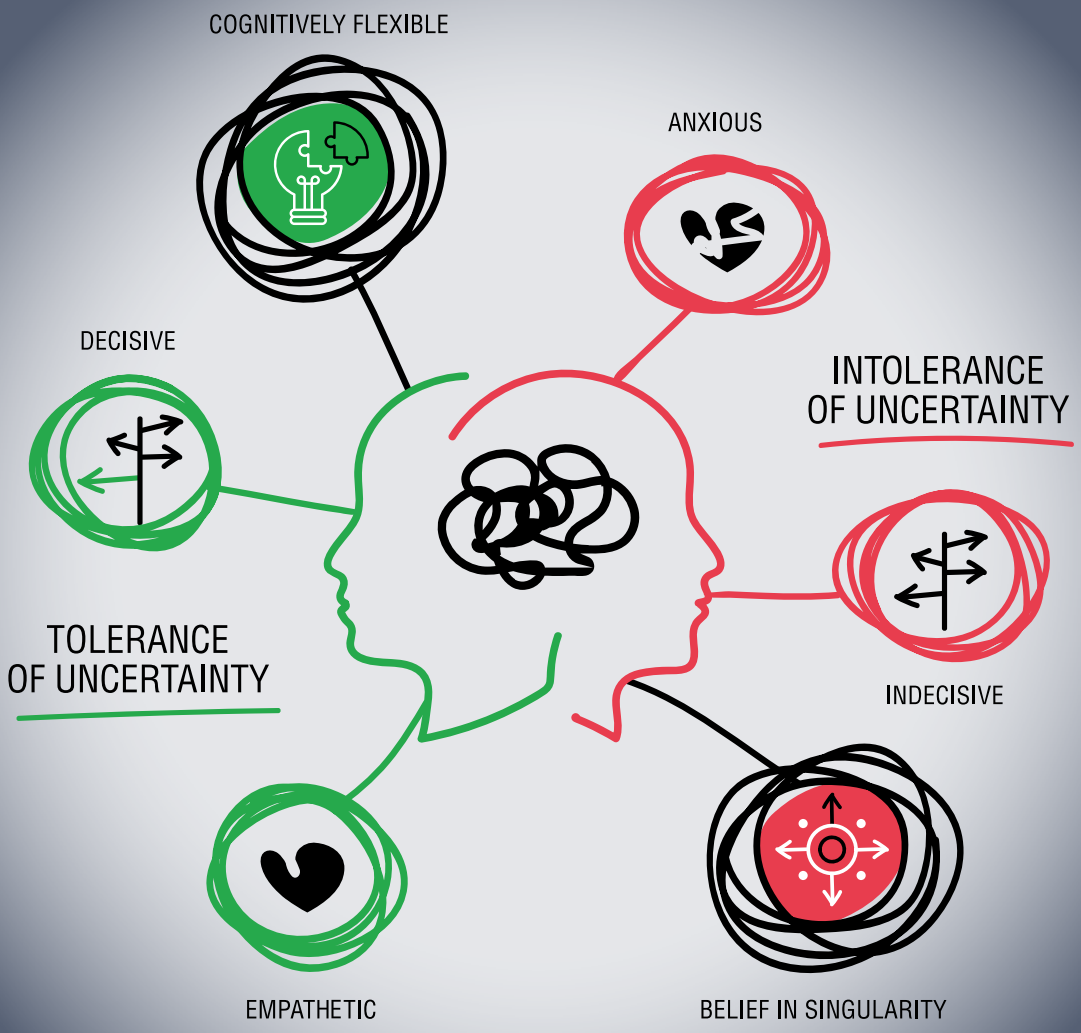
Preparing today's learners for uncertainty



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Uncertainties in the workplace are ever present. 'Uncertainty tolerance' (UT), or how we process and respond to unknown or complex situations, is increasingly recognised as an essential workplace skill. The goal of this paper is to raise awareness of UT, and to outline some teaching practices to help students improve their uncertainty tolerance.

