REMOTE UNIVERSITY NETWORK (RUN)

Evaluation of Parallel Authentic Research-Based Courses in Human Biology on Student Experiences at Stanford University and the University of Gothenburg

Supported by Wallenberg Global Learning Network and GU (ongoing)

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Initial Objectives - Process Driven

DISCUSSIONS LED TO IDENTIFICATION OF COMMON PROBLEMS IN CURRENT TEACHING METHODS

Can we teach students to become “producers” rather than “consumers”?

• Avoid passive learning found in didactics
• Encourage students to develop their own technologies in answering a question
• Learn skills used at all levels of higher education, such as resource management, intellectual independence, creativity
• Involve self – assessment, digital exams, oral & scientific presentation in final grade

[Ref. Future Life Sciences Higher Education: National Research Council; American Association for the Advancement of Science; GU:s Vision2020; Bologna 2020-process]
Various Educational Programs in Health Care & Medicine
KNOWLEDGE MAP

Basic sciences:
- Anatomy
- Physiology
- Biomechanics
- Anthropometry
- Statics & Dynamics

Interdisciplinary:
- KINESIOLOGY
- Ergonomics
- Performance

Application:
- Movement Analysis
- Kinematics & Kinetics

BlendIT Presentation, Mars 17 2016
ICT tools
Polycom, Adobe Acrobat Connect Pro, Skype, motion analyzing software in real time labs, blogs, LMS/GUL, streamed key note lectures, virtual library, interactive self-assessment, virtual oral presentations & expert consulting.

Develop remote-technology usage and also facilities and equipment for the scientific process.

Stanford University Human Performance Lab

Remote online feedback and analysis ICT-room

Univ. of Gothenburg Biomechanic Lab

BlendIT Presentation, Mars 17 2016
[Q1] What impact will the course design have on student and staff satisfaction and perceptions in Stanford and at GU?

[Q2] What impact will the course design have on undergraduate student research-related skills and abilities in Stanford and at GU?

[Q3] How will the students evaluate the tools and ICT-battery use and its different values, perspectives on group work and team collaboration, cross-cultural collaboration and the value of developing global skills and abilities in courses like RUN.

[Q4] Is it possible and valuable to learn the essential basics in biomechanics at undergraduate level in parallel with developing research-related skills and abilities in the same course, compared to the essential basics learned in a traditional course module?
Subjects (RUN III – final year)

- Students: The RUN-course enrolled human biology students (semester 2, n=25) at Stanford and sports science students and physical educator students (semester 3, n=32) studying at IKI, GU

- Staff: The entire RUN-staff team that made this project possible included 32 persons in total at SU and GU. Principal investigators, two project executives, a project manager, course directors, several tutors, teachers, ICT-staff, international expert consultants from several universities.

- Student research background (before course): All students had some research experience; Literature review (SU 80%, GU 67%); Experim./Quantitative (SU 62%, GU 12%).
Method

- This was an exploratory longitudinal case study.
- This ethnographical study focuses on web-questionnaires (quantitative data), but also some findings of the evaluators personal observations and focus group interviews with students and staff (qualitative data).
- All data were collected before, during and after the RUN-courses. The web-questionnaires were based on a 4-6 graded Likert scale with the opportunity to give written comments after most questions.
Results

[Q1] A time difference of nine hours, different educational cultures, and diverse academic backgrounds among SU and GU students made it difficult to collaborate effectively over the Internet.

[Q2] The course-concept improved student abilities to conduct research using lab experiments in interdisciplinary global teams [Q4] while learning theoretical basics.

[Q2] Compared to the baseline scores gathered prior to the course, the mean post course student comfort level with five research related tasks increased radically at SU and at GU. Likert scale (post course), 1-6; Not comfortable (1) to Very comfortable (6); SU (Pre 3.7 – Post 5.3 = Gain 1.6) and GU (Pre 2.9 – Post 4.3 = Gain 1.4).
How did the RUN course meet student expectations?

- The course gave me the freedom to choose a topic of my liking and provided me with all the resources to conduct a rigorous investigation.

- It was a fun, exciting, and intriguing course covering a variety of disciplines. I thought the project really made the students do some serious planning and execution of fun, real-world stuff.

- Overall, very well. I enjoyed the research project and how the project was much more the focus than the lectures.

- However the interactions between Stanford and GU did not seem as well integrated into the course as I had expected.
### ResearchAble impact — before & after the RUN III course (2008)

"Please rank your comfort level with these research related tasks"

