Learning parasitology through virtual clinical case studies: the DMU e-Parasitology project

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Outline

- Curriculum modifications to increase teaching medical parasitology: two sets performed 2016/17 and 2017/18
- Description of first virtual case study module for the DMU e-Parasitology
- Focus group: testing model virtual case study unit
- Preliminary impact using virtual case studies
- Conclusions
Curriculum modifications to increase teaching Parasitology

De Montfort University (DMU, Leicester) → negligible parasitology teaching

BSc Biomedical Science (Hons) → two sets of curriculum changes from 2016/17:

- **“Basic Microbiology”** (1st year module) was expanded to 30 credits:
  - New lectures were introduced (virus, fungi, helminths and emerging infectious diseases).
  - Increment in the number of lectures related to parasitology, from 1 to 3.

- **“Medical Microbiology”** (3rd year module)
  - More interaction: parasitology mini-case studies and a highly specialised workshop was introduced in the module.
Curriculum modifications to increase teaching Parasitology

Basic Microbiology (n=196) → student satisfaction increased from 20% to 64% (percentage responses for agree and strongly agree were considered together).

Medical Microbiology (n=120) → reduction in the number of students dissatisfied, from 20% to 7.4%.

Availability:
https://library.iated.org/view/PENAFERNANDEZ2017CUR
Curriculum modifications to increase teaching Parasitology

During the theoretical component of the training students were provided with different slides collected from the DPDx (CDC, 2018).

Mini case-studies → effective in facilitating the acquisition of different transversal competences including critical thinking, clinical skills, communication and team work.

Figure. Detail of the introduction of case studies during the theoretical component of the course. Slides collected from the DPDx (Case #369 – Available at: https://www.cdc.gov/dpdx/monthlyCaseStudies/2014/case369.html).
Further curriculum modifications undertaken in 2017/18

A second set of curriculum modifications was implemented following final module level feedback:

- **“Basic Microbiology”**: More support with foundation knowledge.
- **“Medical Microbiology”**
  - Reduced number of NHS lecturers → enhance learning and comprehension.
- Creation of **virtual clinical parasitology case studies** → DMU e-Parasitology.

### Table of Curriculum Modifications

<table>
<thead>
<tr>
<th>2016/17</th>
<th>2017/18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to the module</td>
<td>Same</td>
</tr>
<tr>
<td>Bacterial cell structure; difference between prokaryote and eukaryote; staining methods</td>
<td>Prokaryotes: archaea and bacteria. Types, nutrition and reproduction</td>
</tr>
<tr>
<td></td>
<td>Cell walls of archaea and bacteria. Microbial locomotion. Staining methods</td>
</tr>
<tr>
<td></td>
<td>Differences between prokaryote and eukaryote</td>
</tr>
<tr>
<td>Taxonomy of microbes (Parts I &amp; II)</td>
<td>Taxonomy of microbes</td>
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<tr>
<td>Medically important Gram negative bacteria (Parts I &amp; II)</td>
<td>Same</td>
</tr>
<tr>
<td>Spirochetes</td>
<td>Same but with less content</td>
</tr>
<tr>
<td>Medically important Gram positive bacteria-non-spore forming</td>
<td>Same</td>
</tr>
<tr>
<td>Medically Important Gram positive bacteria-spore forming</td>
<td>Same</td>
</tr>
<tr>
<td>Microbial growth</td>
<td>Same</td>
</tr>
<tr>
<td>Microbial interactions with humans - normal microbiota</td>
<td>Same</td>
</tr>
<tr>
<td>Microbial genetics - bacterial genetics (Parts I &amp; II)</td>
<td>Bacterial genetic structure</td>
</tr>
<tr>
<td>Microbial genetics - genetic function (Parts I &amp; II)</td>
<td>Bacterial genetic functions</td>
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<tr>
<td>Microbial evolution</td>
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</tr>
<tr>
<td>Antimicrobials and antimicrobial drug resistance (Parts I &amp; II)</td>
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</tr>
<tr>
<td>Antibiotic susceptibility testing (Parts I &amp; II)</td>
<td>Same</td>
</tr>
<tr>
<td>Infection detection methods and infection control</td>
<td>Same</td>
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<tr>
<td>Sterilisation and disinfection</td>
<td>Content was introduced in “Infection control”</td>
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<tr>
<td>Viruses (Parts I &amp; II)</td>
<td>Introduction to viruses</td>
</tr>
<tr>
<td>Mycology (Parts I &amp; II)</td>
<td>Human ImmunoDeficiency Virus (HIV)</td>
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<tr>
<td>Parasites (Parts I, II &amp; III)</td>
<td>Same but with less content</td>
</tr>
<tr>
<td>Emerging Infectious Diseases</td>
<td>Same</td>
</tr>
</tbody>
</table>

Paper will be available at the IATED library
DMU e-Parasitology emphasises self-learning and will facilitate the acquisition of basic clinical and parasitology skills → freely available on the DMU website here (Image courtesy of DMU; Peña-Fernández A): [http://parasitology.dmu.ac.uk/index.htm](http://parasitology.dmu.ac.uk/index.htm)
DMU e-Parasitology has the following modules [More details have been described in Peña-Fernández et al. (2017)]:

- **A theoretical module** with mini e-learning units to study major human parasites such as free-living amoebas.

