



QT Canberra | Australia

29 April – 1 May 2019

SYSTEMS ENGINEERING TEST AND
EVALUATION CONFERENCE 2019



SYSTEMS SCIENCE & ENGINEERING FOR A BETTER AUSTRALIA

SETE2019.COM.AU

Beyond Competencies: Preparing our Graduate Systems Engineers in the Australian Context

DR CHRIS BROWNE

SESA Tomorrow's Systems Engineer Lead
INCOSE Institute for Technical Leadership Cohort 4

ASEW 2018 Workshop

**SYSTEMS THINKING ABOUT SE COMPETENCY
FRAMEWORK
AND GRADUATE CAPABILITIES OF YOUNG SYSTEMS
ENGINEERS**

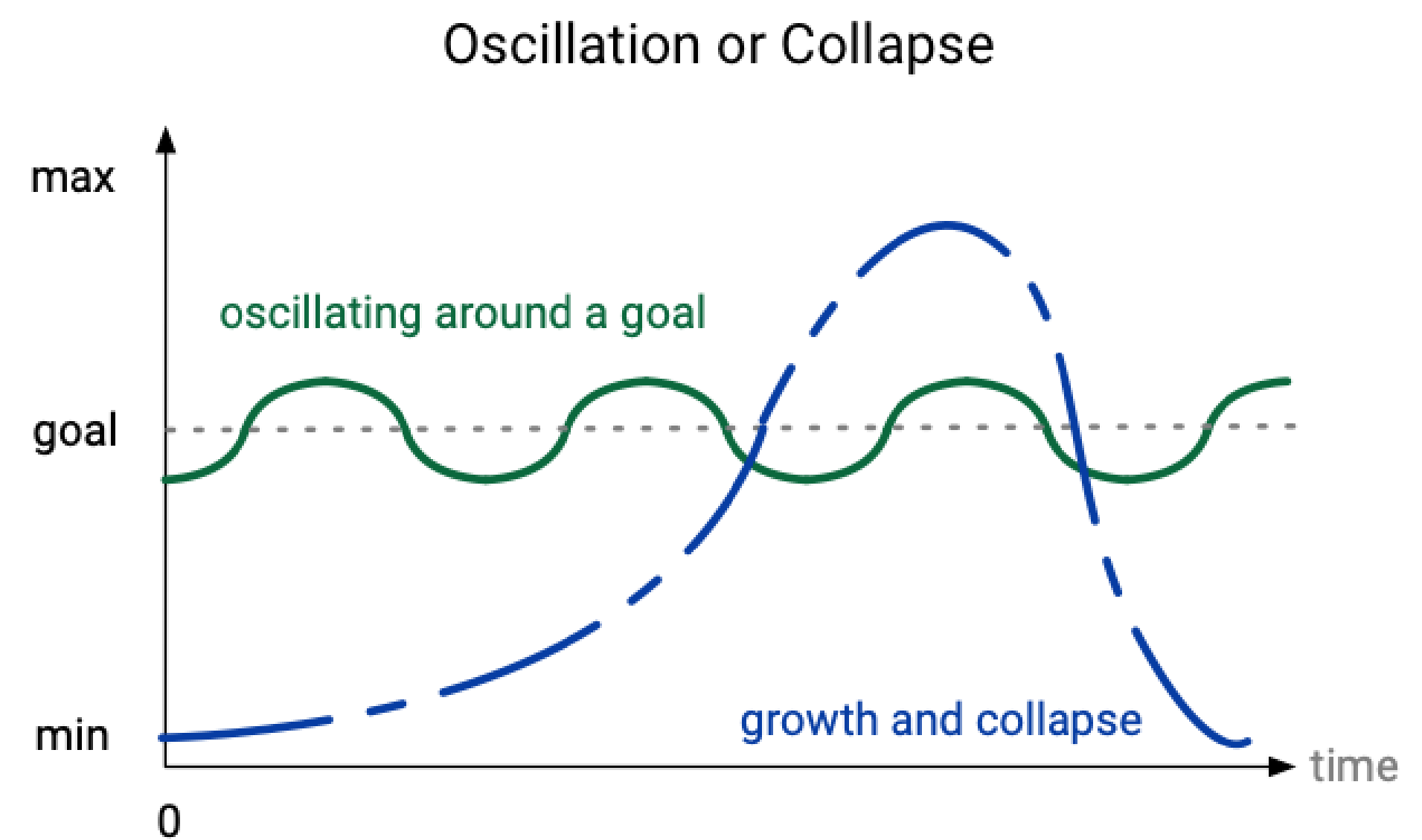
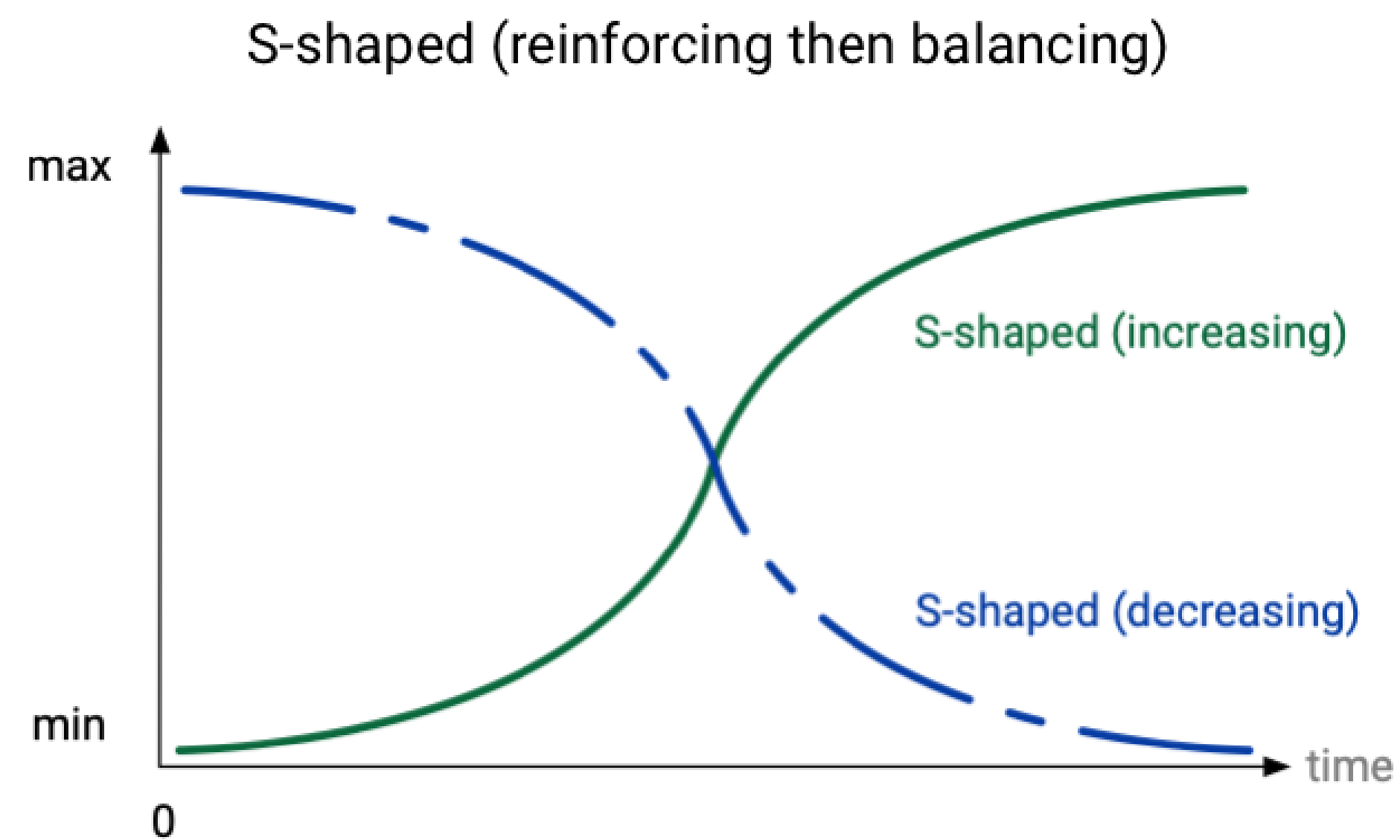
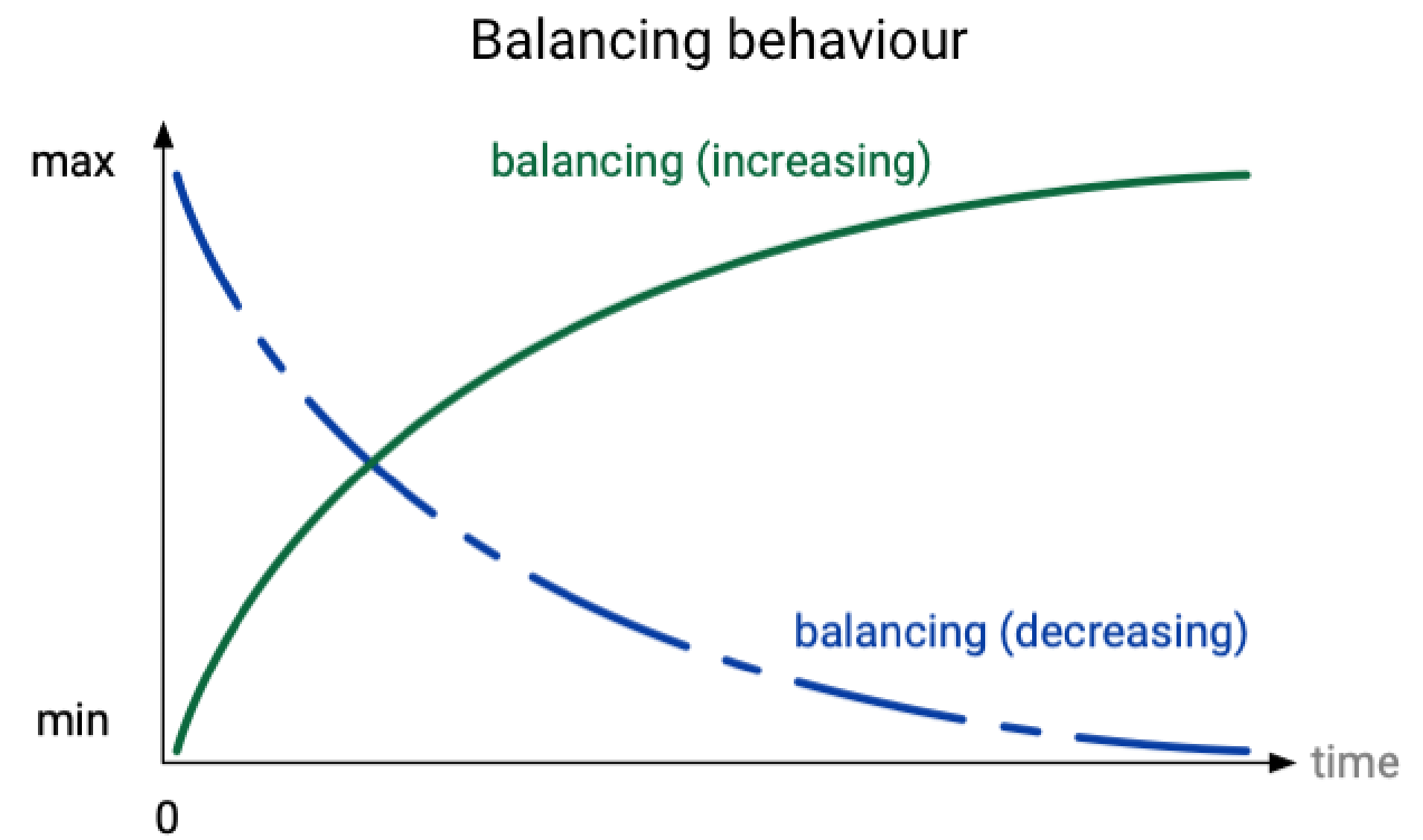
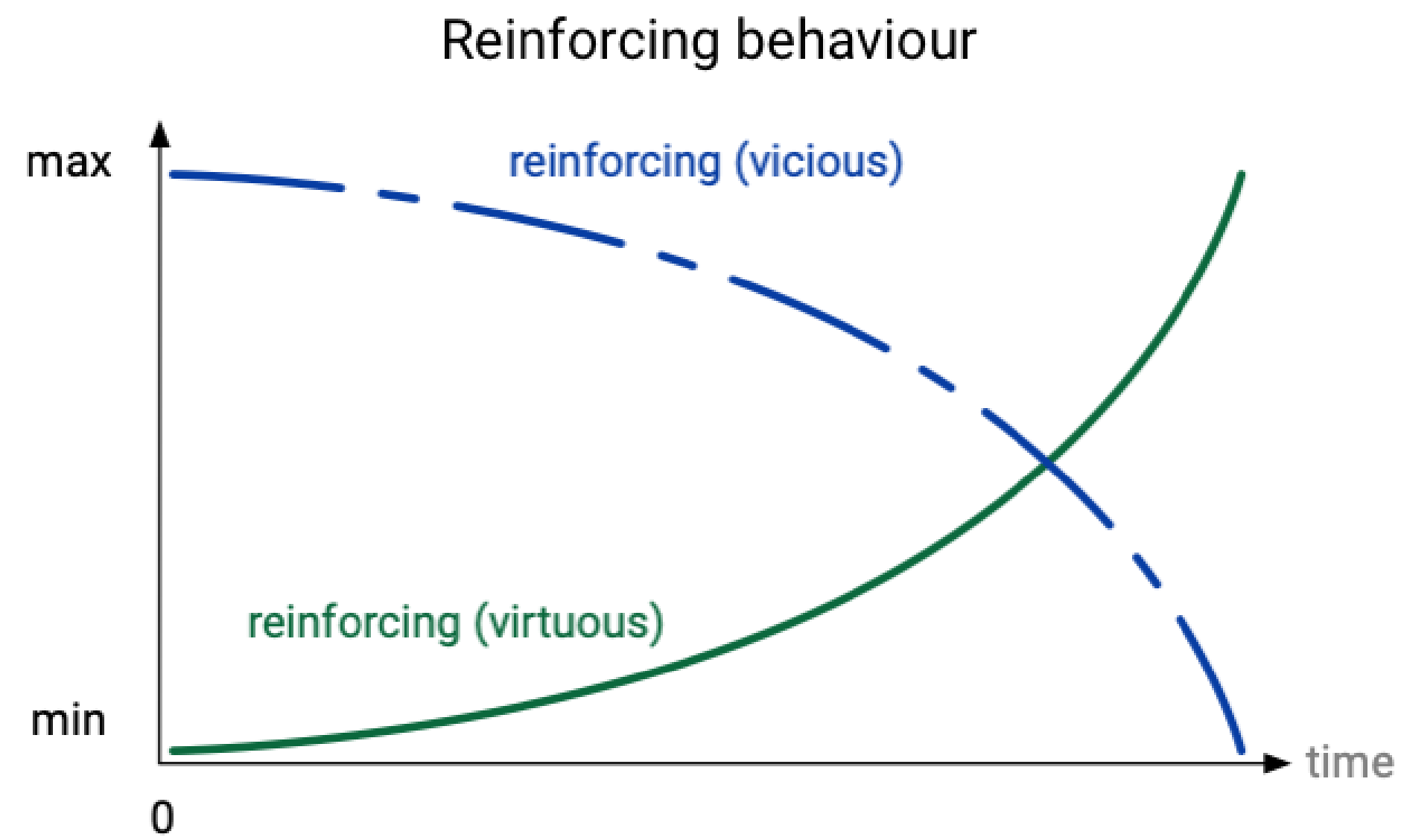
ACT All Colleges Education Conference 2019

