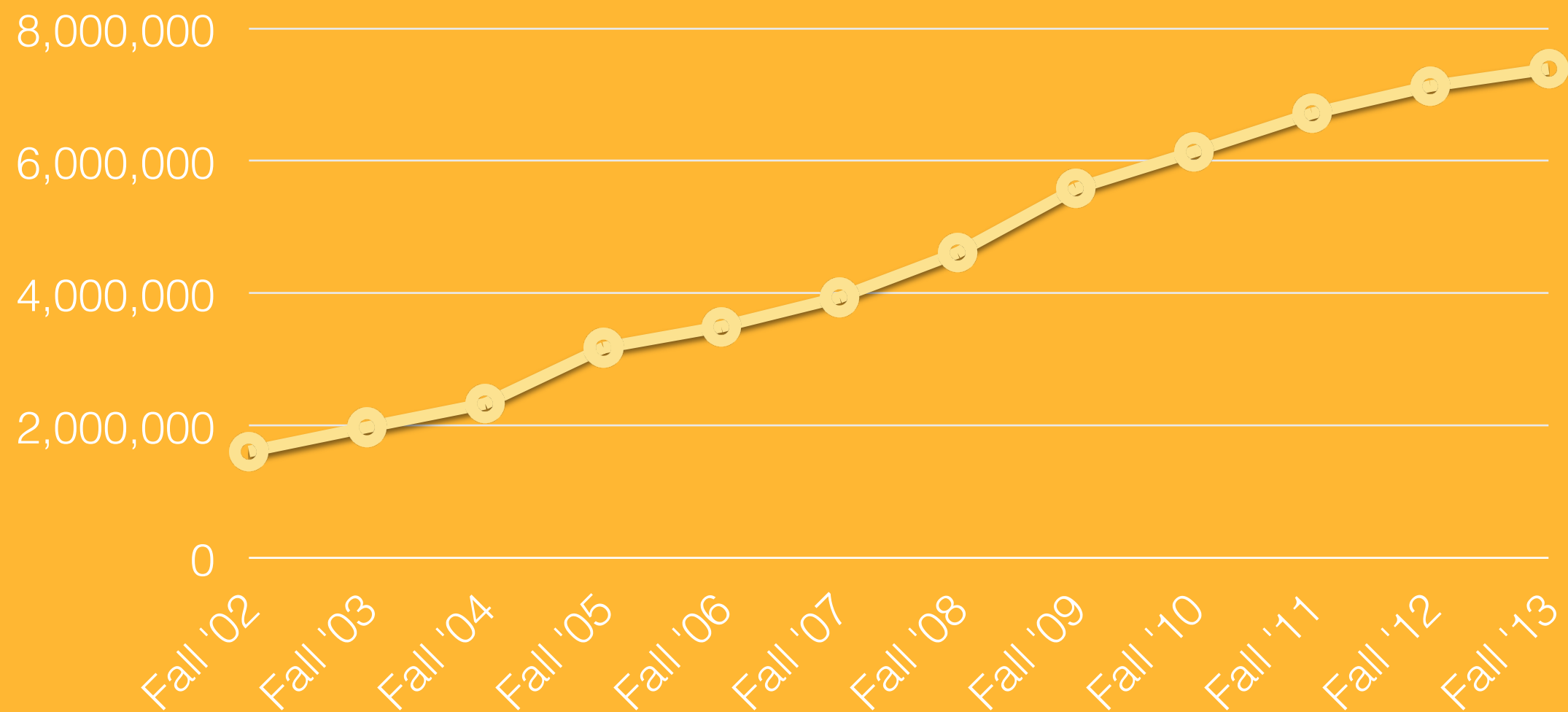


Promoting Online Learning System Design Quality: Utilizing Design Patterns Produced by Data-driven Approaches

