INTEGRATION OF THE CHEMISTRY³ TEXTBOOK WITH THE FIRST YEAR CURRICULUM

Amber Eggleton

MChem Forensic and Investigative Chemistry
UEA
INTRODUCTION

- Previous literature has shown students are not using textbooks as an accompaniment to their learning
- Aimed to explore attitudes toward textbooks and how they could be used more effectively by students and academics
- Specific focus on first year students and Chemistry³
What are student perceptions and experiences using textbooks?

What effect does the closer integration of the set text with the course have, if any?

How could student use of textbooks be both increased and improved?
INFOGRAPHIC INTERVENTION

- Covered the core organic, inorganic and physical chemistry modules
- 42 unique infographics created and distributed
- Evaluated through a primarily qualitative approach
### GETTING THE MOST OUT OF YOUR TEXTBOOK: WEEK 4 (S2)

- **Complete the online introductory quiz.**
- **Study the content online provided by Dr Fuller.**
- **Attend the synchronous teaching session.**
- **Read the pages given below related to the topics covered.**
- **Answer the questions from the relevant sections.**
- **Self-mark your answers then talk it over with each other.**

#### CHE-4302Y BONDING, STRUCTURE AND PERIODICITY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Sections to read</th>
<th>Questions to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro to transition metals</td>
<td>Pgs. 1255-64</td>
<td></td>
</tr>
<tr>
<td>Ligands</td>
<td>Pgs. 1265-70</td>
<td></td>
</tr>
<tr>
<td>Redox reactions</td>
<td>Pgs. 729-10</td>
<td></td>
</tr>
<tr>
<td>Oxidation states</td>
<td>Ch 28: 2 &amp; 3</td>
<td></td>
</tr>
<tr>
<td>Electrochemical cells and cell diagrams</td>
<td>Ch 16: 3, 4 &amp; 9</td>
<td></td>
</tr>
<tr>
<td>Reduction potentials</td>
<td>Ch 16: 5, 6, 8 &amp; 10-14</td>
<td></td>
</tr>
</tbody>
</table>

### GETTING THE MOST OUT OF YOUR TEXTBOOK: WEEK 9

- **View the lecture clips by Prof. Stephenson.**
- **Read the pages given below related to the topics covered.**
- **Answer the questions from the relevant sections.**
- **Self-mark then talk it over on the discussion board!**

#### CHE-4301Y CHEMISTRY OF CARBON-BASED COMPOUNDS

<table>
<thead>
<tr>
<th>Resource</th>
<th>Sections to read</th>
<th>Questions to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry textbook</td>
<td>Ch 24: 30(a) &amp; (c)</td>
<td></td>
</tr>
<tr>
<td>- Esterification</td>
<td>Ch 110B-9</td>
<td></td>
</tr>
<tr>
<td>- Hydrolysis</td>
<td>Ch 112B-112-3</td>
<td></td>
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<tr>
<td>- Acyl chlorides</td>
<td>Ch 113B-113</td>
<td></td>
</tr>
<tr>
<td>Claisen textbook</td>
<td>Ch 24: 1(a), 5(b) &amp; (d)</td>
<td></td>
</tr>
<tr>
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<td>Ch 113B-113</td>
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<td>- Acyl chlorides</td>
<td>Ch 113B-113</td>
<td></td>
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</tbody>
</table>

### GETTING THE MOST OUT OF YOUR TEXTBOOKS: IONS IN SOLUTION

- **Attend the teaching sessions.**
- **Read the pages given below related to the topics covered.**
- **Answer the questions from the relevant sections.**
- **Self-mark then talk it over on the discussion board!**

#### CHE-4202Y LIGHT, ATOMS AND MOLECULES

<table>
<thead>
<tr>
<th>Resource</th>
<th>Section</th>
<th>Questions to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry textbook</td>
<td>162</td>
<td>Ch 16: 1 &amp; 2</td>
</tr>
<tr>
<td>Atkins textbook</td>
<td>18B</td>
<td>E158/La4-4b</td>
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<tr>
<td>Blackboard</td>
<td>Mobius quiz</td>
<td>1-10</td>
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<tr>
<td>Blackboard</td>
<td>Blackboard quiz</td>
<td>1-4</td>
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</tbody>
</table>

### GETTING THE MOST OUT OF YOUR MODULE: WEEK 12

- **Complete the introductory quiz. What was it challenging?**
- **Watch videos online and use the table below to study the content in the textbook.**
- **Complete the formative test.**
- **Talk over your answers on the discussion board!**

