Profile of common genetics misconceptions in 1st to 4th year undergraduate biology students

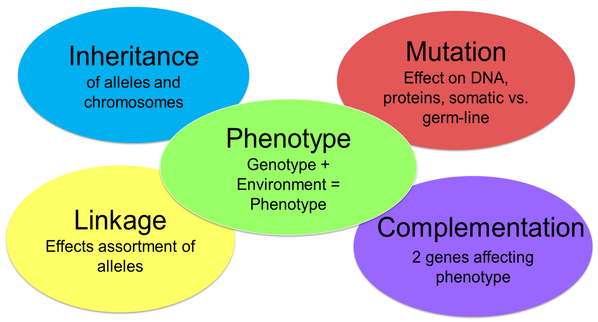
Pam Kalas & Lisa McDonnell

Department of Botany
Department of Zoology

Questions

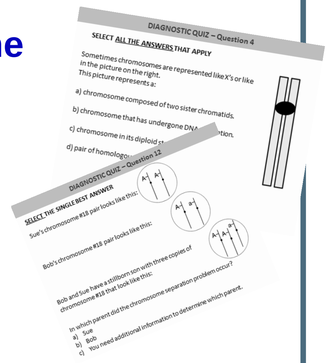
- What conceptual knowledge and misconceptions do students in 1st, 2nd, 3rd, and 4th year have?
- Are given misconceptions predictive of others?

Key Genetics Concepts Tested



Do students understand the concepts?

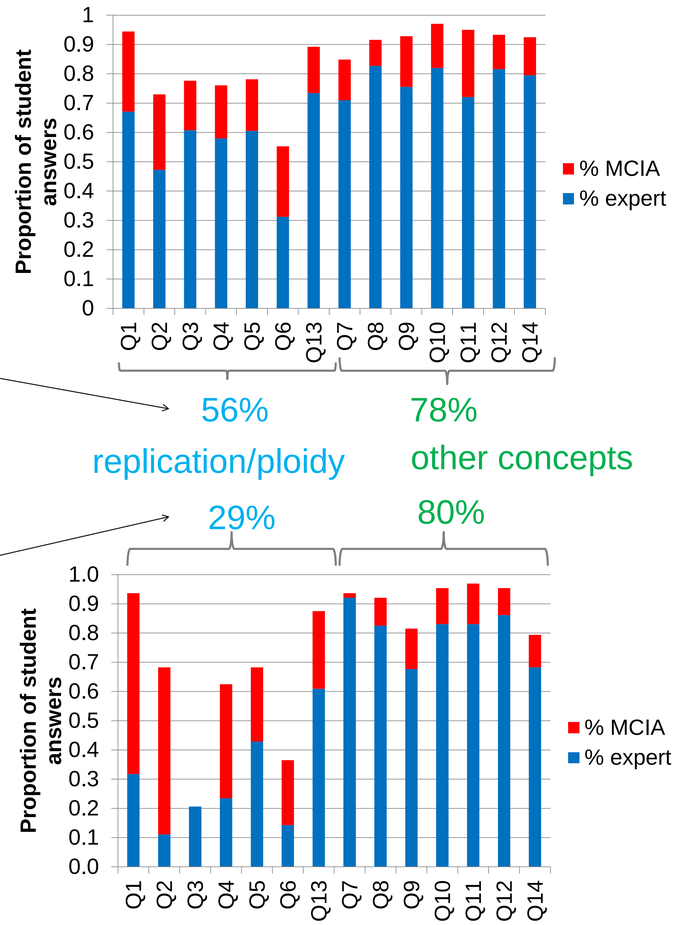
Concept Inventory Test:
14 multiple-choice questions from validated conceptual inventory tests[1,2]



Average % correct in 1st-4th year populations (standard deviations)

	PRE-test	POST-test	Avg. Change
1st year	30.0 (14.3) n=101	54.8 (21.3) n=94	33%
2nd year	31.1 (16.6) n=219	66.4 (22.3) n=218	51%
3rd year		42.4 (17.6) n=194	
4th year		54.0 (18.1) n=65	

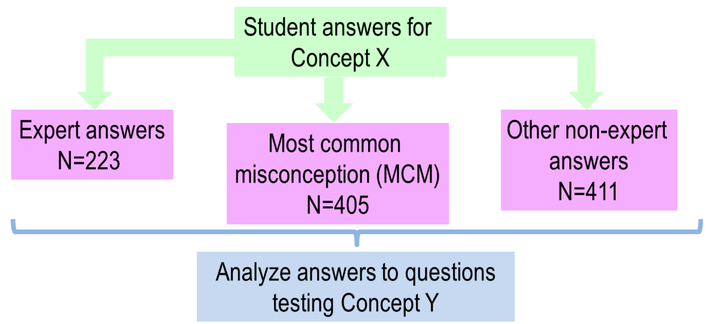
Do students understand the concepts?



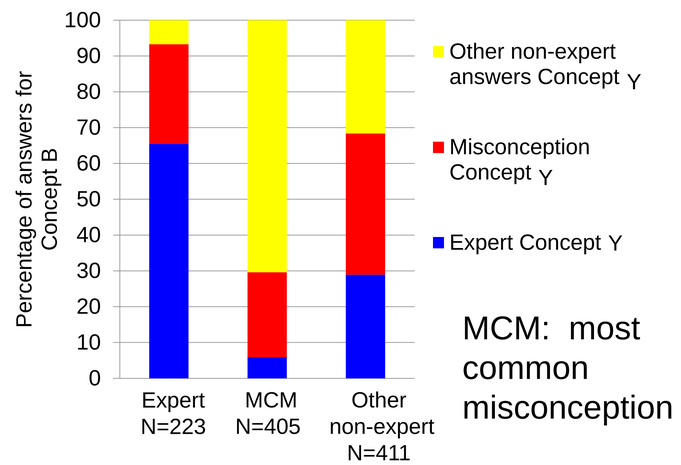
- Significant retention of conceptual understanding of most concepts after 2nd year.
- Strong misconceptions seen in 1st year do not reappear after 2nd year (among "other concepts")
- Loss of conceptual understanding on ploidy & DNA replication-related concepts.

What do we expect?

Unspoken instructor's assumption #1:
If students understand Concept X, it means they also understand Concept Y



Concept X: ploidy (a diploid cell has two copies of each chromosome);
Concept Y: a chromosome composed of two sister chromatids is a replicated chromosome (misconception= it is not replicated).



MCM: most common misconception

→ Understanding of Concept Y is independent from understanding of Concept X

- **Concept inventories are a valuable tool to study retention and common misconceptions**
- **New information for instructors – revealed interesting patterns of retention, and assumptions we make about coupled knowledge and misconceptions.**

1 Smith et al. 2008. CBE-Life Sci Ed 7(4): 422-430; 2 Kalas et al. 2012. Submitted to

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