

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. 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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Did you know?

Students who understand that **success 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 (Rosenthal, 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 utilized 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 research, 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

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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 stop and give up. On the other hand, students who have established a healthy resilience to challenges, have the ability to re-strategize and rebound from failure. As a professor, it is critical to model resilience. Through lecture, 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 normalizing 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!



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 recognize and applaud student's willingness to attempt, effort, patience, and practice.

- ✗ 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 to remind you. Over time, you will internalize it. This will take time, and you will make mistakes, but this is change, and intentional change is good.



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, 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 obstacle that hinders your motivation?
- What do you usually do when you hit obstacle?
- Why it is worth it to you to persevere and get through this challenging situation?

Remind them of achieving success.

For certain students keeping perseverance is a struggle, so they must always be remembered that they are capable of achieving success. Introduce to students that perseverance is not necessarily always 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:

- They can **always ask for help** (professor or colleague).
- Provide them suitable **online resources**, where they can seek help (YouTube channels, lessons, explanations etc.).
- **Normalize 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 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. Through teaching, emphasize 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, only when student regularly reflects on progress.
- **But don't be rigid.** Each student has a unique personality and set of interests, allow them to customize 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

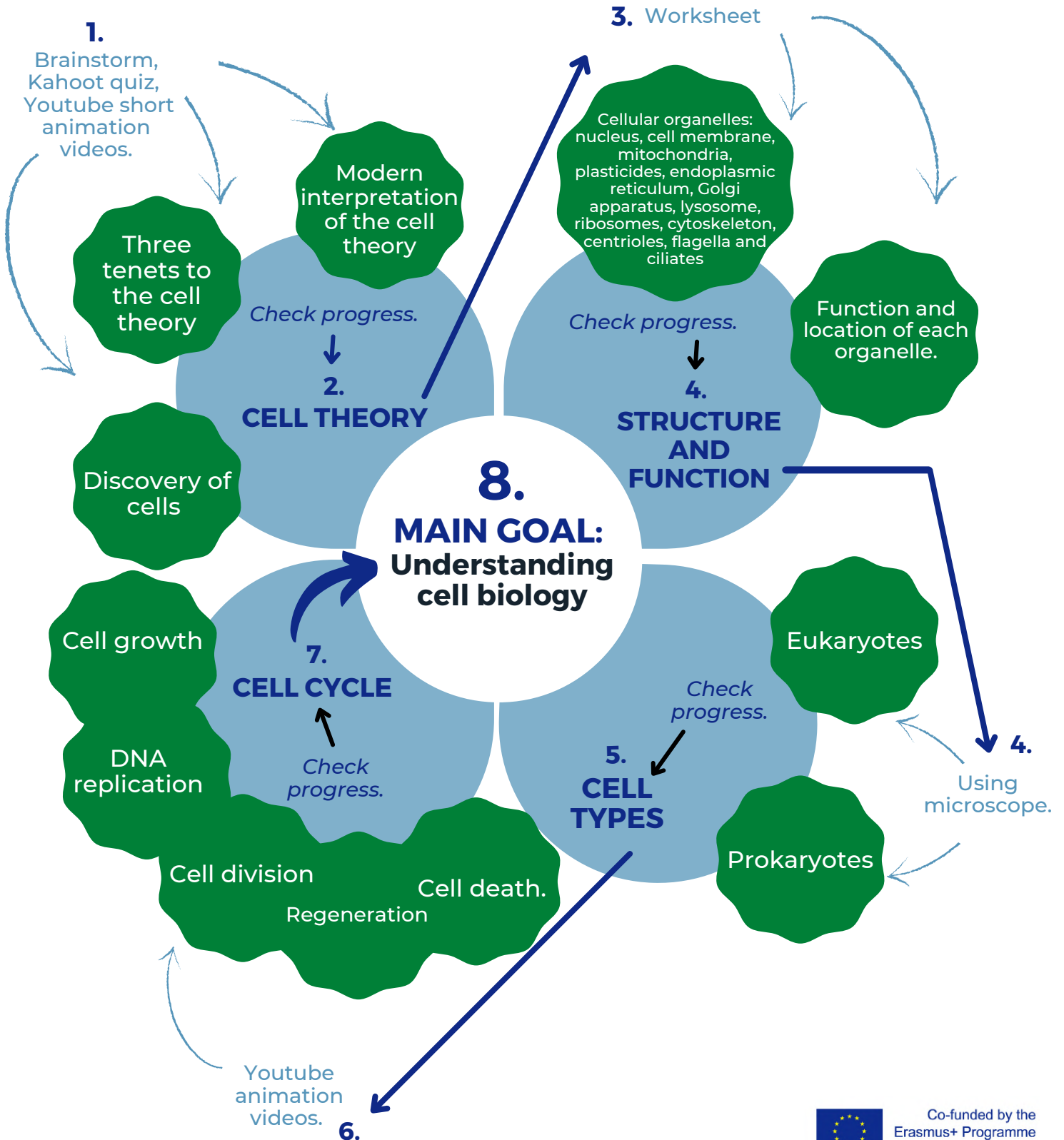
OF BREAKING DOWN GOALS



GROWTHMINDS

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

START



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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 praise intelligence to one that **praise effort and progress** (Dweck, 2006). The student's technique for spotting mistakes is process oriented-feedback provided by 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 feedbacks that are praising students' process or praising their characteristic and attributes?
2. Do I give more oral or written feedbacks?
3. How students react to my feedbacks?



What can you actually do in the classroom?

• Person vs. Process Feedback

Person: directing praise or critique 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 critique 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 show up to work out for you. What are some alternative approaches you might take to this problem?



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What can you actually do in the classroom?

- **Often use oral information.** It is important that feedback is frequent and in time, and 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 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 as 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).



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?

- **Recognize 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.** And 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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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 tasks where they 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 criticizing someone, you look for methods to help them. Instead of giving up on somebody, you think up 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 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.

SENSE OF PURPOSE

WHAT GIVES STUDENTS MEANING?



GROWTHMINDS



Did you know?

Purpose is a consistent and generalized 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 with 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 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 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 practice during the years of studying. You can take them to companies, institutions etc., so they can see real-life problems and their dynamic 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 emphasizing the importance of their feedbacks on the learning process, moreover, you can choose a dedicated hour for individual or group conversations about the changes. Support students to join and participate in the student committee 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 learning process include talking about important historical personalities who have accomplished a lot, as well as still-living influential people who are pushing the boundaries, and also successful former university students. You can also invite guest speakers to give lecture to students.

