

# Assessing student engagement in a multi-media teaching tool in Pharmacy

Andrea Edginton, School of Pharmacy,  
Jane Holbrook, Centre for Teaching Excellence,  
Mary Power, Centre for Teaching Excellence,  
Angela Stark, School of Pharmacy  
University of Waterloo,

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# School of Pharmacy




Situated in downtown Kitchener,  
away from rest of UW campus

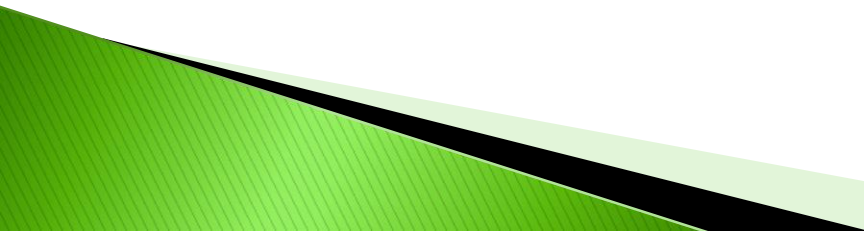


First cohort started January,  
2008 ~ 120 students/year

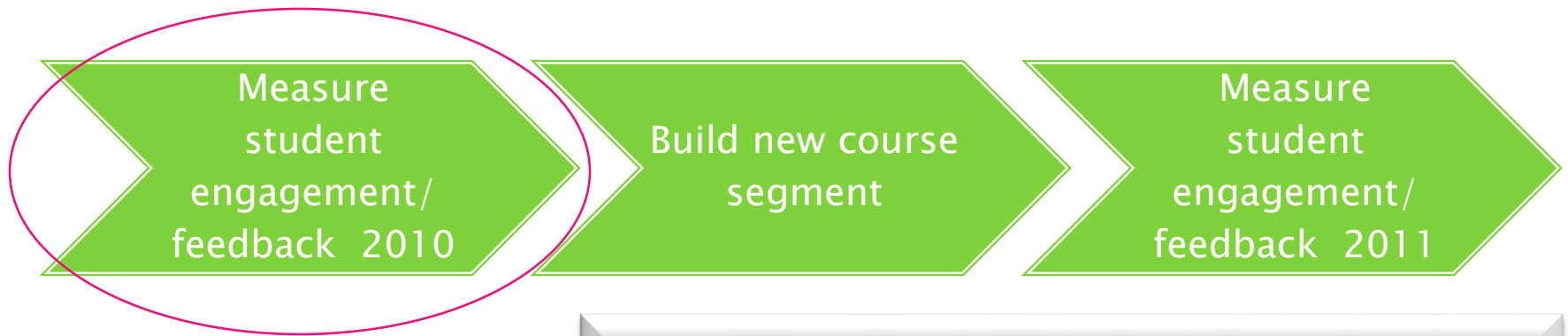
# Why Blend?

- ▶ Instructor felt comfortable with using technology to build materials
  - ▶ Instructor liked the idea of the reusability of the online modules
  - ▶ Instructor felt that having a blended format would save her time as well as allow students to learn difficult material at their own pace
  - ▶ Had success with blended format in another section of the course
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# Objectives of our work

