

The Coherence in the Computer Science Curriculum

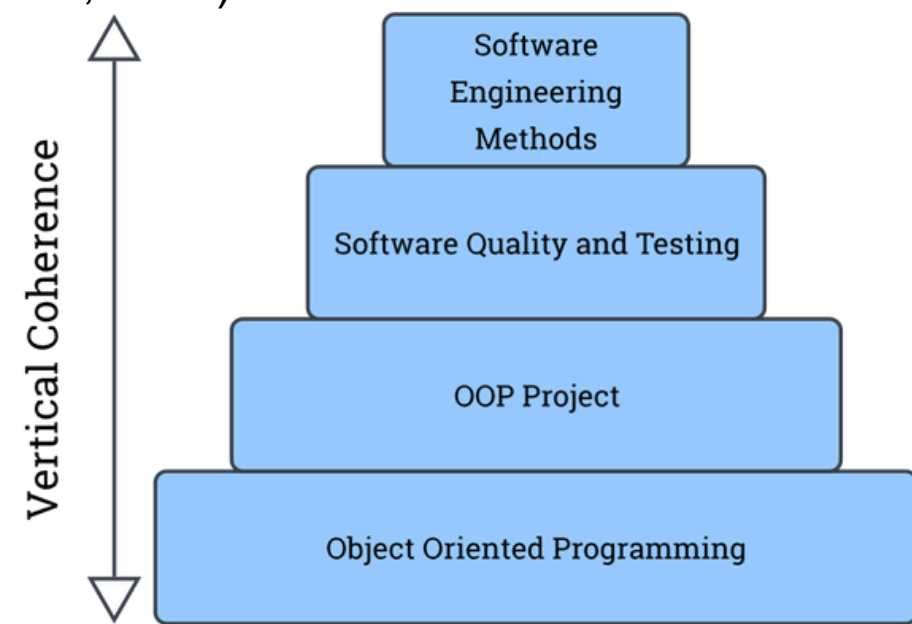
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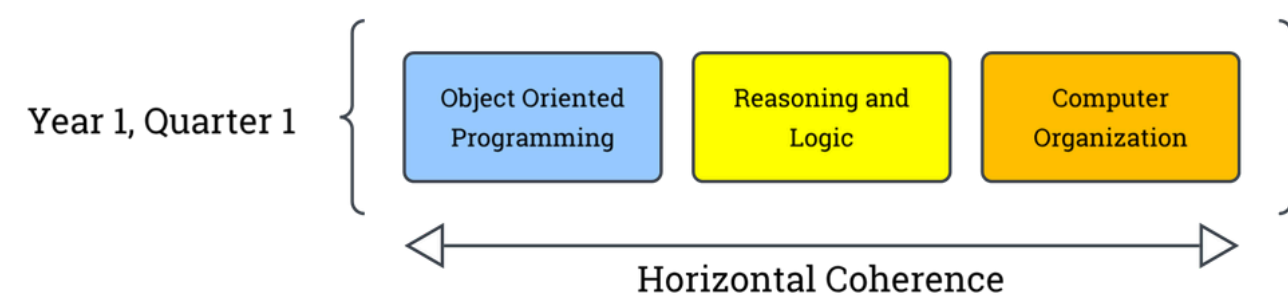
1. Background

Curricular coherence: sensible connections and coordination between topics and courses in a curriculum (Newmann et al, 2001).

Vertical coherence: Coherence between subjects over time (Thijs et al, 2009).



Horizontal coherence: coherence between subjects at the same level (Thijs et al, 2009).



2. Research Question

“How do bachelor computer science students experience the coherence of their curriculum?”

3. Method

Semi structured interviews: guides the topic while staying flexible. Helps finding specific issues instead of generalizing.

