

A Competency-Based Framework for Critical Appraisal in Dentistry: A National Educational Initiative...

*...and an open-access learning platform
for European dental education?*

JEAN-NOEL VERGNES

Full-Time Professor, DMD, PhD

Public health dentistry

Toulouse Health Faculty

Toulouse University Hospital

CERPOP Unit research - BIOETHICS



OLIVIER HAMEL

Full-Time Professor, DMD, PhD

Public health dentistry

Toulouse Health Faculty

Toulouse University Hospital

CERPOP Unit research - BIOETHICS

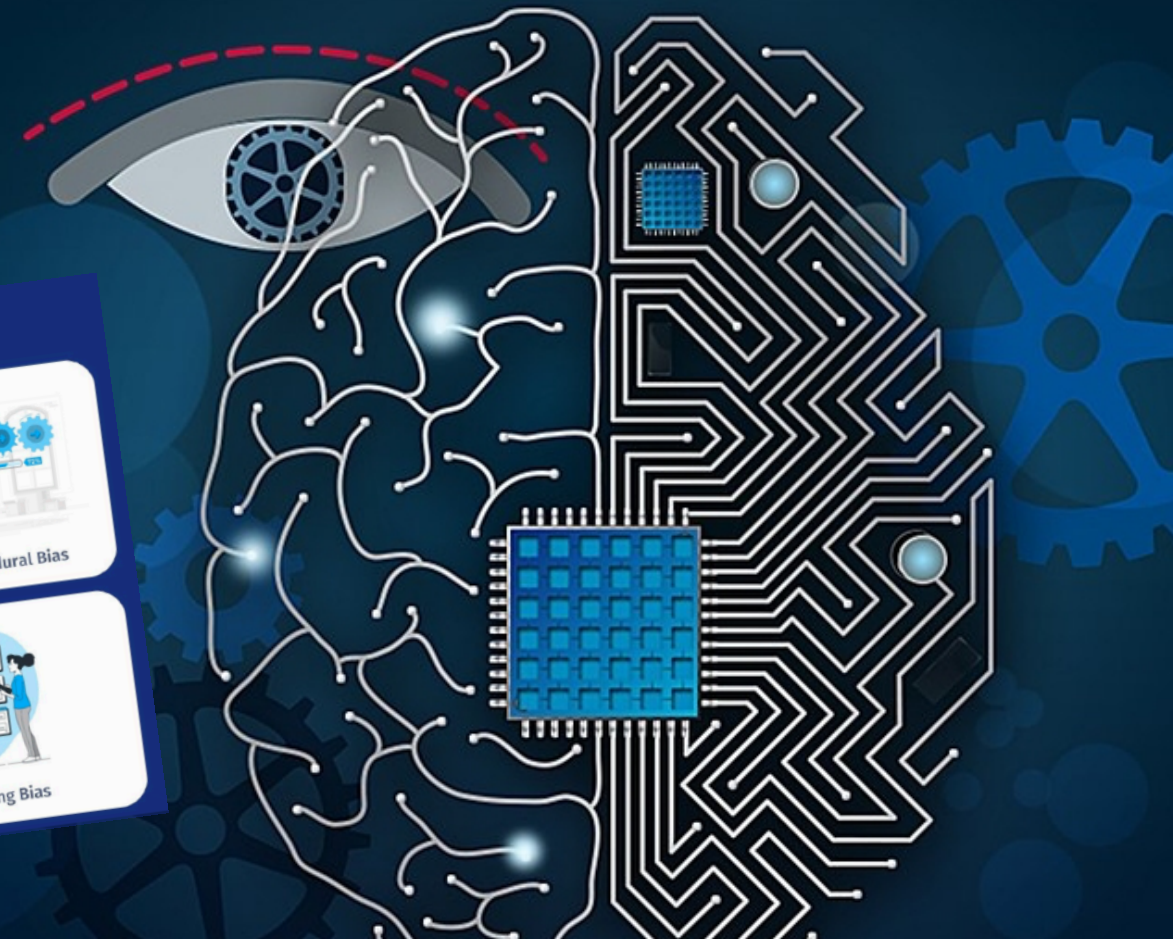


Why did we need to evolve?

