

Check out the app until 9/25



Schema Study: Harnessing AI to enhance study skills and learning in biology

The Problem:

Novice learners often lack study skills that promote deep, higher-order learning and inspire feelings of self-efficacy.

- Teaching higher-order study skills is time and labor-intensive.
- It can be intimidating to proactively seek resources.
- Drawbacks to using unstructured tools such as ChatGPT and web searches



A Solution: Guided web-based study activities with generative AI formative feedback

Benefits:

- Real-time feedback
 - Anytime/anywhere
 - Scalable for large classes
- R/python web application and OpenAI API
 - Structured Activity
 - Student responses are filtered through instructor prompt
- More inclusive
 - Cost is shifted away from students
 - Less of a technical hurdle
 - Directly integrated into course LMS
- Can train the chatbot on a corpus of course material
- Potentially more secure

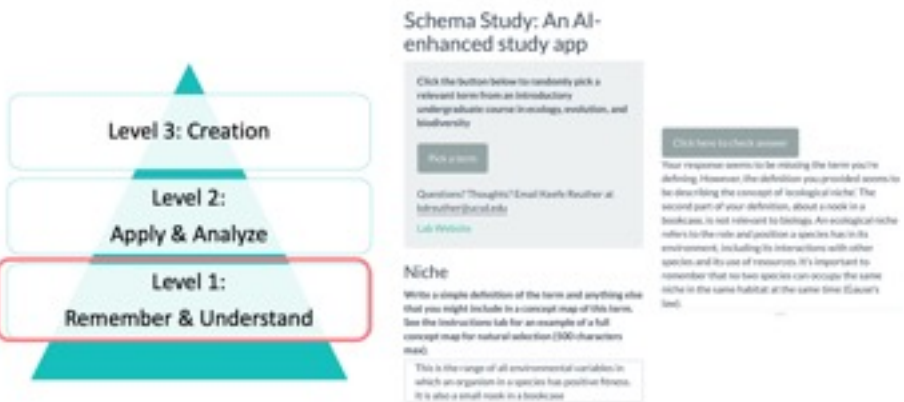
Implementation

Schema Theory & Concept Mapping

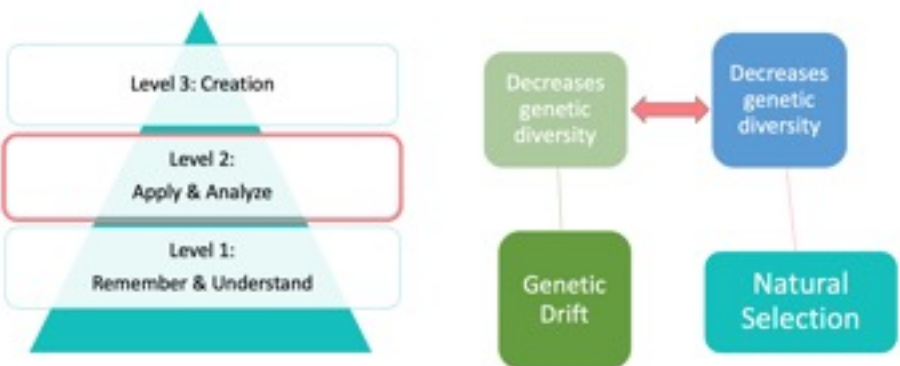


- Experts easily apply relevant schema
- Students can benefit from their:
 - Creation
 - Evaluation

