



CENTRO UNIVERSITÁRIO DE ANÁPOLIS - UNIEVANGÉLICA  
PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA

Denise Campos Amaral

**ANÁLISE DO DESEMPENHO DOS ESTUDANTES DO CURSO DE  
ODONTOLOGIA DO CENTRO UNIVERSITÁRIO DE ANÁPOLIS –  
UNIEVANGÉLICA EM TRÊS METODOLOGIAS DE AVALIAÇÃO  
UTILIZADAS NO PROCESSO ENSINO-APRENDIZAGEM**

Anápolis – GO

2020

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UNIEVANGÉLICA EM TRÊS METODOLOGIAS DE AVALIAÇÃO  
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Área de concentração: Clínica Odontológica.  
Orientação: Prof.<sup>a</sup> Dra. Carolina Cintra Gomes.  
Co-orientação: Prof.<sup>o</sup>Dr. Diogo Rodrigues Cruvinel

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## FOLHA DE APROVAÇÃO

### ANÁLISE DO DESEMPENHO DOS ESTUDANTES DO CURSO DE ODONTOLOGIA DO CENTRO UNIVERSITÁRIO DE ANÁPOLIS – UNIEVANGÉLICA EM TRÊS MÉTODOS AVALIATIVOS UTILIZADOS NO PROCESSO ENSINO-APRENDIZAGEM

**Denise Campos Amaral**

Dissertação apresentada ao Programa de Pós-graduação em Odontologia - PPGO do Centro Universitário de Anápolis - UniEVANGÉLICA como requisito parcial à obtenção do grau de MESTRE.

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Prof. Dra. Gabriella Lopes de Rezende Barbosa

## DEDICATÓRIA

A um sentimento chamado amor que é paciente, benigno, nobre e verdadeiro. Que nos transforma em pessoas melhores e nos faz acreditar em um mundo mais justo.

## **AGRADECIMENTOS**

Ao Criador do universo que me permite ser grata em todos os momentos da minha vida.

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## EPÍGRAFE

"Tudo vale a pena quando a alma não é pequena."

Fernando Pessoa

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## LISTA DE ABREVIATURAS E SIGLAS

Comitê de Ética em Pesquisa.....	CEP
Exame Clínico Objetivo Estruturado..... ( <i>Objective Structured Clinical Exam</i> )	OSCE
Learning Verifications.....	L. A.
Núcleo de Apoio Psicopedagógico ao Docente e Discente.....	NAPED
Verificação de Aprendizagem.....	V. A.
Termos de Livre Consentimento e Esclarecido.....	TLCE

## **RESUMO**

O objetivo dessa pesquisa foi analisar se os resultados obtidos por 179 estudantes em três metodologias de avaliação (teórica, prática clínica e Exame Clínico Objetivo Estruturado - OSCE) empregadas nas disciplinas de clínicas integradas do Curso de Odontologia do Centro Universitário de Anápolis – UniEVANGÉLICA apresentam similaridade, bem como analisar a evolução do desempenho de 33 estudantes de uma mesma turma quando cursaram o 5º, 6º, 7º e 8º período. A partir das médias obtidas pelos estudantes em cada metodologia de avaliação, as análises comparativas foram realizadas. Os resultados mostraram que há similaridade entre as avaliações teóricas e OSCE, os quais diferem significativamente dos resultados obtidos na avaliação prática clínica. Ao se comparar o desempenho dos 33 estudantes nos diferentes períodos (2018.1, 2018.2, 2019.1 e 2019.2), os resultados apontaram diferença estatisticamente significativa nas avaliações teóricas entre 2019.1 e 2019.2 ( $p \leq 0,001$ ), havendo uma evolução positiva dos estudantes entre esses semestres. Entre 2018.1 e 2019.1, foi observada uma queda no desempenho dos estudantes na avaliação teórica. Quanto ao desempenho dos estudantes na avaliação prática clínica, as diferenças significantes se mostraram positivas entre 2018.2 e 2019.1/ 2019.2. Entre 2018.1 e 2018.2 foi observada uma queda no desempenho dos estudantes na avaliação prática. A mesma análise na avaliação OSCE apresentou-se positiva entre 2018.2 e 2019.1/ 2019.2., e com queda no desempenho entre 2018.1 e 2018.2. A partir dos resultados apresentados nesse estudo, deve-se considerar algumas alterações no sistema de avaliação, se atentando para o valor educacional do mesmo.

**Palavras-chave:** Metodologia de Avaliação; ensino; desempenho acadêmico.

## **ABSTRACT**

The research objective was to analyze if the results obtained from 179 students considering three evaluation methodologies (theoretical, clinical practice and Objective Structured Clinical Exam - OSCE) used in the Integrated Clinics disciplines of the School of Dentistry, University of Anápolis - UniEVANGÉLICA present similarity, as well as to analyze the performance evolution of 33 students from the same class during 5th, 6th, 7th and 8th periods. From the averages obtained by the students in each evaluation methodology the comparative analyses were carried out. The results showed similarity between the theoretical and OSCE evaluations, which differ significantly from the results obtained in the practical clinical evaluation. Comparing the performance of the 33 students during different periods (2018.1, 2018.2, 2019.1 and 2019.2), the results showed a statistically significant difference in the theoretical evaluations between 2019.1 and 2019.2 ( $p \leq 0.001$ ), with a positive students evolution between these semesters. Between 2018.1 and 2019.1, a decrease in student performance in the theoretical evaluation was observed. As for the performance of students in clinical practice evaluation, the significant differences were positive between 2018.2 and 2019.1/2019.2. Between 2018.1 and 2018.2 was observed a decrease in performance of students in clinical practice evaluation. The same analysis in the OSCE evaluation was positive between 2018.2 and 2019.1/2019.2, showing a drop in the performance between 2018.1 and 2018.2. From the results presented in this study, some changes in the evaluation system should be considered, paying attention to its educational value.

**Keywords:** Educational Measurement; teaching; Academic Performance.

## 1. INTRODUÇÃO

O objetivo do ensino superior deve ser o de estimular o desenvolvimento de características de aprendizagem, como pensamento crítico, autonomia e resolução de problemas<sup>1</sup>. Isso também é válido para educação odontológica<sup>2</sup>.

O processo de aprendizagem é registrado ao longo do curso por meio de avaliações que determinam se os estudantes estão aptos a iniciar a prática odontológica de forma independente<sup>3</sup>. A avaliação é uma tarefa programática que precisa tornar-se parte viva de qualquer programa educacional. Para os programas educacionais baseados em competências, o desenho do sistema de avaliação deve refletir a filosofia programática e seu contexto<sup>4</sup>.