**HOW DO WE PREPARE HIGH-SCHOOL STUDENTS
TO BECOME GOOD ENGINEERS**

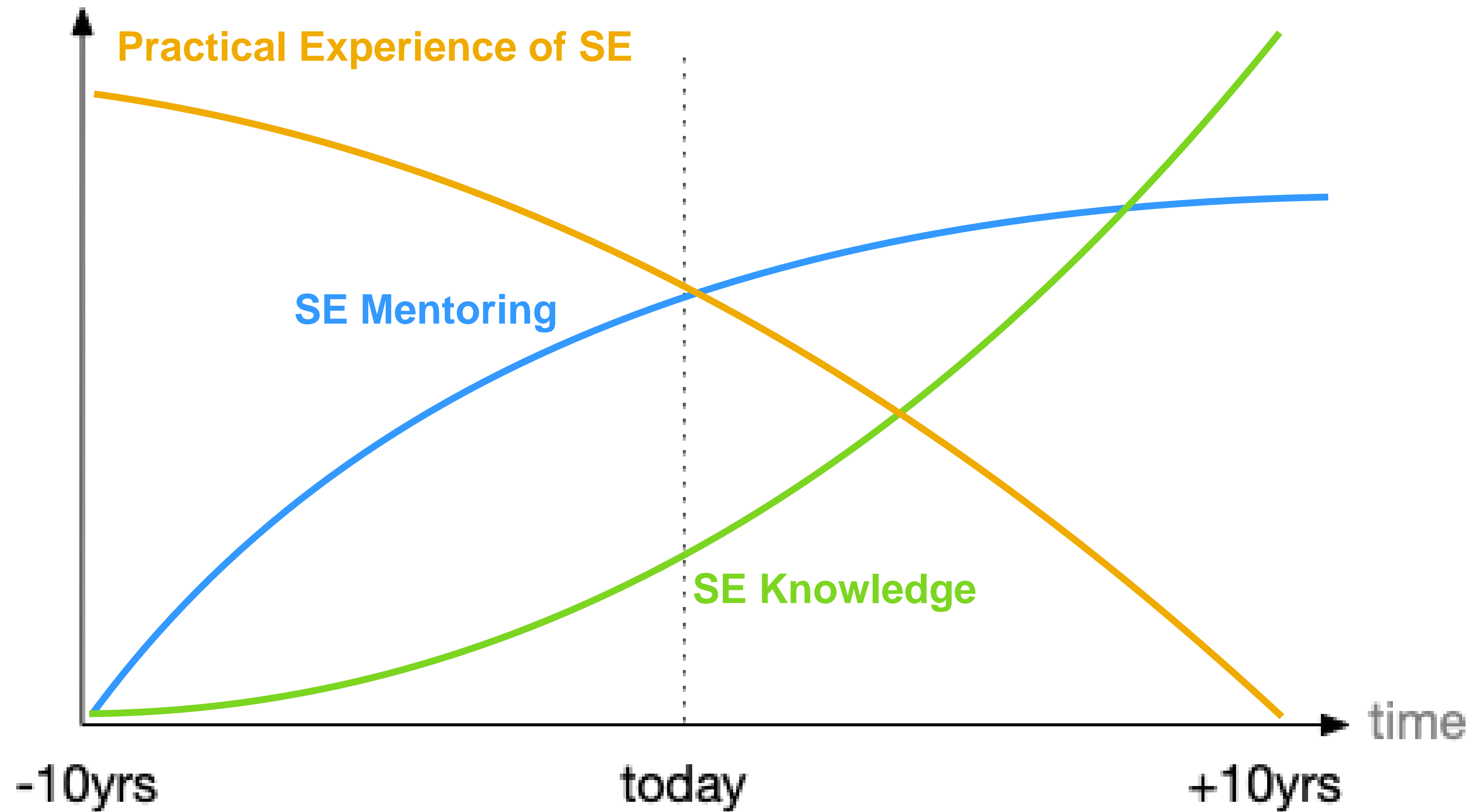
General Group Modelling Approach

1. Introduction to the problem context
2. Group discussion of key variables
3. Draw and share individual 'reference mode' graphs
4. Scaffolded 'causal-loop modelling' approach
5. Looking for 'feedback loops' and 'leverage points'

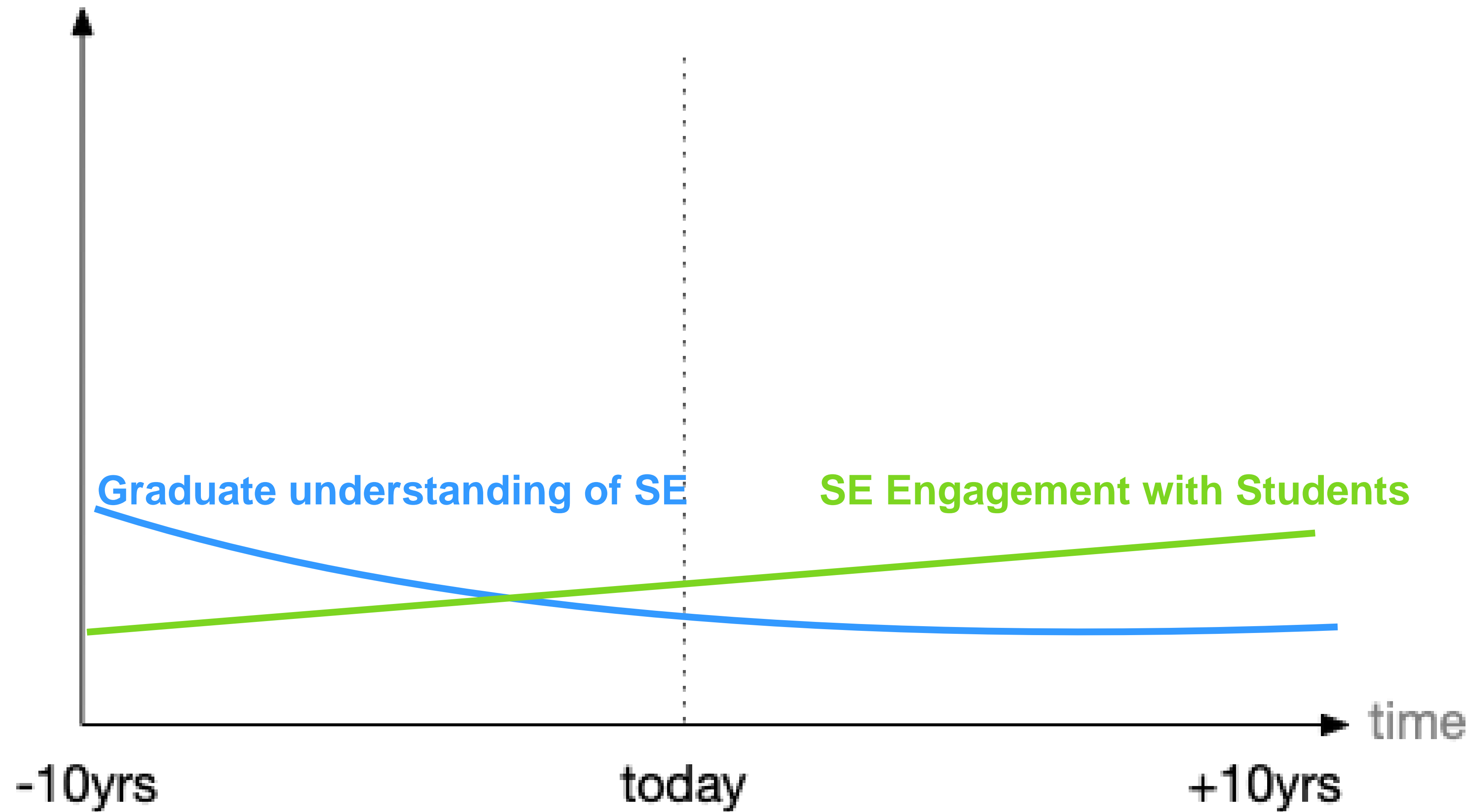
Drawing Time-Series Graphs of Variables of Interest



