Concept Maps, Selectivity, and Learning Environments

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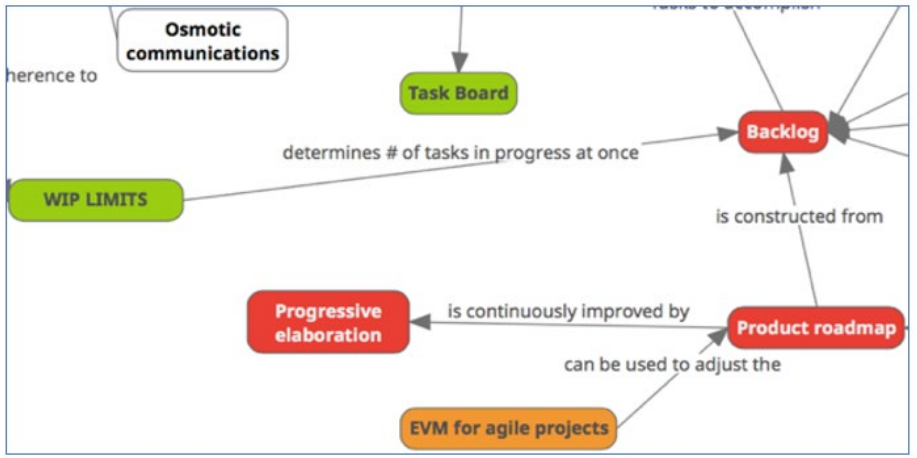
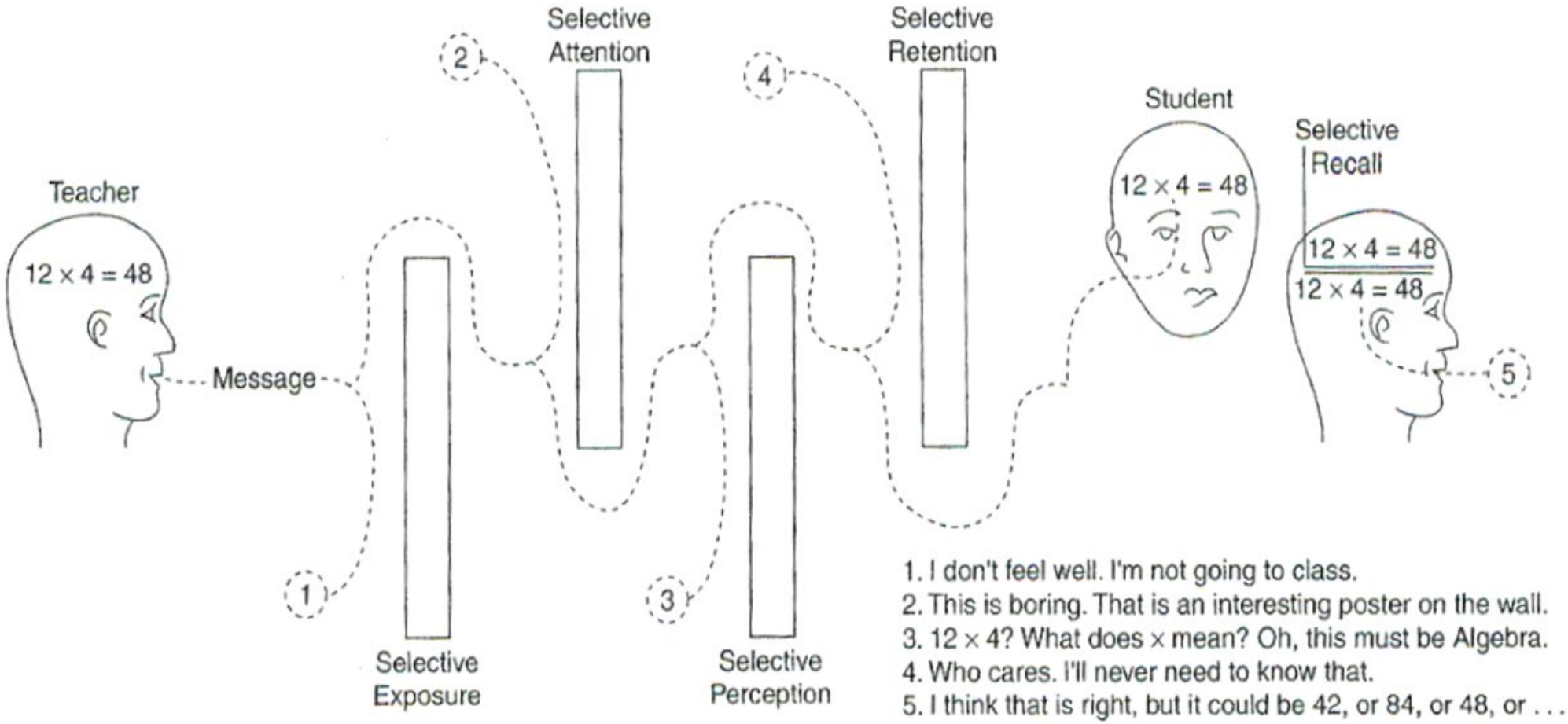
Our quest:

