

Journal Database to Strengthen Vertical Integration between Basic Sciences and Clinical Medicine

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Background

Basic sciences are a core component of virtually all undergraduate programmes for healthcare professionals.

Academic journals are valuable sources of scholarly information. Potential benefits of applying journal-based teaching materials in education of basic sciences:

Deepen students' understanding of course content / Move students beyond memorisation-driven learning / Instill a lasting curiosity

Journal articles that illustrate the clinical relevance of biomedical sciences are expected to facilitate vertical integration, an educational approach in which the time spent on basic sciences gradually decreases as the amount of clinical practice gradually increases.

- Kassirer JP (1992) Learning medicine. Too many books, too few journals. *N Engl J Med* 326:1427-1428.
- Beresford WA (1997) Journal articles for first-year students. *Acad Med* 72:934-935.
- Wijnen-Meijer M *et al.* (2020) Vertical integration in medical education: the broader perspective. *BMC Med Educ* 20:509.



Problem

Too many journal articles

As the medical literature is huge, it is very **time-consuming** for teachers to identify the **most appropriate and relevant journal articles** with meaningful content for enriching teaching materials.

Online databases only provide basic searching function mainly based on keywords without allowing the identification of **journal articles that best fit the teaching purpose** of illustrating the connection between **basic sciences & clinical medicine** related to **specific teaching topics**.

Solution

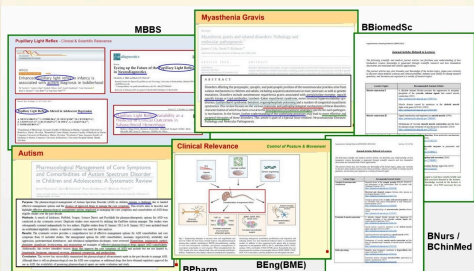
To develop a database of suitable journal articles

Screening & classification of journal articles were performed manually to achieve a high level of specificity. Results generated from multiple searches were organised.

Journal articles that provide representative information with a good balance between **biomedical sciences & clinical relevance** from research studies with significant value were **selected**.

Journal articles that focus too much on technical aspects, purely report clinical cases, or discuss too many issues rather than specific teaching topics were **excluded**.

Teaching Materials



Student Learning

Journal-based teaching materials enhance students' motivation to learn biomedical sciences.

Biomedical Sciences Courses (256 students) in 6 Programmes: MBBS / BNurs / BPharm / BChinMed / BBiomedSc / BEng(BME)

After learning with journal-based materials:

- ↑ Overall learning motivation scores (statistically significant for 5 programmes)
- ↑ Scores across 5 domains of motivation (statistically significant for all large classes)

- **Self-efficacy** - believe more strongly in the ability to perform well in biomedical sciences
- **Active learning strategies** - take a more active role in constructing knowledge
- **Science learning value** - perceive better the importance of learning biomedical sciences
- **Achievement goal** - feel more satisfied with achievement in learning biomedical sciences
- **Learning environment stimulation** - respond more towards stimulations in learning environment

Questionnaire designed to measure students' motivation towards science learning (SMTSL)
Tuan HL *et al.* (2005) *Int J Sci Educ* 27:639-654.

1. **Clearer ideas about clinical applications of biomedical knowledge.** Journal articles help students appreciate the contribution of **scientific research** to the development of therapeutic strategies.
2. **Clearer concepts of scientific research process.** Journal articles present comprehensive information of research work, hence reinforcing student learning about the **steps of research process** and **how to report scientific research findings**.
3. **Stronger ability in generating research questions.** Journal articles describe in detail how researchers come up with clinically-related scientific research questions & find out the answers. Students can learn to **raise meaningful research questions** through deeper thinking & reasoning.
4. **Exploration of research interests.** Journal articles increase students' exposure to a variety of research topics, which help them to **identify their favourite research areas** & better prepare for pursuing research projects in the future.

Journal Database

6,000 journal articles in 10 Excel files (10 biological systems) covering major topics in curricula of programmes offered by HKUMed

Title of Article	Journal	Link
Structure of the Renal System		
Renal Blood Flow		
Urine Formation		
McTurnion		
Acid-Base Balance		
Electrolyte		

- Nervous System
- Endocrine System
- Cardiovascular System
- Respiratory System
- Renal System
- Digestive System
- Muscular System
- Skeletal System
- Reproductive System
- Immune System

Journal articles help students understand:

- How is biomedical science knowledge generated through scientific research?
- How are biomedical discoveries translated into clinical applications?



Vertical integration fosters increasing levels of clinical responsibility within undergraduate training & supports students to develop abilities in solving medical problems, managing unfamiliar situations & prioritising tasks.

Teaching

1. **Promote undergraduate research** by using journal articles to prepare students for research projects
2. **Strengthen teaching-research nexus** by engaging students in research discussions & developing their research skills to enhance the interplay between teaching & research roles
3. **Encourage inquiry-based learning** by guiding students to actively discover knowledge as supported by journal articles that **stimulate questions** driven by students' interest, hence providing opportunities to **engage students** in knowledge creation

Efficiently identify suitable journal articles with content that matches teaching topics

Prepare teaching materials that facilitates vertical integration between basic sciences & clinical medicine

Create a smooth transition during undergraduate studies for students