Uncertainty tolerance affects career performance

Uncertainty tolerance is the ability to act *despite* unknowns, complexities or incongruences in data, with the inverse (*in*tolerance of uncertainty) being inaction in the same situations. Research highlights that employees who are intolerant of uncertainty have negative work experiences, which damages the workplace sector.

In business, employees with low uncertainty tolerance need increased supervision. These employees struggle to make decisions without all the information, despite key information being available. They try to gather more data, creating a 'circular action' that can delay loans, raise costs and increase supervisor workload.

In healthcare, uncertainty *in*tolerant doctors inappropriately order tests, raising costs and potentially delaying diagnosis and treatment. Research highlights links between uncertainty *in*tolerance and psychological wellbeing. Healthcare providers and medical students with lower UT appear to be at greater risk of stress, burnout and mental health disorders.

Our research (Lazarus et al. 2020, Stephens et al. 2020) suggests that UT is changeable as well as modifiable through teaching practices. Below are some practical ways you can help your students develop UT.

Teaching practices can foster uncertainty tolerance

Teachers appear to play a strong role in helping students develop UT. UT follows a perception-response pattern. Students *perceive* uncertainty ('stimulus'), and *respond* to it cognitively (thinking), emotionally (feeling) and behaviourally (actions). These responses range from positive (e.g. excitement, curiosity, appropriate action) to negative (e.g. doubt, anxiety, inaction). Early on, teachers can limit exposure to uncertainties, increasing exposure as students progress through school, allowing students to progressively develop skills for managing uncertainty.

Below, we consider an example of teaching liquid surface tension to describe ways you could introduce uncertainty.

- **Transferring learning to new contexts**: Students learn and practise a maths equation about surface tension as a class. They are then tasked to work through a scenario of a bug 'walking' on water, applying these maths equations. Students become aware that knowledge isn't used in isolation but rather in complex applications.
- **Introducing 'grey' cases**: Here, the 'bug on water' challenge would include some unknowns (such as water temperature). Students work to solve the problem with one set of criteria (after recognising the missing information and asking the teacher about the unknowns). After they solve the original problem, the students are given a new set of parameters and asked to solve the problem again. This helps demonstrate that application of learnt knowledge is changeable.
- **Presenting multiple points of view**: In the case of surface tension, you can bring in experts in water salinisation, weather or sustainability and ask them to describe what they consider important about surface tension. This demonstrates that different fields interpret the same problem in different ways.
- **Questioning preconceptions**: Place rubbing alcohol in a glass, asking students to identify the liquid. Some students will use available cues to identify the liquid as water. Others may ask questions, arriving at a different answer. This challenges students' long-held beliefs, helping them become curious (instead of presumptuous) which leaves room for 'unknowns' when arriving at answers.

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The myfuture *School to Work Pathways infographics* can be used as conversation starters about students' future careers, helping students become aware that there are many ways to reach a career goal. You can help students explore how curiosity and ingenuity will help them identify career options and success.

The myfuture site also offers real-life career stories that demonstrate how young people have managed their transitions, and related uncertainties, into training, study and work.

When working through these uncertainty stimuli, teachers can support their students' management of uncertainties, as outlined below.

- **Intellectual candour**: Talk to students about your own experiences managing uncertainties. This allows you to role-model and normalise challenges related to unknowns. Teachers are significant influencers in student career development. Sharing your career experience, the challenges and uncertainties you faced and how you overcame them can help students (Molloy and Bearman 2018).
- **Lecturing vs. facilitating learning**: Teachers who lecture didactically on how to solve the 'uncertain' problem actually prevent UT development. Presenting a 'solution' reinforces singularity, rather than complexity and uncertainty. Alternatively, teachers using the Socratic method (asking guiding questions), while also explaining the natural complexity surrounding a problem, have a positive impact on their students' UT because they are transparent about the complexity of knowledge.
- **Diverse teamwork and collaborative tasks**: When setting 'uncertain' classroom tasks, place students in diverse teams (for example from different cultural or socio-economic backgrounds). This distributes responsibility for completing the task across the group, engaging different points of view, which improves students' UT. When students are individually responsible for answers, their UT drops. This drop appears to be linked to risk aversity.
- **Reflective practice**: Multiple studies have found that formative reflective practice can improve UT. After completing the 'uncertain' task, students talk or write about what they thought during the task, how they felt and what they learnt. This helps them identify what worked, and build confidence in managing future 'uncertain' tasks.