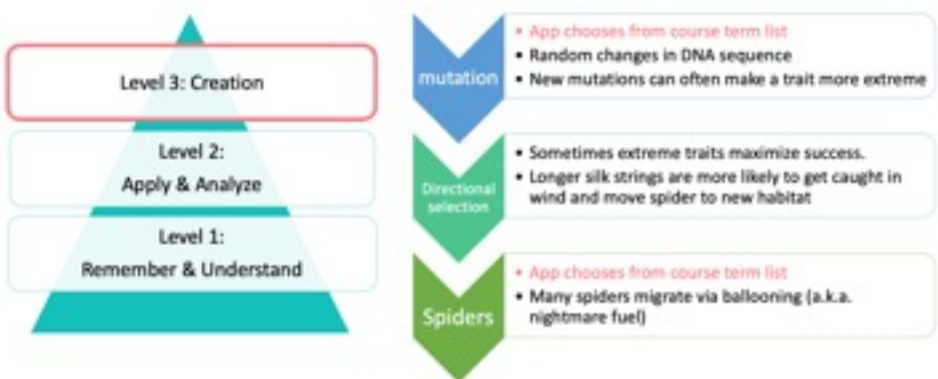
Schema Study: an R-based Shiny web app



Schema Study – Level 2

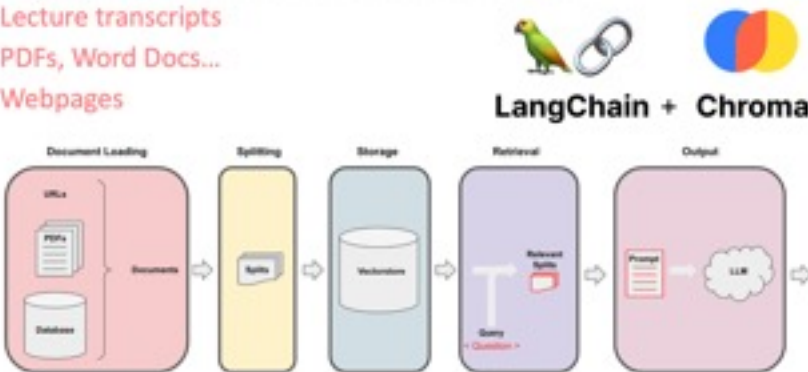


Schema Study – Level 3

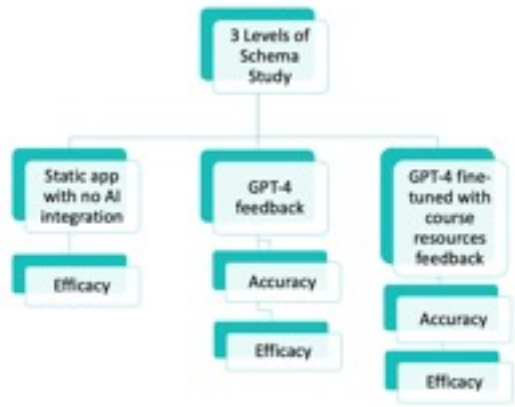


Fine-tuning with Course Information:

- Adding your course data to the chat conversation
 - Lecture transcripts
 - PDFs, Word Docs...
 - Webpages



Evaluation



- Efficacy
 - Pre/post quizzes
 - Surveys
 - User data
 - Interviews
- Accuracy
 - Expert review

Interested in collaborating?

- Testing apps in python or JavaScript
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- How can we apply this in different feedback and assessment contexts?
 - Images
 - Quantitative Reasoning
 - Subjective Assessments
 - Anything else you can think of!