Scientific literature in medicine / dentistry



Predatory Journals





Critical appraisal has always been important



ADVANCING EDUCATION
AND ORAL HEALTH

DOMAIN V – RESEARCH DOCUMENT



MAJOR COMPETENCE: 5.1: Research Design

Learning outcomes

A graduating dentist must be able to:

- 5.1.1 Formulate relevant research questions/hypotheses
- 5.1.2 Identify appropriate databases/sources of information
- 5.1.3 Formulate an effective and logical strategy for finding information
- 5.1.4 Explain the value of peer-review in quality assuring research
- 5.1.5 Appraise the various types of study design
- 5.1.6 Propose an appropriate study design to answer a particular research question
- 5.1.7 Explain the concept of a hierarchy of evidence
- 5.1.8 Explain the need for ethical review prior to carrying out research
- 5.1.9 Describe the main ethical considerations when planning research

MAJOR COMPETENCE: 5.2: Data Analysis and Interpretation

Learning outcomes:

A graduating dentist must be able to:

- 5.2.1 Explain the concept of critical appraisal
- 5.2.2 Critically appraise published research
- 5.2.3 Formulate appropriate conclusions from, and understand the limitations of, research data
- 5.2.4 Explain how conclusions from research might impact on clinical practice or patient care

MAJOR COMPETENCE: 5.3: Information Literacy

Learning Outcomes

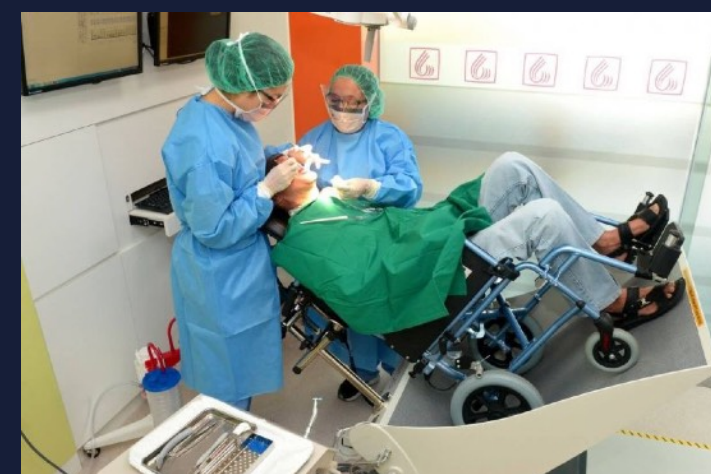
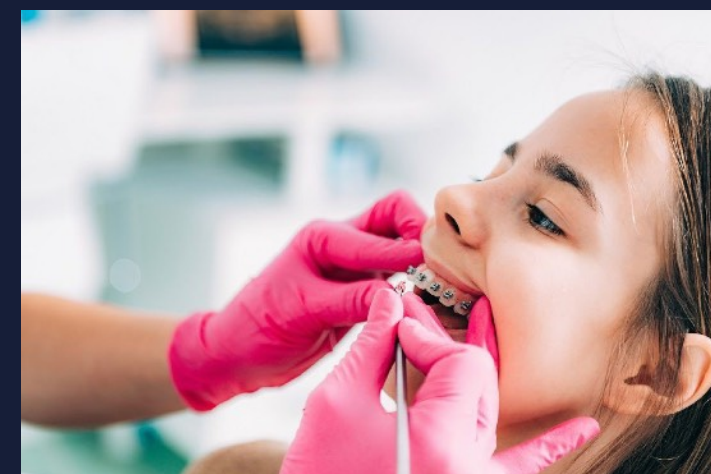
A graduating dentist must be able to:

- 5.3.1 Effectively summarise and present findings from original research or published papers
- 5.3.2 Correctly acknowledge sources of information or ideas

French context



**Clinical questions
+
Critical appraisal
of literature**





How did we build something new?