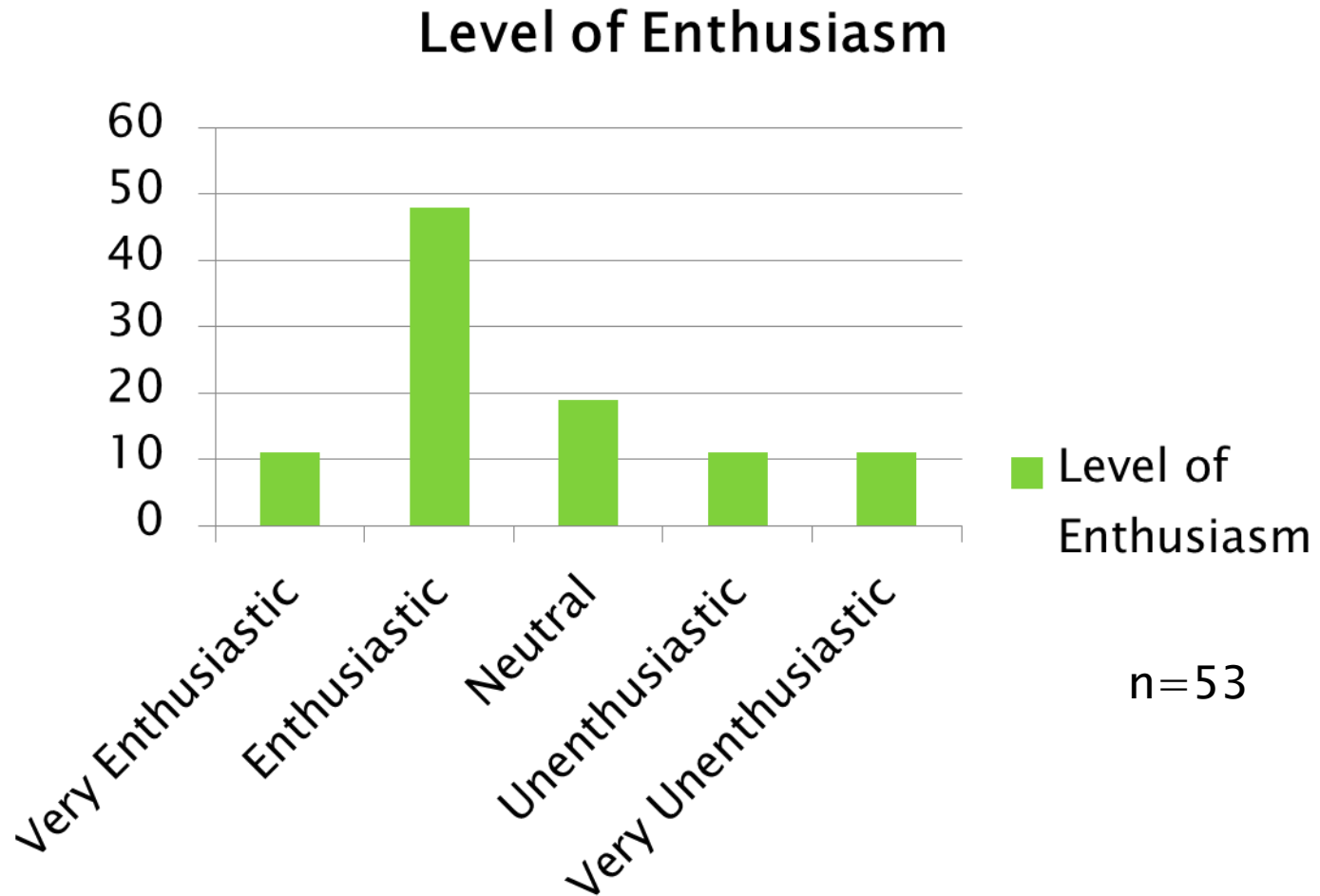
- ▶ Create a blended Clinical Biochemistry module based on student feedback
  - ▶ Assess if the introduction of multi-media based teaching module using virtual field trips, self-assessments and f2f tutorial
    - increases student understanding of the connections between the results from lab measurements and patient assessment
    - enhances student engagement
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## Based on the premise that blending was a good way to go in Clinical Biochemistry ....

