

Data-Driven Learning Assessment Using Question Tagging and Longitudinal Reports in ExamSoft

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Learning objectives

- To understand the rationales of question tagging.
- To learn the dental school's question tagging guidelines.
- To understand the value of longitudinal reports.
- To implement question tagging in other university programs.

Rationales: Externally

"Assessment of student performance should measure not only retention of factual knowledge, but also the development of skills, behaviors, and attitudes needed for subsequent education and practice. The education program should assess problem solving, clinical reasoning, professionalism, ethical decision-making, and communication skills."

--Commission on Dental Accreditation (CODA) standard

(Standard 2-5, Intent, p. 24)

Rationales: Internally

- How often are learning objectives/course outcomes taught and assessed?
- How well are learning objectives/course outcomes met?
- What are students' areas of strength and weakness?
- How can instructional and assessment practice be adjusted?

Dental school's question tagging guidelines

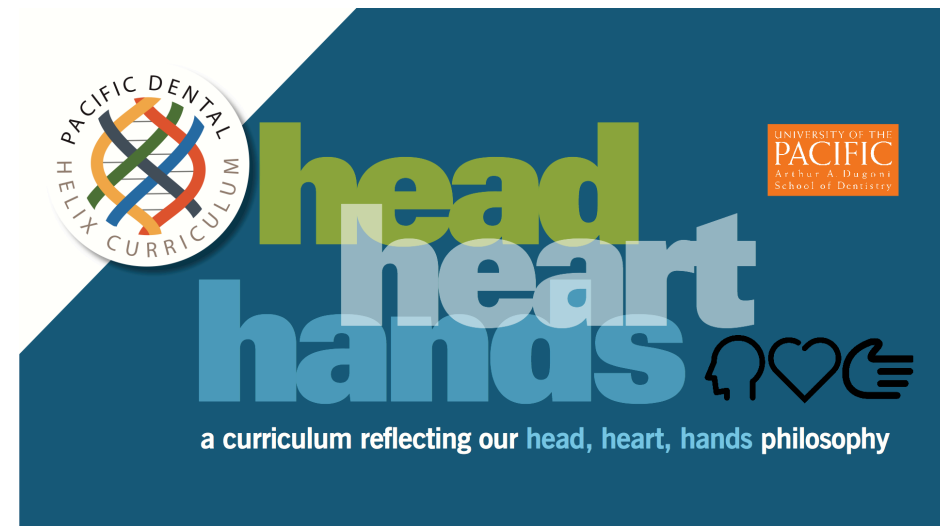
- All mid-term and final exams are administered on ExamSoft.
- Tagging: A taxonomy to classify exam questions.
- Starting from Summer Quarter 2019, all questions on ExamSoft should be tagged to two **required** categories:
 - Content areas/Disciplines
 - School competencies

Content areas/Disciplines

- D1- Biomedical sciences
 - D1a- Anatomy
 - D1b- Biochemistry/Nutrition
 - D1c- Microbiology
 - D1d- Genetics / Molecular Biology
 - D1e- Histology / Cell Biology
 - D1f- Immunology
 - D1g- Pharmacology
 - D1h- Physiology / Neuroscience
- D2- Diagnostic sciences
 - D2a- General pathology
 - D2b- Oral pathology
 - D2c- ODTP
 - D2d- Radiology
 - D2e- Geriatric dentistry
- D3- Endodontics
- D4- Orthodontics
- D5- Oral surgery
- D6- Pediatrics
- D7- Periodontics
- D8- Restorative dentistry
 - D8a- Cariology/Caries risk assessment
 - D8b- Dental anatomy and morphology
 - D8c- Dental material
 - D8d- Digital dentistry
 - D8e- Fixed prosthodontics
 - D8f - Implant dentistry
 - D8g- Occlusion
 - D8h- Operative dentistry
 - D8i- Removable prosthodontics
- D9- Behavioral Skills
- D10- EBD/ Epidemiology/Applied research methodology
- D11- Statistics/Informatics
- D12- Community Health
- D13- Preventive Medicine and Dentistry
- D14- Pain management/ Local anesthesia

School competencies

- 28 competency statements
- School's 'head, heart and hands' philosophy
 - Head: Integration of biomedical and clinical knowledge.
 - Heart: Professionalism, ethical behavior, empathy, and communication skills.
 - Hands: Clinical skills.



Longitudinal analysis report

- Tracking curriculum, course, and student performance **over time**.
- Students' performance in each category across **multiple** exams over a selected period of time.