Uma competência é a capacidade de lidar com uma tarefa profissional complexa integrando os conhecimentos cognitivos, psicomotores e habilidades afetivas. Na prática educacional, os currículos têm sido construídos em torno dessas competências, idealizadas pela teoria moderna educacional, que postula que a aprendizagem é facilitada quando as tarefas são integradas<sup>5,6</sup>.

Reconhece-se que dificilmente todas as dimensões e elementos da aprendizagem clínica podem, de forma adequada e holística, ser avaliadas recorrendo às tradicionais formas de avaliação oral e escrita<sup>7</sup>, não podendo ser determinada por uma única metodologia de avaliação<sup>3</sup>. Indubitavelmente, estas formas de avaliação são válidas para testar conhecimento e pensamento clínico, mas revelam-se insuficientes ao avaliar competências e aptidões clínicas<sup>7</sup>. Sendo assim, as práticas de avaliação nesse modelo educacional devem ser projetadas para refletir as especificidades características da educação por competência<sup>4,8</sup>. Dessa forma, a seleção da metodologia de avaliação deve estar alinhada ao resultado de aprendizagem específico esperado<sup>3</sup>.

Para avaliar os diferentes resultados dos tipos de aprendizagem de forma válida e rigorosa, diferentes metodologias de avaliação devem ser utilizadas. Por exemplo, as habilidades de desempenho não podem ser avaliadas por meio de relatórios escritos ou testes de múltipla escolha. Para isso, o uso de simulações com exercícios laboratoriais e exames objetivos clínicos estruturados (OSCEs) são mais apropriados<sup>9</sup>.

O OSCE é uma metodologia de avaliação que permite avaliar níveis de cognição superiores à memorização básica de fatos. Em relação à taxonomia de Bloom dos objetivos educacionais na área do domínio cognitiva<sup>10</sup> o OSCE é projetado para avaliar os níveis de aplicação, análise, síntese e avaliação<sup>11</sup>.

Especialistas em educação baseada em competências definiram o uso de portfólios para avaliação como uma prática recomendada. Os portfólios permitem avaliações múltiplas, de forma continuada, com múltiplos avaliadores fornecendo a melhor estratégia para avaliação global das competências do estudante de uma maneira válida e confiável<sup>12</sup>.

Uma avaliação ideal exigiria a implementação de uma infinidade de metodologias de avaliação e a combinação de informações dessas metodologias garantiria a sua validade e confiabilidade. Portanto, cada metodologia de avaliação deve apresentar resultados de aprendizagem específicos<sup>3</sup>, e nenhuma metodologia é considerada melhor que outra. A avaliação global das competências exigidas para a formação de um profissional em Odontologia ocorre com a combinação de resultados obtidos nas diferentes metodologias de avaliação<sup>3</sup>.

Considera-se que várias metodologias de avaliação são necessárias para se obter uma avaliação que contemple as habilidades e competências requeridas para a formação do profissional em Odontologia<sup>12</sup>. Esse estudo foi realizado em uma escola de Odontologia brasileira, a qual aplica a avaliação teórica, avaliação prática clínica com o uso de portfólios e OSCE como metodologias de avaliação durante a formação profissional dos estudantes.

Diante desse pressuposto, o objetivo dessa pesquisa foi analisar se os resultados obtidos por estudantes em três metodologias de avaliação (teórica, prática clínica e Exame Clínico Objetivo Estruturado - OSCE) empregadas nas disciplinas de clínicas integradas do Curso de Odontologia do Centro Universitário de Anápolis – UniEVANGÉLICA apresentam similaridade; bem como analisar a evolução do desempenho de estudantes de uma mesma turma durante quatro semestres letivos.

## 2. METODOLOGIA

Esta pesquisa quantitativa consistiu em um estudo observacional de caráter transversal e foi realizada no Curso de Odontologia do Centro Universitário de Anápolis - UniEVANGÉLICA.

O projeto dessa pesquisa foi aprovado pelo Comitê de Ética em Pesquisa (CEP) da UniEVANGÉLICA, sob protocolo de número 4.338.975.

### 2.1 Aspectos Éticos

Esta pesquisa seguiu o disposto na Resolução MS 466/2012 e complementares, de conhecimento de todos os pesquisadores. A coleta de dados se iniciou após a aprovação do projeto pelo CEP.

Foi formalizado junto ao CEP o pedido de dispensa de apresentação dos Termos de Livre Consentimento e Esclarecido (TLCE) dos participantes, por ser uma pesquisa retrospectiva com uso de banco de dados, pela impossibilidade de se contactar todos os indivíduos que realizaram as avaliações devido à alteração de endereços e telefones de alguns estudantes que já se formaram.

Os dados das avaliações foram disponibilizados pelo Núcleo de Apoio Psicopedagógico ao Docente e Discente (NAPEDD), do Curso de Odontologia da UniEVANGÉLICA garantindo a confidencialidade dos participantes e assegurando a preservação dos documentos escolares pela disponibilização das notas sem a identificação dos participantes.

### 2.2 População e amostra

Para analisar se as metodologias de avaliação estudadas (avaliações: teóricas, práticas clínicas e OSCE) apresentaram similaridade nos seus resultados, foi selecionada uma amostra inicial dos resultados obtidos nas disciplinas de Clínica Integrada por 183 estudantes do 5º ao 8º períodos.

Foi considerado critério de inclusão os resultados das avaliações dos estudantes que cursaram as disciplinas de Clínica Integrada II, III, IV e V do Curso de Odontologia do Centro Universitário de Anápolis - UniEVANGÉLICA

regularmente no semestre letivo de 2019.2. Foram incluídos os resultados das avaliações dos estudantes que cursaram a disciplina de Clínica Integrada II em 2018.1, Clínica Integrada III em 2018.2, Clínica Integrada IV em 2019.1 e Clínica Integrada V em 2019.2, para a análise da evolução do desempenho desses estudantes.

Como critérios de exclusão foram considerados os resultados das avaliações dos estudantes que não concluíram as disciplinas de Clínica Integrada II, III, IV e V do Curso de Odontologia do Centro Universidade de Anápolis - UniEVANGÉLICA no segundo semestre de 2019. Os estudantes que não cursaram as disciplinas de Clínica Integrada de II a V regularmente no período entre 2018.1 a 2019.2. De acordo com esses critérios, foram excluídos os resultados obtidos por quatro estudantes e a amostra final do estudo foi composta pelos resultados das avaliações de 179 estudantes do 5º ao 8º período cursando as disciplinas de Clínica Integrada II (n=60), III (n=35), IV (n=45) e V (n=39). As idades variaram de 19 a 35 anos, com uma média de 22 anos de idade. Da amostra total, 133 eram do sexo feminino e 46 do sexo masculino.