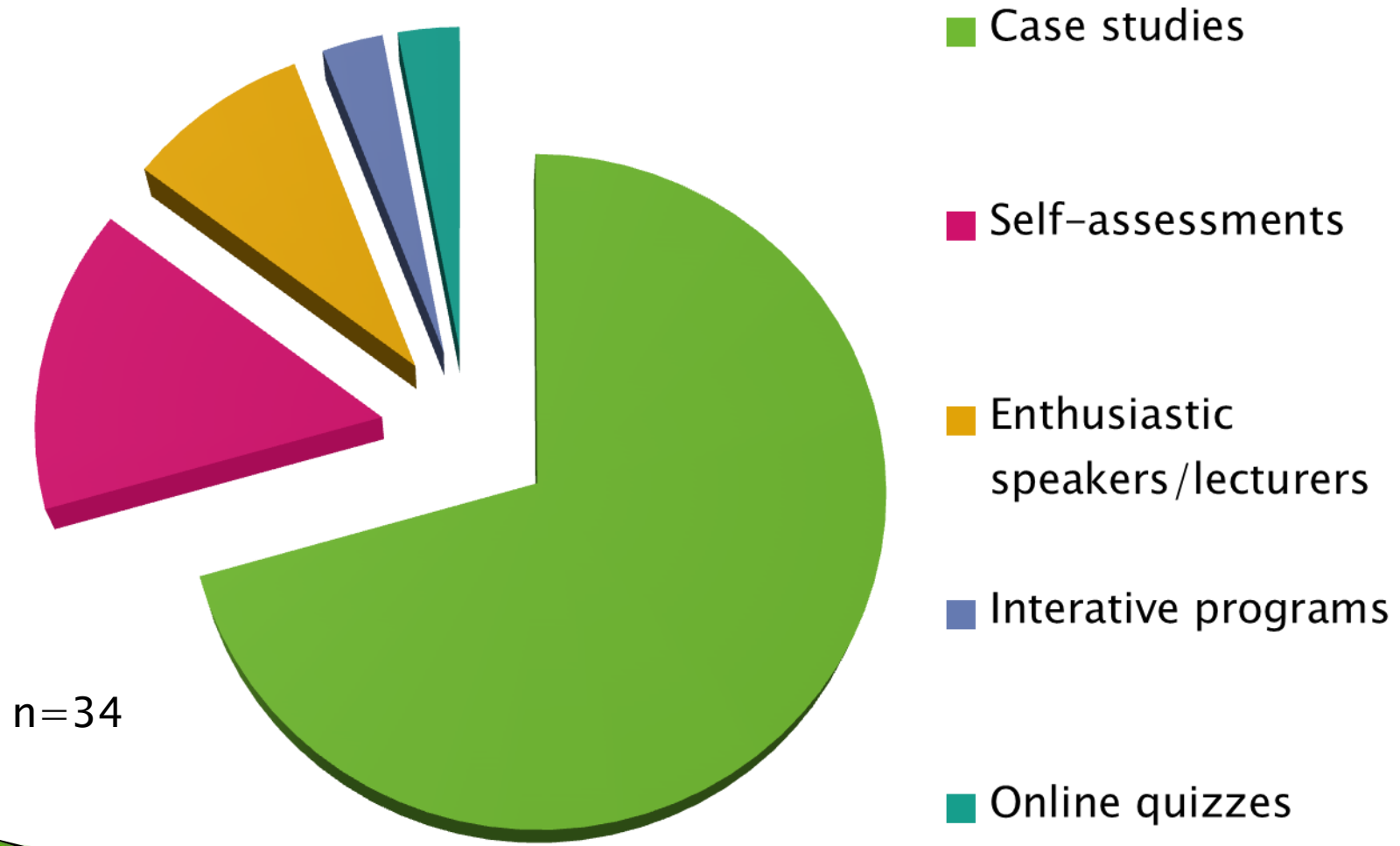


- Feedback from 2010 cohort on what would help them engage and make connections
- Comparison of common exam questions in 2010 and 2011 to examine connections between the results from lab measurements and patient assessment; engagement questions; self-reported gains on learning objectives.

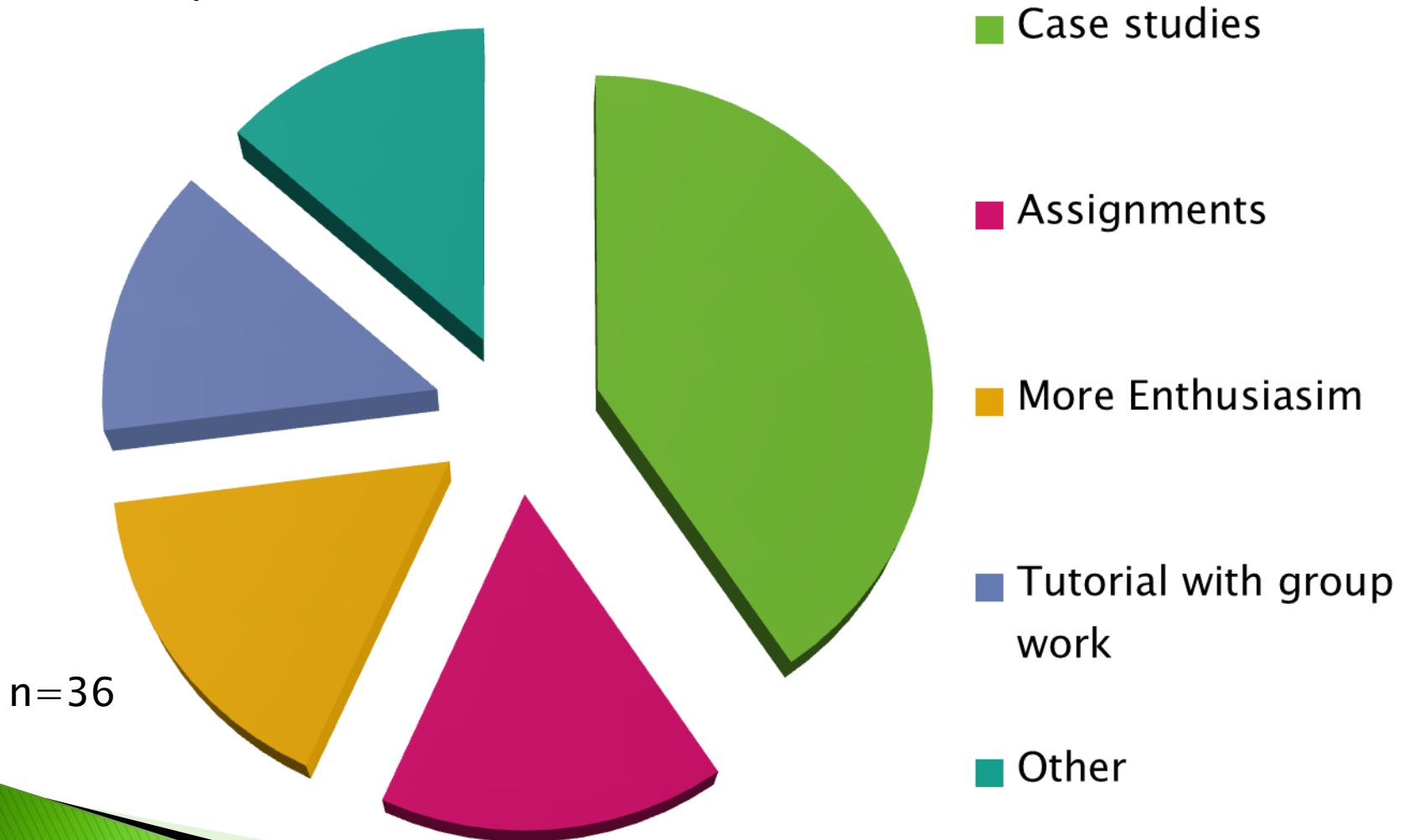
What is your LEVEL OF ENTHUSIASM for introducing a blended format to the Clinical Biochemistry section of the course?