Use concept maps to

- *Alleviate selectivity*
- *Encourage integration of topics*



Selectivity

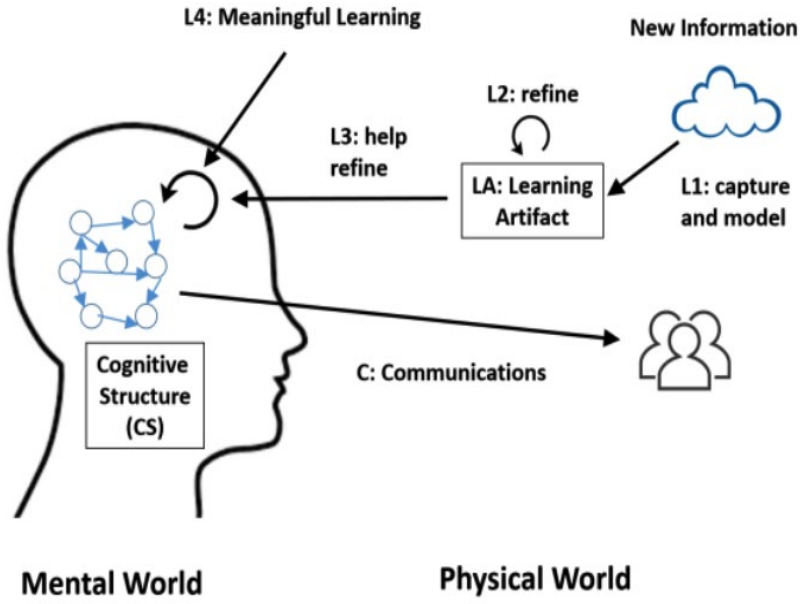


Selectivity in learning environments (McCroskey & Richardson 2006)