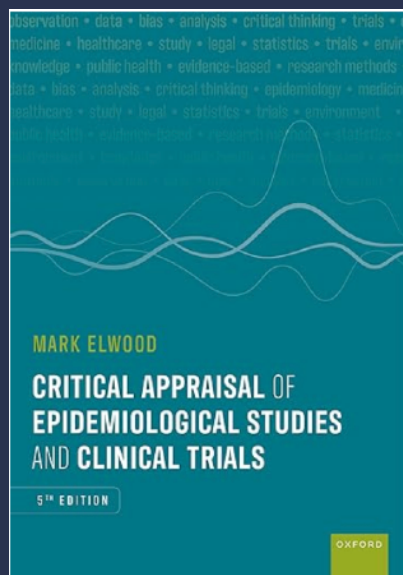


A different way to learn critical appraisal

From knowledge-driven learning ... to competency-driven learning

Traditional approach TOP - DOWN:

Research methods



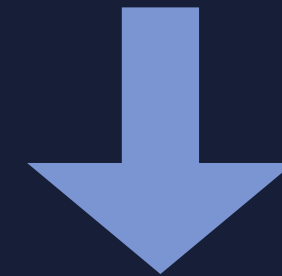
Critical appraisal exercises

Our approach BOTTOM - UP :

Real article excerpt

Explanation

[18]. Therefore, the main objective of our study was to comparatively evaluate the effect of various biomarkers in saliva on the oral health status of children with CKD at different stages of the disease, compared with healthy children. Another aim was to investigate the correlation between the ionic composition of saliva and plasma in children with CKD, in light of the growing interest in using saliva as a diagnostic material in recent years [14, 19]. The primary null hypothesis of the study was that there would be no significant difference in oral health and salivary parameters between children with CKD and healthy controls. The secondary null hypothesis was that there would be no significant correlation between serum and salivary biomarker levels.



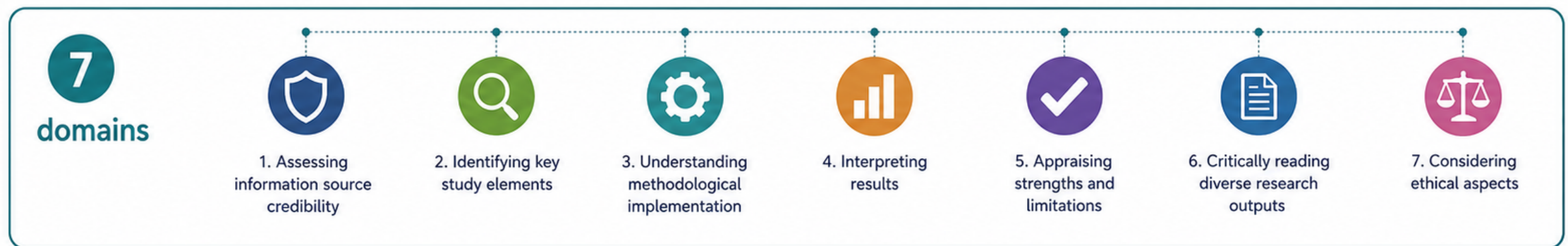
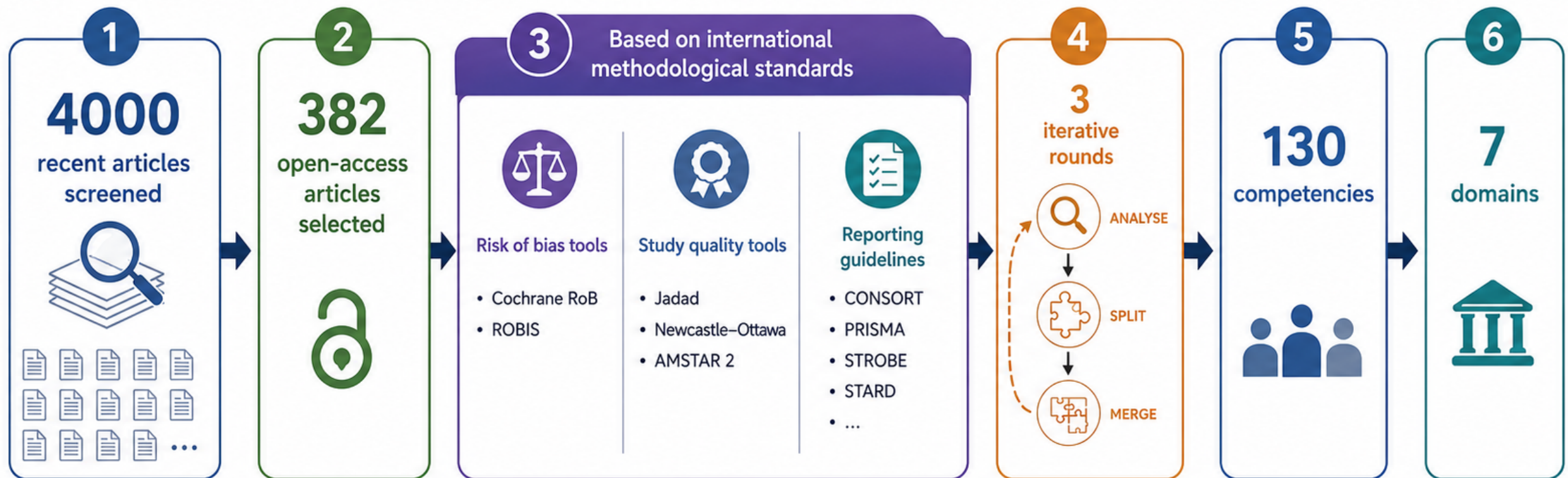
Related concepts