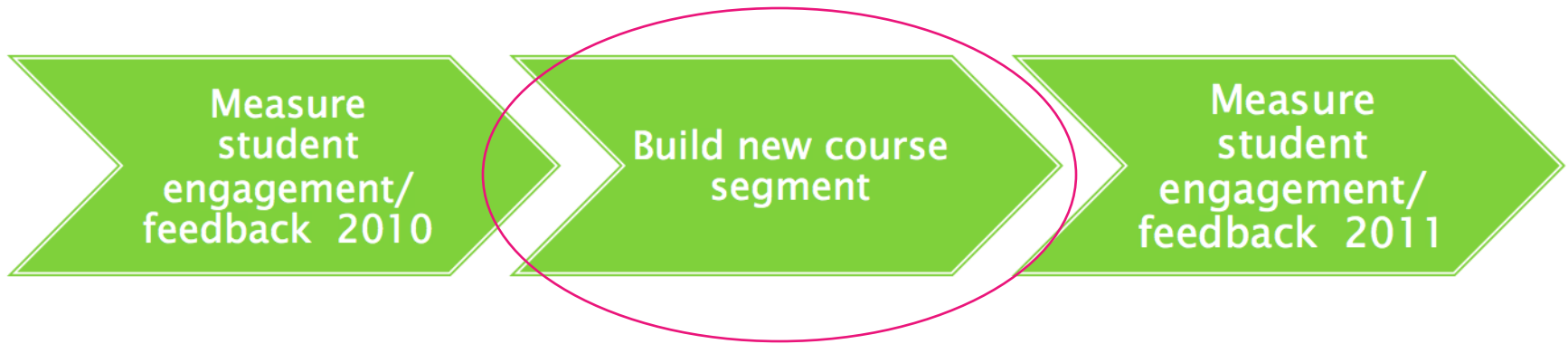
# Student Feedback – What *online* course activities would help you connect lab results with patient assessment ?



Student Feedback – What *collaborative* course activities would increase your understanding of Clinical Biochemistry course concepts?







- Built around a virtual field trip to clinical biochemistry lab
  - incorporating one major case and several smaller cases
  - self assessment pieces

# Development of the storyboard.....

The storyboard is a collection of notes and cards arranged on a wall. The notes are handwritten and cover a wide range of medical statistics concepts. Key sections include:

- Base Skills - Interpreting Lab Data**: Notes on laboratory test reliability, including terms like sensitivity, specificity, and predictive value. Includes a small diagram of a person with arrows pointing to different parts of the body.
- Predictive Value**: Discusses sensitivity and specificity, and how they relate to prevalence. Includes a formula for Positive Predictive Value (PPV).
- Qualitative Tests**: Notes on tests that give a 'yes/no' result, such as a pregnancy test. Discusses concepts like specificity and sensitivity in the context of a positive result.
- Quantitative Tests**: Notes on tests that give a numerical result, such as a blood glucose test. Discusses concepts like sensitivity and specificity in the context of a numerical result.
- ROC Curves**: Notes on Receiver Operating Characteristic curves, explaining how they plot sensitivity against 1 - specificity to evaluate test performance.
- Bayes' Theorem**: Notes on how to calculate the probability of a disease given a test result, incorporating prior probability and test characteristics.
- Summary**: A small table and text summarizing the key concepts covered in the storyboard.