<table>
<thead>
<tr>
<th>Research abilities and skills</th>
<th>Pre (SU) n=25</th>
<th>Post (SU) n=21</th>
<th>Gain (SU)</th>
<th>Pre (GU) n=32</th>
<th>Post (GU) n=32</th>
<th>Gain (GU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing on a research topic</td>
<td>4.0 (0.68)</td>
<td>5.5 (0.6)</td>
<td>1.5</td>
<td>3.1 (0.8)</td>
<td>4.6 (0.92)</td>
<td>1.5</td>
</tr>
<tr>
<td>Conducting a literature review</td>
<td>4.0 (0.73)</td>
<td>5.6 (0.68)</td>
<td>1.6</td>
<td>3.2 (0.88)</td>
<td>4.7 (0.91)</td>
<td>1.5</td>
</tr>
<tr>
<td>Developing a hypothesis</td>
<td>3.8 (1.0)</td>
<td>5.7 (0.46)</td>
<td>1.9</td>
<td>3.0 (0.87)</td>
<td>4.6 (1.11)</td>
<td>1.6</td>
</tr>
<tr>
<td>Designing an experiment</td>
<td>3.5 (0.71)</td>
<td>5.3 (0.78)</td>
<td>1.8</td>
<td>2.5 (1.0)</td>
<td>4.2 (1.01)</td>
<td>1.7</td>
</tr>
<tr>
<td>Conducting the experiment †</td>
<td>——</td>
<td>5.3 (0.85)</td>
<td>——</td>
<td>——</td>
<td>4.5 (1.08)</td>
<td>——</td>
</tr>
<tr>
<td>Learning to use/interpret data †</td>
<td>——</td>
<td>5.0 (0.84)</td>
<td>——</td>
<td>——</td>
<td>4.0 (1.36)</td>
<td>——</td>
</tr>
<tr>
<td>Analyzing experimental results</td>
<td>3.5 (1.08)</td>
<td>4.9 (0.91)</td>
<td>1.4</td>
<td>2.9 (0.76)</td>
<td>4.1 (1.3)</td>
<td>1.2</td>
</tr>
<tr>
<td>Presenting your experiment †</td>
<td>——</td>
<td>5.3 (0.78)</td>
<td>——</td>
<td>——</td>
<td>4.3 (1.18)</td>
<td>——</td>
</tr>
<tr>
<td>Total average values</td>
<td>3.7 (1.24)</td>
<td>5.3 (0.78)</td>
<td>1.6</td>
<td>2.9 (1.25)</td>
<td>4.3 (1.32)</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Likert scale = 1 (not comfortable) to 6 (very comfortable)
# ResearchAble impact – after the RUN III course (2008)

## Course contribution & impact on research-oriented skills & abilities

<table>
<thead>
<tr>
<th>Research abilities and skills</th>
<th>n=subjects (SU)</th>
<th>Mean values (SU)</th>
<th>SD (SU)</th>
<th>n=subjects (GU)</th>
<th>Mean values (GU)</th>
<th>SD (GU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing on a research topic</td>
<td>21</td>
<td>4.90</td>
<td>1.41</td>
<td>31</td>
<td>3.74</td>
<td>1.41</td>
</tr>
<tr>
<td>Conducting a literature review</td>
<td>21</td>
<td>4.33</td>
<td>1.56</td>
<td>32</td>
<td>3.38</td>
<td>1.43</td>
</tr>
<tr>
<td>Developing a hypothesis</td>
<td>21</td>
<td>4.52</td>
<td>1.36</td>
<td>31</td>
<td>3.81</td>
<td>1.19</td>
</tr>
<tr>
<td>Designing an experiment</td>
<td>20</td>
<td>5.35</td>
<td>0.99</td>
<td>31</td>
<td>4.23</td>
<td>1.06</td>
</tr>
<tr>
<td>Conducting the experiment</td>
<td>20</td>
<td>5.70</td>
<td>0.57</td>
<td>30</td>
<td>4.53</td>
<td>1.17</td>
</tr>
<tr>
<td>Learning how to use/interpret data</td>
<td>21</td>
<td>5.48</td>
<td>0.93</td>
<td>31</td>
<td>4.16</td>
<td>1.21</td>
</tr>
<tr>
<td>Analyzing experimental results</td>
<td>20</td>
<td>5.25</td>
<td>0.85</td>
<td>31</td>
<td>3.87</td>
<td>1.09</td>
</tr>
<tr>
<td>Presenting your experiment</td>
<td>21</td>
<td>4.95</td>
<td>1.36</td>
<td>31</td>
<td>3.52</td>
<td>1.26</td>
</tr>
<tr>
<td>Total average values</td>
<td>20.6</td>
<td>5.05</td>
<td>1.24</td>
<td>31</td>
<td>3.90</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Likert scale from (1) Did not contribute at all to (6) Contributed a lot.
Discussion

Limitations (most important findings):

[1] The RUN-concept was fully tested twice, [2] a relatively small participant sample and in biomechanics, [3] student samples were not fully comparable (academic background), [4] difficult to compare objective learning impact (“facts”) in biomechanics compared to more traditional course models, [5] different academic cultures and views on pedagogy, and [7] a large time zone difference. [8] The ICT-battery and the methods were new to students and most staff. [9] RUN was demanding for students & staff and [10] external funding is necessary.

Strengths:

Outlook and impact

- Existing data will be used to evaluate the RUN-model more in detail [Q1-4] in upcoming papers (2016-17) including inference statistics.

- We intend to implement the course model in other human biology courses at GU.

- We hope to be able to focus on sustainability at the basic level, but also to evaluate the RUN-concept at the advanced level in human biology courses at GU.

- A long-term vision is to further validate and export this generic curriculum to other levels and areas of higher education in an expanded network of remote universities.
Efficacy goals

Hopefully, our generic educational model will provide:

- Shared access to knowledge among participating universities
- Lowered course costs for programs by sharing
- Increased students’ awareness of ICT possibilities
- Increased cultural exchange and understanding
- Interdisciplinary work and research preparation

- Launch and process faculty research (aid of course budgets)
- Enhanced distance collaboration and international student mobility
- Implementation of our model to other programs & courses at GU & other universities, by further scientific validation of our tools & methods
- A testbed platform for sports research & innovation (benefit sports performance, industry & injury rehab & prevention) & new ICT & multimedia
“What is a good course design for sophisticated pedagogy supporting the building of research skills – How should they be designed and conducted?”

Limitations, strengths and for whom (fields and academic levels)

Thanks