Student Engagement with an Online Tool to Structure Clinical Problem Solving

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Objective

o Explore and measure medical students' use and acceptance of an online tool designed to teach a structured problem-solving process.

Background & Setting

o Case-based instruction (CBI) at the University of Arizona College of Medicine (UA COM) is designed to emphasize the development of clinical problem-solving. Content is taught elsewhere in the curriculum but is integrated through application in CBI.

o Previous data have documented the use of ThinkSpace by graduate students in science[1], but more research is needed on how medical students perceive and utilize, i.e. "accept," this tool.

o All data in this study is from the first-year Musculoskeletal System (MSS) block, which ran for five weeks in January/February 2013.

o All participants are first-year medical students
  • n=93 students consented to be part of the overall study
  • n=63 students also filled out the end of block feedback survey

Structured Problem-solving with ThinkSpace

ThinkSpace online tool:
o Uses a 5-step structure for problem-solving
o Renders thinking visible to self, peers and instructors
o Automatically records all student activity for data mining
o Certain patterns of activity suggest reflective engagement in the problem-solving process

Step 1 Restate
Step 2 Hypothesize
Step 3 Strategize
Step 4 Narrow Dx
Step 5 Reflect
Problem-Solving Structure
Aligned with Self-Regulatory Learning

Figure 1. ThinkSpace Navigation

Data Mining: ThinkSpace Activity

Figure 2. ThinkSpace Trails

Student 1: Case #4 [Minimum required effort] *

*Only 6 participants (~6%) displayed minimum effort

Student 2: Case #4 [Average effort]

Student 3: Case #3 [Greater effort]

Chart 1. Average student effort per case

Results: Analysis of ThinkSpace Activity

Figure 3. What are students looking at?

- Initial Entries 22%
- Updates 9%
- Peer-views 68%
- Self-views 1%
- Wiki Views 1%

Step 1: Restate 21%
Step 2: Hypothesize 25%
Step 3: Strategize 20%
Step 4: Narrow Dx 31%
Step 5: Reflect 3%

Figure 4. What are students updating?

- Case 1 20%
- Case 2 29%
- Case 3 28%
- Case 4 23%

Step 1: Restate 15%
Step 2: Hypothesize 26%
Step 3: Strategize 24%
Step 4: Narrow Dx 32%
Step 5: Reflect 3%

Chart 2. Comparison of reported and actual peer views of hypotheses[◊]

◊ Response to survey item, "I reviewed my peers' hypotheses using ThinkSpace.
* mean = 15 views

Measures of Acceptance

• "Explicit acceptance" – measured by end-of-course feedback surveys
• "Implicit acceptance" – measured by ThinkSpace activity logs

Findings

1. Explicit acceptance:
   o 94% agreed that the format of CBI in the MSS block taught them to think like physicians.
   o 75% agreed that ThinkSpace aided learning in the MSS block.
   o 78% said their ability to generate hypotheses improved in the MSS block.

2. Implicit acceptance: Medical students use ThinkSpace appropriately to engage in problem-solving.
   o Average student effort is 4 to 5 times the minimum requirement (Chart 1).
   o 68% of all actions are views of peer entries, of all 5 steps (Figure 3).
   o Students update previous entries, demonstrating self-reflection (Figure 4).

3. "Explicit acceptance" and "implicit acceptance" are not always congruent.
   o A percentage of students who reported the frequency of viewing peer hypotheses as "sometimes" (45%), "often" (38%), and "always" (40%), actually viewed peer hypotheses (Step 2) less than the average number of times, ranging from 2 to 13 views (Chart 2).

Conclusions

1. Students generally demonstrate acceptance of ThinkSpace tool by consistently expending effort beyond the minimum required in every case.
   o However, 1 in 4 students do not agree ThinkSpace aids their learning.

2. Students demonstrate metacognitive thinking (reflection) such as peer views and revising entries, returning to view entries in previous cases or reviewing peer reflections after the case has been resolved.

3. Student reporting of peer viewing behavior does not correlate highly with their recorded behavior.
   o Students may interpret survey frequency measures differently.

References

1. Spear-Ellinwood K, Griffith M, Gordon H. An online tool for organizing self-regulatory learning and promoting metacognitive engagement in problem-solving. Poster presented at the Western Group on Educational Affairs Regional Conference. Asilomar State Park, CA: 2012.

Acknowledgements