There are also several printed cards, including a "Patient Factors" card, a "Calculating Sensitivity & Specificity" card, and a "Summary" card. A diagram of a normal distribution curve is also present, showing the relationship between standard deviation and standard error.

# Development of the outline of the main case study and field trip ....

## 1. Electrolyte Tests

1. *Learning Outcomes & Why check electrolytes? (read)*
2. *Case Introduction - Billy (read)*
3. *Volume assessment*
  1. *Link out to Skin Tenting Photo (we can reproduce this with acknowledgement)*
  2. *Link out to JVP and Hepatojugular reflux (video) (Andrea to get permission)*
  3. *Link out to edema picture (Andrea to get permission)*
4. *Fluid status assessment (read)*
5. *Virtual Lab Tour re: how electrolytes are tested in the lab (video) (Andrea)*
6. *Billy's lab result table with numerous link outs*
  1. *Sodium - narrated PowerPoint (Angela)*
  2. *Potassium - narrated PowerPoint (Angela)*
  3. *Chloride - read only*
  4. *C02/HCO3 - Serum bicarbonate read followed by link out to Acid-base status which is read, followed by Billy's results*
    1. *Self-assessment question on Billy's values*
    2. *Magnesium, Calcium and Phosphate - narrated PowerPoint (Angela)*
7. *Framework to interpret lab values (read)*
  1. *link out to the narrated PowerPoint on this from the Basic skills module*
8. *Self-assessment questions - must complete before moving on*

Module demo...

# In face-to-face tutorial ..



- ▶ Two cases presented and students could prepare for either. Working first with the group and then the instructor to analyze each of the cases.

Patient ID:	Encounter:	Date:
#58417	EMERGENCY ROOM	JAN 5

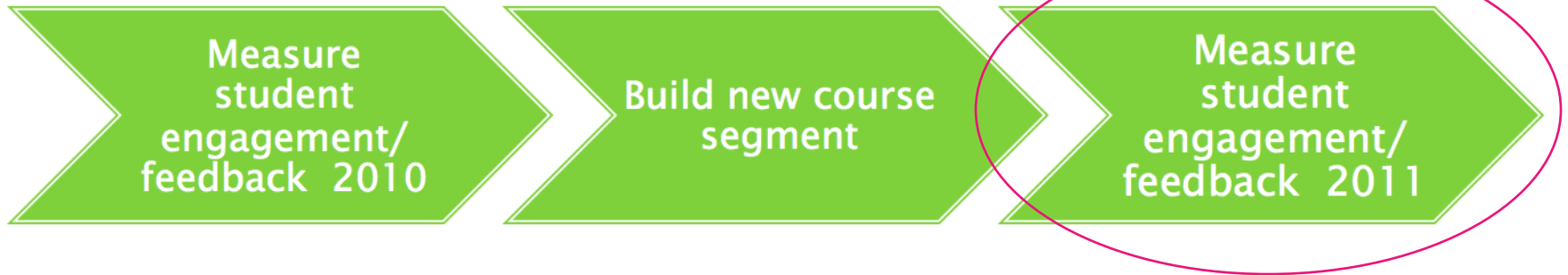
Patient Name:	Age:	Sex:	Admitting Diagnosis:
PETER PRINCE	44 Y	M	EDEMA, FATIGUE

#### RESULTS LIST

Result Name:	Results:	Units:	Reference Range:
Sodium (Na)	135	mmol/L	135-145
Potassium (K)	3.4	mmol/L	3.5-5
Chloride (Cl)	98	mmol/L	100-108
Bicarbonate (HCO <sub>3</sub> )	22	mmol/L	24-30 (CO <sub>2</sub> )
BUN	16.2	mmol/L	2.5-8
SCr	253	μmol/L	58-110
Calcium (Ca)	1.91	mmol/L	2.1-2.6
Albumin	29	g/L	35-50

- ▶ Opportunity for face to face questions and discussion of material from the on-line modules.

# How will we assess the impact of blending?




- ▶ Common questions on exam in 2010 and 2011 were used to compare the ability of students to make connections between the results from lab measurements and patient assessment.
- ▶ Measured changes in perceived gains on two course objectives
- ▶ Shifts in the survey questions that measure engagement
- ▶ Feedback on modules to tweak new course design