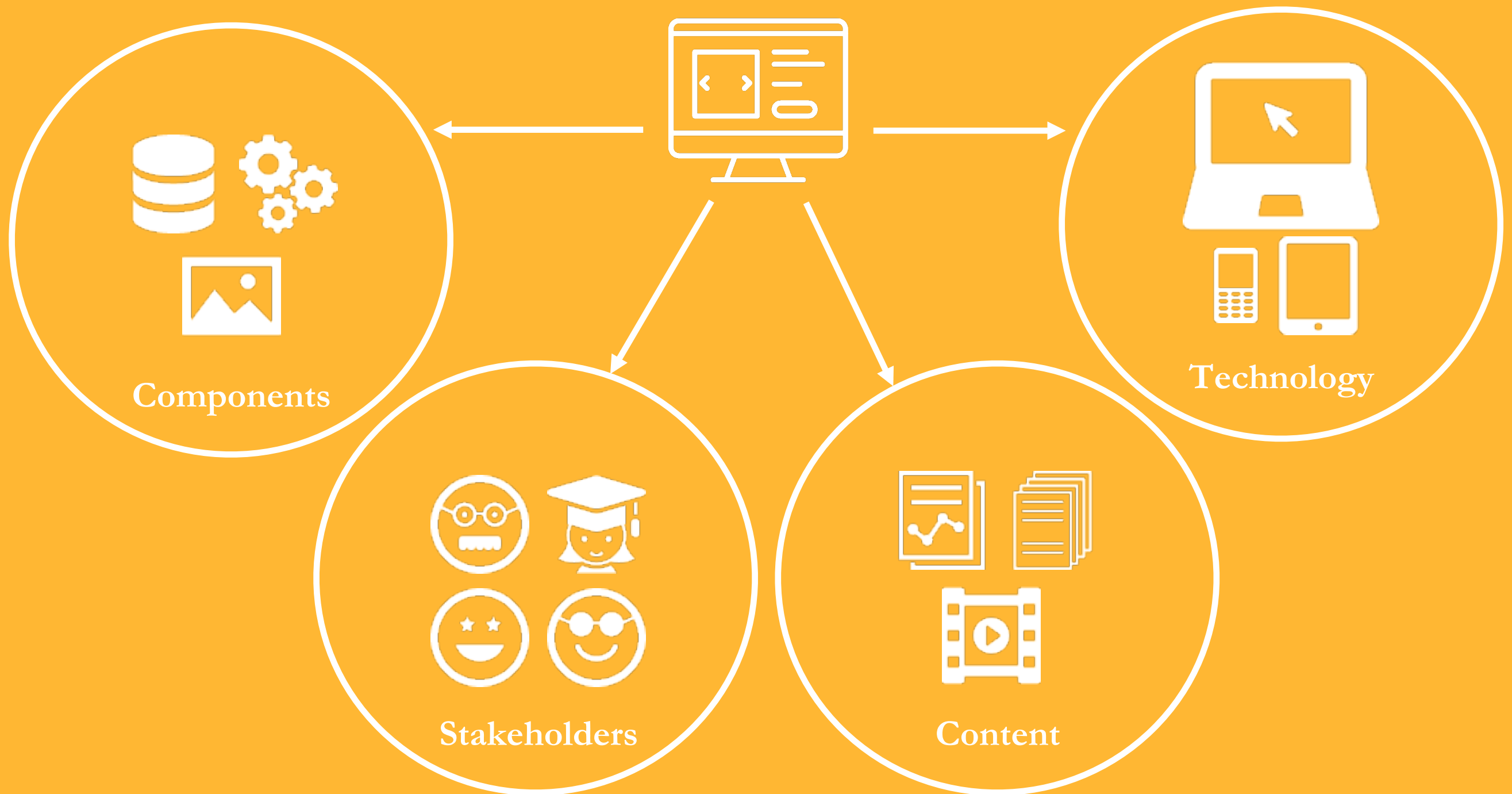
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School of Design, Carnegie Mellon University, USA

Number of Students taking at least one online course in a degree-granting postsecondary institution



Complexities of Online Learning Systems



System Design Quality



Online Learning
system



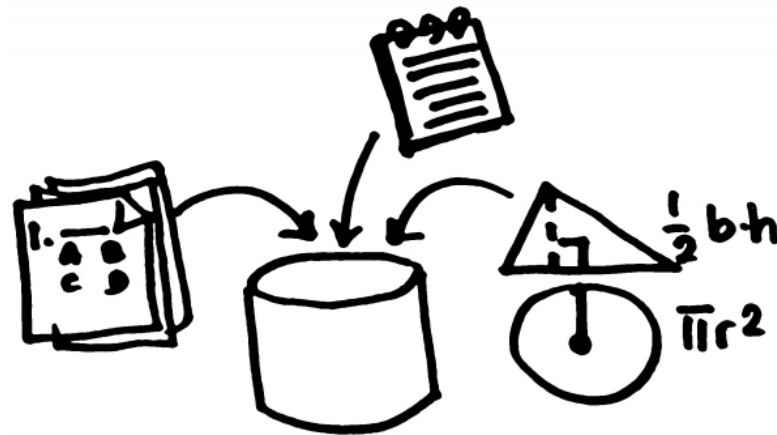
Student learning
experiences

Design patterns

“Known high quality solutions to known problems in a given context”

- Context: describes when a pattern can be used
- Problem: describes what problem is being addressed
- Forces: describes factors that make the problem complex but is addressed by the solution
- Solution: describes how a problem is solved

All content in one place



Context

Students are asked to answer problems in class or at home in an online learning system. Teachers have control over the content and presentation of each problem in the online learning system.