Repeat...

Autonomous critical reader

How did we build it?

How we built the framework



How did we build it?



○ ● ● What does one competency look like ?

Competency 21: Distinguish whether a study is interventional or observational

Core knowledge

As discussed in *Competency 12*, the fundamental distinction between an interventional study and an observational study lies in the role played by researchers in assigning the exposure or intervention. When researchers actively assign an exposure or intervention as part of the research process, the study is interventional, in other words, a clinical trial. Conversely, when researchers merely observe exposures or interventions that already exist within the study population, without assigning them themselves, the study is observational.

This distinction, described by Grimes and Schulz in their landmark article *The Lay of the Land*¹, places randomized and non-randomized clinical trials on the interventional side, and descriptive, cross-sectional, cohort, and case-control studies on the observational side. Thus, in most cases, the study design reported by the authors not only allows readers to distinguish between interventional and observational studies, but also to identify categories for which this distinction is not applicable, such as diagnostic or qualitative studies.

There are, however, situations in which the boundary is less clear and readers must carefully examine the Methods section to determine whether a study is interventional or observational. It

What does one competency look like ?

Critical appraisal of article excerpts

Article excerpts A

The following examples illustrate studies for which the observational or interventional nature is clearly identifiable. Although the terms interventional and observational are not always explicitly stated in articles, the study design itself usually indicates which category applies. By definition, a clinical trial is always interventional because it involves an intentional modification of participant management according to a predefined protocol. In contrast, descriptive, case-control, cohort, and cross-sectional studies are observational.

In the most common situations, the study design is specified in the article title, abstract, and/or Methods section. Moreover, in the vast majority of articles, the study design highlighted by the authors is consistent with the design described throughout the remainder of the paper.

- Randomized clinical trial (1) :

<https://jamanetwork.com/journals/jamapediatrics/fullarticle/2815515>

This clinical trial is clearly an interventional study, as indicated both by its title and by the description of a clearly defined intervention :

JAMA Pediatrics | **Original Investigation**

Noninferiority of Silver Diamine Fluoride vs Sealants for Reducing Dental Caries Prevalence and Incidence A Randomized Clinical Trial

INTERVENTIONS Participants were randomized at the school level to receive either a 38% concentration SDF solution or glass ionomer sealants and ART. Each participant also received fluoride varnish.

What does one competency look like ?

Multiple-choice questions

Badge Uness > Espace de test > test quizz > Banque de questions > Importer

Importer

Analyse des questions du fichier d'importation.