Para a avaliação da evolução dos resultados do desempenho dos estudantes nas três metodologias de avaliação, foram inicialmente selecionados os 39 estudantes que cursaram a Clínica Integrada V em 2019.2. Destes, verificou-se que seis estudantes não cursaram sequencialmente as disciplinas de Clínica Integrada II a V nos semestres de 2018.1 a 2019.2, sendo então excluídos da amostra. Assim, a amostra final para o acompanhamento do desempenho durante dois anos nas disciplinas clínicas foi de 33 estudantes, dos quais 20 eram do sexo feminino e 13 do sexo masculino.

### 2.3 Procedimentos realizados

No início do semestre letivo os Planos de Ensino das disciplinas de Clínica Integrada são apresentados aos estudantes, os quais tomam ciência do processo avaliativo nesse momento. O processo avaliativo das disciplinas de Clínica Integrada é composto por 03 Verificações de Aprendizagem (1ª V.A., 2ª V.A. e 3ª V.A.), sendo que em cada Verificação de Aprendizagem o estudante realiza:

- Uma Avaliação Teórica com valor de 0 a 100 pontos;
- Uma Avaliação Prática com valor de 0 a 100 pontos.

A 3ª Verificação de Aprendizagem inclui o OSCE, que neste estudo foi pontuado com valor de 0 a 100 pontos, proporcional ao número de acertos.

### **2.3.1 Avaliação Teórica**

A avaliação teórica é composta por questões objetivas, sendo pontuada de 0 a 100 pontos na composição final de cada Verificação de Aprendizagem (1ª, 2ª e 3ª). O conteúdo da avaliação teórica é distribuído conforme declarado nas habilidades e competências dos Plano de Ensino, abordando as seguintes áreas:

Clínica Integrada II: Diagnóstico, Periodontia, Dentística e Prótese.

Clínica Integrada III, IV e V: Diagnóstico, Periodontia, Dentística, Endodontia, Cirurgia e Prótese.

As notas resultantes das avaliações teóricas foram analisadas nesse estudo. Para essa análise foi calculada uma média final na avaliação teórica por estudante através de média aritmética simples das notas por ele obtidas nas três Verificações de Aprendizagem.

A partir de todas as médias finais foi calculada uma média global das avaliações teóricas.

### **2.3.2 Avaliação Prática Clínica**

A avaliação prática clínica é composta pela média aritmética simples das notas diárias, das diferentes áreas da Odontologia, no período avaliado que constam no portfólio.

- A Nota Diária de cada área é composta da seguinte forma:

Somatória de duas notas: Nota Atitudinal + Nota Técnica.

A Nota Atitudinal, é obtida em cada sessão válida, no valor de 0 a 10 pontos, obedecendo aos quesitos e valores a seguir:

- Pontualidade no Atendimento – 2 pontos.
- Manejo do Prontuário – 2 pontos.
- Apresentação pessoal:



Uniforme e Equipamento de Proteção Individual – 2 pontos.

- Barreiras Físicas – 2 pontos.

- Organização da Bancada de apoio – 2 pontos.

Totalizando - 10 pontos.

A Nota Técnica é obtida em cada sessão válida, no valor de 0 a 90 pontos, obedecendo a quesitos e valores estabelecidos no portfólio de cada área.

As notas resultantes das avaliações práticas foram analisadas nesse estudo. Para essa análise foi calculada uma média final na avaliação prática por estudante através de média aritmética simples das notas por ele obtidas nas três Verificações de Aprendizagem.

A partir de todas as médias finais foi calculada uma média global das avaliações práticas.

### **2.3.3 OSCE**

O OSCE refere-se a uma avaliação objetiva estruturada de desempenho clínico, e esta avaliação é realizada de forma interdisciplinar articulada com todas as disciplinas de cada período, sendo o valor de 0 a 40 pontos. Entretanto, neste estudo foi pontuado com valor de 0 a 100 pontos, proporcional ao número de acertos.

### **2.3.4 Tabulação das Notas**

Ao final do segundo semestre do período letivo de 2019 no Curso de Odontologia do Centro Universitário de Anápolis - UniEVANGÉLICA as notas teóricas, práticas clínicas e as notas dos OSCE's foram tabuladas pelo NAPEDD do próprio curso.

As médias de cada tipo de avaliação foram transcritas em tabelas do Software Microsoft Office Excel.

Outra tabela foi criada para avaliar a evolução do mesmo estudante do 5º ao 8º período. Todas as médias obtidas (teóricas, práticas e OSCE) em cada tipo de avaliação durante os quatro períodos foram tabuladas para posterior comparação e análise.

## **2.4 Análise dos dados**

Os pesquisadores responsáveis pelo estudo analisaram se os métodos de avaliação estudados (avaliações: teóricas, práticas clínicas e OSCE) apresentaram similaridade nos seus resultados, comparando as médias globais de cada tipo de avaliação.

A análise da evolução do mesmo estudante do 5º ao 8º período, foi realizada a partir de todas as médias obtidas em cada tipo de avaliação (teóricas, práticas e OSCE) durante os quatro períodos.

## **2.5 Análise Estatística**

A amostra final do estudo foi composta por 179 estudantes do 5º ao 8º período cursando as disciplinas de Clínica Integrada II (n=60), III (n=35), IV (n=45) e V (n=39). As idades variaram de 19 a 35 anos, com uma média de 22 anos de idade. Da amostra total, 133 eram do sexo feminino e 46 do sexo masculino.

Para comparação das notas obtidas pelos estudantes nas avaliações teórica, prática clínica e OSCE foi aplicado a análise de variância (ANOVA). As diferenças entre os grupos foram identificadas pelo teste post-hoc de Tukey-Kramer.

As análises foram realizadas no software Jamovi versão 1.2 (The Jamovi Project. Jamovi (Version 1.2) [Computer Software]. 2020. Available online: <https://www.jamovi.org>) empregando-se nível de significância de  $\alpha = 0,05$  para todos os testes estatísticos realizados.

### **3. CAPÍTULO 1**

#### **Analysis of three assessment methods of a Dental School used in the teaching-learning process**

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#### **Conflict of interest**

The authors deny any conflicts of interest related to this study.

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## **Analysis of three assessment methods of a Dental School used in the teaching-learning process**

### **Abstract**

The research objective was to analyze if the results obtained from 179 students considering three evaluation methodologies (theoretical, clinical practice and Objective Structured Clinical Exam - OSCE) used in the Integrated Clinics disciplines of the School of Dentistry, University of Anápolis - UniEVANGÉLICA present similarity, as well as to analyze the performance evolution of 33 students from the same class during 5th, 6th, 7th and 8th periods. From the averages obtained by the students in each evaluation methodology the comparative analyses were carried out. The results showed similarity between the theoretical and OSCE evaluations, which differ significantly from the results obtained in the practical clinical evaluation. Comparing the performance of the 33 students during different periods (2018.1, 2018.2, 2019.1 and 2019.2), the results showed a statistically significant difference in the theoretical evaluations between 2019.1 and 2019.2 ( $p \leq 0.001$ ), with a positive students evolution between these semesters. Between 2018.1 and 2019.1, a decrease in student performance in the theoretical evaluation was observed. As for the performance of students in clinical practice evaluation, the significant differences were positive between 2018.2 and 2019.1/2019.2. Between 2018.1 and 2018.2 was observed a decrease in performance of students in clinical practice evaluation. The same analysis in the OSCE evaluation was positive between 2018.2 and 2019.1/2019.2, showing a drop in the performance between 2018.1 and 2018.2. From the results presented in this study, some changes in the evaluation system should be considered, paying attention to its educational value.