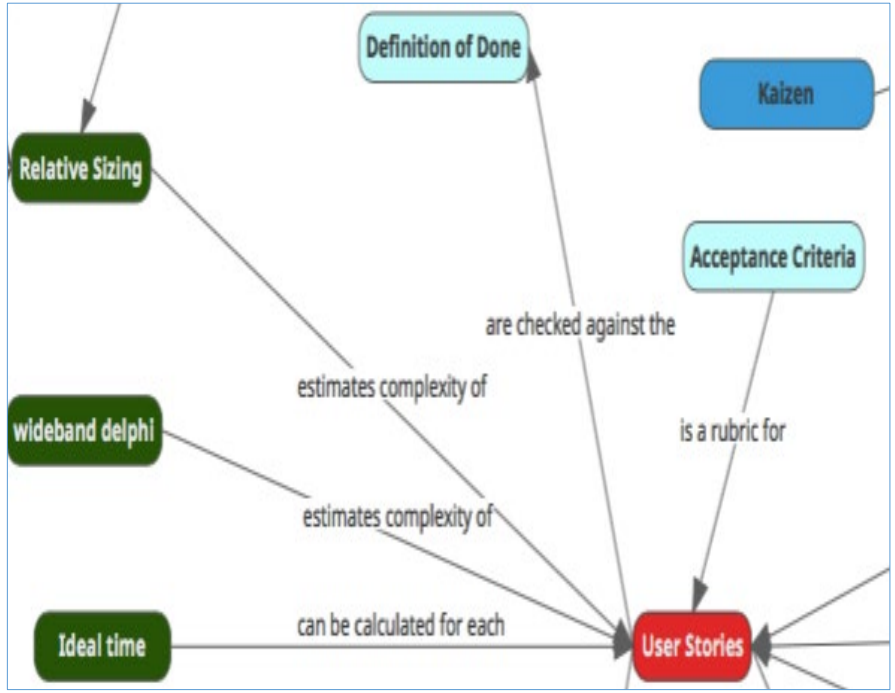
Concept maps

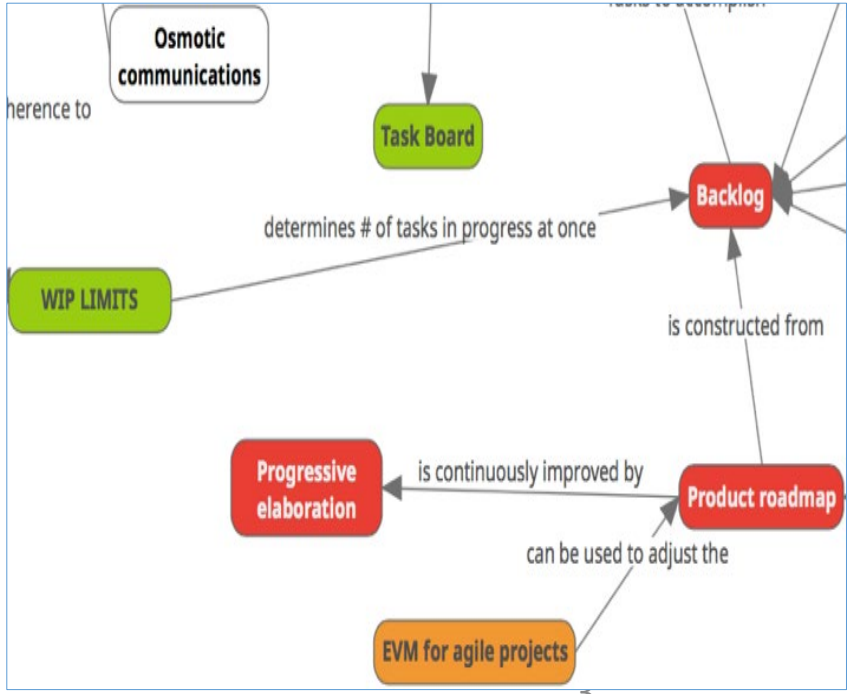
integrative complexity:

- a critical **'gluing'** mechanism for creating meaningful learning experiences within and beyond a given course.
- Can advance information processing and decision making which are essential for life-long **independent** learning.