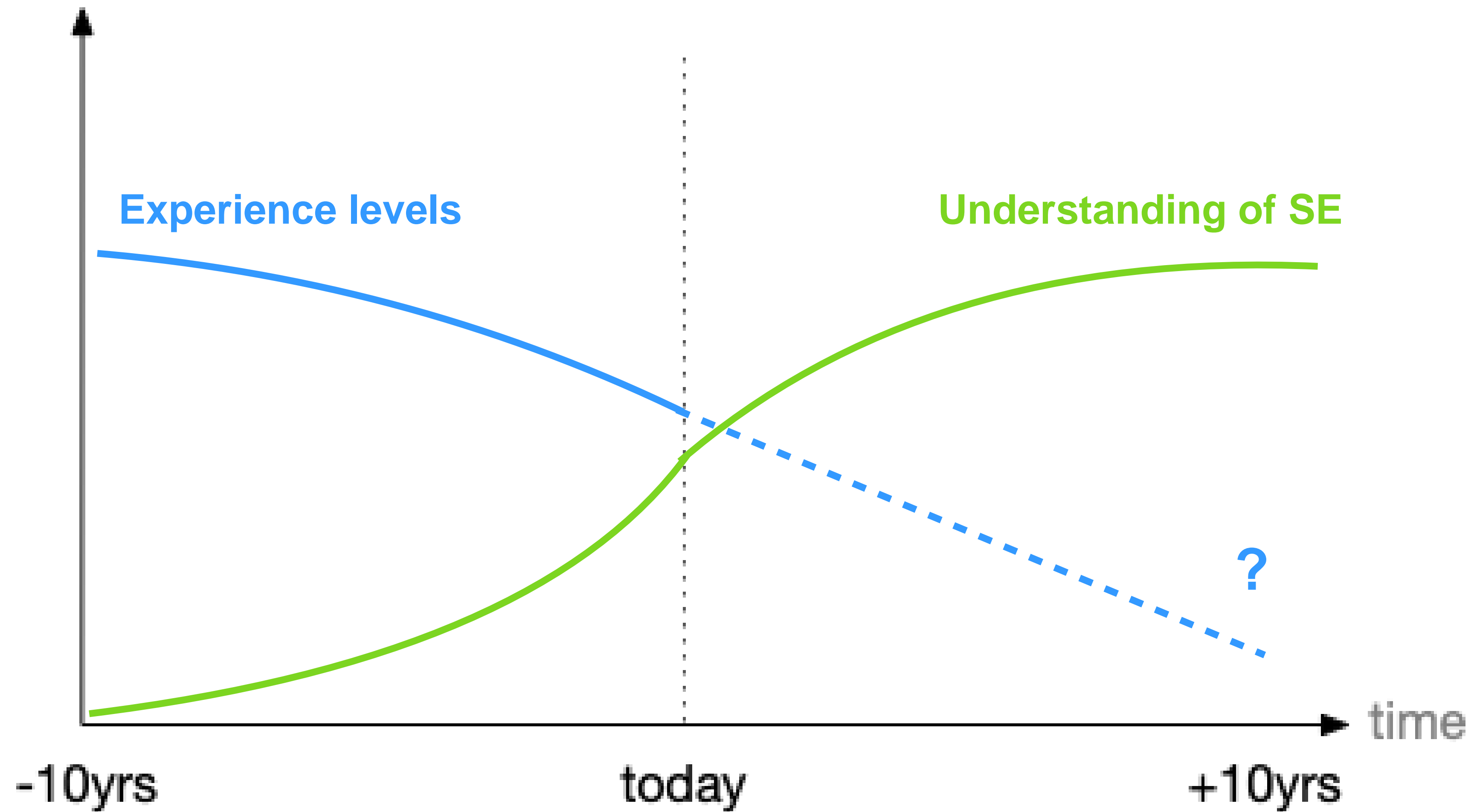
Professional perspective: Time-Series Graphs of Variables of Interest



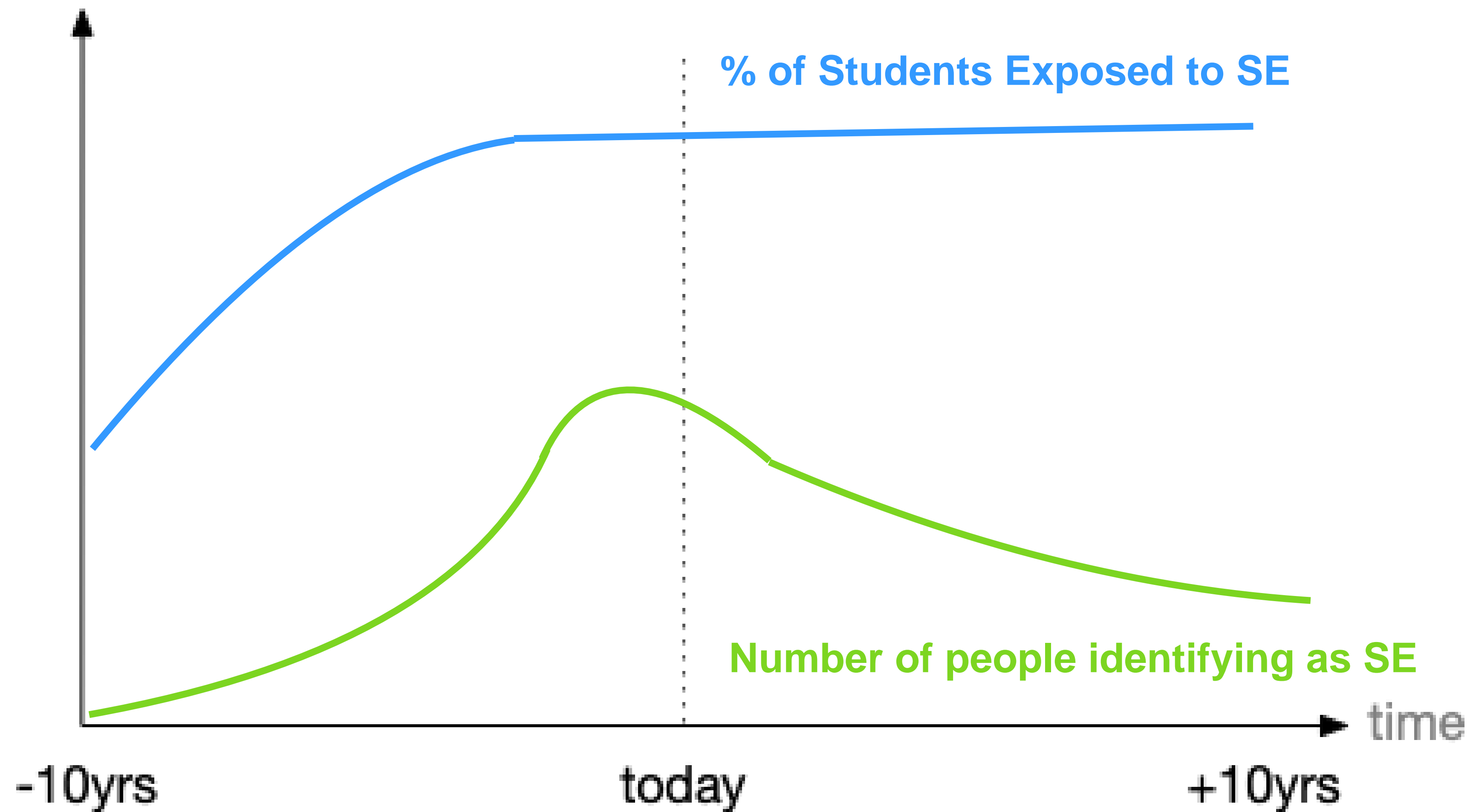
Professional perspective: Time-Series Graphs of Variables of Interest



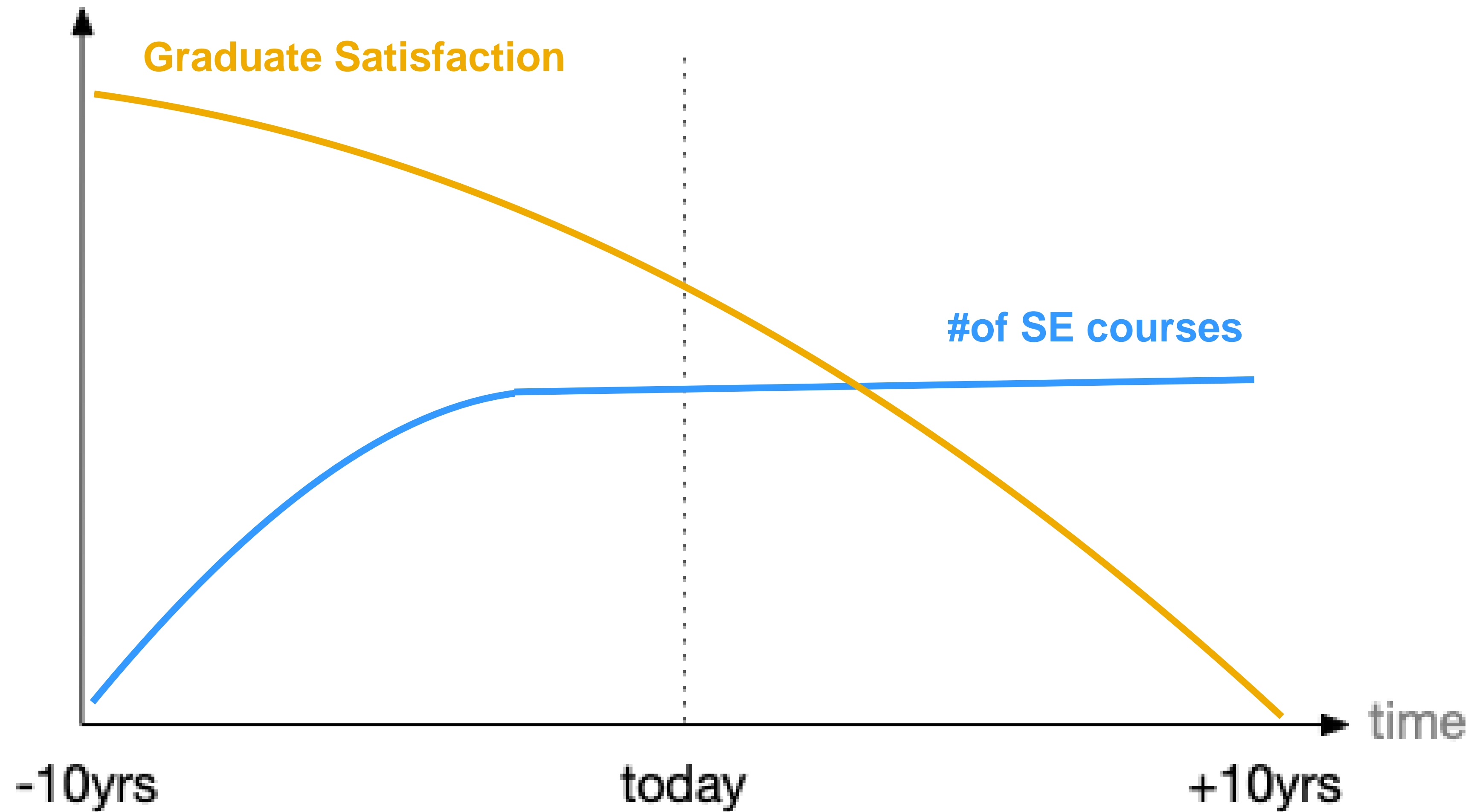
Professional perspective: Time-Series Graphs of Variables of Interest



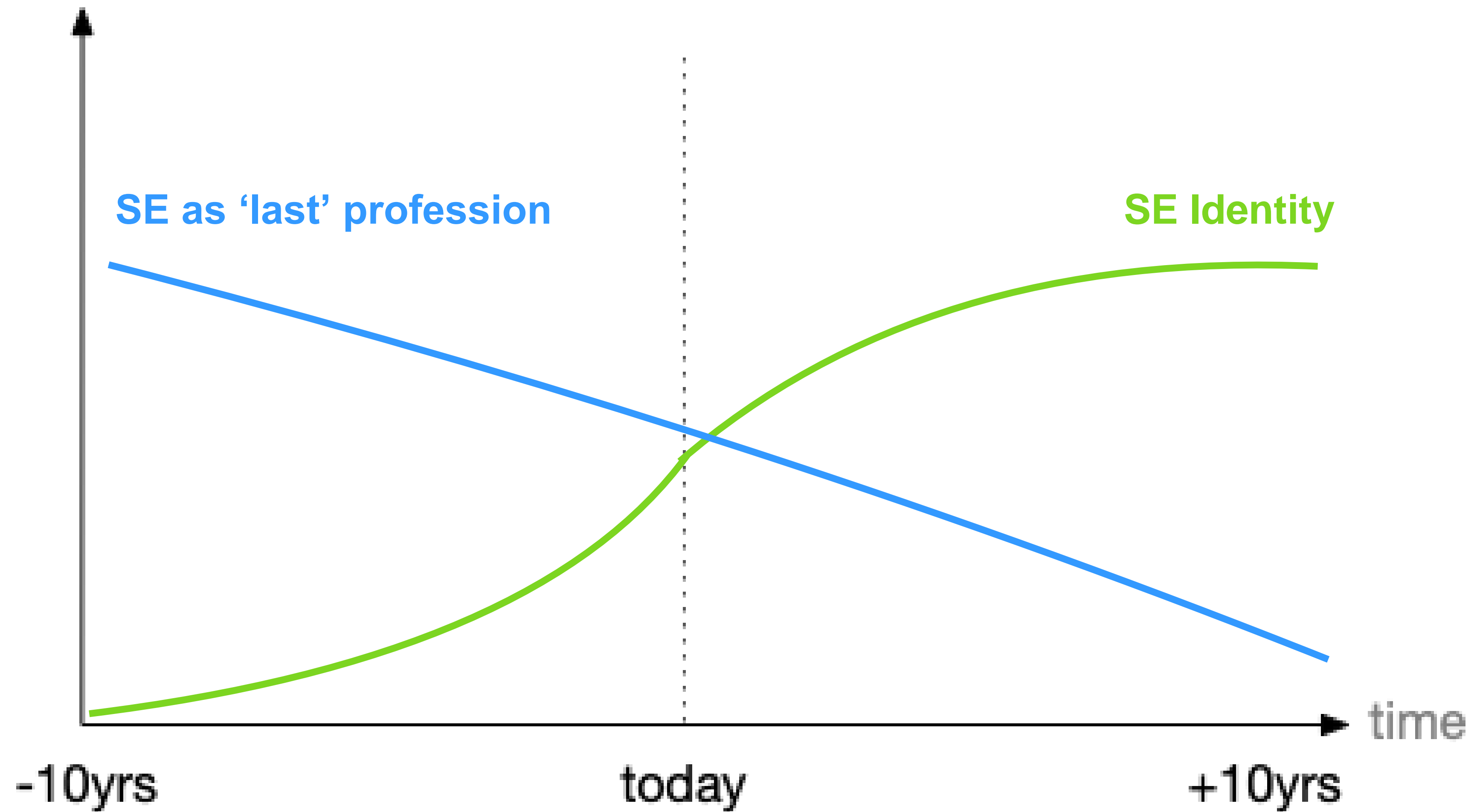
Professional perspective: Time-Series Graphs of Variables of Interest