**Keywords:** Educational Measurement; teaching; Academic Performance.

## **Introduction**

The objective of undergraduate should be to stimulate the development of learning features such as critical thinking, autonomy and problem solving<sup>1</sup>. This is also valid for dental education<sup>2</sup>.

The learning process is recorded throughout the course by assessments that determine whether students can begin dental practice independently<sup>3</sup>. Evaluation is a programmatic task that needs to become a living part of any educational program. For competence-based educational programs, the design of the evaluation system must reflect the programmatic philosophy and its context<sup>4</sup>.

A competence is the ability to handle a complex professional task integrating cognitive, psychomotor and affective skills. In educational practice, resumes have been built around these competencies, idealized by modern educational theory, which postulates that learning is facilitated when tasks are integrated<sup>5,6</sup>.

It is recognized that hardly all dimensions and elements of clinical learning can be, in an adequate and holistic way, evaluated using traditional forms of oral and written assessment<sup>7</sup>, and cannot be determined by a single assessment method<sup>3</sup>. Undoubtedly, these forms of assessment are valid for testing clinical knowledge and thinking, but they are insufficient when assessing clinical skills and abilities<sup>7</sup>. Thus, the evaluation practices in this educational model should be designed to reflect the specific characteristics of competence-based education<sup>4,8</sup>. Therefore, the selection of the evaluation method should be aligned with the specific learning outcome expected<sup>3</sup>.

To evaluate the different learning outcomes in a valid and rigorous way, different evaluation methods should be used. For example, performance skills cannot be evaluated through reports or multiple-choice tests. For this purpose, the use of simulations with laboratory exercises and Objective Structured Clinical Exam (OSCEs) are more appropriate<sup>9</sup>.

The OSCE is an evaluation method that allows assessing levels of cognition higher than basic fact memorization. Regarding the Bloom taxonomy of educational goals in cognitive domain<sup>10</sup> the OSCE is designed to evaluate the levels of application, analysis, synthesis and evaluation<sup>11</sup>.

Experts in skills-based education have defined the use of portfolios for evaluation as a recommended practice. Portfolios enable multiple and ongoing evaluations with multiple evaluators providing the best strategy for overall assessment of the student's skills in a valid and reliable way<sup>12</sup>.

An ideal evaluation would require the implementation of a multitude of evaluative methods and the combination of information from these methods would ensure their validity and reliability. Therefore, each evaluation method must present specific learning outcomes<sup>3</sup> and there is method better than another. The overall assessment of the required skills for the training of a dental professional occurs with the combination of the outcomes obtained in the different assessment methods<sup>3</sup>.

It is considered that several kinds of evaluation methods are necessary to obtain an evaluation that contemplates the skills and competences required for the training of a Dentistry professional. This study was carried out in a Brazilian Dentistry School, which applies theoretical evaluation, clinical practice

evaluation using portfolios and OSCE as evaluation methods during the professional training of students<sup>12</sup>.

The research objective was to analyze if the results obtained from 179 students considering three evaluation methodologies (theoretical, clinical practice and Structured Objective Clinical Exam - OSCE) used in the Integrated Clinics disciplines of the School of Dentistry, University of Anápolis - UniEVANGÉLICA present similarity, as well as to analyze the performance evolution of students from the same class during 2 years.

## **Methods**

This quantitative research consisted of a cross-sectional observational study approved by the Research Ethics Committee of UniEVANGÉLICA. To analyze if the studied evaluation methods (evaluations: theoretical, clinical practices and OSCE) presented similarity in their results, an initial sample of the results obtained in the disciplines of Integrated Clinic was selected by 183 students from the 5th to the 8th period of the School of Dentistry, University of Anápolis - UniEVANGÉLICA.

Results of the evaluations of the students who attended the disciplines of Integrated Clinic II, III, IV and V regularly in the 2019.2 academic semester were considered and included. Results of the evaluations of the students who attended the course of Integrated Clinic II in 2018.1, Integrated Clinic III in 2018.2, Integrated Clinic IV in 2019.1 and Integrated Clinic V in 2019.2 were included to analyze the student performance evolution. As exclusion criteria, the evaluations results of students who did not complete the subjects of Integrated Clinic II, III, IV and V in the second semester of 2019 were considered. The



students who did not complete the subjects of Integrated Clinics II to V regularly in the period 2018.1 to 2019.2.

According to these criteria, the results obtained from four students were excluded and the final sample of the study was composed by the results of the evaluations of 179 students from the 5th to the 8th period studying the subjects of Integrated Clinics II (n=60), III (n=35), IV (n=45) and V (n=39). The ages varied from 19 to 35 years, considering the average 22 years of age. From the total sample, 133 were female and 46 were male. For the analysis of the students' performance evolution, there was a sample of 33 students, 20 female and 13 male.

At the beginning of the school semester, the Integrated Clinic Teaching Plans are presented to the students, for them to be aware of the evaluation process at that moment. The evaluation process of the Integrated Clinic subjects is composed of 03 Learning Verifications (1st L.V., 2nd L.V. and 3rd L.V.), and each Learning Verification is composed by:

- A Theoretical Evaluation (0 to 100 points);
- A Practical Evaluation (0 to 100 points).

The 3rd Learning Verification includes the OSCE, which in this study was considered 0 to 100 points, proportional to the number of correct answers. From all the grades obtained in the 1st L.V., 2nd L.V., and 3rd L.V., an average of each evaluation method was calculated, transcribed into Microsoft Office Excel Software worksheets.

To evaluate the evolution of the same student from the 5th to the 8th period the averages obtained in each evaluation method during four periods were tabulated for later comparison and analysis.

The researchers analyzed if the studied evaluation methods presented similarity in their results, comparing the average of each method.

The evolution analysis of the same student from the 5th to the 8th period was done from the average obtained in each evaluation method during the four periods considered.

For the analysis of similarity, it was carried out the comparison of the grades obtained by the students in the theoretical, practical and OSCE evaluations through the analysis of variance (ANOVA) by repeated measures. The differences between the groups were identified by the Tukey-Kramer post-hoc test.