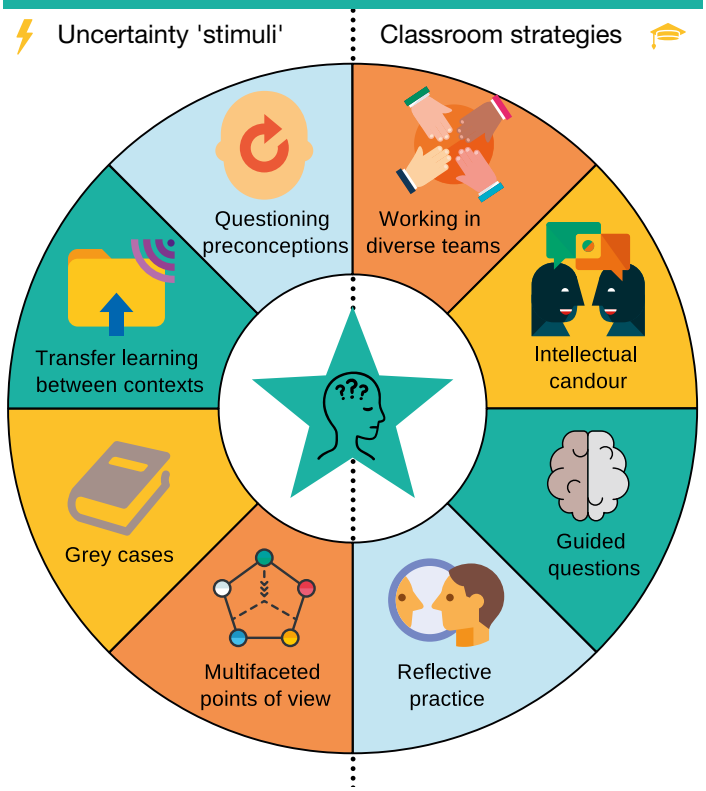
Below are examples of student traits — along with recommendations of how to address the trait — that could influence how they respond to uncertainty education.

- **Subject mastery**: How comfortable are students with the topic? If students are new to the subject, scaffold (increasing) uncertainty and integrate self-reflection into the activities.
- **Merit-minded**: Students focused on grades tend to have lower UT, and may be resistant to UT pedagogy. Assessing these students on their process through the task, rather than the final outcome, will help them adjust. Remind them that tolerating uncertainty will help them in their future careers.

The future of work

The future world of work will be characterised by rapid and constant change. It will demand new skills, bring forth new industries and occupations, and feature advanced technologies that alter how we work. To help career influencers to discuss the future of work with young people, myfuture has collated content from a range of sources on the future of work.

Teaching practices fostering uncertainty tolerance



Learners benefit when they are tolerant of uncertainty

Students benefit when teachers help them develop UT. As students progress through this teaching, they begin to accept uncertainty as part of life, and understand its importance. They become more confident in their ability to work through future uncertainties, and are more receptive to alternative ways of thinking. Students who initially seek information 'compulsively' or avoid the 'uncertain' task become more curiously engaged. Many students are not happy about undertaking an 'uncertain' task. This could present as stress, anxiety and feelings of vulnerability. By using the approaches outlined above, particularly incorporating reflective practice, students shift these feelings towards gratitude for their new skills. The negative emotions students experience may, in part, be due to their socialisation that uncertainty is 'bad'. By taking steps in changing this view, we may be able to foster psychological wellbeing early in their development.

Take home

The challenge for educators is balancing discipline knowledge with opportunities for students to practise managing uncertainty. When knowledge is taught alone, we risk conveying that knowledge is neat and finite, when in fact learnt knowledge applied to career contexts is messy, ambiguous and complex. When these are taught together, students' psychological wellbeing can improve, they are better prepared with job skills, more likely to seek creative solutions, and they are more likely to be satisfied in their careers. By working together across the educational spectrum, teachers can help students tolerate uncertainty and thrive on it.

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