# Assessment comparison

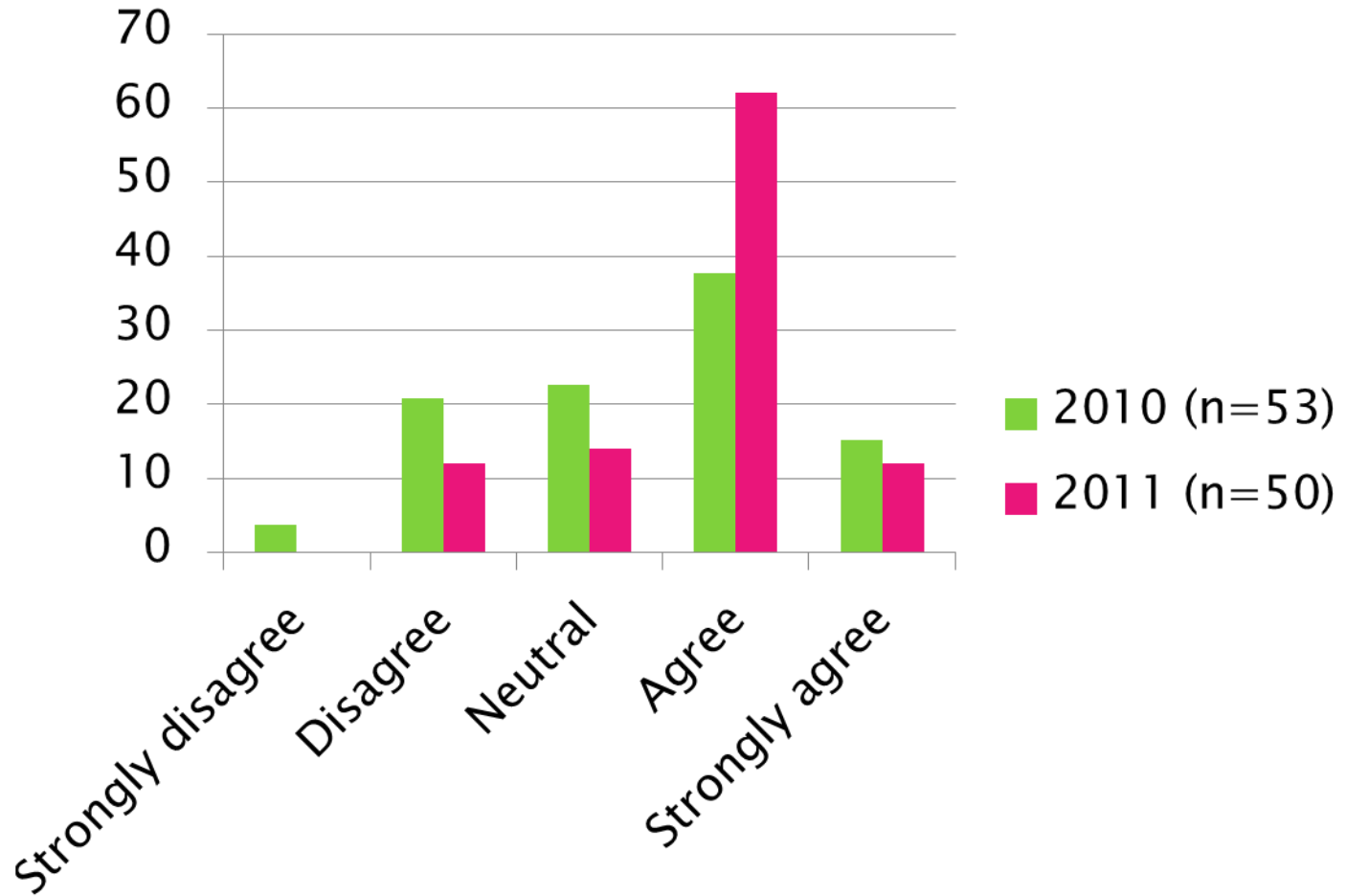
- ▶ Grades on the CB questions on exam increased 20%, but grades in all components of the course were better in 2011
- ▶ In 2010 Clinical Biochemistry lowered students' overall grades by 4.67%, in 2011 by 1.47%