The analyses were performed in the Jamovi software version 1.2 (The Jamovi Project. Jamovi (Version 1.2) [Computer Software]. 2020. Available online: <https://www.jamovi.org>) using a significance level of  $\alpha = 0.05$  for all statistical tests performed.

## **Results**

In this present study two analyses were performed in different samples. The first analysis compared students grades in Integrated Clinics subjects in three evaluation methodologies (n= 179); and the second analysis compared grades from the same group of students during four periods of Integrated Clinics subjects with (n= 33).

For the comparison of the grades obtained by the students in the theoretical, clinical practice and OSCE evaluations, the analysis of variance (ANOVA) of repeated measurements was applied. Differences between groups were identified by the Tukey-Kramer post-hoc test. All analyses were performed in the Jamovi software version 1.2 (The Jamovi Project. Jamovi (Version 1.2) [Computer Software]. 2020. Available online: <https://www.jamovi.org>) applying a significance level as  $\alpha = 0.05$  for all statistical tests performed.

A scale of 0 to 100 points was used to compare the average obtained from the performance results of the 179 students in each evaluation methodologies. The results presented an average of 62.5 points in the theoretical evaluation, 82.2 points in the practical clinical evaluation and 59.2 points in the OSCE evaluation (Table 1), with statistically significant difference between the practical evaluation and the others ( $p < 0.05$ ). For each evaluation methodology, the results presented variations, and the OSCE was the evaluation methodology that presented the greatest variation, followed by the theoretical evaluation and the practical clinical evaluation, showing the least variation (Figure 1).

For the results performance evolution analysis of the 33 students considering the three evaluation methodologies, a scale of 0 to 100 points was also used. Comparing different periods (2018.1, 2018.2, 2019.1 and 2019.2), a statistically significant differences were observed in the theoretical evaluations between 2019.1 and 2019.2 ( $p \leq 0.001$ ), with a positive students evolution between these semesters (Table 2). Between 2018.1 and 2019.1, a decrease in student performance was observed in this evaluation methodology. As for the

performance of students in clinical practice evaluation, the significant differences were positive between 2018.2 and 2019.1/2019.2. Between 2018.1 and 2018.2 was observed a decrease in performance of students in clinical practice evaluation (Table 3). The same analysis in the OSCE evaluation was positive between 2018.2 and 2019.1/ 2019.2, showing a drop in performance between 2018.1 and 2018.2 (Table 4). The oscillations observed in the three evaluation methodologies can be seen in Figure 2.

## **Discussion**

The results evaluation obtained by students studying the disciplines of Integrated Clinical from 5th to 8th periods in three different evaluation methods, showed that practical evaluations presented better results when compared to the theoretical and OSCE evaluations. The practical evaluation was performed using a portfolio, where clinical procedures, reports and attitudinal factors were considered. According to Patel (2018), there has been a search for reliability and objectivity in the evaluations, OSCE being an example of this. However, the evaluation of complex skills such as professionalism, management and leadership require subjectivity. The assessments reliability and the objective assessment limitations should be considered, so that it does not interfere the validity of practical assessments even considering the use of portfolios. Reliability and validity are inversely related and a balance between these elements can be achieved by combining different assessment methods<sup>3</sup>.

Despite all efforts, teachers in clinical disciplines often find it difficult to assess complex skills, and "competence-based education" has received criticism in the literature<sup>13-15</sup>. For example, the use of portfolios to assess

attitudinal factors with pre-defined grades interferes the assessment validity, standardizing this assessment method. The evaluation of complex skills should be performed in a non-standardized way, being the teacher a vital component in this process<sup>3</sup>. However, subjective evaluations are considered as low reliability, because in many situations they are performed by a single evaluator. For this, it is suggested that subjective evaluations are carried out by multiple teachers, with different subjective judgments, which allows validating the evaluation of complex skills<sup>3,16</sup>.

Considering this study, although the practical evaluation is performed by several teachers from different areas of dentistry, the questioning of the validity and reliability of the portfolio by the student intimidates the teacher in the subjective evaluation of complex skills. This consideration pointed by the literature, supports the results presented in this study, where practical evaluations present better results than the theoretical and OSCE's evaluations<sup>3</sup>.

Although practical evaluation showed positive results, showing satisfactory performance of the students (average = 82.2 points), in the theoretical evaluations this result was significantly lower (average = 62.5 points;  $p \leq 0.05$ ). Theoretical assessment based on traditional multiple-choice exams are valuable in determining a student's ability to remember basic principles or to recognize and make fundamental associations but are not ideal for assessing levels of order of thought<sup>17</sup>. Traditional assessment methods in dental education often focus on the student's knowledge and memorization skills rather than the cognitive skills needed for clinical practice<sup>11</sup>. The difference in performance results between the practical and theoretical evaluations presented in this study

justifies the use of theoretical evaluations aiming the student's effort to learn the basic concepts, such as precepts for clinical practice.

Considering this, the results showed a correlation between students performance in theoretical and OSCE's evaluations, showing a statistically significant difference when compared to practical evaluations. The study results, presenting the performance in the practical assessments with higher averages than the theoretical and OSCE assessments can be questioned, based on the objective way in which the complex competencies are being assessed. The literature points out that OSCE's and theoretical evaluations are significant related to the the clinical performance of students. OSCE as an evaluation method is considered useful to identify students who may be underperforming in a clinical environment<sup>18</sup>, which may be being masked by the way the portfolio has been used in the context of this study.

The student's performance throughout the course of Dentistry showed results similar to those pointed out in the comparison of the three evaluation methods. The average analysis of each student in each method observed, did not present significant difference during the evolution between 5th to 8th periods in the Integrated Clinic discipline. According to Tonni *et al.* (2020), evaluations focusing on quantifiable evaluation data (e.g., grades and performance ratings) may have a detrimental effect on learning and decrease students' intrinsic motivation.

Therefore, graduate professionals committed to excellence in health care and continuing education may require a change in evaluation systems.

Evaluation methods should value teacher orientation and consider the validity of

subjective evaluation of the faculty, paying attention to the educational value of evaluations.

### **Conclusion**

The performances results obtained by students in the theoretical and OSCE evaluation methodologies showed similarity, differing from the results observed in the practical clinical evaluations, which showed higher compared to the others. Regarding the evolution analysis of the students from the same class during four semesters, significant differences were observed in the performances of the evaluation methodologies analyzed during that period.

### **Acknowledgements**

The authors deny any conflicts of interest related to this study.