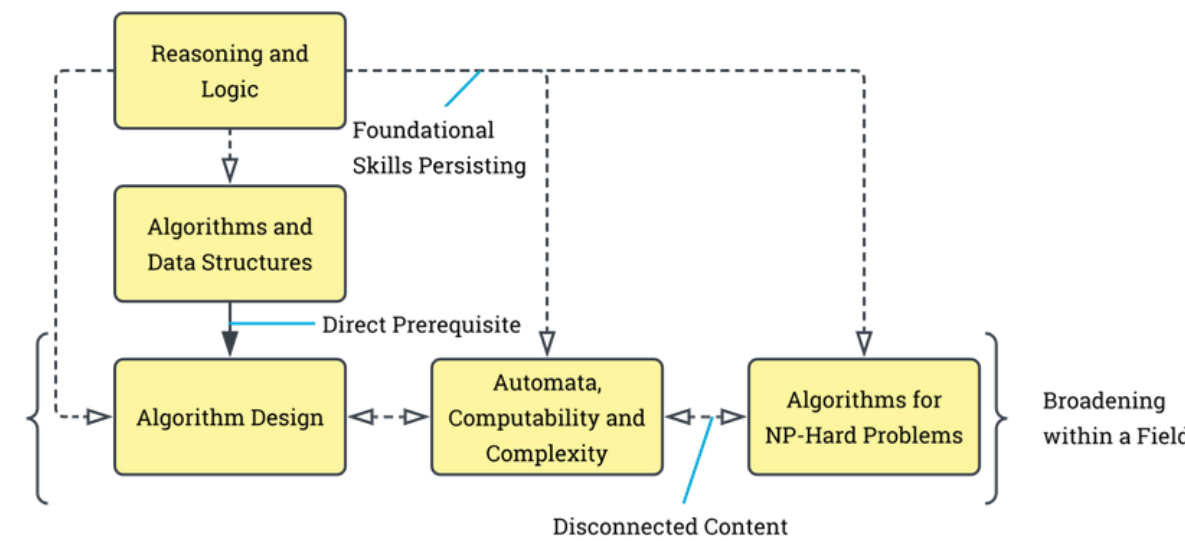
Purposive Sampling: Gather only relevant participants (Final year Bachelor students).

Reflexive Thematic Analysis: inductive coding of interviews using observer’s subjectivity as a strength.

4. Results

This section illustrates the themes resulting from the interviews, labeled with some example codes/categories.

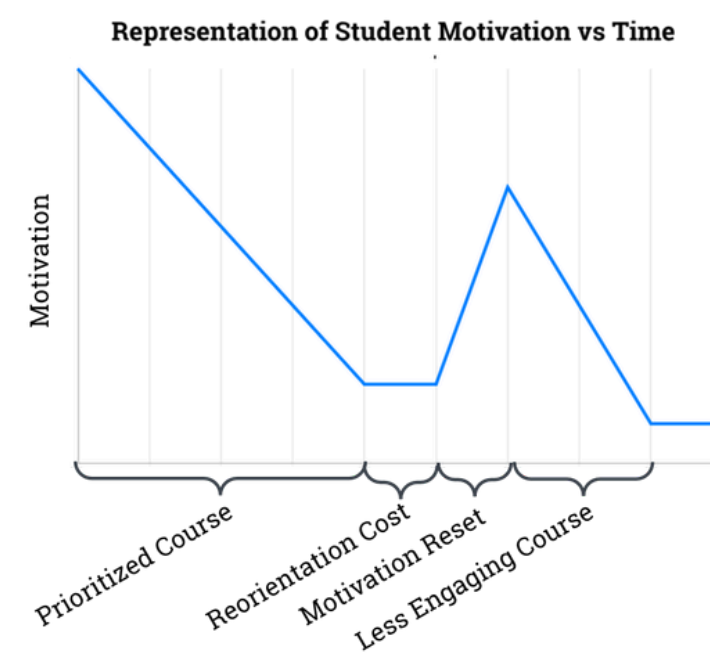
Vertical Coherence - Coherence Through Knowledge Depth or Breadth



Vertical Coherence - Supporting New Content: Getting the Right Amount of Reinforcement

Lack of Reinforcement	Well-timed Reinforcement	Redundant Reinforcement
Missing Knowledge	Implicit Reinforcement	Wasted Time
Use of External Support	Refresher	Loss of Motivation
Vague Understanding	Cognitive Load Reduction	Disengaging from Content

Horizontal Coherence - Switching as a Strategy: Resetting Motivation and Varying Engagement



5. Conclusion

Vertical Coherence - Coherence Through Knowledge Depth and Breadth

- The progression of knowledge is important in spacing the mental burden of learning
- Disconnect between courses is necessary to explore breadth in a field

Vertical Coherence - Supporting New Content: Getting the Right Amount of Reinforcement

- Students may experience the *expertise reversal effect* due to excessive redundancy, causing repetition to reduce engagement
- Knowledge gaps are supplemented with external sources, but may result in vague understanding.

Horizontal Coherence - Switching as a Strategy: Resetting Motivation and Varying Engagement

- Students understand the effect of coherence through the benefit of resetting motivation by task switching, which are effects of spaced learning
- Students experienced uneven distribution of engagement, making them perform better their preferred course and have less time for other courses.

6. Limitations and Future Work

- Only investigated 6 participants means findings may not generalize to the broader field.
- Researched specifically computer science curriculum. Student perspectives in other fields may result in different findings.
- Different levels of education may have different goals, and thus be structured differently.

References

Thijs, A., & van den Akker, J. (2009). *Curriculum in development*. SLO, Netherlands Institute for Curriculum Development.

Newmann, F. M., Smith, B., Allensworth, E., & Bryk, A. S. (2001). Instructional Program Coherence: What It Is and Why It Should Guide School Improvement Policy.

Educational Evaluation and Policy Analysis, 23(4), 297–321. <http://www.jstor.org/stable/3594132>