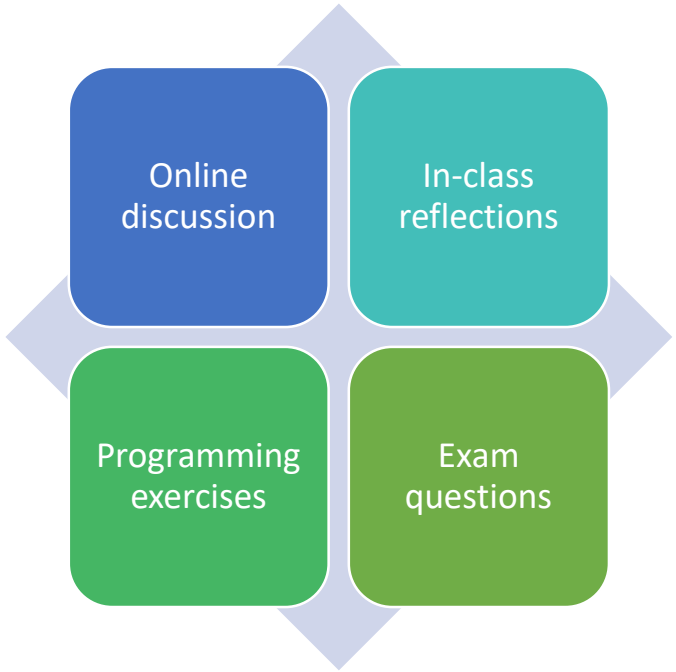


Concept maps for meaningful learning (Wei & Yue 2017)





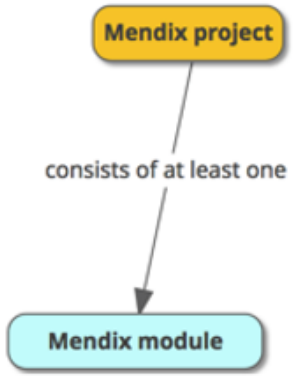
Concept Maps



Reflect on and summarize concepts that we've discussed in the past two weeks.

1. List 10-12 concepts from the 6 categories of topics shown below.
2. Add links to connect related concepts and label links to specify the nature of the relationship.
3. When connecting concepts & labeling links, make sure
   { Concept 1 + Link Label + Concept 2}
   reads a logical statement that is consistent with what we have discussed in the course.
4. See the simple example on the right.

Multi-layer design	SOLID principles	Encapsulation
Data access objects	Observer pattern	MVC pattern