Contact me!
Keefe Reuther
UC San Diego
kdreuther@ucsd.edu

References

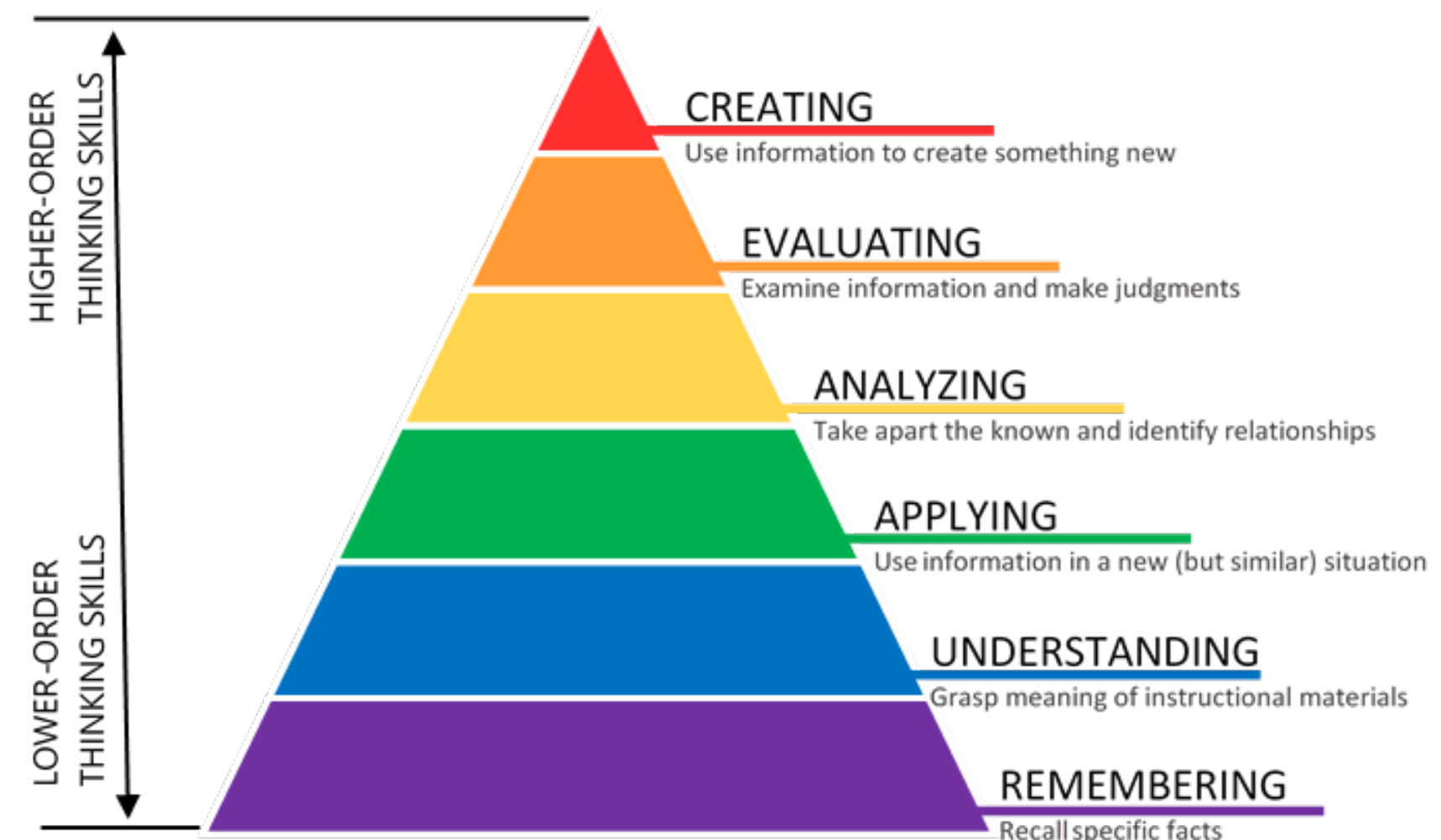
- Brown, S., White, S., Wakeling, L., & Nalder, M. (2015). Approaches and Study Skills Inventory for Students (ASSIST) in an Introductory Course in Chemistry. *Journal of University Teaching & Learning Practice*, 12(3). <https://ro.uow.edu.au/jutlp/vol12/iss3/6>
- Chiesi, F., Primi, C., Bilgin, A., López, M., Fabrizio, M., Goetz, S., & Nguyen, T. (2015). Measuring University Students' Approaches to Learning Statistics: An Invariance Study. *Journal of Psychoeducational Assessment*, 34. <https://doi.org/10.1177/0734282815596125>
- Bloom's Taxonomy - Center for Instructional Technology and Training - University of Florida. (n.d.). <https://citt.ufl.edu/resources/the-learning-process/designing-the-learning-experience/blooms-taxonomy/>
- Question Answering | Langchain. (n.d.). https://python.langchain.com/docs/use_cases/question_answering/