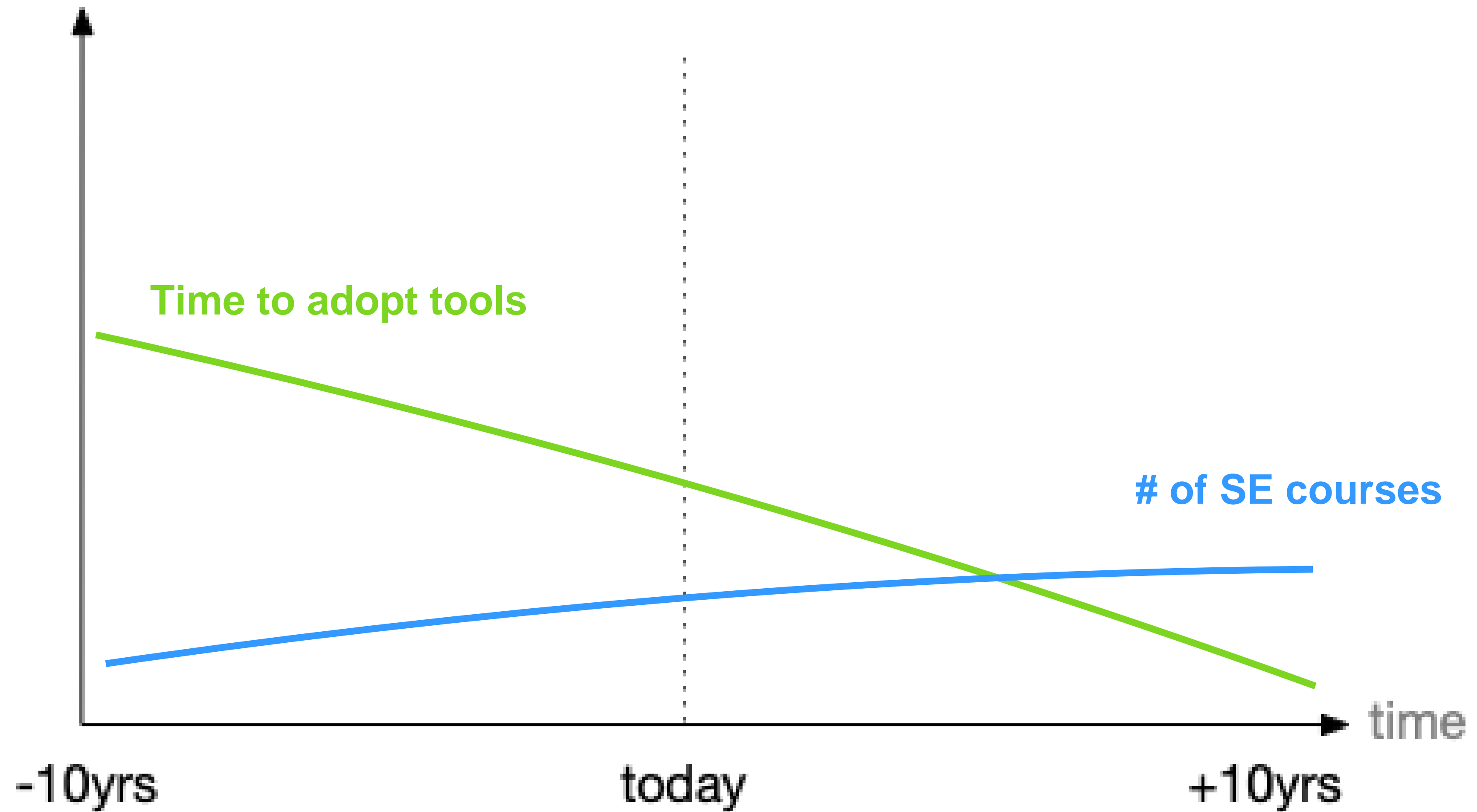
Professional perspective: Time-Series Graphs of Variables of Interest



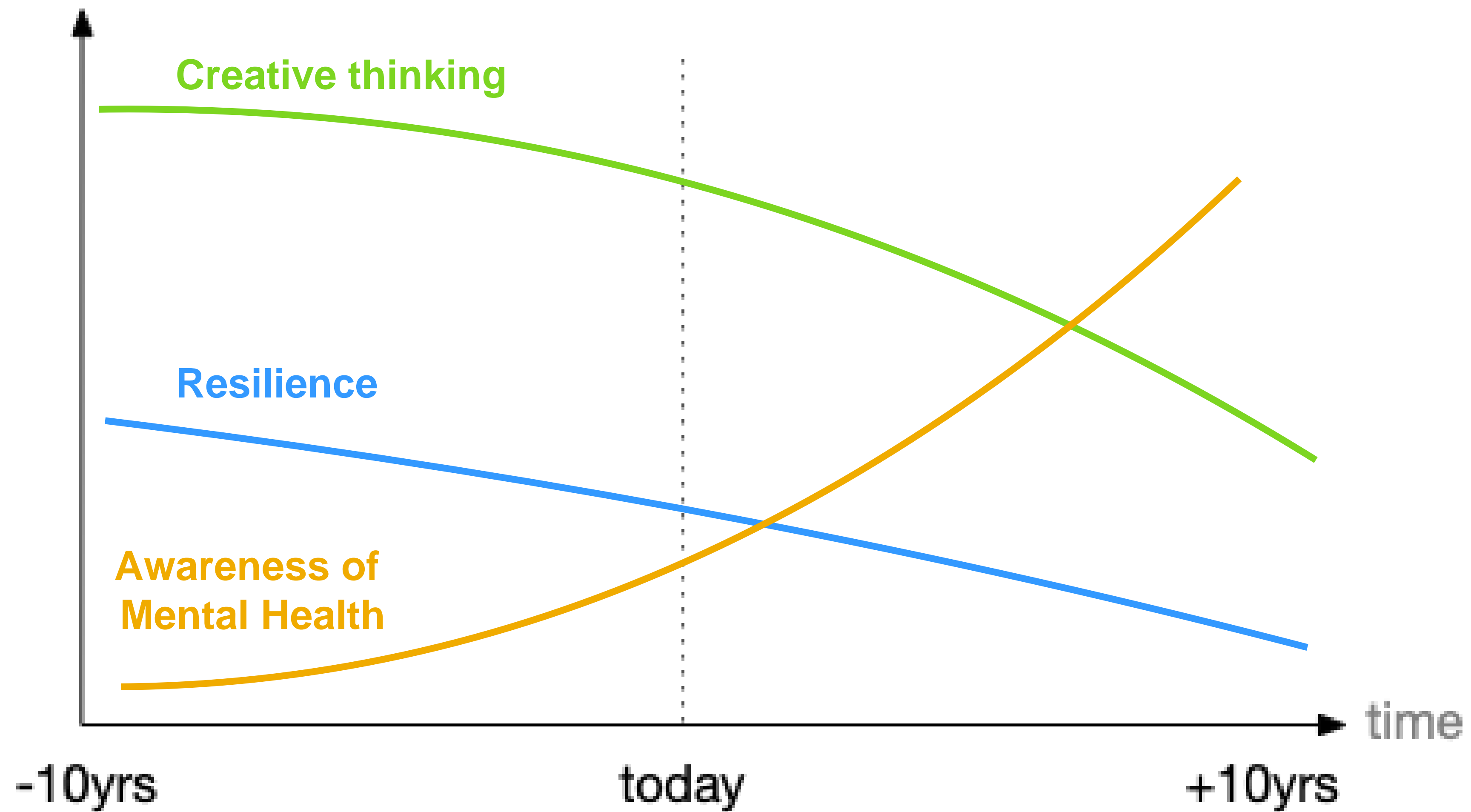
Professional perspective: Time-Series Graphs of Variables of Interest



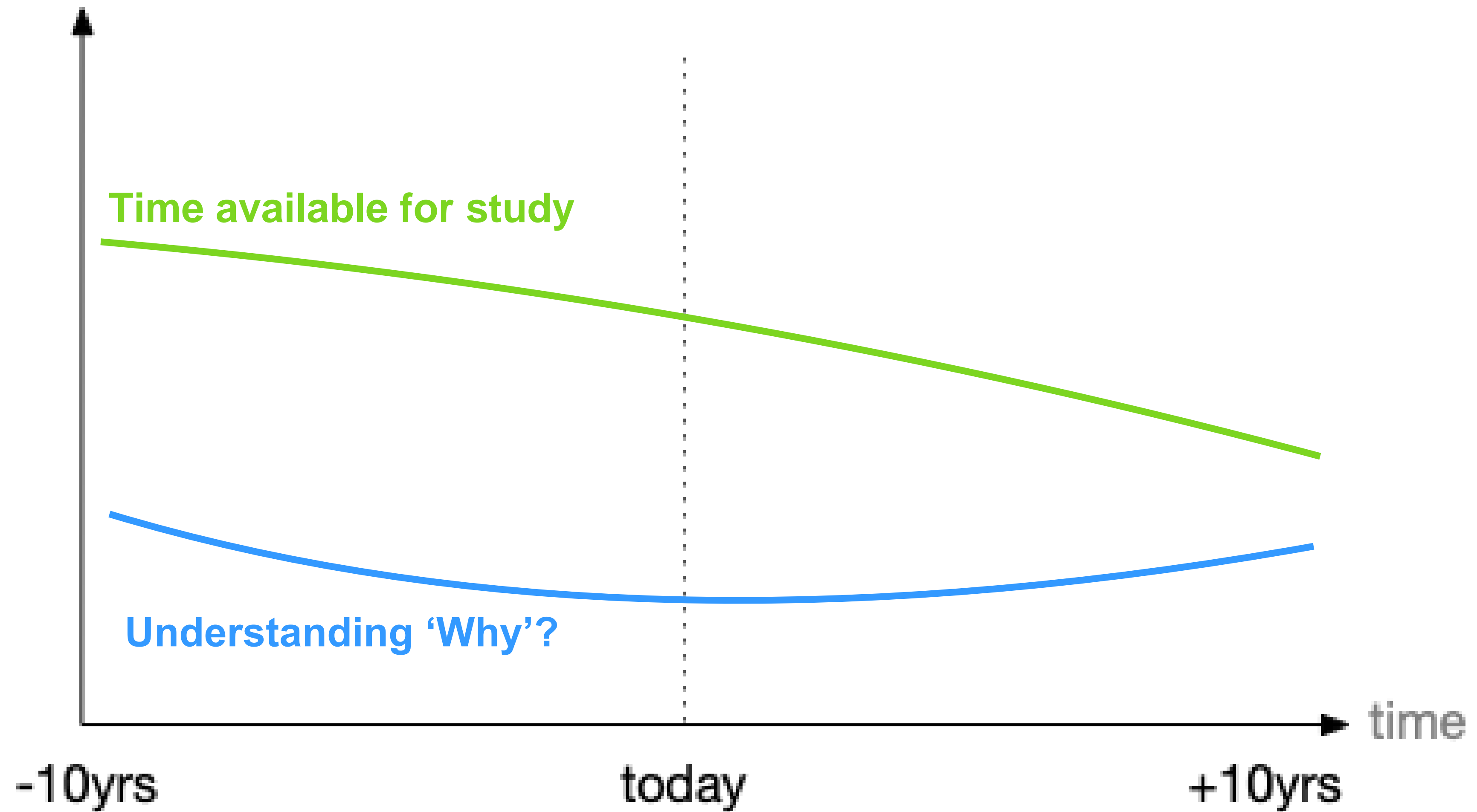
Professional perspective: Time-Series Graphs of Variables of Interest