Importation de 10 questions depuis le fichier

1. Quelle est ou quelles sont la (les) proposition(s) exacte(s) ?
2. Quelle est ou quelles sont la (les) propriété(s) du Tungstène qui en font un métal de choix po
3. A propos du rayonnement "diffusé", quelle est ou quelles sont la (les) proposition(s) exacte



And, finally...

2

16. Repérer les critères de jugement principaux et secondaires, et évaluer leur cohérence avec les objectifs et les résultats

Ce qu'il faut savoir

Pour les chercheurs, le choix des critères de jugement (outcomes) est aussi stratégique et délicat que celui des objectifs (*cf Compétence 13*). Ces critères constituent la traduction opérationnelle des objectifs de l'étude : ce sont eux qui seront effectivement mesurés pour en évaluer les résultats. Ils doivent être choisis en amont, définis avec précision, et documentés dans le protocole. Ce choix influence directement l'utilité des conclusions tirées de l'étude.

Un critère de jugement principal (primary outcome) répond, normalement, à l'objectif principal. Il représente la mesure la plus importante sur laquelle reposera l'évaluation de l'efficacité d'une intervention ou la force d'une exposition. C'est avec des valeurs estimées du critère de jugement principal qu'est calculée la taille de l'échantillon. D'autres critères de jugement, dits secondaires, permettent d'explorer des dimensions complémentaires.

Parfois, les auteurs ont recours à des critères de jugement « composites », c'est-à-dire des critères regroupant plusieurs événements distincts au sein d'une même variable (par exemple la variable « échec implantaire » si elle est définie par la survenue d'au moins un des événements suivants : perte de l'implant, mobilité, douleur persistante, infection péri-implantaire ou perte osseuse excessive). Cette stratégie permet souvent d'augmenter le nombre d'événements observés et donc de diminuer la taille de l'effectif. Cependant, elle pose des questions importantes de pertinence et d'interprétation : les différents composants du critère peuvent ne pas avoir la même gravité clinique, la même fréquence, ni la même sensibilité à l'intervention. L'analyse critique doit repérer les critères de jugement composites, car ils peuvent fragiliser la validité interne et externe de l'étude.

Dans certains articles, le critère de jugement peut être désigné par des termes statistiques comme « dépendant variable », « réponse variable », ou encore « outcome variable ». Ces expressions renvoient à la variable dont on cherche à expliquer les variations en fonction d'une ou plusieurs autres variables. Elles relèvent du vocabulaire statistique.

2

16. Repérer les critères de jugement principaux et secondaires, et évaluer leur cohérence avec les objectifs et les résultats

Lecture critique d'extraits d'article B

<https://doi.org/10.1093/ejo/cjaf043>

Dans cet essai clinique randomisé en split mouth (*cf Compétence 26*), les auteurs comparent deux stratégies d'avulsion de la deuxième molaire déciduale chez des enfants présentant une agénésie congénitale des deuxième prémolaires mandibulaires (4) :

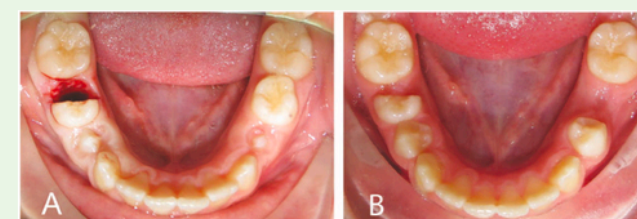
Hemisection versus conventional extraction as interceptive treatment in congenitally missing mandibular second premolars: a randomised controlled split-mouth trial

L'objectif de l'étude est clairement formulé, en fin d'introduction, en suivant le cadre PICO (*cf Compétence 9*) :

This study, designed using the PICO framework, aims to evaluate patients with congenital absence of mandibular second premolars (Population). It compares hemisection of the second primary mandibular molar (Intervention) to conventional extraction (Comparison). The primary outcome is space closure, while secondary outcomes include angulation of adjacent teeth, complications, and cost-effectiveness (Outcome), aiming to determine the most favourable treatment approach.

On y prend connaissance du critère de jugement principal (fermeture d'espace) et de multiples critères de jugement secondaires, dont le coût-efficacité des techniques comparées.