# Course value and engagement before and after the redesign

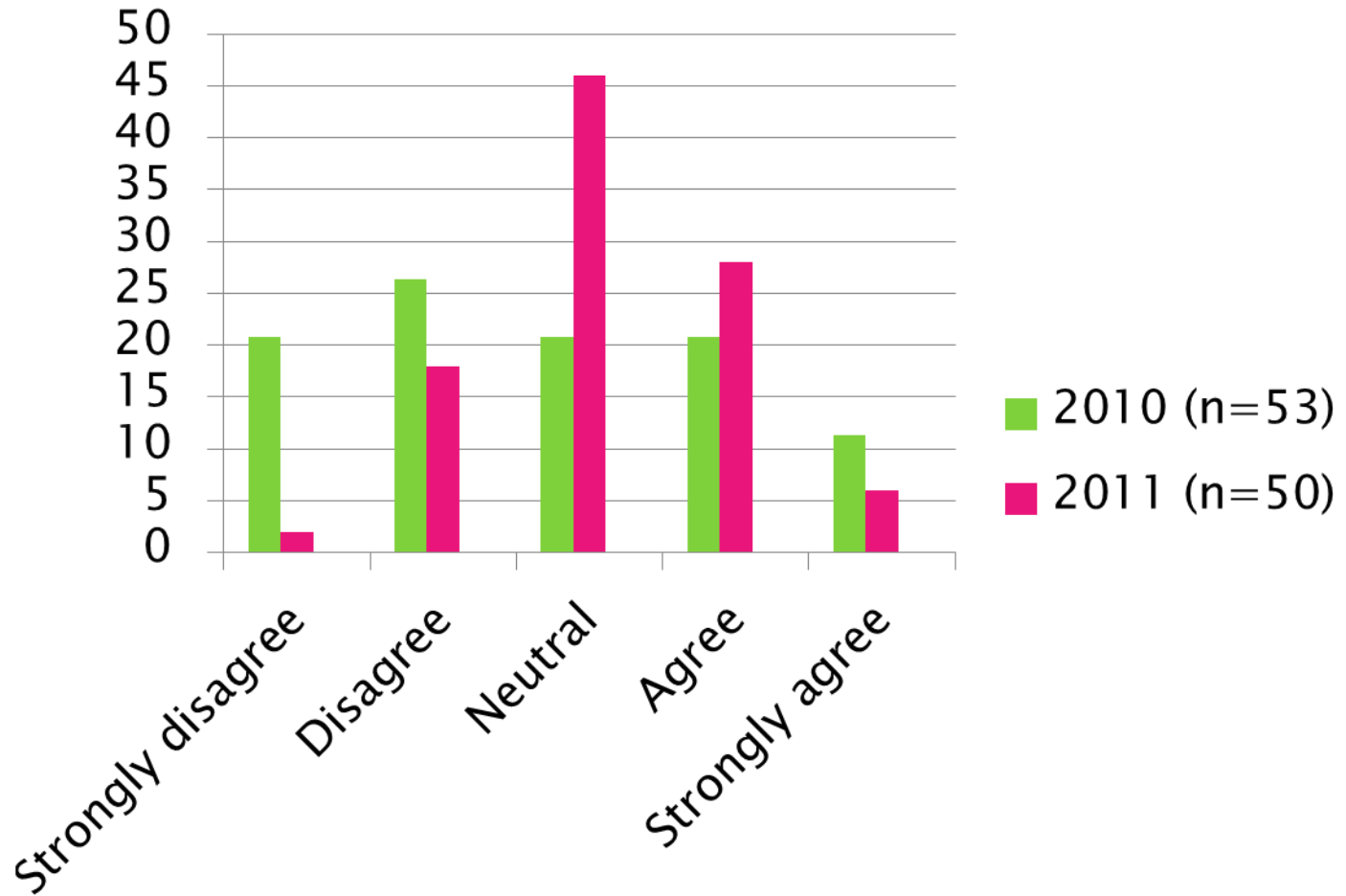
- ▶ This component of Pharm 220 increased my interest in the subject
  - ▶ What I am learning in this class will be important in my future
  - ▶ Students shared their ideas/knowledge in this component of Pharm 220
  - ▶ This component of Pharm 220 encourages questions and ideas
  - ▶ I felt very involved or engaged in this component of Pharm 220
- 