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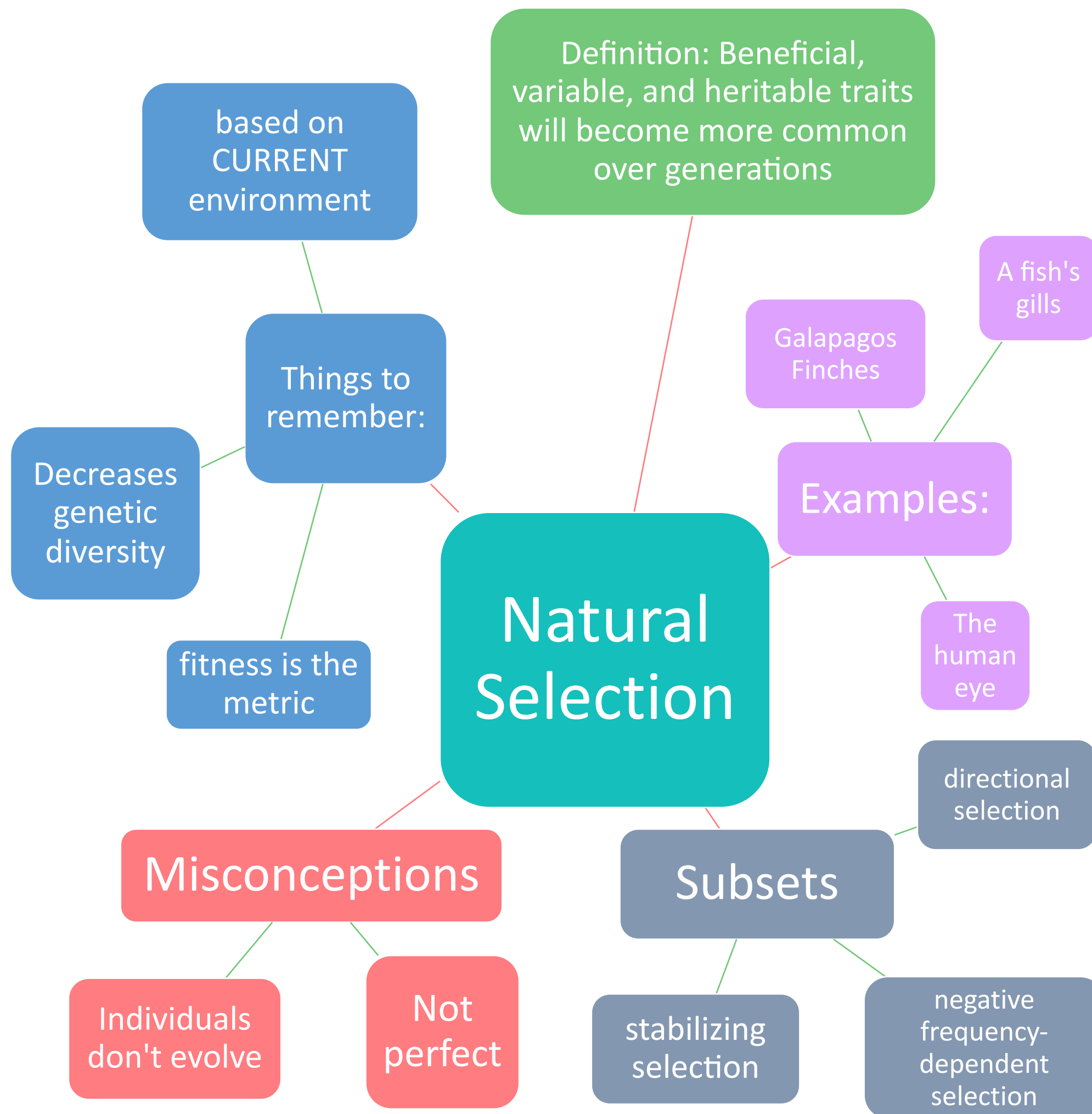
Bloom's Taxonomy



