



Curriculum Mapping via Student Crowdsourcing

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Background



- ❑ Medical Education Curriculum Mapping
- ❑ Linkages of educational content
 - ❑ Varying levels of event granularity (e.g., course, session, site)
 - ❑ Multiple standards (e.g., CanMeds, MCC, Mesh Terms)
- ❑ Outcome: a searchable educational resource for curriculum planning, content audits and student learning

Issues



- ❑ Expert-centric mapping solutions are resource intensive
- ❑ Meta-tags are difficult to understand and accumulate through voluntary basis
- ❑ Mapping exercises are time-intensive

Purpose



- ❑ The purpose of our study is to develop an alternative method for collecting curriculum mapping information
 - ❑ Time constraint
 - ❑ Large amount information
 - ❑ Complex data structures

Proposed Method



- ❑ Crowdsourcing – a method of obtaining human input for a given task by distributing that task over a large population (Blanco et al., 2011)
- ❑ Popular method for relevance evaluation, search engine optimization, and other comparison tasks.
- ❑ Reconceptualising mapping into different perspectives

A screenshot of the Amazon Mechanical Turk interface. The header shows "amazonmechanicalturk Artificial Intelligence" and navigation links for "Your Account", "HITS", and "Qualifications". It indicates "238,311 HITS available now". A search bar contains "HITS" and a filter for "that pay at least \$ 0.00". Below, a table lists "All HITS" with columns for Requester, HIT Expiration Date, Time Allotted, Reward, and HITS Available. Three tasks are visible: "Data Clean up: Names of people", "Inv. B. 2", and "Search: Keywords on Google.com (US)".

A screenshot of the InnoCentive website. The header includes "INNOCENTIVE" and navigation links for "My IC", "Products/Services", "For Solvers", "Challenge Center", "Resources", and "About Us". A search bar is present. The main content area shows "InnoCentive Challenges" with filters for "All Challenge Sources" (Premium, Grand Challenge) and "All Challenge Disciplines" (Business & Entrepreneurship, Chemistry, Computer/Info. Technology, Engineering/Design, Food/Agriculture). A table of challenges is displayed, with one challenge highlighted: "Enabling Local Government to Communicate Compelling Messages" with a reward of \$7,500 USD and 103 solvers.



Proposed Method

- ❑ Ten medical students were recruited in the form of a summer studentship to map portion of the sessions delivered in the first year
- ❑ Mapping of three taxonomies are demonstrated
- ❑ Students were assigned mapping tasks on a week to week basis depending on their progress

Medical Council of Canada

CanMeds Roles

Program Level Objectives

Course Level Objectives

Session Level Objectives

Special Interest Objectives

Crowdsourcing



UME Program

- Provide blocks of mapping tasks



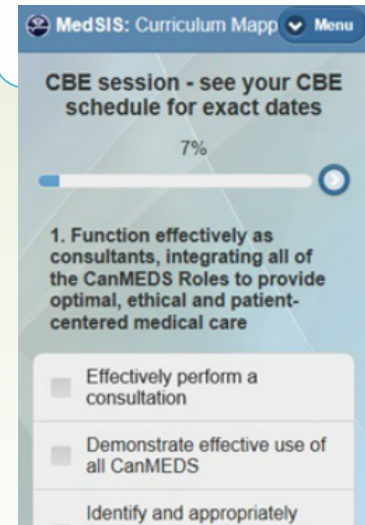
Software Interface

- Mapping and scheduling Interface



Student

- Student map specific assignments



Results



- ❑ Mapping outcomes
- ❑ Rater reliability results



Mapping Progress

- ❑ 12 weeks of mapping

- ❑ Year 1 Mapping Requirements
 - ❑ Lectures (333 lecture hours)
 - ❑ Discovery Learning (PBL) Events (112 unique hours)
 - 4 raters
 - ❑ Small Group Activities and Labs (35 unique events)
 - 3 raters

Year 1 Results



| | |
|--------------------------|-------|
| Average Tags Per Session | 14.90 |
| Total Tags Collected | 9821 |

| Hierarchy Coverage | Count | Percent |
|-----------------------------|-------|---------|
| MCC | 196 | 84% |
| CanMeds | 132 | 86% |
| Special Interest Objectives | 28 | 82% |

Popular Topics Y1



MCC

| |
|---|
| Dyspnea |
| Diabetes mellitus |
| Chest pain |
| Cough |
| Hypertension |
| Weight loss / eating disorders / anorexia |
| Congenital anomalies, dysmorphic features |
| Vascular injury |
| Bone or joint injury |
| Pain |

CANMEDS

| |
|--|
| Demonstrate effective clinical problem solving and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans |
| For the purposes of prevention and health promotion, diagnosis and or management, elicit a history that is relevant, concise and accurate to context and preferences |
| Pose an appropriate learning question |
| Demonstrate effective, appropriate, and timely performance of diagnostic procedures relevant |
| Use preventive and therapeutic interventions effectively |
| Demonstrate effective, appropriate, and timely performance of therapeutic procedures relevant |
| Encourage discussion, questions, and interaction in the encounter |
| Demonstrate effective, appropriate, and timely application of preventive and therapeutic interventions relevant to the physician's practice |
| Establish and maintain clinical knowledge, skills and attitudes appropriate to their practice |
| For the purposes of prevention and health promotion, diagnosis and/or management, perform a focused physical examination that is relevant and accurate |