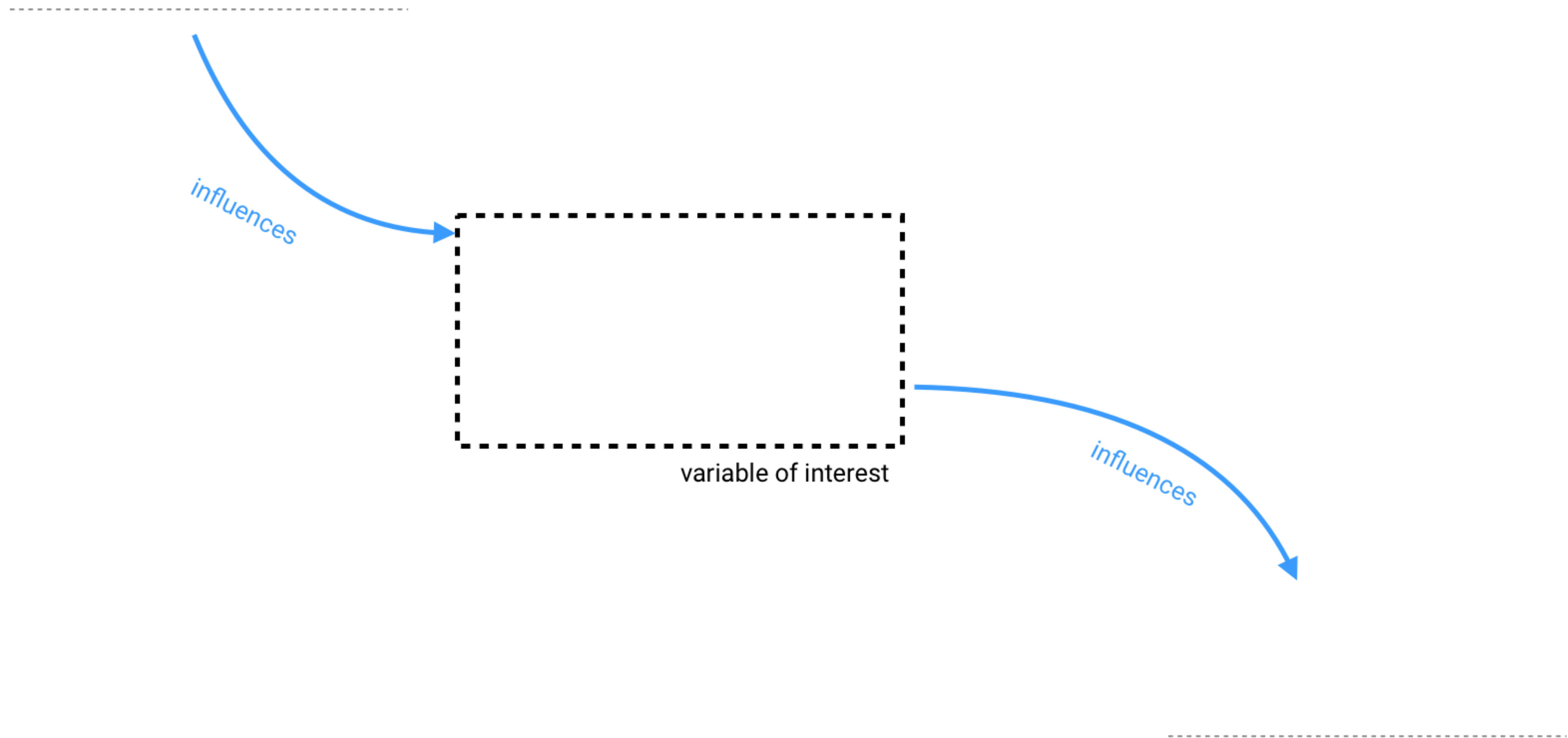
Teacher perspective: Time-Series Graphs of Variables of Interest



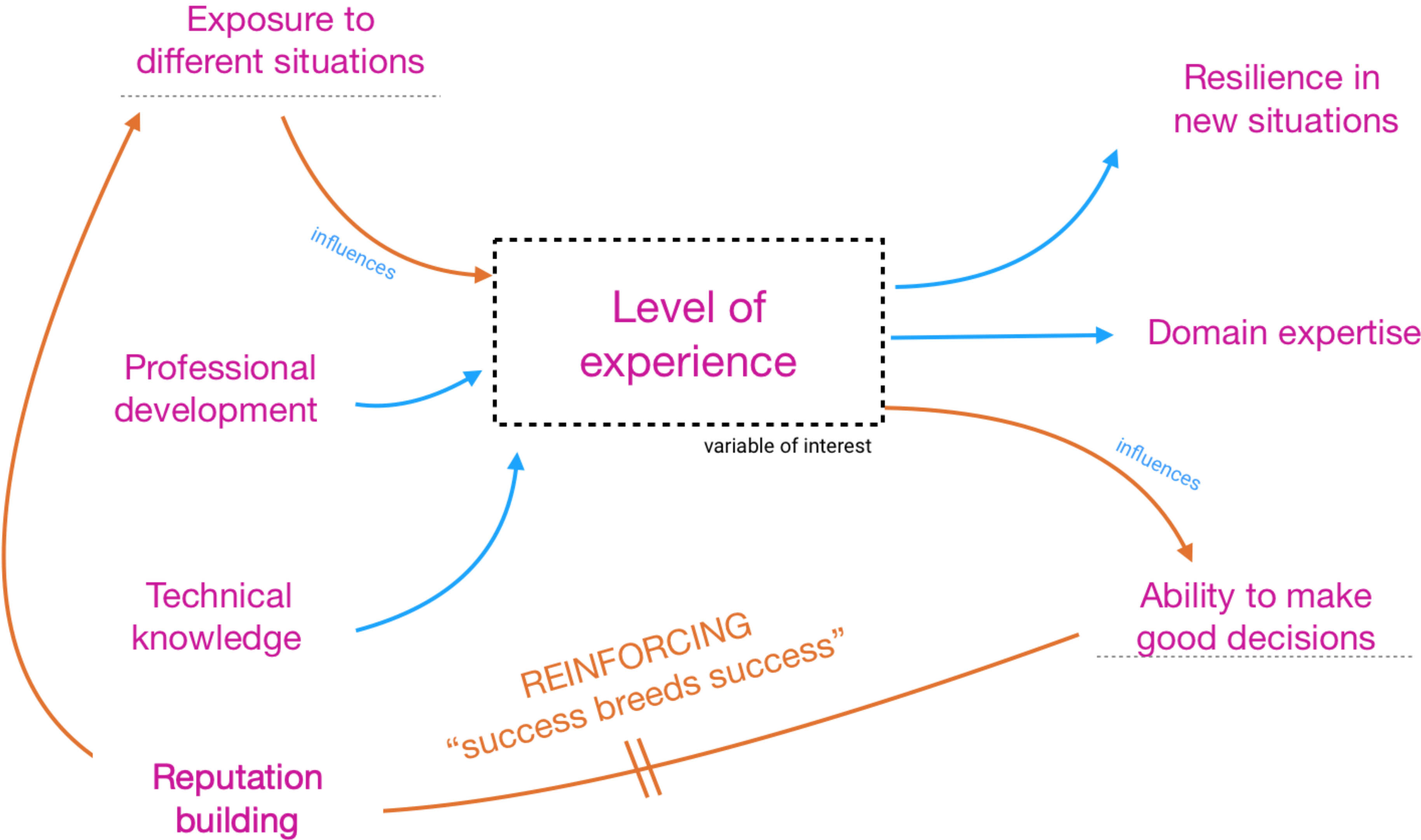
Teacher perspective: Time-Series Graphs of Variables of Interest