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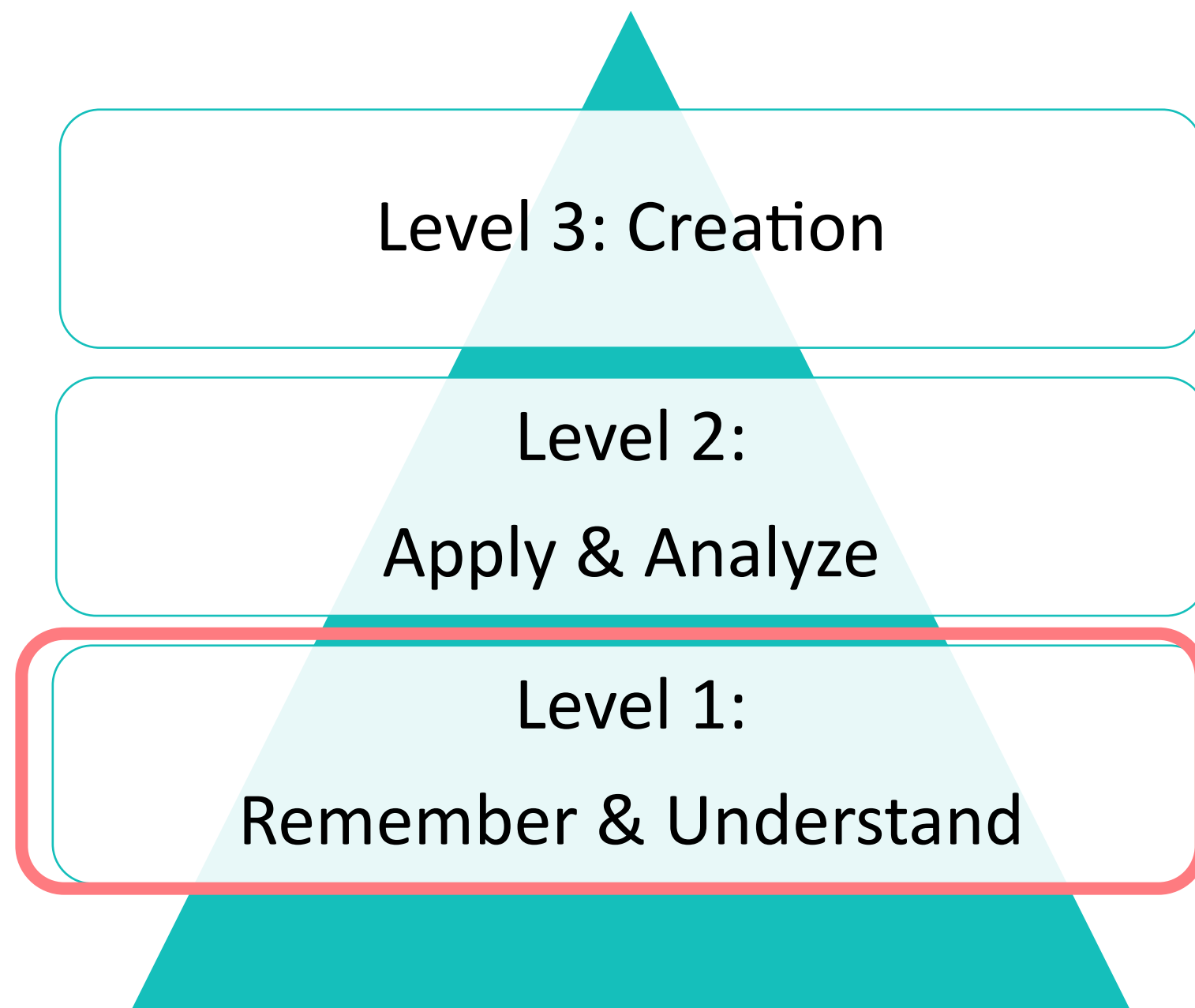


Implementation

Schema Theory & Concept Mapping

- Experts easily apply relevant schema
- Students can benefit from their:
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Schema Study: an R-based Shiny web app



Schema Study: An AI-enhanced study app

Click the button below to randomly pick a relevant term from an introductory undergraduate course in ecology, evolution, and biodiversity

Pick a term

Questions? Thoughts? Email Keefe Reuther at kdreuther@ucsd.edu

[Lab Website](#)