Problem

Students become bored or disengaged when asked to split their attention across multiple resources to solve a problem.

Forces

Accessibility. Students may lack access to resources used in the problem (e.g., forgetting to bring their textbook, finding internet access, having access to a computer)

Split-attention effect. Unnecessary processing of information imposes a cognitive load that interferes with learning. High cognitive load impairs performance, which could increase the difficulty of a learning task.

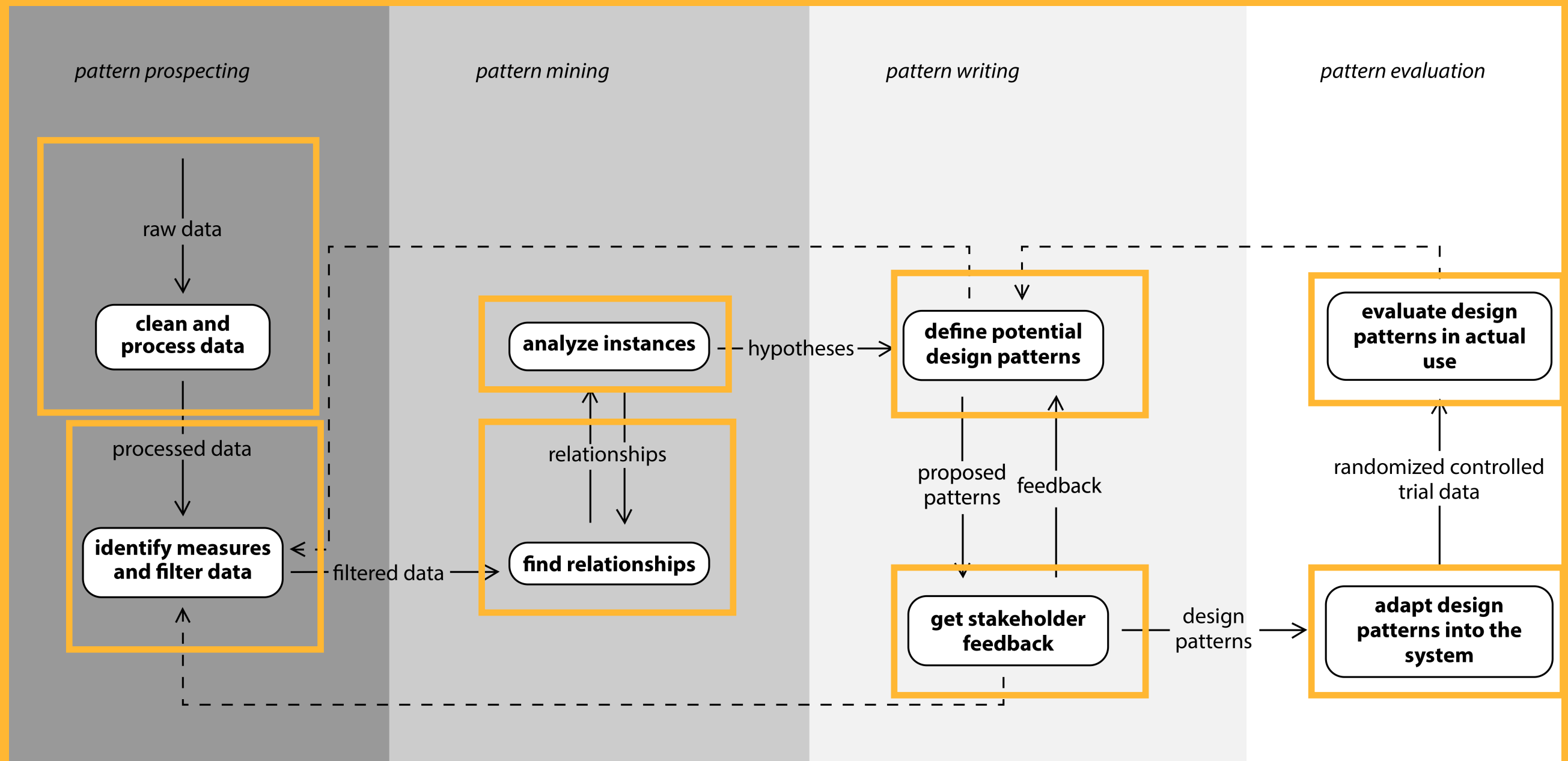
Affect. When students experience too much difficulty or get stuck in trying to solve a problem, they are likely to disengage from the activity.