## References

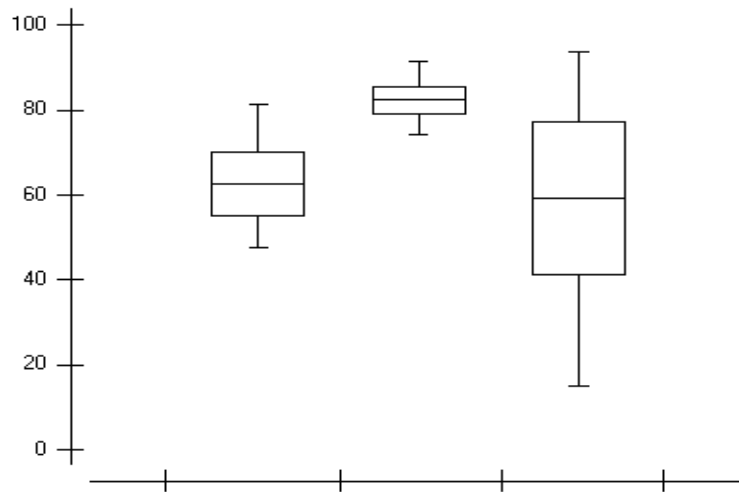
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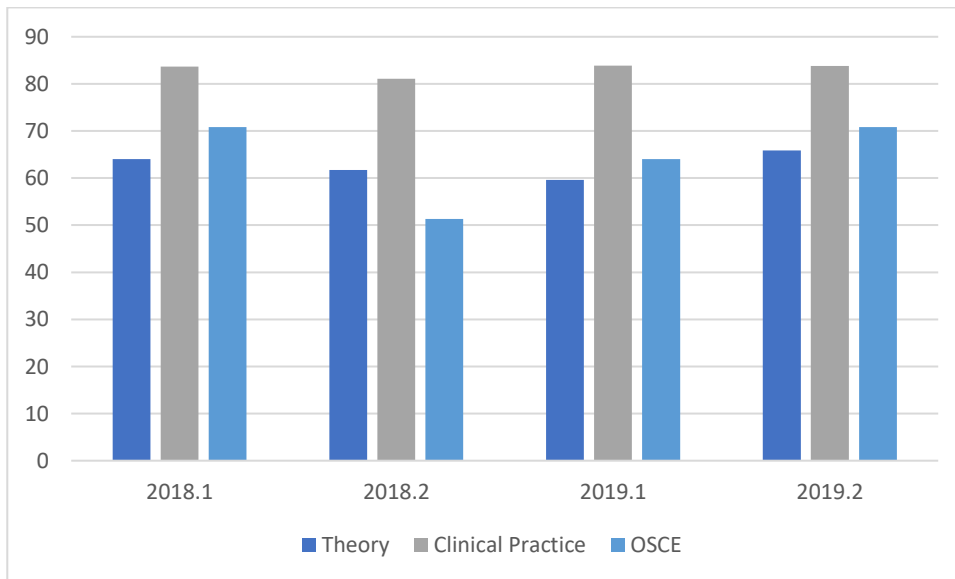
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## Figures and Tables



**Figure 1** – Box plot showing the distribution of the theory, clinical practice and OSCE grades.



**Figure 2** - Distribution of the averages obtained in the theoretical, practical and OSCE evaluations over four periods with clinical disciplines.

**Table 1** - Comparison of means of student performance results in each evaluation method.

Method of Assessment	Results (grades)		
	Mean	Minimum	Maximum
Theory ( <i>Multiple choices</i> )	62,5 <sup>A</sup>	47,3	81,3
Clinical Practice	82,2 <sup>B</sup>	74,2	91,4
OSCE	59,2 <sup>A</sup>	15,0	93,8

Different letters in superscript following values indicate statistical significance (level of significance set at  $p < 0.05$ ).

**Table 2** - Evolution of student performance in theory evaluations throughout the clinical disciplines.

		Mean	Minimum	Maximum
Theory (Multiple)	2018.1	64.0 <sup>AC</sup>	44.3	80.3
	2018.2	61.7 <sup>AB</sup>	51.4	74.8
	2019.1	59.6 <sup>B</sup>	48.1	72.0
	2019.2	65.9 <sup>C</sup>	49.3	81.3

Different letters in superscript following values indicate statistical significance (level of significance set at  $p < 0.05$ )

**Table 3** - Evolution of student performance in clinical practical evaluations throughout the clinical disciplines.

		Mean	Minimum	Maximum
Clinical Practice	2018.1	83.7 <sup>A</sup>	73.1	91.4
	2018.2	81.1 <sup>B</sup>	73.3	85.7
	2019.1	83.9 <sup>A</sup>	79.0	87.3
	2019.2	83.8 <sup>A</sup>	74.2	91.4

Different letters in superscript following values indicate statistical significance (level of significance set at  $p < 0.05$ )

**Table 4** - Evolution of student performance in OSCE evaluations throughout the clinical disciplines.

		Mean	Minimum	Maximum
OSCE	2018.1	70.8 <sup>A</sup>	47.5	93.8
	2018.2	51.3 <sup>B</sup>	27.5	70.0
	2019.1	64.0 <sup>A</sup>	39.0	94.0
	2019.2	70.8 <sup>A</sup>	47.5	93.8

Different letters in superscript following values indicate statistical significance (level of significance set at  $p < 0.05$ )

# ANEXO 1

## CONFLICT OF INTEREST

As a condition for publication of the submitted manuscript, the American Dental Education Association requires that each author complete this conflict of interest statement. (This form may be reproduced as many times as necessary).

I, Carolina Cintra Gomes, declare that

1) I am not aware of any authorship dispute regarding the manuscript entitled:  
Analysis of three assessment methods of a Dental School used in the teaching-learning process  
, and

2) I have no proprietary, financial, profession or other personal interest of any nature in any product, service and/or company that could be construed as influencing the position presented in the manuscript entitled, and

3) All sources of funding have been disclosed in the article, including non-government funding,

except for the following:


Author Carolina Cintra Gomes Date 03/12/2020

## ANEXO 2



### PARECER CONSUBSTANCIADO DO CEP

#### DADOS DO PROJETO DE PESQUISA

**Título da Pesquisa:** ANÁLISE DO DESEMPENHO DOS ESTUDANTES DO CURSO DE ODONTOLOGIA DO CENTRO UNIVERSITÁRIO DE ANÁPOLIS, UNIEVANGÉLICA EM TRÊS MÉTODOS AVALIATIVOS UTILIZADOS NO PROCESSO ENSINO-APRENDIZAGEM

**Pesquisador:** Carolina Cintra Gomes

**Área Temática:**

**Versão:** 2

**CAAE:** 36518120.9.0000.5076

**Instituição Proponente:** Centro Universitário de Anápolis - UniEVANGÉLICA

**Patrocinador Principal:** Financiamento Próprio

#### DADOS DO PARECER

**Número do Parecer:** 4.338.975

#### Apresentação do Projeto:

Em conformidade com o número do parecer: 4.293.340

#### Objetivo da Pesquisa:

Objetivo primário

O objetivo dessa pesquisa será comparar os resultados obtidos por estudantes nos três tipos de avaliação (teórica, prática clínica e OSCE) empregados nas disciplinas de clínicas integradas do Curso de Odontologia do Centro Universitário de Anápolis – UniEVANGÉLICA.