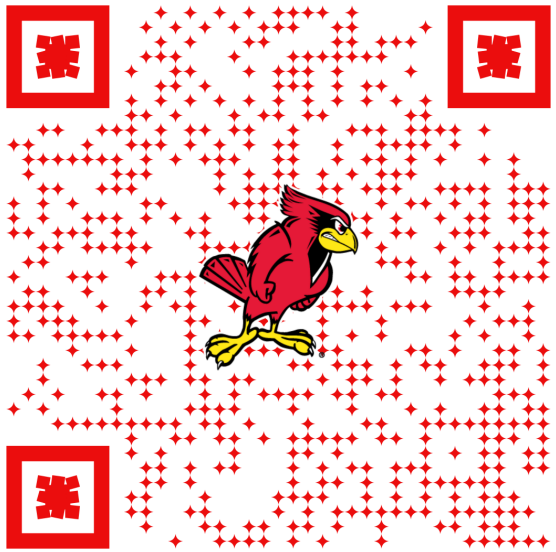
Programming activity

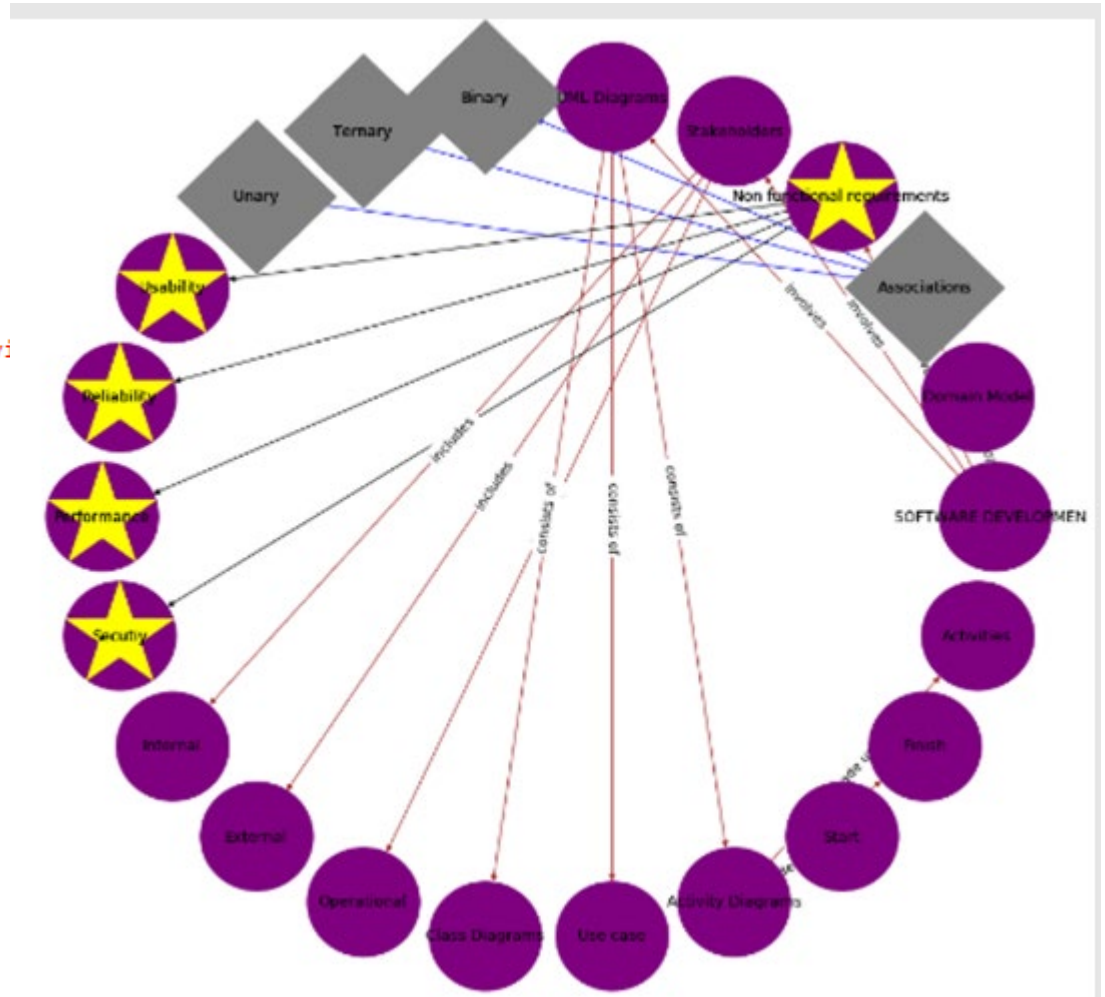
fun for students

enables using different media

reinforces paper & pencil activity

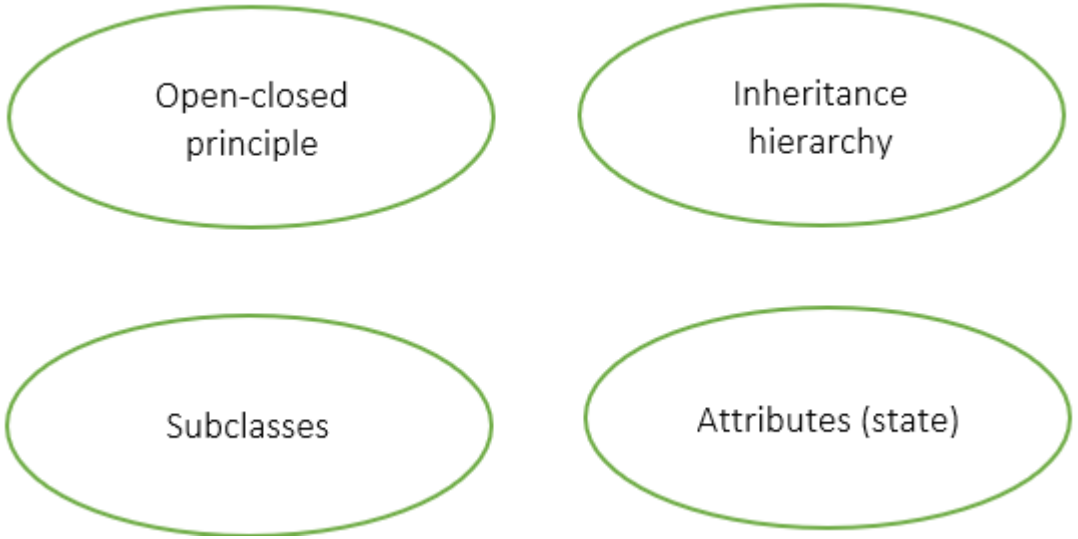
```
1  import networkx as nx
2  import matplotlib.pyplot as plt
3
4  CM=nx.DiGraph()
5  CM.add_nodes_from(['CRUD','Use Case'])
6
7  CM.add_edges_from([('CRUD', 'Use Case')], label='helps with identifyi
8  edgeLabels=nx.get_edge_attributes(CM,'label')
9
10 plt.figure(1,figsize=(8,8))
11 pos=nx.circular_layout(CM)