Solution

Therefore, consolidate all necessary references or resources needed to solve the problem in one place for easy access.

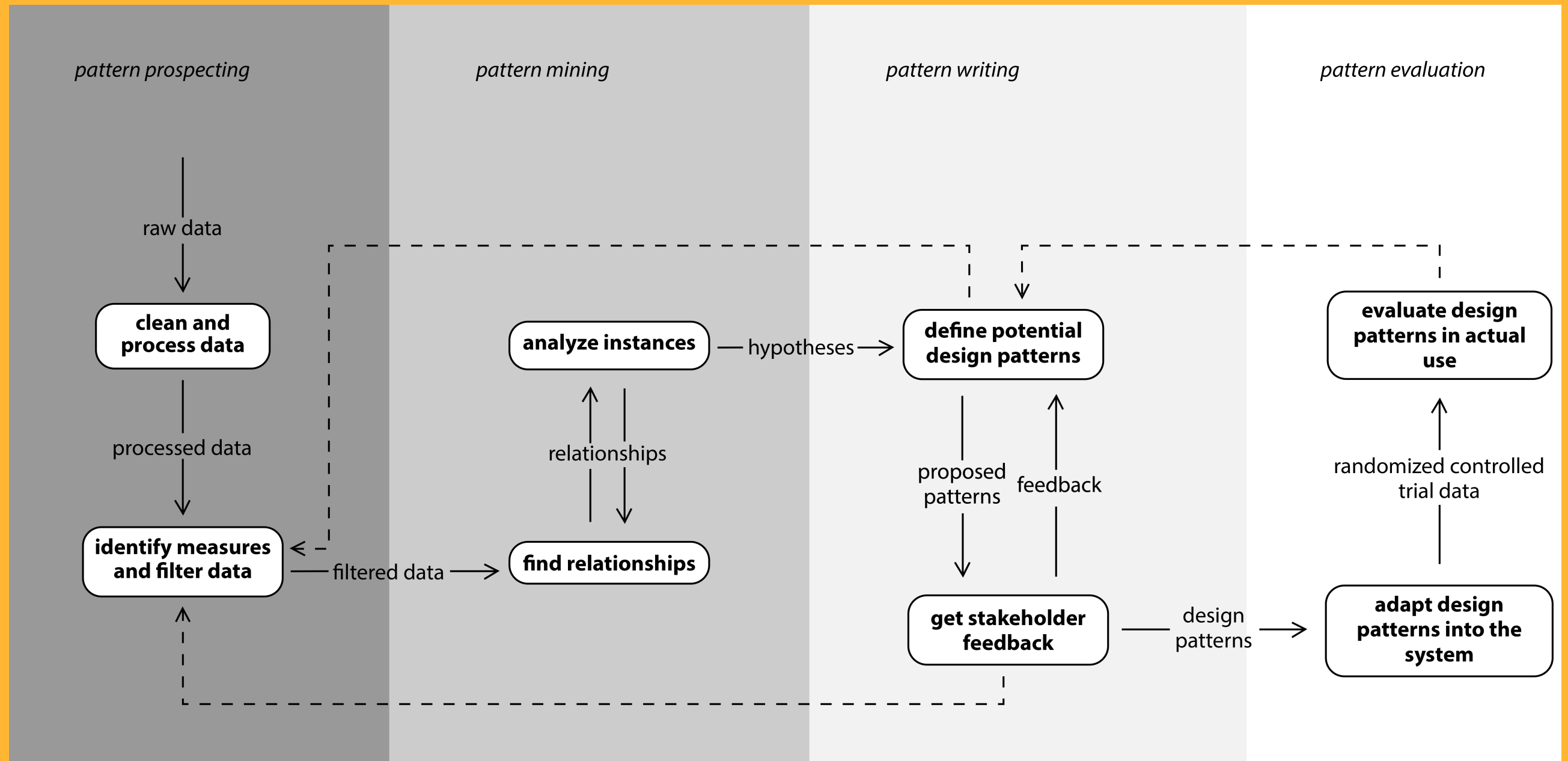
Resources could be presented in the same page as the problem if it does not up take too much space to display. If the problem uses too many resources, the problem author could Keep it simple by splitting it into multiple problems.

Data-driven design pattern production (3D2P) methodology



Open, Collaborative Framework for Design Pattern Production

system design (e.g., teachers, content experts,
developers, interaction designers, etc)



data and analyses (e.g., learning analytics experts, data miners, etc.)

pattern writers