Click here to check answer

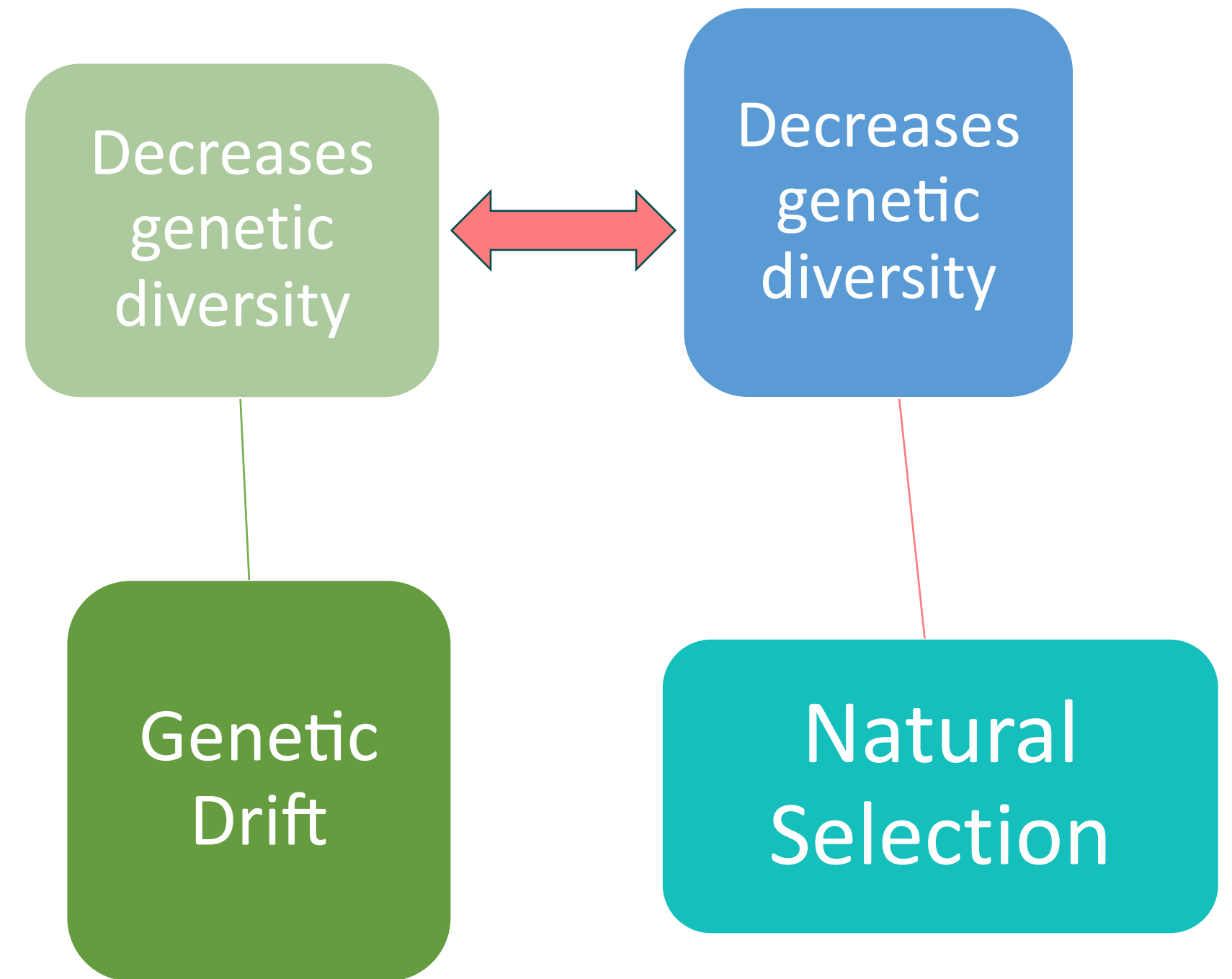
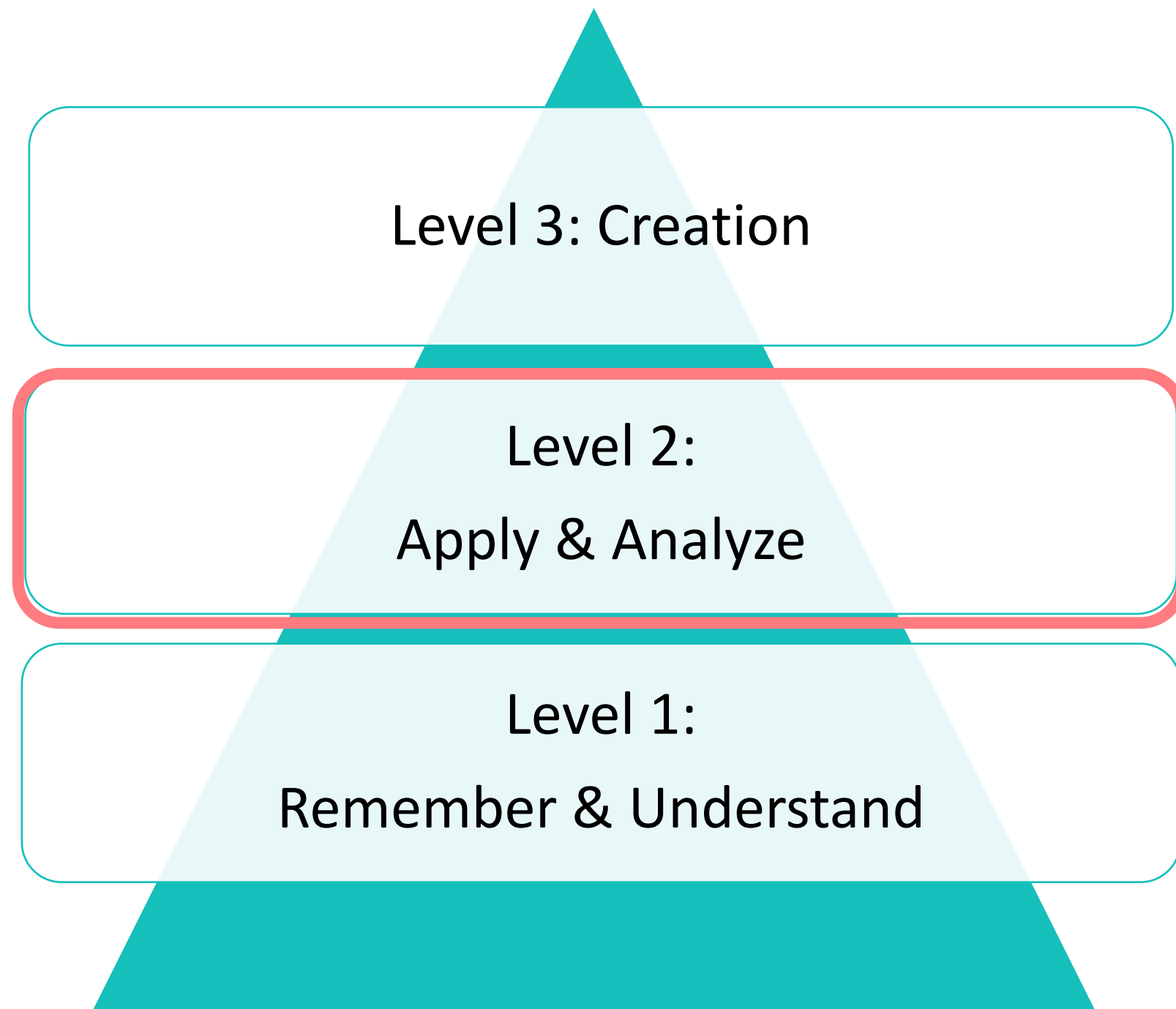
Your response seems to be missing the term you're defining. However, the definition you provided seems to be describing the concept of 'ecological niche'. The second part of your definition, about a nook in a bookcase, is not relevant to biology. An ecological niche refers to the role and position a species has in its environment, including its interactions with other species and its use of resources. It's important to remember that no two species can occupy the same niche in the same habitat at the same time (Gause's law).