- **A virtual laboratory module** with engaging and interactive units about different techniques which are relevant for the study of parasitic human diseases.

- **A virtual microscope** with a real slide collection of clinical samples of human parasites.

- A module with **virtual clinical case studies**.
DMU e-Parasitology: virtual case studies

Virtual case studies

→ interactive, with different degrees of difficulty:

- Easy
- Medium
- High

Overview of the virtual case studies section created in the DMU e-Parasitology (Image courtesy of DMU; Peña-Fernández et al., 2017). Available at: http://parasitology.dmu.ac.uk/learn/case_studies/cs1/story_html5.html
DMU e-Parasitology virtual case studies: model unit

First virtual case study unit: model

→ *Entamoeba histolytica* and *Acanthamoeba* spp. in an HIV positive patient.

→ Highly interactive and visually engaging slides with short medical history following progress of patient

→ Different types of tests/quizzes → diagnostic techniques, treatment & prevention.

Overview of the first virtual case study created in the DMU e-Parasitology (Image courtesy of DMU; Peña-Fernández et al., 2017). Available at: [http://parasitology.dmu.ac.uk/learn/case_studies/cs1/story_html5.html](http://parasitology.dmu.ac.uk/learn/case_studies/cs1/story_html5.html)
Focus group study → undergraduate students from 95 fourth year Pharmacy students from University Miguel Hernandez de Elche that studied Clinical Analysis & Diagnostics II* during the first term of 2017/18 [6 ECTS; 4th year module; 109 students were enrolled in this module].

*Syllabus of Parasitology module. Available at the UMH website: https://umh.es/contenido/Estudios/:asi_g_1705_P1/datos_en.html [accessed 24/06/2018]

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Coordinator</th>
<th>Lecture</th>
<th>Laboratory</th>
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<tbody>
<tr>
<td>ANTEQUERA RODRIGUEZ, PEDRO</td>
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<tr>
<td>BORNAY LLINARES, FERNANDO JORGE</td>
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<tr>
<td>ACOSTA SOTO, LUCRECIA</td>
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</tbody>
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CLINICAL ANALYSIS AND DIAGNOSTICS II

2018/2019 Academic year

Bacteriological and parasitological analyses of biological samples as elements for the assessment of health and disease. Study of the appropriate methodological and instrumental knowledge that must contribute to the diagnosis, prognosis, and evaluation of the therapeutic response in processes triggered by biological pathogens. Clinical microbiology. Clinical parasitology.

Course

- Code: 1705
- Degree: Bachelor's in Pharmacy
- Faculty of Pharmacy
- Year: Year 4 of Bachelor's in Pharmacy
- Semester: Fall
- Type: Required
- Language: Spanish

ECTS credits: 6
- Lecture: 3
- Laboratory: 3

Hours: 150
- Directed: 60
- Shared: 10
- Autonomous: 80

Subject matter: Clinical Theory and Practice
Module: Medicine and Pharmacology
Department: Agrochemistry and Environment
Area: PARASITOLOGY

Classes and exams (24/6/2018)
DMU e-Parasitology virtual case studies: focus group

Students highlighted in the survey (n=95 out of 109)

✓ Questions related to the structure

The case studies presented were appropriate for my studies

The overall design of the e-Parasitology website is appropriate and engaging

Peña-Fernández et al. DMU e-Parasitology. HEA Annual Conference 2018
DMU e-Parasitology virtual case studies: focus group

✓ Questions related to the use

The e-Parasitology website is interactive

Overall, I enjoyed the experience with the e-Parasitology website
Questions related to the **learning**

The virtual clinical slides provided enhanced my learning

I have gained an appropriate knowledge of some parasitic diseases and their pathology, prevention and treatment
DMU e-Parasitology virtual case studies: focus group

Improvements:

- Add more photographs and questions.
- Creation of a general quiz/game to encourage participation.
- Be able to select a different language.
- Some minor modifications to enhance navigation.
Overall impact of introducing virtual clinical case study in BMS programme

“Basic Microbiology” → similar levels of satisfaction are reported when comparing 2018 vs. 2017.

“Medical Microbiology” → a slight improvement was observed in students’ satisfaction from 59.3% to 66.7% from 2016/17 to 17/18.

Results should be treated cautiously until the specific feedback-questionnaires distributed to analyse the academic effect of the novel workshops have been studied.

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**Basic Microbiology**

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Unanswered</th>
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<td>Course 2016/17</td>
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**Medical Microbiology**

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**ADDITIONAL CURRICULUM MODIFICATIONS FOR ENHANCING THE TEACHING OF PARASITOLOGY AND INFECTIOUS DISEASES AT AN ENGLISH UNIVERSITY**

A. Peña-Fornández¹, G. Torrado², R. Agudo², M.A. Peña²

Paper will be available at the IATED library
Conclusions

Preliminary outcomes:

1) Interactive and seem to promote student self-learning and interest in learning medical parasitology.

2) Students gained some medical parasitology knowledge for the pathogens considered & were able to morphologically determine them using the virtual microscope.

3) Facilitate acquisition of different transversal competences → critical thinking and reflection, research skills, communication and team work, etc.

Overview of the virtual case study module in the main page of the DMU e-Parasitology (Image courtesy of DMU; Peña-Fernández et al., 2018). Available at: http://parasitology.dmu.ac.uk/index.htm
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the DMU e-Parasitology project

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