Redesigned Doctor of Dental Surgery (DDS) curriculum

- Cohort: DDS 2022
- Exams : All exams across all courses
- Time frame: First academic year (2019-2020)

Content area	# Exams	# Items	Class Average
D1-Biomedical science			
D1a-Anatomy	19	364	80.99%
D1b-Biochemistry	8	72	82.32%
D1c-Cell biology	3	16	87.00%
D1d-Molecular biology	1	7	91.79%
D1e-Microbiology	6	25	86.21%
D1f-Genetics	6	28	85.75%
D1g-Histology	10	140	76.71%
D1h-Immunology	4	18	90.87%
D1j-Nutrition	2	21	89.76%
D1k-Pharmacology	9	66	77.79%
D1l-Physiology	11	219	80.15%
D2-Diagnostic sciences			
D2a-General pathology	6	183	82.59%
D2b-Oral pathology	7	34	84.46%
D2c-ODTP	3	11	91.71%
D2d-Radiology	2	52	85.28%

Content area	# Exams	# Items	Class Average
D3-Endodontics	4	93	70.50%
D5-Oral surgery	7	25	83.59%
D6-Pediatrics	1	1	93.01%
D7-Periodontics	3	123	84.50%
D8-Restorative dentistry			
D8a-Cariology/Caries risk assessment	4	16	82.43%
D8b-Dental anatomy and morphology	3	13	77.39%
D8c- Dental material	2	3	89.14%
D8d-Digital dentistry	1	2	90.85%
D8e-Fixed prosthodontics	12	97	75.35%
D8f-Implant dentistry	2	6	77.09%
D8g-Occlusion	6	30	81.41%
D8h-Operative dentistry	8	64	79.00%
D8i-Removable prosthodontics	1	1	88.28%
D9-Behavioral skills	2	32	81.94%
D10-EBD/Epidemiology/Applied research methodology	4	15	84.10%
D11-Statistics/Informatics	1	1	97.18%
D12-Community health	3	16	88.90%
D13-Preventive medicine and dentistry	4	41	82.86%

School Competency	# Exams	# Items	Class Average
S1-Integrate basic science and clinical science	29	718	82.13%
S2-Critical thinking; Use scientific method to evaluate evidence	24	598	78.92%
S3-Recognize manifestations of systemic disease and evaluate its impact on oral health	10	112	78.18%
S4-Evaluate impact of oral healthcare on systemic health	3	9	71.68%
S5-Apply principles of health promotion and disease prevention	4	15	92.36%
S6-Apply principles of bioethics	2	28	81.10%
S7- Apply principles of behavioral science	3	7	87.87%
S8-Build trust and rapport; show empathy	3	8	91.51%
S9-Manage oral health needs of different populations (geriatric / complex needs, etc.)	6	41	81.27%
S10- Perform diagnostic evaluations and risk assessment on patients at all life stages	4	29	85.09%
S11-Obtain, select, and interpret images and tests	4	59	81.56%
S12-Formulate treatment plans and prognoses	4	6	73.01%
S14-Follow infection control guidelines	2	53	82.43%

School Competency	# Exams	# Items	Class Average
S15--Preserve and restore hard and soft tissue	3	43	83.57%
S15c-Appropriate utilization of therapeutic and pharmacological agents	1	1	88.28%
S15f-Risk assessment, prevention and management of caries	1	2	87.59%
S15g-Restore and replace teeth	13	208	77.08%
S15h-Risk assessment, prevention, and management of periodontal disease	3	85	86.01%
S15i-Dental emergencies	3	21	80.80%
S15j-Pulpal therapy and endodontics	1	76	68.23%
S15k-Oral mucosal and osseous disorders	3	11	81.75%
S15l-Bony and soft tissue surgery	2	8	74.91%
S15n-Evaluate treatment outcomes, prognosis, and continuing care strategies	1	10	69.86%
S16-Recognize and manage medical emergencies	1	1	69.23%
S18-Practice and refer within scope of practice and in align with patient needs	1	2	88.46%
S20-Evaluate models of care; understand dentistry's role in larger health care system	2	14	80.02%
S22- Evaluate and implement modern dental technology	1	1	87.41%
S24-Behave professionally	1	4	91.55%
S25-Local, state and federal policies	1	10	77.45%
S26-Reflection, self-assessment, continuous learning	1	2	88.97%
S27-Demonstrate healthy coping and self care strategies	1	6	78.62%

Individual students

	D1a-Anatomy	D1b-Biochemistry	D1c-Cell biology	D1d-Molecular biology	D1e-Microbiology	D1f-Genetics	D1g-Histology
# Exams	19	8	3	1	6	6	10
# Items	364	72	16	7	25	28	140
Class Average	80.99%	82.32%	87.00%	91.79%	86.21%	85.75%	76.71%
Angela	74.07%	81.71%	83.33%	85.71%	73.08%	84.09%	70.10%
Alan	70.87%	74.80%	88.89%	100%	76.92%	68.18%	65.20%
Ben	87.81%	84.96%	100%	100%	88.46%	95.45%	85.98%
Bill	84.23%	93.09%	83.33%	100%	100%	86.36%	80.52%
Chris	82.29%	86.18%	100%	100%	88.46%	79.55%	83.39%
Calvin	89.42%	84.96%	77.78%	85.71%	88.46%	90.91%	83.11%
Daniel	92.30%	88.62%	100%	100%	96.15%	90.91%	91.33%
Devon	72.91%	79.67%	83.33%	71.43%	69.23%	79.55%	63.40%
Eric	71.90%	86.18%	94.44%	85.71%	80.77%	72.73%	66.61%
Jason	79.56%	74.39%	94.44%	100%	75%	85.71%	66.53%

Summary

Longitudinal reports can be used for different purposes.

- School administration: Accreditation; curriculum evaluation.
- Faculty: Inform teaching and assessment.
- Students: Improve learning.