- Le critère de jugement principal est précisé dans la section "Materials and Methods". Il s'agit de « l'espace résiduel » (une mesure de distance interproximale qui peut concerner à la fois la distance entre deux dents et le cumul de ces distances entre plusieurs dents d'une héli-arcade).



Le paragraphe « Residual space » ainsi que le Tableau 1 donnent des informations sur la mesure de ce critère de jugement principal :

5



Towards a European collaboration

From France to Europe



And now?



Let's build it together.

This framework is open.

It can grow through partnerships and real-world implementations.



The most motivated among you can become change-makers and initiate the evolution of Critical Appraisal teaching in your own faculty.

ON-SITE IMPLEMENTATIONS

Bring the framework to your faculty.
We support you at every step.



Faculty workshops



Training for educators



Local adaptation



PARTNERSHIP AGREEMENTS

Formalize collaborations for sustainable impact.



With Schools of Public Health



Formal agreements and MoUs



Joint development and research



Be the initiator in your faculty.
Lead the change.



Start a conversation



Explore local implementation

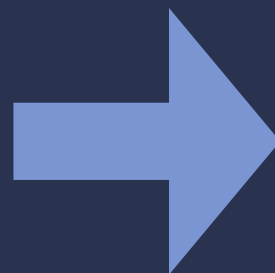


Become the champion of Critical Appraisal education



Together, we can transform Critical Appraisal education across Europe.

○ ● ● ADEE collaboration?



**Association for Dental
Education in Europe**
Advancing Education
and Oral Health

○ ● ● Academic publishers?



Thank you for your attention!



We'd be happy to answer any questions

Contact us:

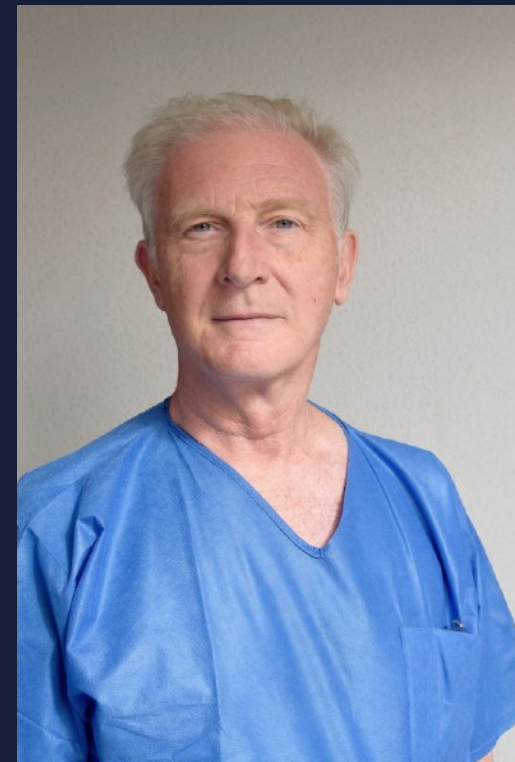


jn.vergnes@etik.com

JEAN-NOEL VERGNES
Full-Time Professor, DMD, PhD
Public health dentistry
Toulouse Health Faculty
Toulouse University Hospital
CERPOP Unit research
(BIOETHICS team)

OLIVIER HAMEL
Full-Time Professor, DMD, PhD
Public health dentistry
Toulouse Health Faculty
Toulouse University Hospital
CERPOP Unit research
(BIOETHICS team)

olivier.hamel@utoulouse.fr





Appendix



Content

Catégorie	n	% approximatif
Grandes maisons historiques	205	~54 %
Divers	65	~17 %
OA commercial moderne (MDPI/Frontiers/Hindawi)	64	~17 %
OA académique structuré (BMC/PLOS)	48	~13 %

Grandes maisons historiques (205)

Incluant principalement :

- Springer hors BMC
- Wiley
- Elsevier
- Sage
- Oxford
- BMJ
- Wolters Kluwer
- Karger
- AMA
- Cambridge
- etc.

Divers (65)

Incluant :

- SciELO
- petits éditeurs
- revues spécialisées
- journaux régionaux
- publications atypiques
- certains éditeurs universitaires