Objetivos secundários

- Analisar se os resultados obtidos por estudantes nos métodos de avaliação estudados (avaliações: teóricas, práticas clínicas e OSCE) apresentam similaridade nos seus resultados.
- Analisar e comparar o desempenho entre o 4º, 5º, 6º, 7º e 8º períodos.
- Analisar e comparar a evolução do desempenho dos mesmos estudantes do 4º ao 8º período.

#### Avaliação dos Riscos e Benefícios:

Em conformidade com o número do parecer: 4.293.340

#### Comentários e Considerações sobre a Pesquisa:

Trata-se de um projeto de pesquisa do curso de odontologia do Centro Universitário de Anápolis – UniEVANGÉLICA, sob a orientação da Profa. Dra. Carolina Cintra Gomes sobre o desempenho dos

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Continuação do Parecer: 4.338.975

estudantes do Curso de Odontologia em três diferentes métodos avaliativos.

**Considerações sobre os Termos de apresentação obrigatória:**

De acordo com as recomendações previstas pela RESOLUÇÃO CNS No 466/2012 e demais complementares o protocolo permitiu a realização da análise ética. Todos os documentos listados abaixo foram analisados.

**Recomendações:**

Não se aplica.

**Conclusões ou Pendências e Lista de Inadequações:**

Lista de pendências

QUANTO A DISPENSA DE TCLE (Dispensa\_TCLE.docx de 17/03/2020)

PENDÊNCIA01: O título do projeto apresentado na solicitação de dispensa de TCLE difere do título apresentado no arquivo Projeto de pesquisa. ANÁLISE: O título da solicitação de dispensa de TCLE foi alterado de acordo com o da Plataforma Brasil. PENDÊNCIA ATENDIDA.

QUANTO AO CRONOGRAMA (Cronograma\_.docx de 17/03/2020)

PENDÊNCIA 02: As datas previstas no cronograma devem ser atualizadas. Os períodos destinados a coleta de dados amostrais, tabulação dos dados e análise estatística já expiraram. ANÁLISE: As datas do cronograma foram atualizadas no projeto e anexado na Plataforma Brasil. PENDÊNCIA ATENDIDA.

**Considerações Finais a critério do CEP:**

Solicitamos ao pesquisador responsável o envio do RELATÓRIO FINAL a este CEP, via Plataforma Brasil, conforme cronograma de execução apresentado

**Este parecer foi elaborado baseado nos documentos abaixo relacionados:**

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1520242.pdf	06/10/2020 20:28:20		Aceito
Outros	Carta_encaminhamento_.docx	06/10/2020 20:27:43	Carolina Cintra Gomes	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Dispensa_TCLE_.docx	06/10/2020 20:25:42	Carolina Cintra Gomes	Aceito

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Continuação do Parecer: 4.338.975

Cronograma	Cronograma.docx	06/10/2020 20:25:15	Carolina Cintra Gomes	Aceito
Projeto Detalhado / Brochura Investigador	Projeto_de_Pesquisa_CPqO.docx	06/10/2020 20:24:55	Carolina Cintra Gomes	Aceito
Outros	Termo_de_Ciencia.docx	23/09/2020 10:08:41	Carolina Cintra Gomes	Aceito
Outros	Declaracao_Relatorio_Final.docx	12/08/2020 18:42:22	Carolina Cintra Gomes	Aceito
Orçamento	Orcamento_.docx	17/03/2020 12:08:49	Carolina Cintra Gomes	Aceito
Folha de Rosto	Folha_de_rosto.pdf	17/03/2020 11:22:32	Carolina Cintra Gomes	Aceito

**Situação do Parecer:**

Aprovado

**Necessita Apreciação da CONEP:**

Não

ANAPOLIS, 14 de Outubro de 2020

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**Assinado por:**  
**Constanza Thaise Xavier Silva**  
**(Coordenador(a))**

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## ANEXO 3

*Journal of Dental Education*—Information for Authors



### INFORMATION FOR AUTHORS

The [\*Journal of Dental Education\* \(JDE\)](#) is a peer-reviewed monthly journal that publishes a wide variety of educational and scientific research in dental, allied dental and advanced dental education. Published continuously by the [American Dental Education Association](#) since 1936 and internationally recognized as the premier journal for academic dentistry, the *JDE* publishes articles on such topics as curriculum reform, education research methods, innovative educational and assessment methodologies, faculty development, community-based dental education, student recruitment and admissions, professional and educational ethics, dental education around the world and systematic reviews of educational interest. The *JDE* is one of the top scholarly journals publishing the most important work in oral health education today; it celebrated its 80th anniversary in 2016.

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## **Submission Guidelines and Instructions**

### **I. Types of Manuscripts Considered and Requirements for Each**

The Editor will consider the following types of manuscripts for publication: Submissions for Peer Review:

- [Original Articles](#) (see below for categories within this type)
- [Review Articles](#)

Solicited or Pre-approved by the Editor:

- [Guest Editorials](#) (solicited by the Editor)
- [Letters to the Editor](#) (solicited or pre-approved by the Editor)
- [Perspectives](#) (pre-approved by the Editor)
- [Brief Communications](#) (pre-approved by the Editor)
- [Point/Counterpoint](#) (solicited by the Editor)

Association Reports:

- [Miscellaneous](#) (submitted by ADEA staff)

## **Submissions for Peer Review**

### **1. Original Articles**

This type of article addresses subject matter in the following categories:

- a. Predoctoral Dental Education
- b. Advanced Dental Education
- c. Allied Dental Education
- d. Interprofessional Education
- e. Community-based Dental Education
- f. Global Dental Education—Manuscripts pertaining to global health education or issues pertinent to the global dental education community. (Not intended solely for submissions from international authors. International authors should submit manuscripts under pertinent topic areas provided in this section.)
- g. Use of Technology in Dental Education
- h. Assessment
- i. Faculty Issues/Development
- j. Continuing Education

Original Articles should report the results of hypothesis-based research studies and may be either qualitative, quantitative or of a mixed methods nature. Manuscripts must address how the findings advance our understanding of the questions asked in the study and make a novel contribution to the literature. The limitations of the study should also be addressed. Small studies of local relevance/interest, limited to one class/course, or small course/student-based surveys may not meet the criteria to be published as an Original Article.

Original Articles should be no more than 3,500 words, excluding the abstract, illustrations and references. A maximum of six figures and tables can be submitted (the figures can be

multi-panel), and the number of references should not exceed 50 (unless the article is a systematic review).