#### CHE-4301Y BONDING, STRUCTURE AND PERIODICITY

<table>
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<tbody>
<tr>
<td>p-block elements</td>
<td>27.1</td>
</tr>
<tr>
<td>Group 13</td>
<td>27.2</td>
</tr>
<tr>
<td>Group 14</td>
<td>27.3</td>
</tr>
</tbody>
</table>

Questions for the introductory quiz and formative test will be taken from the Chemistry textbook (3rd ed.).
QUANTITATIVE RESULTS: UEA LIBRARY

- Most used chemistry textbook in the BibliU collection
- General upward trend in Chemistry³ access via the library throughout the academic year

<table>
<thead>
<tr>
<th>Chemistry textbook</th>
<th>Copies purchased</th>
<th>Activations</th>
<th>Usage (%)</th>
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</thead>
<tbody>
<tr>
<td>Chemistry³</td>
<td>103</td>
<td>103</td>
<td>100</td>
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<tr>
<td>Organic Chemistry</td>
<td>80</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>Physical Chemistry</td>
<td>80</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Inorganic Chemistry</td>
<td>80</td>
<td>1</td>
<td>1</td>
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<td>39</td>
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<td>Physical Chemistry</td>
<td>80</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>Inorganic Chemistry</td>
<td>80</td>
<td>13</td>
<td>16</td>
</tr>
</tbody>
</table>
QUANTITATIVE RESULTS: CHEMISTRY³ AND THE INFOGRAPHICS

- Out of 172 sections in Chemistry³, 112 (65%) were referenced in the infographics.
- Almost all of the first year curriculum could be located in Chemistry³.
- Those not referenced could be sorted into three categories:
  - A-level content
  - Optional module content
  - Second year content at UEA
Those 112 sections were then divided further based on the module they were referenced in.

Two reasons for inorganic having the largest section of the chart:

- Better alignment between the Chemistry³ content and the content delivered by lecturers
- Overlap between the organic and physical chemistry content
SEMI-STRUCTURED INTERVIEWS

- Ethics applications approved in November 2020
- 10 participants in total, 5 students and 5 academics
- Interviewees were asked 10 questions, focused mainly on Chemistry³ and the infographic intervention
- Transcripts of each interview were coded and co-coded by another researcher to identify any major themes from the responses
QUALITATIVE RESULTS: SEMI-STRUCTURED INTERVIEWS

**General textbook usage**
- Student use
- Academic use
- Suitability
- Accessibility

**Chemistry**
- Usage
- Suitability
- Positive perceptions
- Negative perceptions

**Infographic intervention**
- Integration
- Development
- Positive perceptions

**Alternate resources**
- Other textbooks
- Online resources

**Teaching methods on the first year curriculum**
- Utilisation of textbooks
- Student engagement
- Active learning approaches

“There was basically a love declaration on the Facebook chat.” (Student 3)

“Typographically it’s nicely done. It’s a nice, neat, professional job as you’d expect… I thought it was a pleasant book to use.” (Academic 5)

“When I’ve got an issue, it’s much easier to just Google it than to try and use the search option in BibliU to try and find what’s relevant.” (Student 2)

“Students currently have grown up with the internet, so their first port of call is Google… That’s a problem of the year we live in now.” (Academic 3)

“The infographic, I think, is excellent… It’s the first point I go to.” (Student 2)

“I use [the textbook] a lot before exams or tutorials… I basically go through everything and just do it from the book.” (Student 3)

“I think the nature of teaching is, in a lot of ways, maybe eliminating the need to go to the library and make notes from textbooks.” (Academic 1)
CONCLUSION: LIMITATIONS AND FUTURE DEVELOPMENTS

- Limitations of the project:
  - Undergraduate project timescales
  - Small number of interviewees

- Future developments:
  - Implement infographics for the foundation year curriculum
  - Incorporate the optional Analytical Chemistry module (CHE-4501Y)
CONCLUSION: ADDRESSING THE RESEARCH QUESTIONS

- What are student perceptions and experiences using textbooks?
  - While students’ previous experiences with textbooks varied a lot, all of them said they found textbooks overwhelming and inaccessible.

- What effect does the closer integration of the set text with the course have, if any?
  - Students expressed how seeing the correlation between their teaching sessions and the content in the textbook helped their understanding.

- How could student use of textbooks be both increased and improved?
  - Students confirmed that the infographics had this effect, with all of the students saying they used the infographics to guide their independent study.