12 nx.draw(CM, pos,arrows=True, node_size= 5000, node_color='grey',
13         with_labels=True, edge_color='green')
14 nx.draw_networkx_edge_labels(CM, pos, edge_labels=edgeLabels,
15                              label_pos=0.5, font_size=11)
16 plt.show()
```



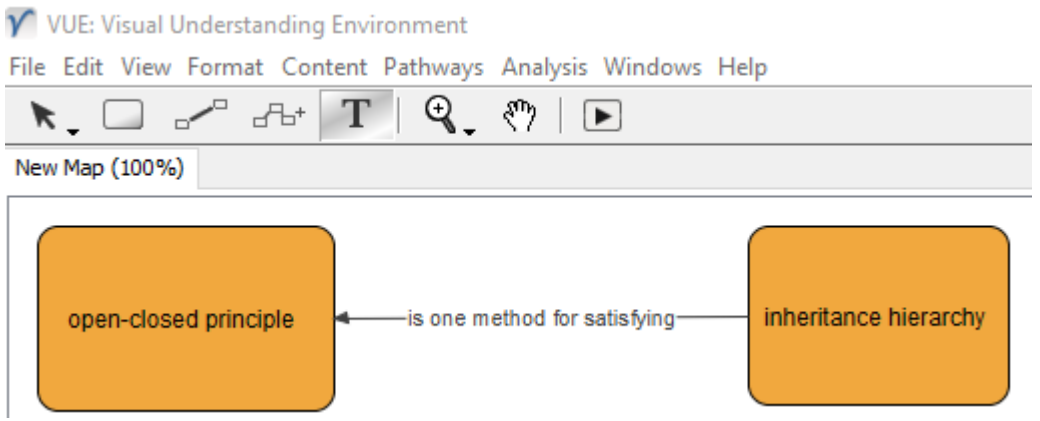


Exam questions

Examine the following four concepts; when you see fit and logical, add a link, label the link, and make sure (concept 1, link label, concept 2) reads a meaningful statements. Add only necessary links, additional & illogical links will negatively impact evaluation of your work.



