

The Snowball Effect

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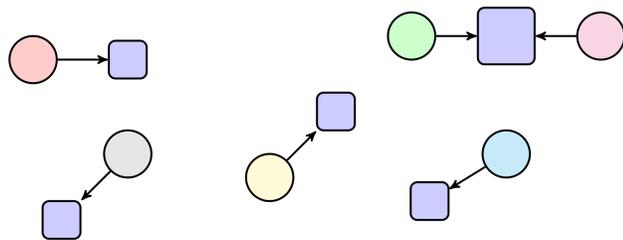
General Context

The constraints of academia are such that professors have limited time to plan courses and reflect on curriculums. Faculty members must strive to maximize the pedagogical benefits of preparation time.

How should instructors best prepare for interactions with students?

Seeking Long-Term Impact

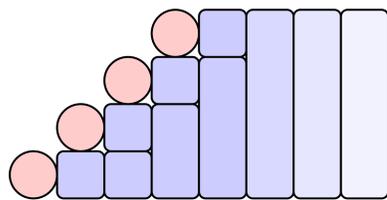
- A myopic view of teaching can lead to repetitive behavior, duplicated efforts and, consequently, impede progress.



Avoid repeated tasks and isolated efforts.

Lasting Tools and Resources

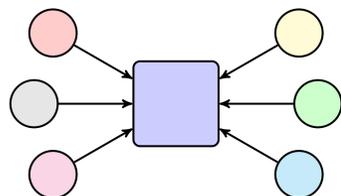
- Devoting time to building lasting tools can enhance the productivity of instructors and thereby elevate the quality of a program over time.



Build resources through incremental, concerted steps.

Strength in Numbers

- Working jointly in a cohesive framework can lead to great achievements whose values far exceed individual contributions.



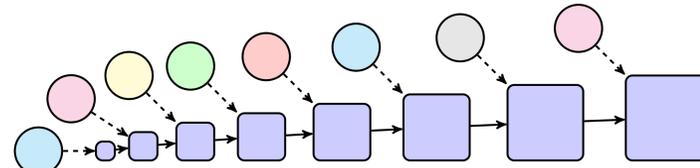
Adopt a framework for collaborative authorship.

1. Lessons from Software Development

- Best practices can be inferred from software engineering and large open projects, e.g., GNU/Linux, FreeBSD, Apache, Mozilla/Firefox.
- Software versioning and revision control systems can manage changes to educational documents and source files.

Prime Example: **Apache Subversion**

<http://subversion.apache.org/>



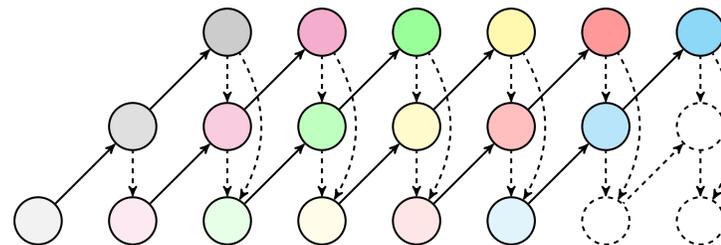
Push resources forward with version control.

Collaborative Authorship

Available technologies provide means to generate value added out of everyday lesson planning and typical preparation routines through modest, frequent improvements to educational documents.

2. Project-Based Courses

- Engineering students must develop several facets: teamwork, programming and marketing skills, time management, creativity.
- Project-based learning complements the traditional classroom, and it can be used to assist students acquire these skills.



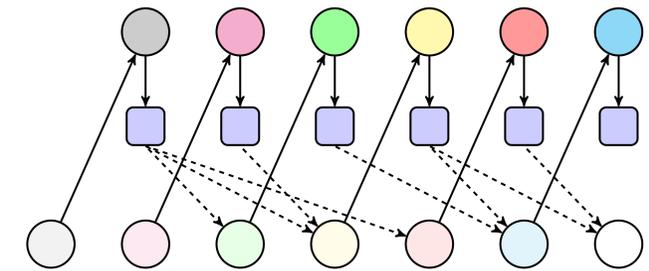
Foster cultures where students help students.

Knowledge Cultures

Key to the success of project-based learning is to create knowledge cultures where participants share their expertise with one another, and where senior members train and help novice participants.

3. Align Deliverables and Valuables

- Adjusting course requirements to have students produce documents that are pertinent to others can improve capstone resources.
- Reports often get low readership, whereas good tutorials can have broader appeal and can be leveraged to bootstrap future projects.



Have students produce useful documents.

Constructive Goals

Setting goals that fulfill curriculum requirements and yield valuable outcomes can elevate the quality of a program over time.

Supporting Evidence

- **EduDocs.org**: Subversion and \LaTeX are employed by multiple authors at Texas A&M University to create and maintain documents that are used by many instructors and hundreds of students.
- The *Innovation Laboratory* is an outlet for creativity with weekly research meetings and an environment akin to the workplace; each project surveys a fundamental concept and an enabling technology.
- The *14 Grand Challenges* led to a pilot course that engages teams of students in multidisciplinary investigations; it features writing tutorials and producing videos as part of its requirements.

Acknowledgement and Support

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