Curriculum Mapping Using an Artificial Intelligence Approach

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**Background**

Curriculum maps provide medical schools with a clear overview to guide curriculum evaluation and management. Mapping fosters accountability, quality, and transparency of the educational process, all of which are required for accreditation. There are many challenges to curriculum mapping when addressing accreditation, such as the recent updates to the AOA Commission on Osteopathic College Accreditation (COCA). Mapping must be an ongoing process with new maps being generated whenever there are changes in the curriculum, resulting in a potentially time-consuming and costly process. The goal of this pilot project was to explore methods to reduce the negative aspects of curriculum mapping while maximizing the quality of the map. This project utilized Mapradish artificial intelligence (AI) software (Sarcix Inc., Riverside, CA) and served as the first osteopathic curriculum to be assessed using this approach.

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**Objectives**

- Leverage technological algorithms in the evolution of a standard curriculum map.
- Enhance curriculum mapping by linking to multiple nationally recognized competency outcome standards including COMLEX Level 1-2, USMLE Step 1, AAO Core Competencies, AACOM EPAs and MeSH terms.
- Identify the accuracy and completeness of the map in representing curricular content associated with different learning activities.
- Explore the application of the map as a blueprint for quality improvement of curricular integration and content.

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**Methods**

This curriculum project used a non-experimental design engaging qualitative inquiry and using the following activities:
- Creation of a directory of curricular events organized by academic semesters (1-4), resulting in a total of 923 curriculum events;
- Identification and collection of all text-based curriculum materials from the 2017-2018 academic year, including course syllabi (n=29), lecture PowerPoints, lecture study guides, and resource materials (Fair Use practices were followed for all copyrighted materials);
- Organization of curriculum materials into the curriculum directory;
- Identification and benchmark utilization of appropriate published competency standards, including AAOOM Student Osteopathic Core Competencies, NBME USMLE Step 1 Blueprint, and AAOOM Core Entrutable Professional Activities (EPAs);
- AI-based statistical analysis and reporting of curriculum data using a proprietary system (Mapradish). Additionally, MeSH terms were utilized in mapping data (not presented).

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**Results**

**Figure 1:** Longitudinal Mapradish representation of first- and second-year curriculum. Curriculum events were mapped against the AI AAOOM Osteopathic Core Competencies for Medical Students, or the AI AAOM Core Entrutable Professional Activities. Competencies/EPAs not supported by the AI algorithm were manually mapped. **AALOM** competencies and curriculum events in clinical courses are strongly correlated. **AALOM** competencies are broadly represented in the curriculum. The correlation between competencies and curriculum events are defined as "hot" on a color gradient (dark blue [0% match] to dark red [100% match]).

**Figure 2:** Correlation of **AALOM** Competencies to clinical courses. A more detailed view of Semester 1 curriculum events mapped against the AI AAOOM Osteopathic Core Competencies for Medical Students, or the AI AAOM Core Entrutable Professional Activities. Competencies/EPAs not supported by the AI algorithm were manually mapped. The correlation between competencies and curriculum events are defined as "hot" on a color gradient (dark blue [0% match] to dark red [100% match]).

**Discussion/Conclusions**

Initial results demonstrate the feasibility of implementing AI principles in osteopathic curriculum mapping. Intermittent validity checks demonstrated both intended and unintended correlations with osteopathic competency standards.

Next steps include:
- Use of faculty development to engage faculty in curricular analysis and quality improvement;
- Completion of mapping to the NBOME COMLEX-USA Level 1 Blueprint.

Lessons learned include:
- Image-intensive materials are not adequately represented in the map, potentially leading to inaccurate conclusions about curricular coverage of particular topics (e.g., Clinical Anatomy, Systemic Pathology, and Histology);
- Earlier involvement of key faculty in curriculum mapping planning stages would more adequately address faculty concerns surrounding the process and facilitate ongoing curricular integration.