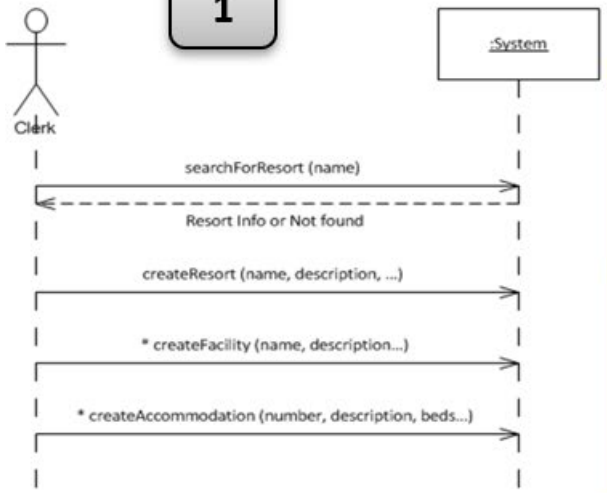
VUE: Tufts University
Courtesy of Rebekka Darner, Director of CeMast



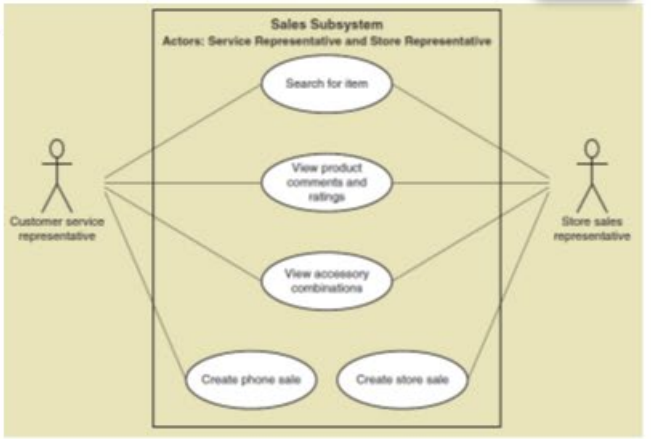
Exam questions

Identify one appropriate label for ideas/concepts/activities shown in the following pictures; then create a concept map of the three concepts, add links when needed, specify directions, and label the links so that the {concept 1, label, concept 2) reads a logical statement. The numbering is to separate the three pictures, the order of the numbers is arbitrary.

1



2



3

Gather detailed information
Define requirements
Prioritize requirements
Develop user-interface dialogs
Evaluate requirements with users

Magnetic concepts & in-class discussions

Idea: ***Bekky Darner & Eric Walsh***, *School of Biological Sciences*

Feedback

Areas	Feedback will focus on
Concepts	-Missing key concepts -inclusion of non-relevant concept
Relationships	-Missing key relationships -Inclusion of non-logical relationships
Qualifiers	-Incorrect label -Inaccurate label -Wrong direction for the relationship
Others (bonus points)	- new concepts (from other IT courses, experiences, or other disciplines) -examples from work, other courses, other disciplines, or real-life

Example

Learning

Selectivity

Integrative complexity

Concept maps

Discussion

Original post: read the two articles, identify a few major concept and model major relationships among the concepts using a concept map.

1. List 8-10 concepts from the articles.
2. Add & label links with logical representation of the relationships among said concepts.
3. When connecting concepts & labeling links, make sure