Not Covered Y1



MCC

| |
|--|
| Fecal incontinence |
| Incontinence, urine, pediatric / enuresis |
| Neonatal jaundice |
| Lump / mass (musculoskeletal) |
| Premenstrual syndrome (pms) |
| Delirium |
| Dementia |
| Non-reassuring fetal status (fetal distress) |
| Pap smear screening |
| Hypotonic infant |
| Pelvic mass |
| Preterm labour |
| Uterine prolapse, pelvic relaxation |
| Pupil abnormalities |
| Malignant hypertension |
| Hypertensive disorders of pregnancy |
| Scrotal mass |
| Childhood communicable diseases |

CANMEDS

| |
|--|
| Identify and appropriately respond to relevant ethical issues |
| Recognize and respond to the ethical dimensions in medical decision-making |
| Demonstrate medical expertise in providing expert legal testimony or advising governments, as needed |
| Participate effectively in interprofessional team meetings |
| Describe the principles of team dynamics |
| Work with other professionals to prevent conflicts |
| Employ collaborative negotiation to resolve conflicts |
| Chair or participate effectively in committees and meetings |
| Describe the practice communities that they serve |
| Appreciate the possibility of competing interests between the communities served and other populations |
| Describe an approach to implementing a change in a determinant of health of the populations they serve |
| Describe the principles and strategies for implementing a personal knowledge management system |
| Conduct a personal practice audit |
| Appropriately manage conflicts of interest |

Coverage By Roles and Course



| Role | 511 | 512 | 513 | 514 | 515 | 516 | Grand Total |
|-----------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| Medical Expert | Yellow | Green | Light Green | Green | Yellow | Red | Green |
| Communicator | Yellow | Light Yellow | Light Yellow | Light Yellow | Red | Red | Yellow |
| Collaborator | Red | Yellow | Orange | Red | Light Green | Light Green | Orange |
| Manager | Yellow | Orange | Orange | Orange | Orange | Light Green | Red |
| Health Advocate | Yellow | Yellow | Yellow | Light Yellow | Red | Light Green | Yellow |
| Scholar | Light Yellow | Green | Light Yellow | Light Green | Yellow | Red | Light Green |
| Professional | Yellow | Red | Red | Orange | Orange | White | Red |

Undergraduate Medical Education

Mapping by Lecture Start Time



| Lecture Start Time | Number of Lectures | Tags | Lecture/Tag Ratio |
|--------------------|--------------------|------|-------------------|
| 8:00 | 42 | 284 | 6.76 |
| 9:00 | 35 | 494 | 14.11 |
| 10:00 | 94 | 1155 | 12.29 |
| 11:00 | 73 | 791 | 10.84 |
| 13:00 | 55 | 494 | 8.98 |
| 14:00 | 25 | 218 | 8.72 |



Rater Reliability Analysis

- ❑ Discovery Learning (PBL)
 - ❑ 23 activities (112 sessions)
 - ❑ 4 student raters
- ❑ Methods
 - ❑ Fleiss Kappa
 - ❑ Percent Agreement

Results



| Discovery Learning(PBL) | Kappa | Agreement |
|--------------------------------|--------------|------------------|
| Mean | 0.56 | 88% |
| SD | 0.12 | 2.81% |
| Min | 0.11 | 84% |
| Max | 0.69 | 94% |

4 raters, 23 events

| By Taxonomy | Kappa | Agreement |
|-----------------------------|--------------|------------------|
| MCC | 0.59 | 93% |
| CanMeds Roles | 0.53 | 76% |
| Special Interest Objectives | 0.62 | 90% |

Results



| By CanMED Roles | Kappa | Agreement |
|------------------------|--------------|------------------|
| Medical Expert | 0.48 | 59% |
| Communicator | 0.39 | 57% |
| Collaborator | 0.52 | 79% |
| Manager | 0.22 | 91% |
| Health Advocate | 0.65 | 87% |
| Scholar | 0.60 | 82% |
| Professional | 0.47 | 97% |

Students map consistently in well-defined specifications or roles

Agreement drops as roles become more broad

Summary



- ❑ Student crowdsourcing is an alternative method for collecting large amount of curriculum relevant data in a short period of time
- ❑ Results from this study have provided some evidence for inter-rater reliability from the student perspective
- ❑ As medical education curriculum becomes more coordinated, student mapping of the curriculum can offer an efficient source of validation on the delivery of educational content

Current Directions



- ❑ Evaluating remap consistency across year
- ❑ Tracking differences across planned and unplanned curriculum change
- ❑ Evaluating consistency between student mapped and instructor mapped tags

Thank You!



Questions:

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