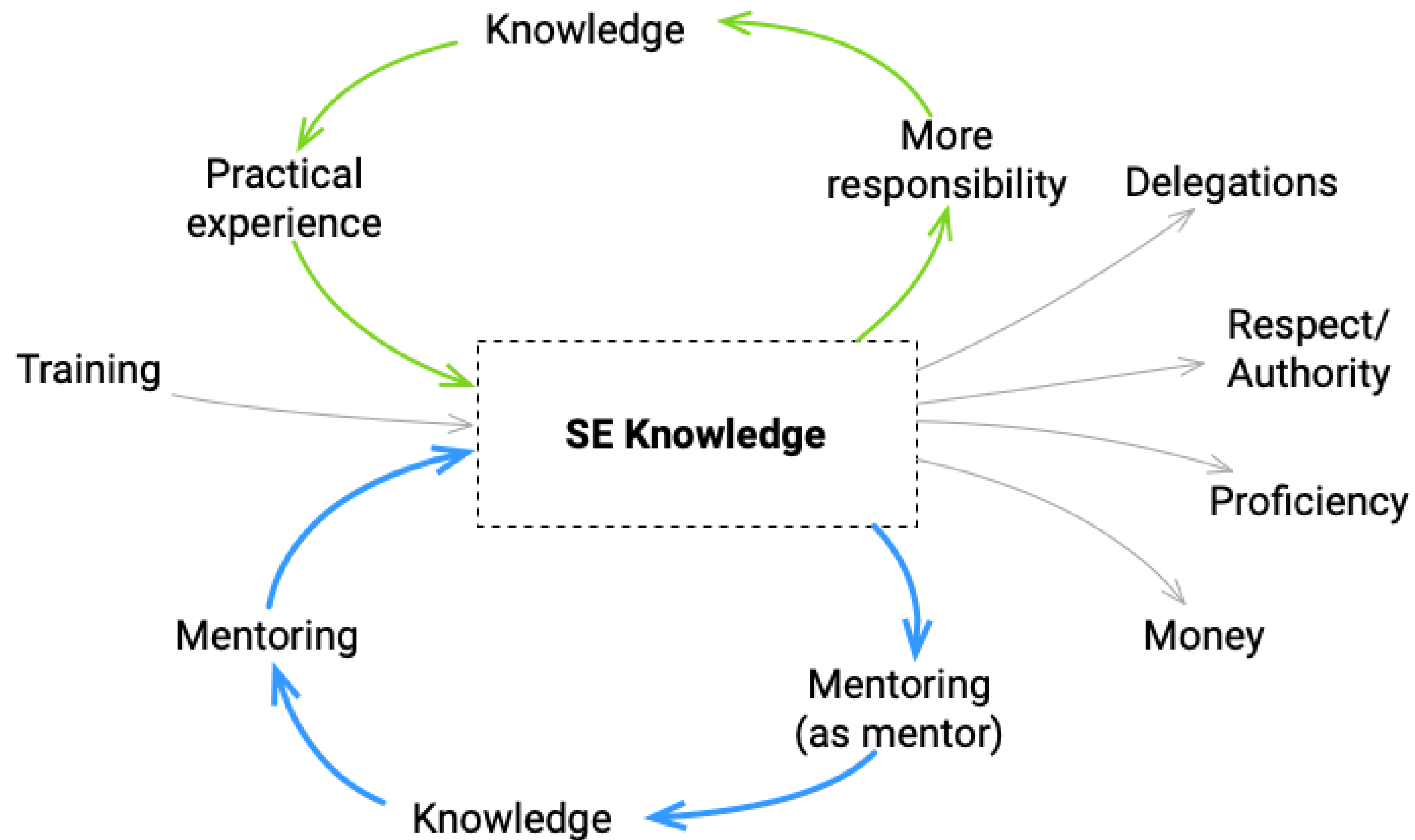
Drawing Causal Loop Diagrams



Drawing Causal Loop Diagrams

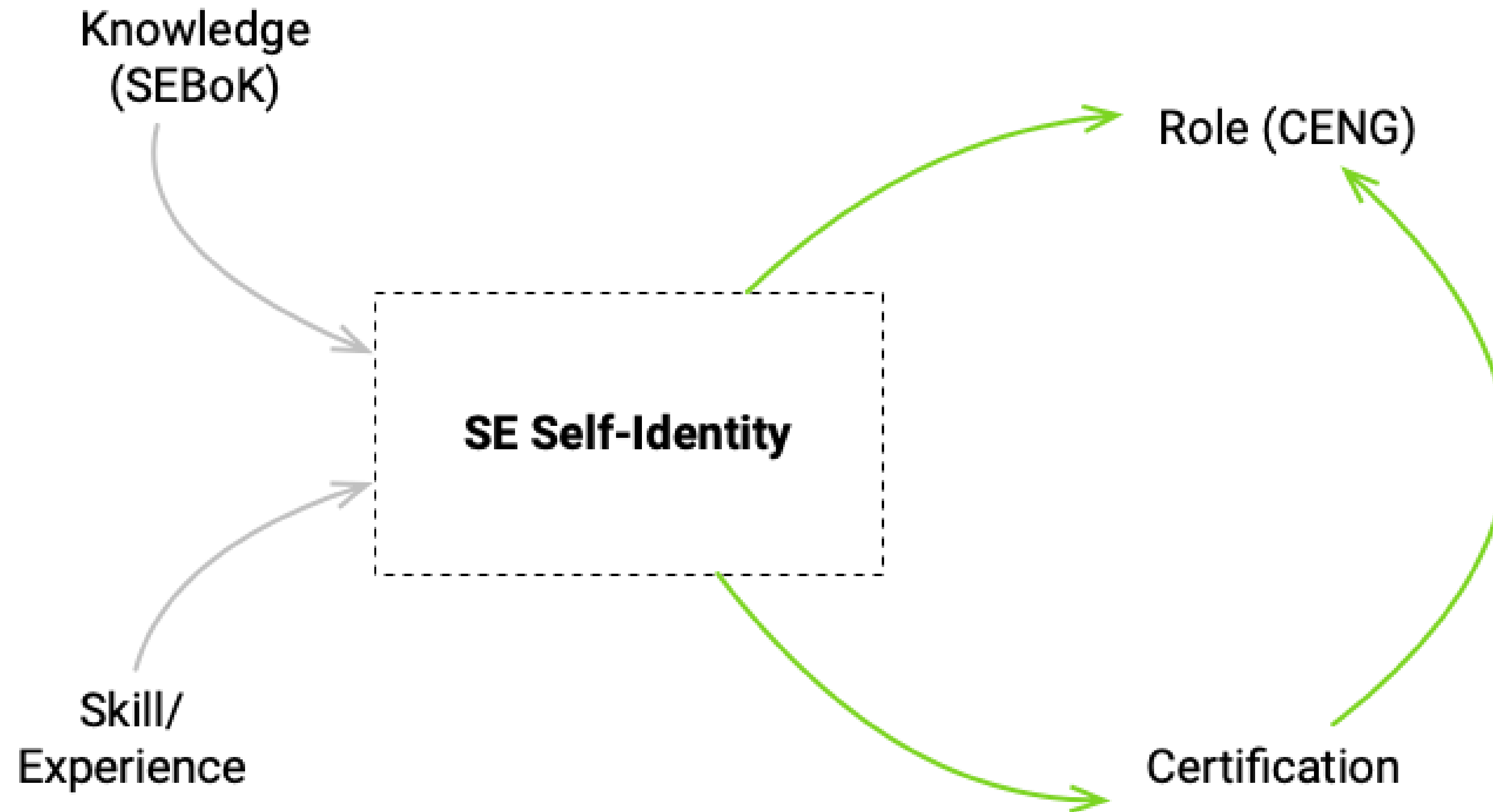


Professional Story: **Developing Graduate Knowledge and Feeding It Back to the Community**



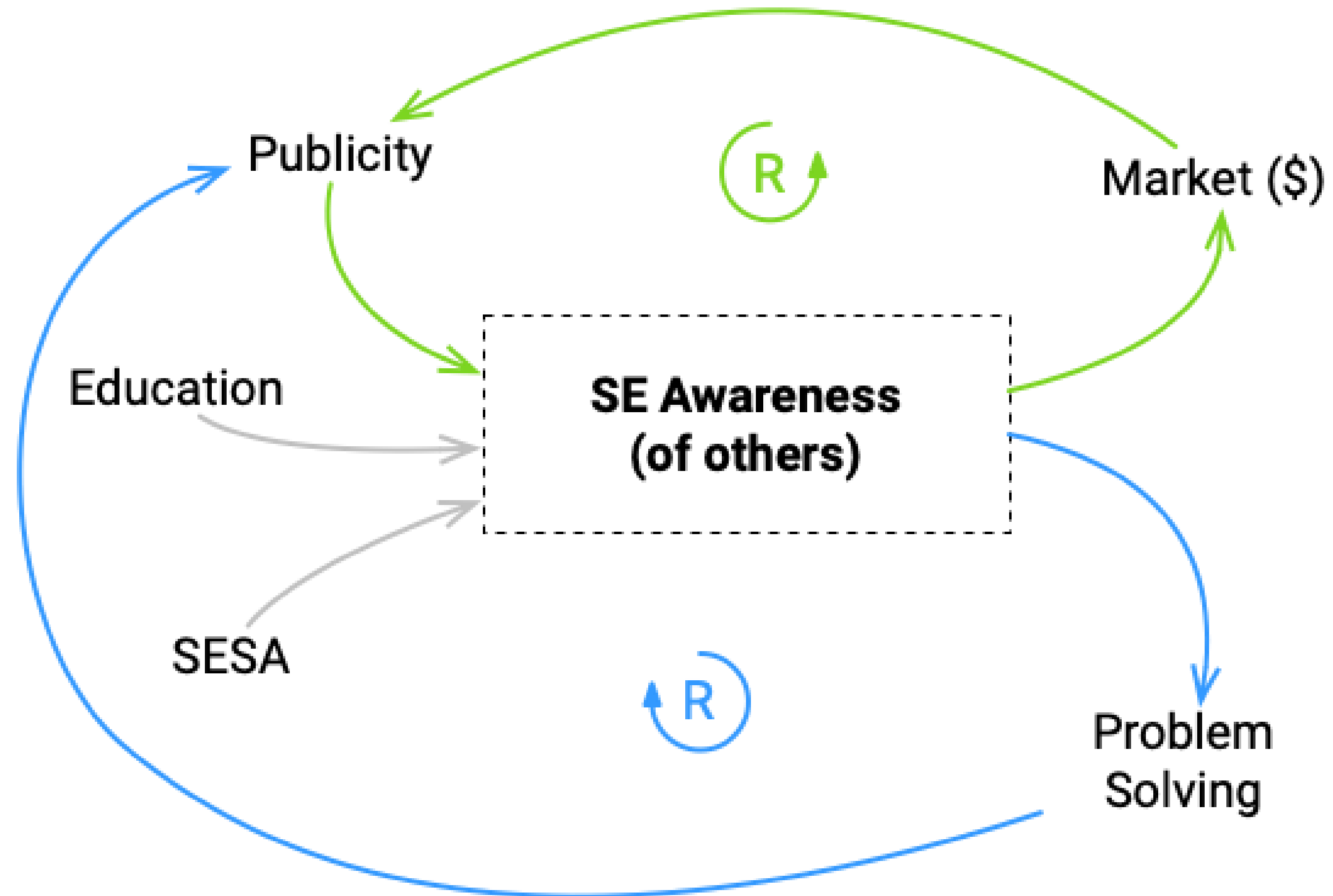
Leverage Point: Change organisational mindsets to spend more time in development of grads before expecting a return in value

Professional Story: **SE Competency Growth**



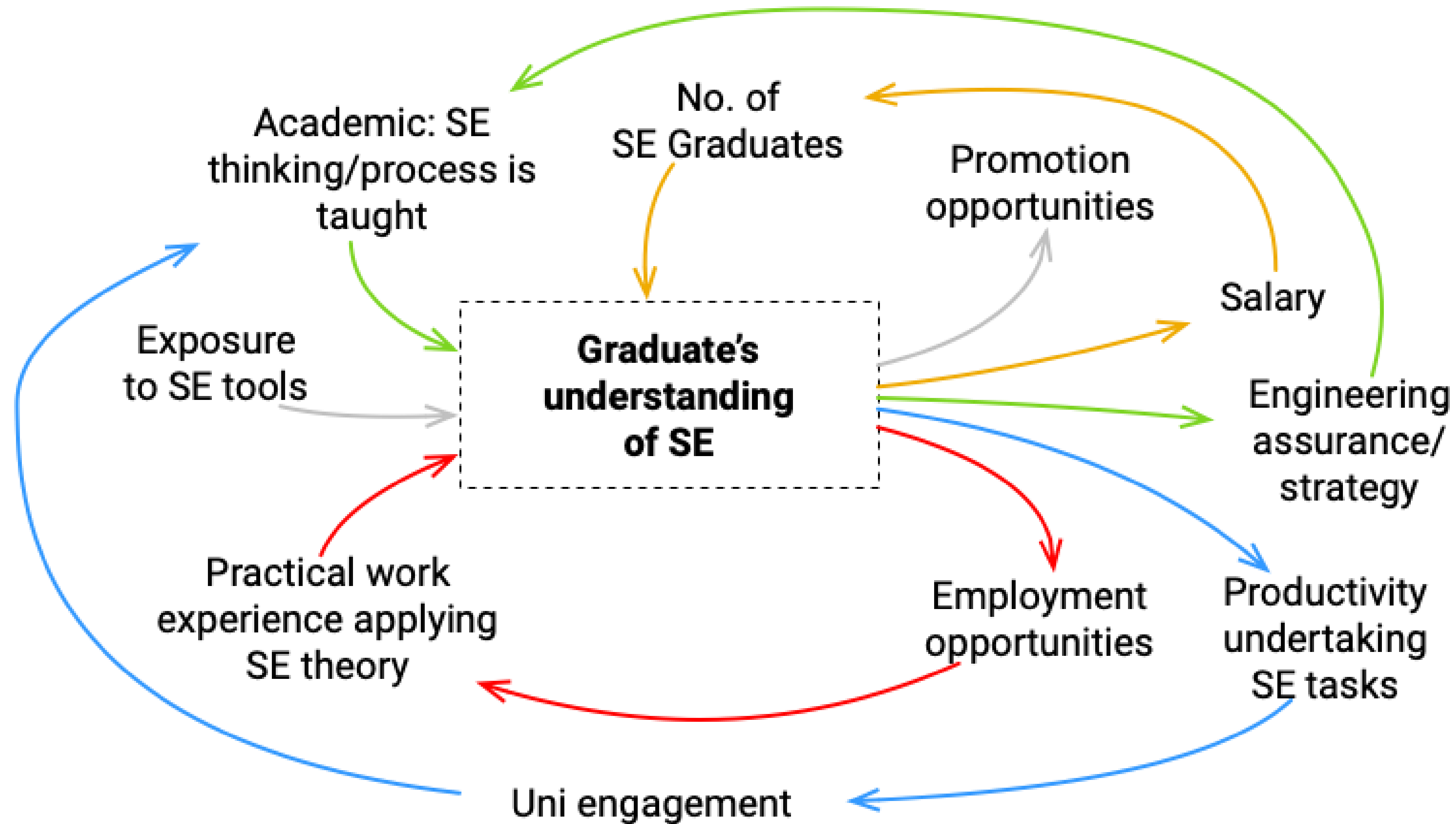
Leverage Point: SEs grow in their competence is influenced by increasing access to knowledge and application opportunities

Professional Story: Raise Awareness of SE



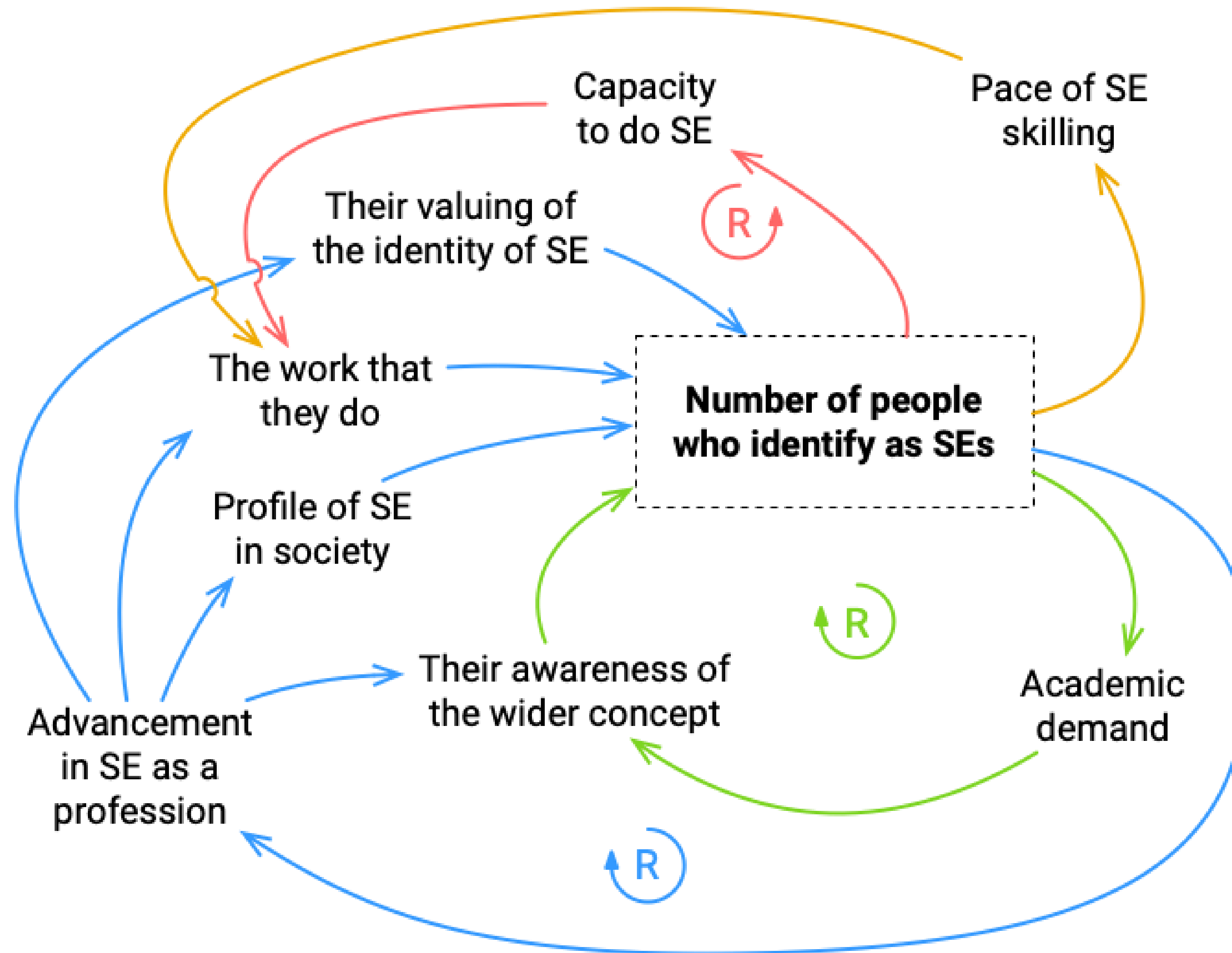
Leverage Point: none given.

