

### Objective

• 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.

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

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

- 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
- Renders thinking visible to self, peers and instructors
- Automatically records all student activity for data mining
- Certain patterns of activity suggest reflective engagement in the problem-solving process

Aligned with Self-Regulatory Learning Step 3

Figure 1. ThinkSpace Navigation

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Available Cases		Groups
Mr. Pressey	<b>Initial History:</b> IVIs. Wang is a 43-year-old woman who works as a childcare provider out of her home. She complains of pain and stiffness in several of the	MSS-Facils
Ms. Peltonen	fingers of both hands. The onset of pain was about 6 weeks ago: there is no	
Essile Mr. Usierrer	history of a previous similar problem. She states that the joints of several fin-	
raciis - IVIF. Heisman	gers feel very stiff and painful in the morning and this lasts for about an hour.	Comments on your posts
Facils – Ms. Wang more	She denies pain in her wrists, elbows, shoulders, neck, hips, knees, or back.	Kse commented on your
	She has noted similar but milder pain and stiffness in her feet over the same	Definition
	period. She denies skin rash now but did note a rash around the time the joint	
	diarrhea. She has not traveled out of Arizona in the past year	Facilitating Navigation of the CBI-ThinkSpa
Activity Log	Giarmea. She has not traveled out of Anzona in the past year.	rue containing rue gation of the con-rhinkopa
You viewed the case Ms.	- Meta Data	
Peltonen	Problem Release Date: January 19, 2012 - 4:15pm	PROVIDED
You viewed the case Facils –	Due Date: January 24, 2012 - 10:30am	Initial History
ivis. vvang		
You viewed the case <u>Ms.</u> Peltonen	Step 1: Define the Problem	Step 1. Define the
You viewed <=	iThink weThink	Problem
href="/users/flashstudent"		
title="View user profile.">flashstudent's	You have not defined this problem. Add a definition	Step 2. Formulate Release A
Definition for the problem Facils		rationales Compete Histor
Wassiana Lan	Release A	
rou viewed <u><a< u=""> href="/users/sellis" title="View</a<></u>	Release B	Step 3. Develop
user profile.">Sellis's Definition for the problem Facils		strategies for Release B
– Ms. Wang		assessment
more	Step 2: Formulate Hypotheses with Rationales	4
		Step 4. Narrow Release C
	Step 3: Develop Strategies for Assessment	Generate plan
	Step 4: Narrow Diagnoses and Generate Plan	
		Step 5. Reflect
	Step 5: Reflect	

# Student Engagement with an Online Tool to Structure Clinical Problem Solving Celia O'Brien, PhD<sup>1</sup>, Karen Spear-Ellinwood, PhD<sup>1</sup>, Susan Ellis, EdS, Paul St. John, PhD, John Bloom, MD<sup>2</sup>, Herman Gordon, PhD<sup>3</sup> <sup>1</sup>Office of Medical Student Education, <sup>2</sup>Departments of Medicine & Pharmacology, <sup>3</sup>Department of Cellular & Molecular Medicine

#### Data Mining: ThinkSpace Activity Figure 2. ThinkSpace Trails Student 1: Case #4 [Minimum required effort] \* Student 3: Case #3 [Greater effort] Define Hypothesize Strategize Narrow Dx Reflect Hypothesize Strategize Narrow Dx Reflect Define **Initial Entry Initial Entry** Update Student H Student Reflection Prior to facilitated session Student. \*Only 6 participants (~6%) displayed minimum effort Student K Student Student 2: Case #4 [Average effort] Hypothesize Strategize Narrow Dx Reflect Define **Initial Entry** Student Student I Student A Student Student K Student M Student A Student B Student M Student C Student Student D Student Student E Student I Student I Student Student G Student Student A Student Student I Student k Student D Student H Student C Student Student Student Student Student Student A Student J Student Update Student Student D Student N Student E Student M Reflection Student Student M Student K Student k Student M Chart 1. Average student effort per case Post-case Update Post-case Peer views 25 # 10 Minimal Effort Required

Case 2

Case 1

Case 3

Case 4

University of Arizona College of Medicine, Tucson, AZ



Reported frequency of views of peer hypotheses

<sup>o</sup> 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:

• 94% agreed that the format of CBI in the MSS block taught them to think like physicians.

- 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.
- Average student effort is 4 to 5 times the minimum requirement (Chart 1).
- 68% of all actions are views of peer entries, of all 5 steps (Figure 3).
- Students update previous entries, demonstrating self-reflection (Figure 4).

#### . "Explicit acceptance" and "implicit acceptance" are not always congruent.

• 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

. Students generally demonstrate acceptance of ThinkSpace tool by consistently expending effort beyond the minimum required in every case.

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

#### References

Spear-Ellinwood K, Griffith M, Gordon H. An online tool for organizing selfregulatory 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

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