kardos and Daniela Stefanescu ("George Emil Palade" University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania)
What is your experience with growth mindset teaching?
Growth mindset teaching is a rather new approach in our higher educational system. Thanks to our engagement in the project activities, we have become more aware of its positive impact on both sides of the educational process, students and academic staff.

What have you learned?
We have learned that growth mindset teaching can lead to increased performance in all learning models, focusing mainly on the process and less on the results, offering opportunities for sustainable self-development.

Have you changed anything in your teaching practice?
Based on the knowledge gained during the project training, we have started implementing some of the growth mindset teaching methods and techniques. Thus, these new approaches helped students to be more involved in the learning activities, becoming more open and comfortable to express themselves according to their own pace in a friendlier learning environment than before.
Overall, we consider that applying GM theory is highly beneficial for achieving teaching and learning objectives.

Maja Lebeničnik (University of Primorska, Slovenia)
What is your experience with growth mindset teaching?
Prior to the involvement in this project, I had a more general knowledge about mindset theory, however less applicable knowledge on strategies and practices that support the development of a growth mindset in students. Now I try to apply what I have learned so far into various aspects of my teaching (informal communication, giving feedback, designing tasks and teaching activities). I consider the indicators, developed for the compendium, a very useful tool to support me in planning and evaluating my teaching activities from the growth mindset point of view.

What have you learned?
I learned different ways how to support a growth mindset in students indirectly (e.g., use of appropriate language, responding to mistakes, planning tasks and assignments), during the process of teaching and not just directly (e.g., by presenting the theory of growth mindset).

Have you changed anything in your teaching practice?
I think that the knowledge about the growth mindset affected my teaching practice in practice in several ways:

- I try my best to provide process-oriented, specific feedback on assignments at the most appropriate times.
- I use students' misconceptions and mistakes as a starting point from which I guide them towards a better understanding of the content.
- I try to develop, a supportive yet demanding learning environment using every possible opportunity to acknowledge and praise students for their thinking process, effort or overcoming struggles.
- I use the word 'yet' whenever appropriate.
- When students are faced with a failure (e.g., failing an exam) and come for a face-to-face meeting, I support them to identify what in their learning process or in the process of taking an exam is not adequate, but may be controlled and improved upon for the next time (e.g., time dedicated for learning, familiarity with tasks, learning for repetition but not understanding, reading exam questions carefully etc.).

Blanka Tacer (STEP Institute, Slovenia)
What is your experience with growth mindset teaching?
For me, the concept of growth mindset is very useful for students and teachers. Both students and teachers get new insights when presented with findings by Dr Dweck and other researchers. They are motivated for the GM teaching activities, and they search for more when the training is concluded. I connect easily with people when we talk about growth mindset in our workshops. With some small changes, it is easy to implement GM into teaching at a basic level. On the other hand, it is a bit difficult to implement GM in work organizations. Leaders and employees express positive attitudes towards the theory, but implementation for them is difficult because of standardized work

procedures which hardly change. So they use the concept for their personal development and parenting skills.

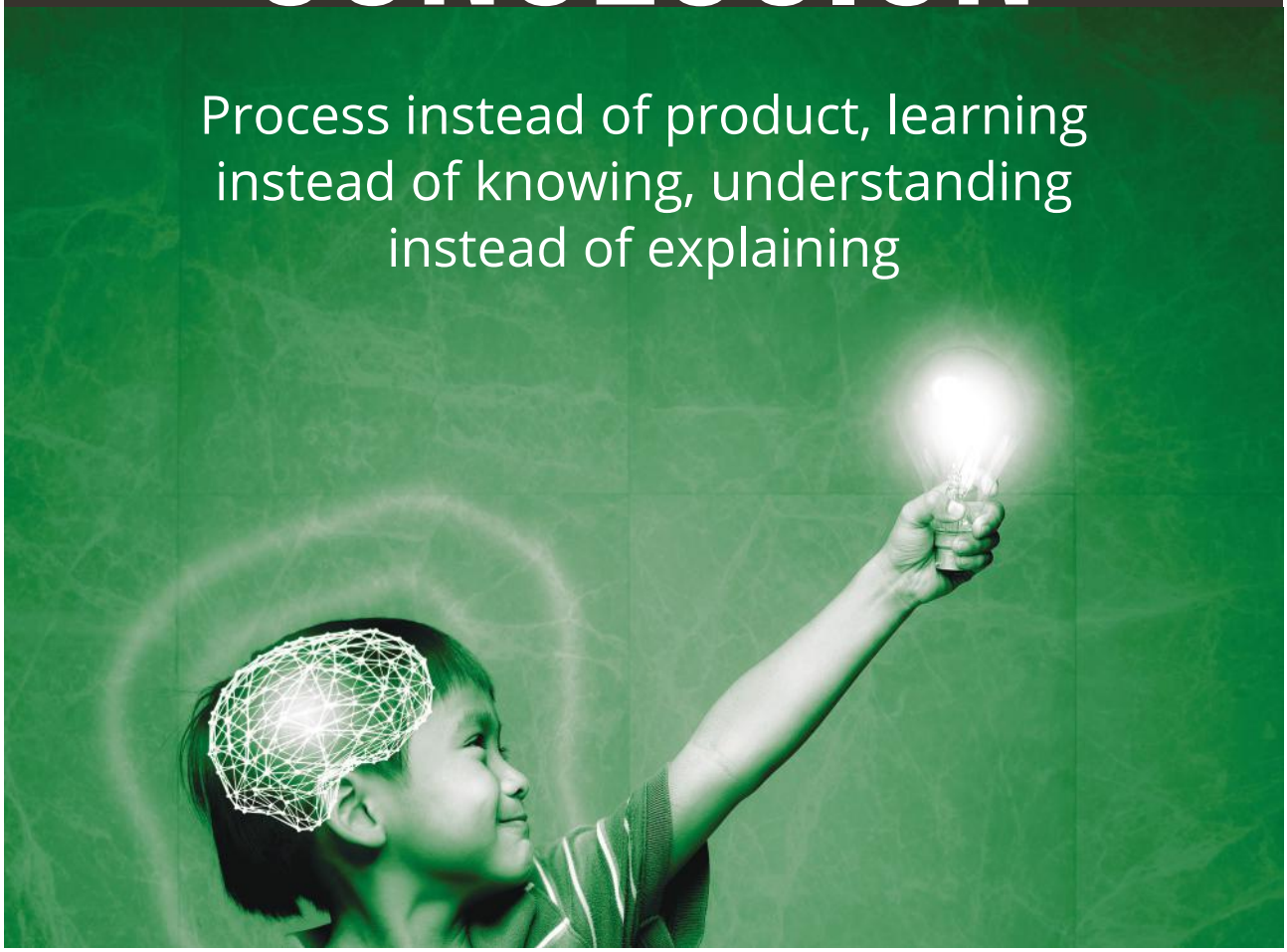
What have you learned?
It is easy to implement growth mindset on a basic level by changing language and some teaching strategies. But on the other hand, it is difficult to change at the level of values and attitudes. It requires a lot of training and work, but also time. When I changed some things in my teaching practice, I saw the changes gradually.