Professional Story: Aspects Influencing the Employment of SE Graduates



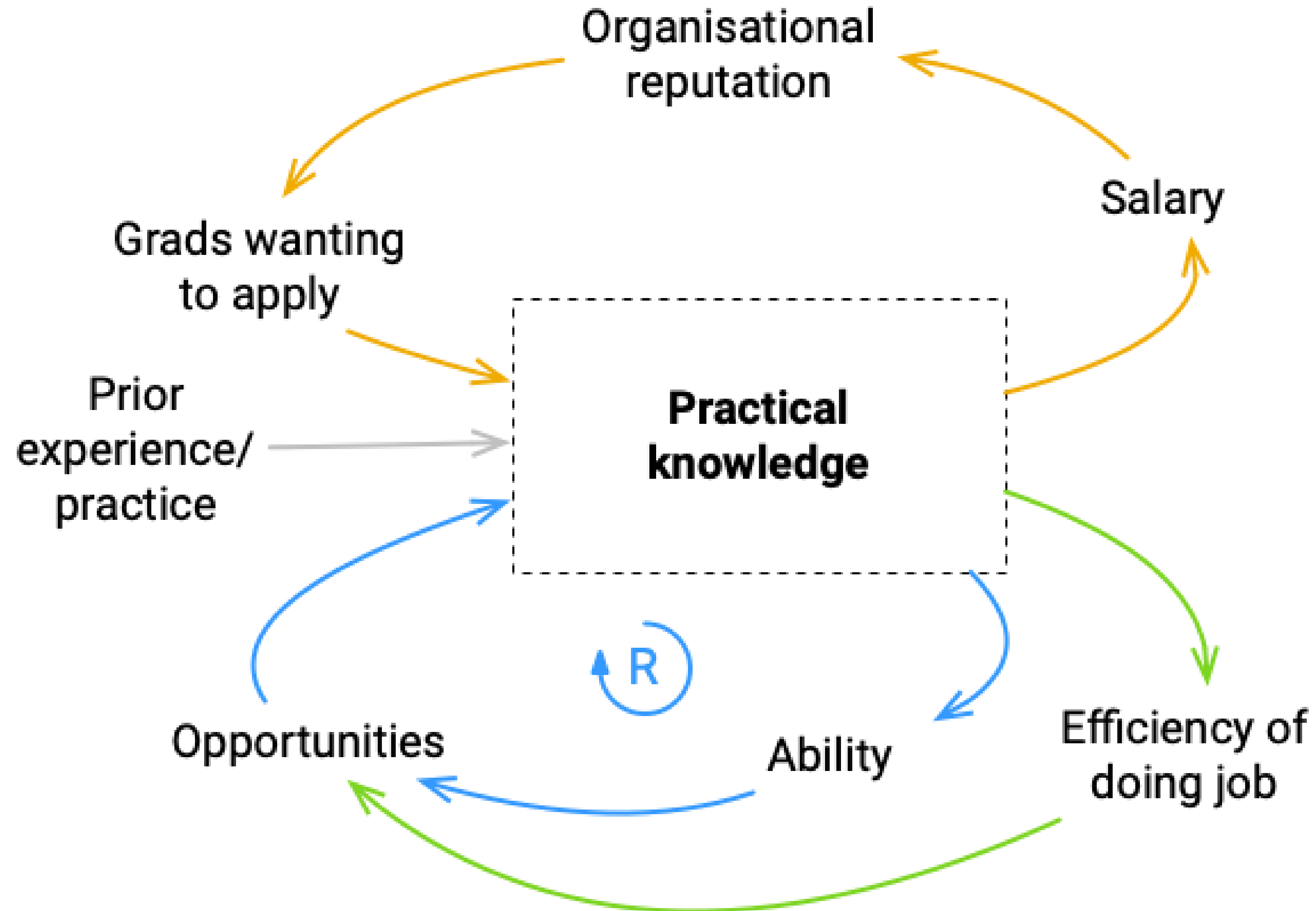
Leverage Point: Provide opportunities on the RHS of chart

Professional Story: Advancing Professional Identity



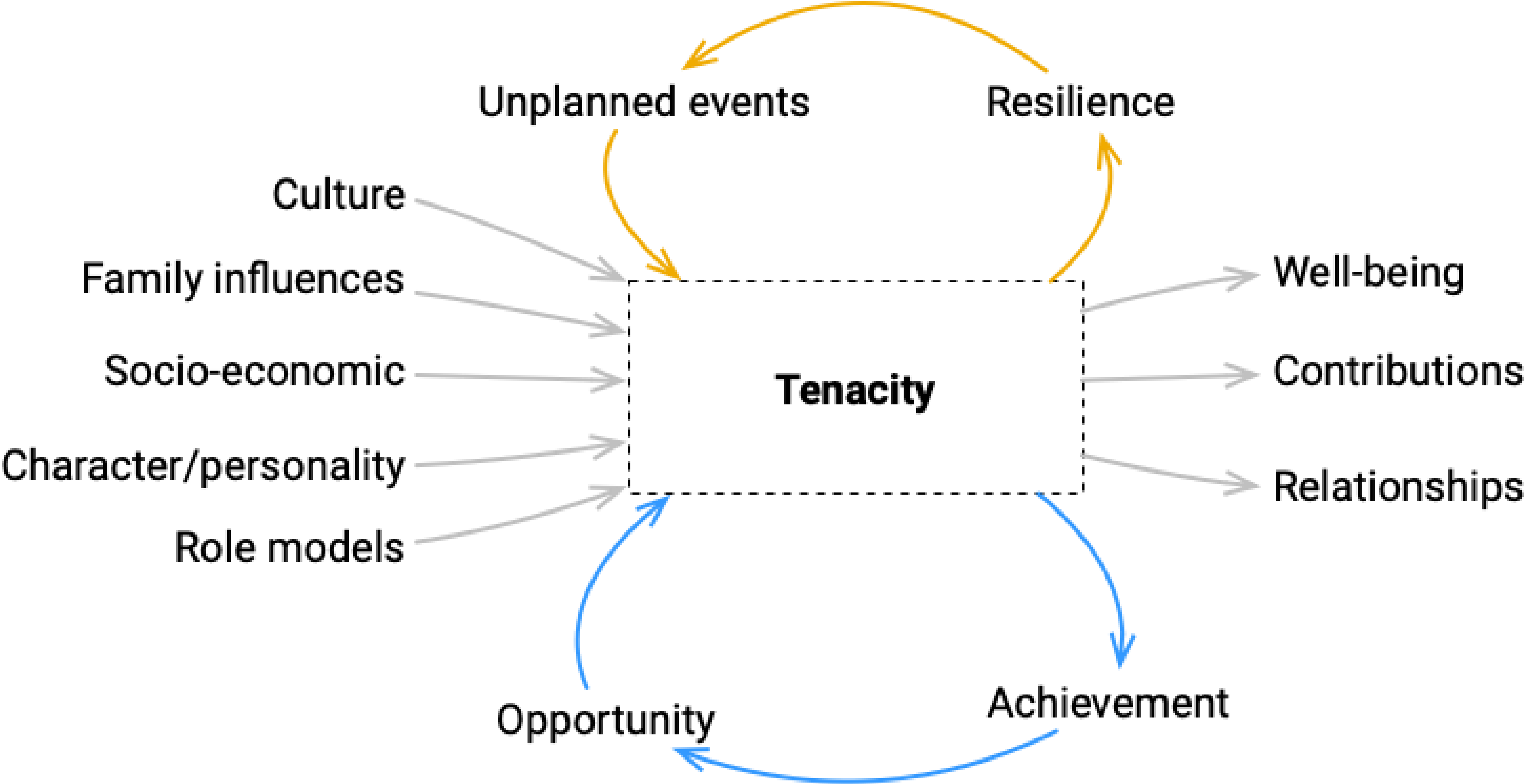
Leverage Point: SE needs to increase in profile to be valued by the community, not just the profession

Professional Story: Graduate Level of Practical Knowledge



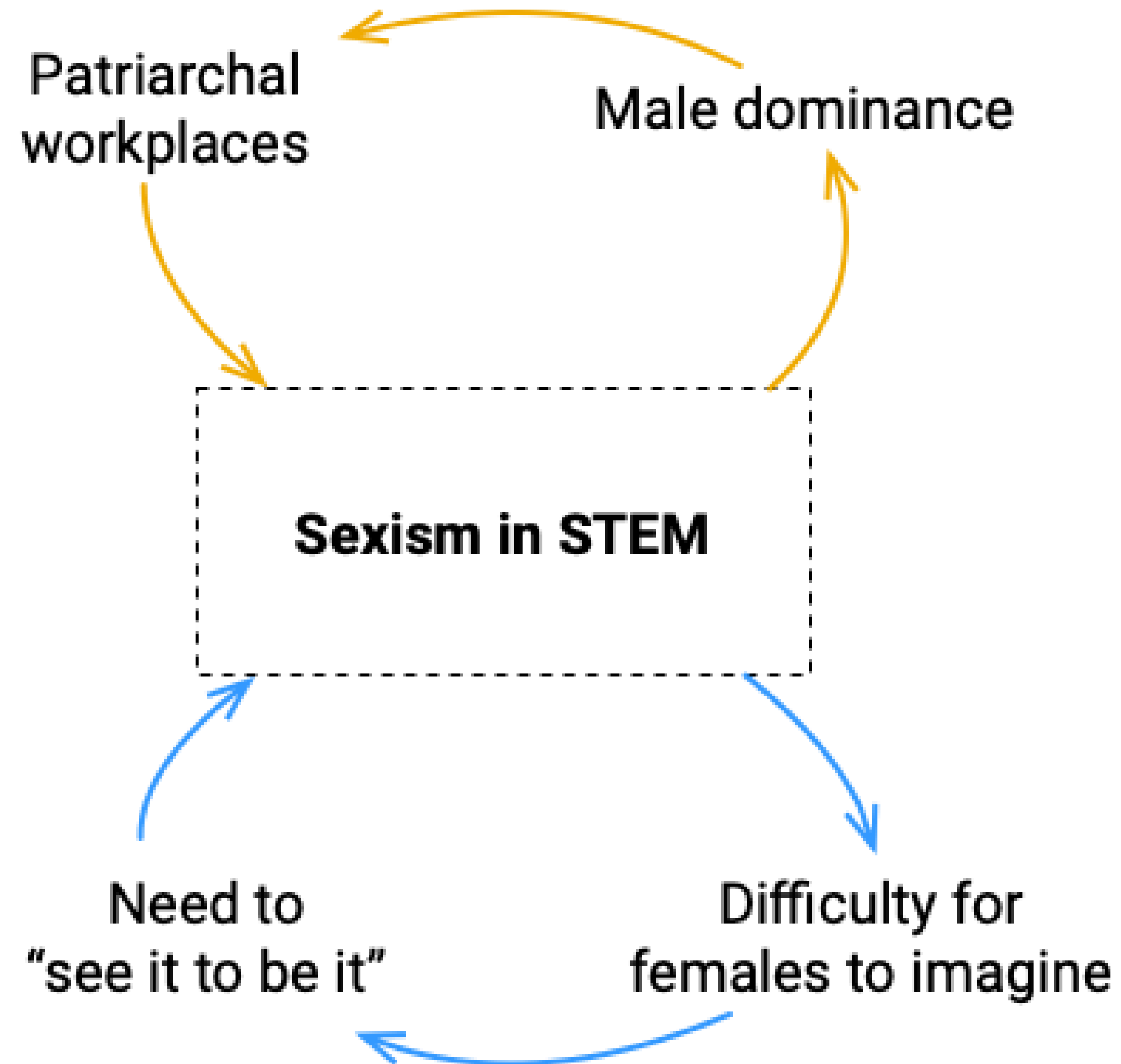
Leverage Point: Structural change; more relevant work/industry experience during courses