Niche

Write a simple definition of the term and anything else that you might include in a concept map of this term. See the instructions tab for an example of a full concept map for natural selection (500 characters max).

This is the range of all environmental variables in which an organism in a species has positive fitness. It is also a small nook in a bookcase

Schema Study – Level 2



Schema Study – Level 3



Level 3: Creation

Level 2:
Apply & Analyze

Level 1:
Remember & Understand

mutation

- App chooses from course term list
- Random changes in DNA sequence
- New mutations can often make a trait more extreme

Directional
selection

- Sometimes extreme traits maximize success.
- Longer silk strings are more likely to get caught in wind and move spider to new habitat

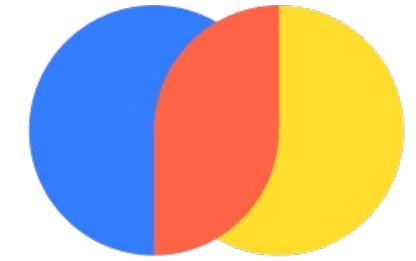
Spiders

- App chooses from course term list
- Many spiders migrate via ballooning (a.k.a. nightmare fuel)

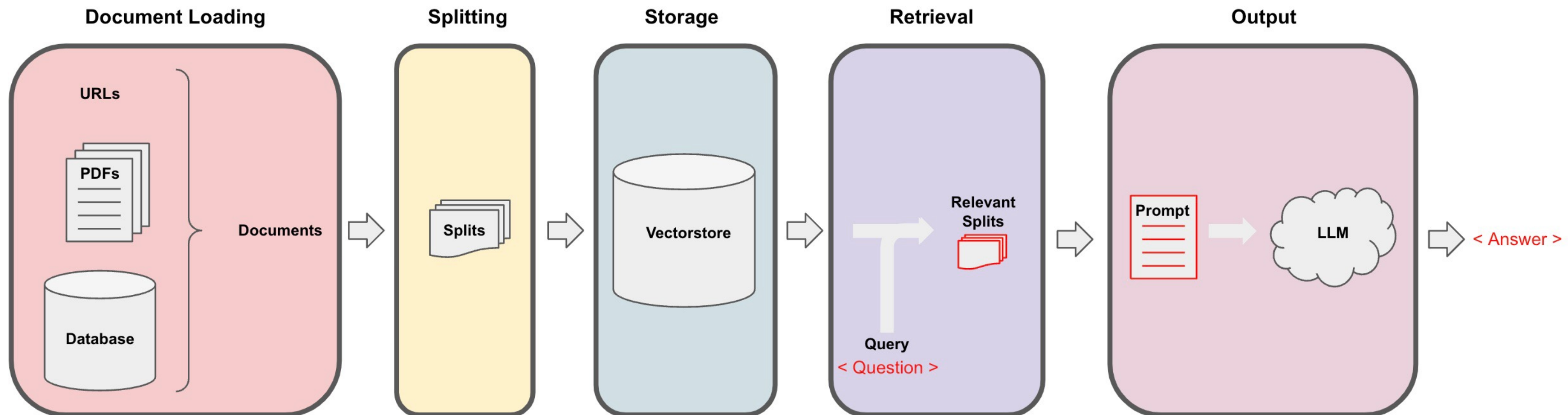
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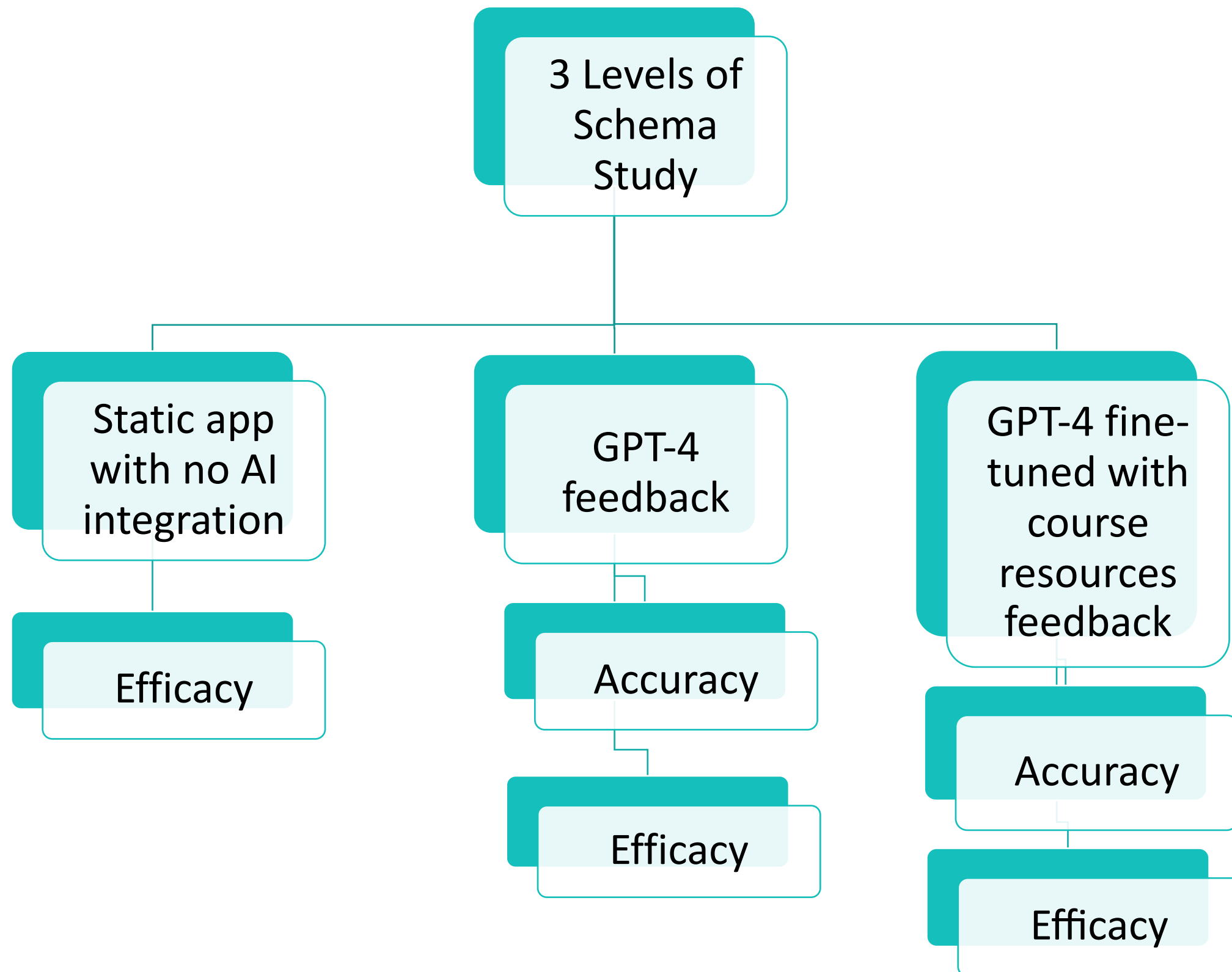
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LangChain + Chroma



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