Have you changed anything in your teaching practice?
I am now more careful in designing learning activities. I try to be more aware of micro-learning. Also, I think I instil more hope in my learners because I often tell them about the nature of struggle, understanding, and emotions.

06

CONCLUSION

Process instead of product, learning instead of knowing, understanding instead of explaining



This compendium is one of the intellectual outputs of the ERASMUS+ project GROWTHMINDS and consists of four sections. First, we introduced eight indicators that capture what growth mindset teaching is about as well as psychological theories from motivation and self-regulation theory that underly mindset theory and from which we deducted these indicators. Second, we included a collection of 19 best practice teaching examples from five different disciplines (business, computer science, education sciences/pedagogy, English, Mathematics, and psychology), four different nations (Austria, Romania, Slovenia, Turkey), and 16 different contributors. Third, this collection includes ten growth mindset information sheets that concisely summarize the most important aspects of growth mindset, from neuroplasticity to process-oriented feedback. Fourth and last, the project partners shared their experiences and reflections on growth mindset and what they had learned and gained from the project.

With this compendium, we aimed to promote the concept of a growth mindset as an evidence-based teaching concept that improves the quality of teaching. We hope to inspire teachers to try out and incorporate growth mindset-based teaching activities in their teaching practice. Ultimately, this should lead to more students adopting a growth mindset, encouraging students to believe in their own strengths and competencies.

Dealing with mindsets is important since the view a person holds about themselves profoundly affects their life: People with a growth mindset believe that intelligence and abilities be cultivated through effort, good teaching, good strategies, and persistence. They are learning-oriented, take on challenges and persevere even when things do not go so well and difficulties arise. They do not see mistakes as failures but as learning opportunities and are not discouraged by them. In contrast, people with a fixed mindset differ fundamentally in terms of their underlying beliefs: They think "That's just the way I am – and I can't change it." People with a growth mindset are convinced that they can develop themselves further with effort and change their life for the better.

Fortunately, mindsets can be changed, meaning that everybody can adopt a growth mindset. Especially teachers play an important role in creating an environment conducive to the development of a growth mindset. For this very reason, we created this compendium within the Erasmus+ project GROWTHMINDS which is dedicated to increasing the quality of the learning process through using a growth mindset in teaching. This compendium serves as a guide for implementing growth-oriented teaching. Therefore, the heart of the compendium is the collection of best practice teaching examples from different disciplines and different countries with diverse backgrounds. They provide insight into what concrete growth-oriented classroom practice might look like.

Based on the team members' reflections, the concept of the growth mindset was not well known in the tertiary education system. Not only has the project helped change this and convince the educators of the advantages and the positive effects on students' achievement, but also inspired them to utilize this concept in their teaching.

Although implementing the concept of a growth mindset does have many advantages, we are also aware that it is not a "magic ingredient" that will somehow make all students motivated and high achieving. A growth mindset should complement other interventions and reforms and ultimately should help students help themselves by supporting them to take better advantage of learning opportunities.

As a final note, we would like to present the following quote from Satya Nadella, CEO of Microsoft, which reflects the intended impact of the compendium:

„As a culture, we are moving from a group of people who know it all to a group of people who want to learn it all."

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