Teacher Story: Finding Purpose



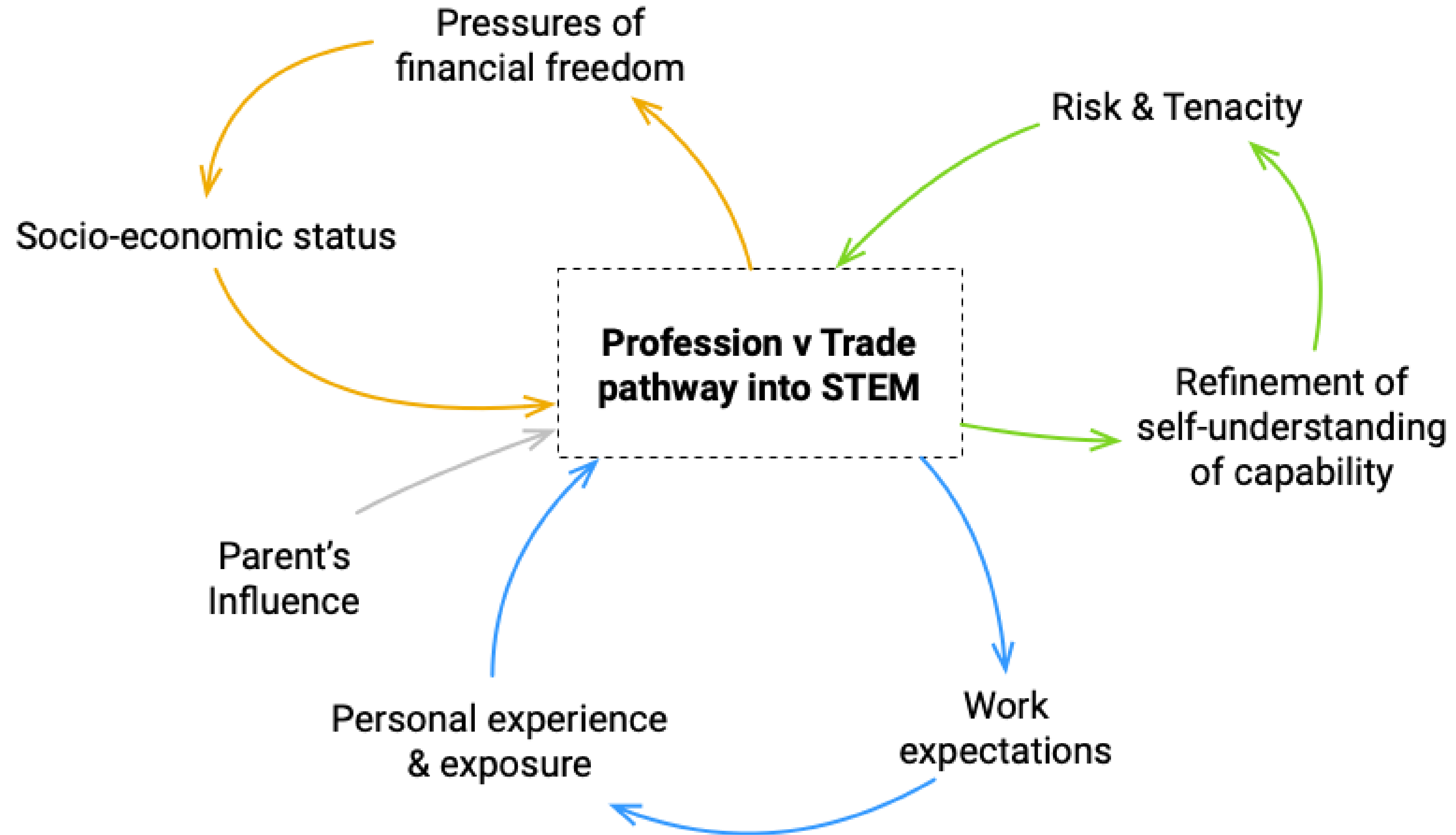
Leverage Point: Building a shared understanding to improve tenacity of young adults

Teacher Story: **Male-dominated industry**



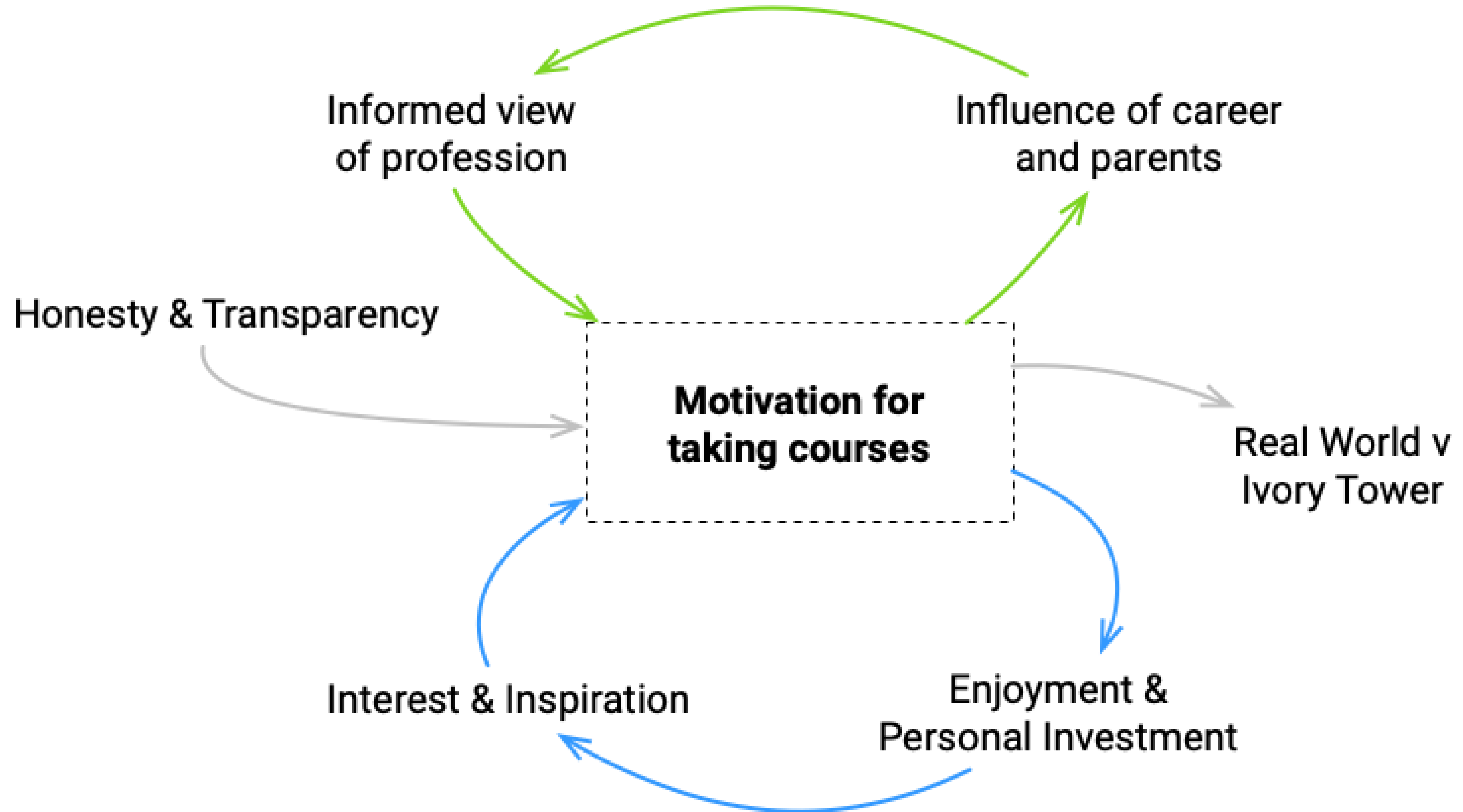
Leverage Point: Change societal norms

Teacher Story: The Pathway to Becoming an Engineer



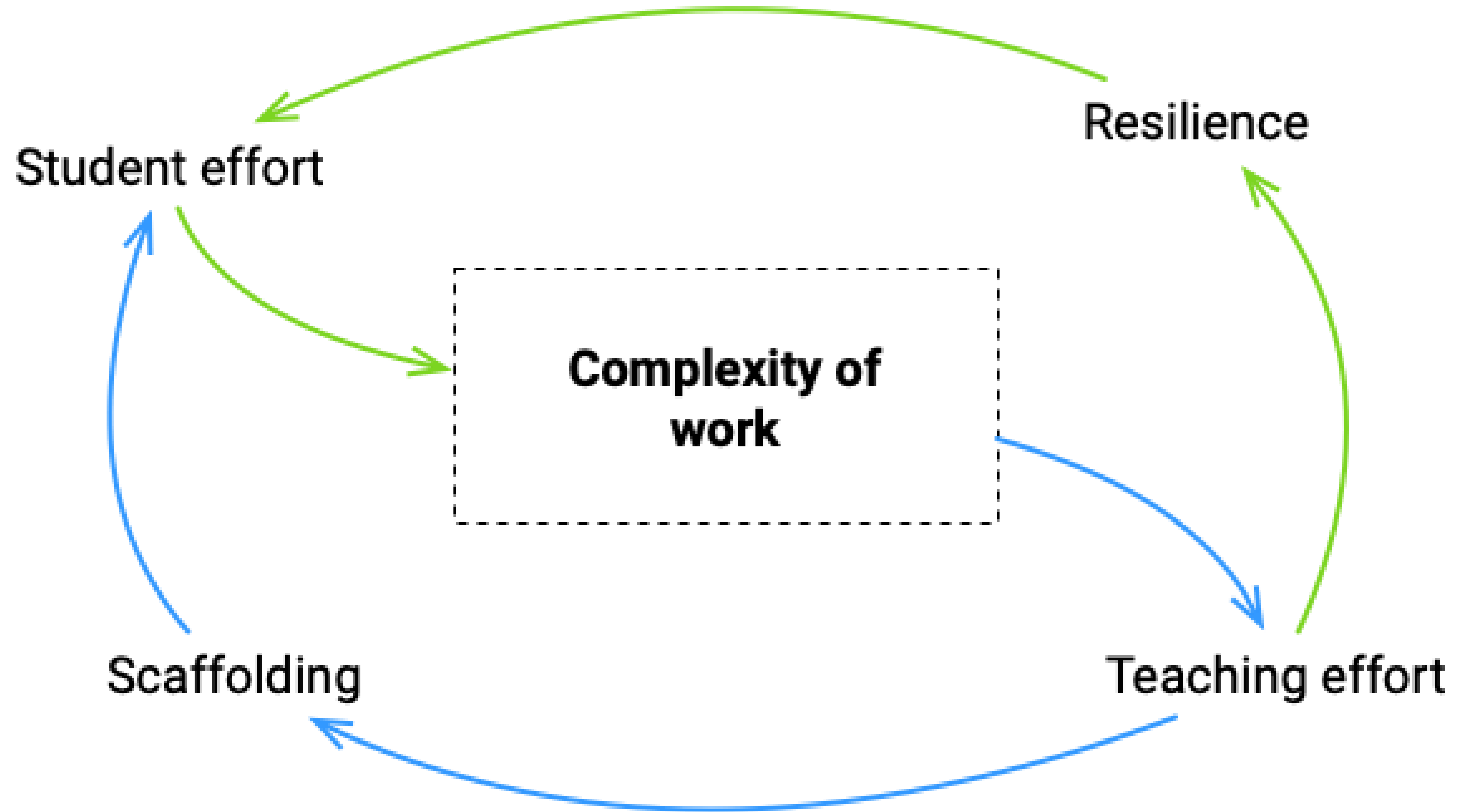
Leverage Point: Provide apprentice-style trade options into engineering profession

Teacher Story: **Discovering Why We Are Here**



Leverage Point: Understanding what motivates our students to invest their time in Engineering

Teacher Story: **Scaffolding v Resilience to Encourage Student Effort**



Leverage Point: Shift paradigm to decouple scaffolding from student projects

What's next?

*How can we use these insights
to understand how we can
respond to the
challenge of promoting
Tomorrow's Systems Engineer?*