This component of Pharm 220 increased my interest in the subject



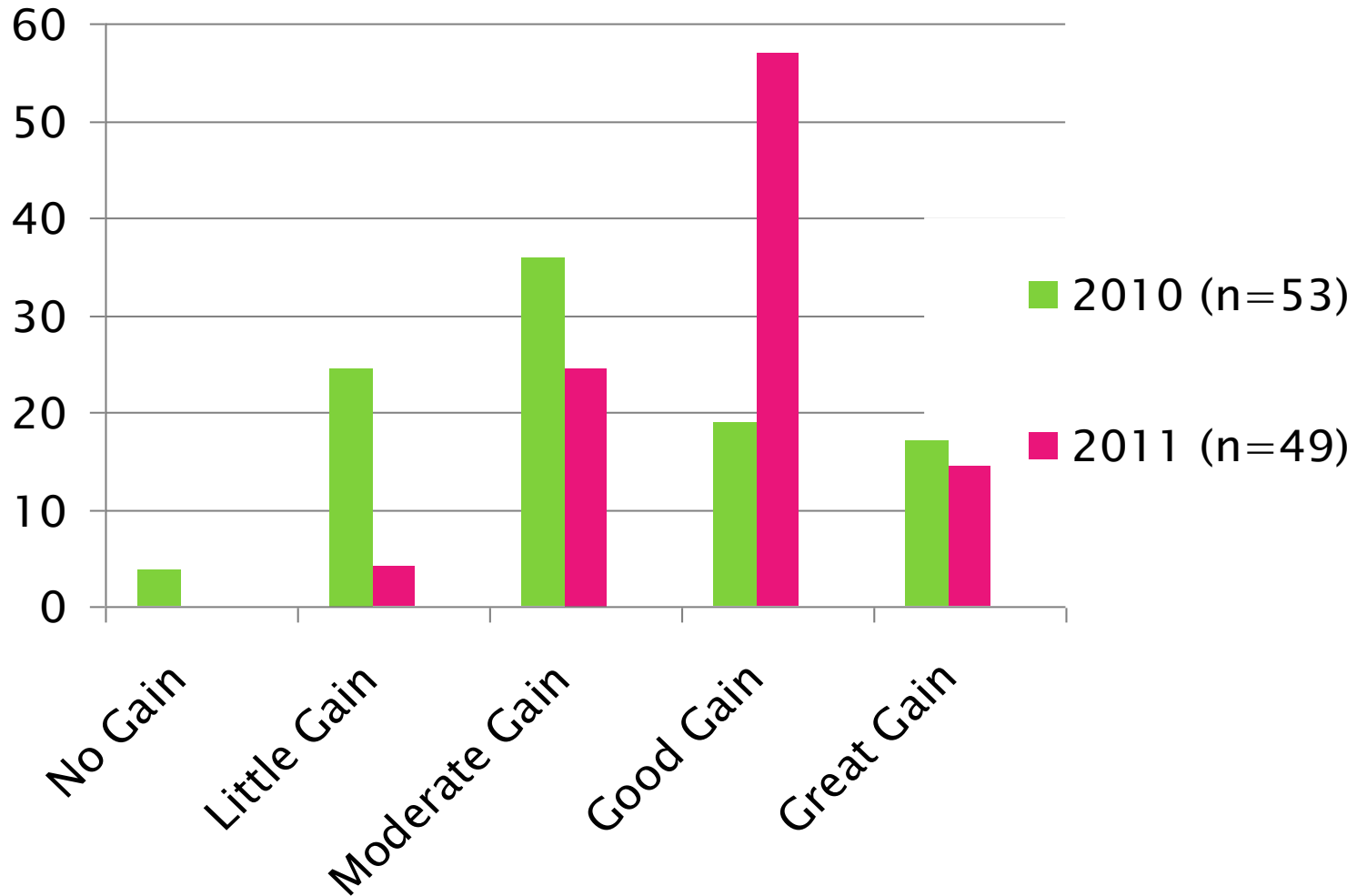
# I felt very involved or engaged in this component of Pharm 220



# Learning gains before and after the redesign

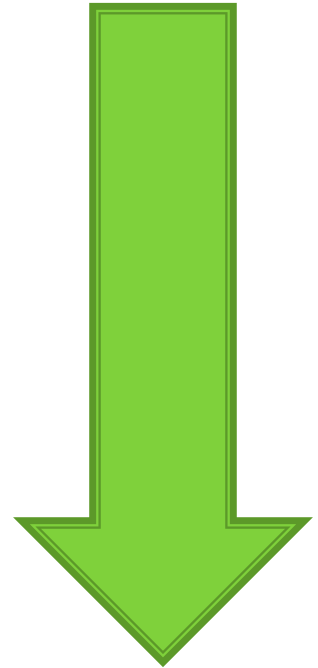
- ▶ Your understanding of the role of lab results in patient assessment
  - ▶ Your understanding of the development of a rational approach for interpreting laboratory data
- 

# Your understanding of the development of a rational approach for interpreting laboratory data



# Effectiveness of online and tutorial components (most to least)

- ▶ Online self-assessment questions
- ▶ Billy's case study
- ▶ Face-to-face tutorial
- ▶ Virtual field trip
- ▶ Online discussion forum



# Evaluation of online components

## ▶ Positives (33)

- Provided situations for applied knowledge or problem solving
- Allowed learning at individual pace, time flexibility
- Case studies were helpful
- Liked the assessment questions

## ▶ Negatives (7)

- Having more tutorials would help

# Evaluation of tutorial activities

## ▶ Positives (43)

- Problem solving and case study applications clarified concepts
- Discussing and talking through cases very helpful
- Engaging with other students/doing group work valuable exercise
- Case studies in general were beneficial
- Questions (from online component) would be answered

## ▶ Negatives (6)

- Not enough tutorials
- Format not helpful – too long, material redundant, smaller cases needed

# Next Steps ....

- ▶ No major changes to the online component.
  - ▶ Include one question and answer period with instructor midway for questions about modules.
  - ▶ Change the way the cases are discussed in the final tutorial so that students feel they are discussing both cases in-depth.
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