   { Concept 1 + Link Label + Concept 2}

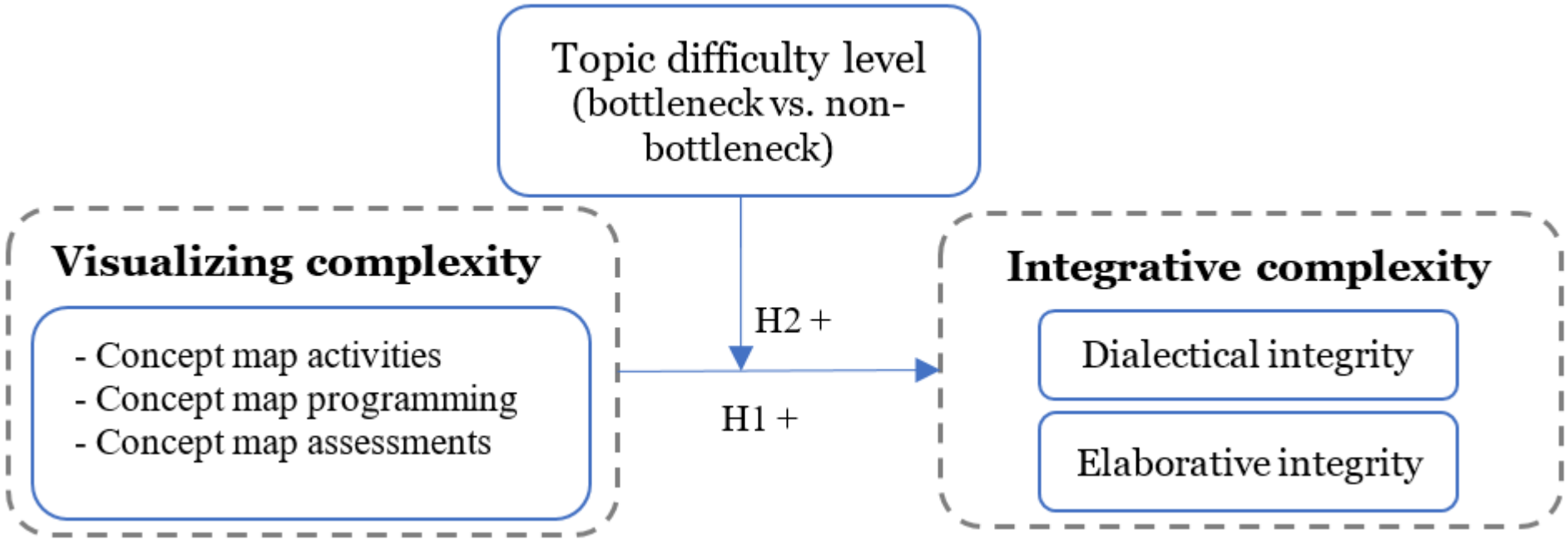
   reads a logical statement that is consistent with what we have discussed in the course.

Comments: read your classmates' post, read the concepts and relationships; provide a response by doing any or a combination of the following activities:

1. Identify a missing key concept (s)
2. Identify missing, wrong or mis-labeled relationships
3. Offer corrections, additions, alternatives
4. If you are adding a new key concept, provide at least one relationship with a meaningful label that connects the new concept to the current concepts

Future plans

- Reflections, programming, and exam questions have been tested.
- Activities were completed in groups.
- Students found the activities fun & helpful (post surveys)



Integrative Complexity

Selectivity

Bottlenecks

Integrative complexity & measurement

- an individual's tendency to perceive and process different dimensions of a given topic (Suedfeld *et al.* 1992)
- consists of the two phases of differentiation and integration (Suedfeld *et al.* 1992).
- we focus on state integrative complexity (as opposed to trait) which is prone to environmental mediators (Harvey et al. 1961; Streufert & Swezey, 1986)
- Measurement:
  - Political Cognition Lab in the University of Montana (Conway *et al* 2014; Houck *et al.* 2014)
  - Built upon a well-validated 1-7 measurement scale for integrative complexity (Baker-Brown *et al.* 1992
  - Dialectical and elaborative integrative complexity will be measured using automated integrative complexity measurement tool
  - We use the tool to evaluate a written 2-page course reflection document which will include all the areas covered in the control and treatment part of the course.

Bottlenecks (Pace 2017)

1. particularly difficult for novice learners to comprehend
2. require extensive practice and guidance (decoding), as well as unraveling by the experts
3. areas in which a significant number of students are unable to perform essential learning activities, or succeed in assessments.

Question: *can concept maps advance decoding of bottleneck areas?*

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Image Resources

- http://www.internetbillboards.net/2015/12/15/how-to-get-more-from-online-course-discussions/
- http://www.ellenhartson.com/do-you-have-an-agenda/
- http://info.growingyourleaders.com/blog/peer-led-learning-%E2%80%93-the-future
- http://healthymamamagazine.com/teal-tick/