Original Articles should have the following general organization (see “Document Preparation, Organization and Formatting” below for more detailed instructions):

**Title:** An informative and concise title limited to 15 words with no more than 150 characters.

**Abstract:** For research studies, a structured abstract of no more than 250 words should be submitted with the following subheads:

**Purpose/Objectives:** Briefly summarize the issue/problem being addressed.

**Methods:** Describe how the study was conducted.

**Results:** Describe the results.

**Conclusion(s):** Report what can be concluded based on the results, and note implications for dental education.

Abstracts for other types of manuscripts should be in paragraph form, with no subheads.

**Introduction:** Provide a succinct description of the study’s background and significance with references to the appropriate published literature. Detailed literature review/discussion should be reserved for the discussion section. Include a short paragraph outlining the aims of the study.

**Materials and Methods:** A statement that the study has been approved or exempted from oversight by a committee that reviews, approves and monitors studies involving human subjects **MUST** be provided at the beginning of this section, along with the IRB protocol number.

In this section, provide descriptions of the study design, curriculum design, subjects, procedures and materials used, as well as a description of and rationale for the statistical analysis. If the design of the study is novel, enough detail should be given for other investigators to reproduce the study. References should be given to proprietary information.

**Results:** The results should be presented in a logical and systematic manner with appropriate reference to tables and figures. Tables and figures should be chosen to illustrate major themes/points without duplicating information available in the text.

**Discussion:** This section should focus on the main findings in the context of the aims of the study and the published literature. The authors should avoid an extensive review of the literature and focus instead on how the study’s findings agree or disagree with the hypotheses addressed and what is known about the subject from other studies. A reflection on new information gained, new hypotheses and limitations of the study should be included, as well as guidance for future research.

**Conclusion:** The article should end with a short paragraph describing the conclusions derived from the findings and implications of the study for dental education.

**Acknowledgments:** The acknowledgments should report all funding sources, as well as any other resources used or significant assistance.

**Disclosure:** Authors must disclose any financial, economic or professional interests that may have influenced the design, execution or presentation of the scholarly work. If there is a disclosure, it will be published with the article.

**Clinical Trials:** Any educational research studies that are designed as “clinical trials” must register the trial before submitting to the *Journal of Dental Education*. The registration number must be provided in the manuscript.

The studies can be registered at [U.S. National Institutes of Health Clinical Trials Registry](#), [EU Clinical Trials Register](#), or [WHO International Clinical Trials Registry Platform](#).

## **2. Review Articles**

The *JDE* will not consider articles that consist of a general review of topics or published information that is more appropriate for a textbook. However, systematic reviews that focus on trends, issues, new programs or innovations in dental education that are of global interest are welcome. These reviews should not be exhaustive reviews of the literature but should be concise and address important and relevant questions that affect dental education. Reviews should be presented in a scientific format and use the methods of a systematic review. Authors can refer to the [Cochrane Handbook for Systematic Reviews of Interventions](#) for more details. In addition, the Editor asks authors of reviews to make sure they follow the [PRISMA checklist](#) and [flow diagram](#) to ensure the highest quality of systematic reviews and meta-analyses.

For review articles, a structured abstract of 250 words or fewer that addresses the question of interest must precede the review. A brief background and significance section with a review of the literature should be provided. The question being asked and the justification for the review should be addressed. As with any systematic review, the search strategy and the inclusion and exclusion criteria should be outlined. The authors should describe the findings of the search and the quality of the studies retrieved. The discussion section should compare the findings of the study to the literature at large. Limitations and future areas of interest/research should be identified. Review articles should be limited to 3,500 words with no more than 80 references. No more than six tables and figures should be included. Acknowledgments and any conflicts of interest should be documented as described in the Original Article section.

## **Solicited or Pre-approved by the Editor**

### **3. Guest Editorials**

Each issue opens with a “From the Editor” note or a Guest Editorial solicited by the Editor, usually consisting of a short commentary on articles in that issue or on critical topics of interest to readers. The Editor’s annual report about the journal will be published in the January issue.

### **4. Letters to the Editor**

Letters to the Editor should be responses to articles published in the *JDE* in the previous three-month period. They should add to the discussion in a scientific manner, without being personal reflections or reactions. On occasion, letters that deal with the profession, education and training, as well as issues critical to dental education, will be considered. Letters should be brief, focused on one or a few specific points or concerns, and can be signed by no more than four individuals. The letter should be limited to 400 words and six references in *JDE* format. Authors should submit letters directly to the Editor ([JDEeditor@adea.org](mailto:JDEeditor@adea.org)).

### **5. Perspectives**

Perspectives articles should provide an opinion-based but well-supported commentary on controversies, innovations or emerging trends in dental education. On occasion, manuscripts addressing historical figures/perspectives that are impacting current practices will also be considered. Perspectives articles may also be solicited by the Editor on issues that are critical in dental education. Authors who want to independently submit a commentary should contact the Editor ahead of time by e-mail. These articles will be limited to 2,000 words, no more than 10 references, and no more than two figures and/or tables.

Perspectives articles should consist of a) an introduction that addresses why this topic is of general interest to a North American and/or global audience; b) a main section that contains the information relevant to the area being discussed, the author’s perspective on it and the grounds for that perspective; and c) a summary that describes the importance of the commentary/perspective to the current and future status of the topic and recommendations concerning how these items can be addressed.

Authors should submit inquiries for submission of perspectives directly to the Editor ([JDEeditor@adea.org](mailto:JDEeditor@adea.org)).

### **6. Brief Communications**

Brief Communications should be used to inform readers about significant findings in studies based on a limited data set, such as a topic of local relevance/interest or limited to one class/course. These communications will typically contain novel items/findings that are time-sensitive. These articles should include an unstructured abstract of 150 words or fewer. This category of article will be limited to 1,000–1,500 words, no more than 10 references and no

more than two tables and/or figures. Authors should submit inquiries for submission of Brief Communications directly to the Editor ([JDEeditor@adea.org](mailto:JDEeditor@adea.org)).

### **7. Point/Counterpoint**

Point/Counterpoint articles will be solicited by the Editor, who will provide those authors with information about required length and format.

## **Association Reports**

In addition to the above types of manuscripts, the *JDE* occasionally publishes several types of articles and reports that fall outside the standard peer-review process. These include Association Reports (which are written by ADEA staff members) and special reports/sections/issues (which are the result of special activities or studies conducted by ADEA or other groups and are considered on a case-by-case basis by the Editor). Each year, the ADEA Annual Proceedings and the abstracts of poster and TechExpo presentations at the ADEA Annual Session & Exhibition are also published in the *JDE*. All these types of documents undergo systematic internal review and selected external review as determined by the Editor.

## **II. Requirements and Policies for Submitted Manuscripts**

The *JDE* considers only manuscripts that are in MS Word and submitted electronically (see "Submission and Production Procedures" below for the submission process). All manuscripts submitted to the journal should follow the "[Uniform Requirements for Manuscripts Submitted to Biomedical Journals](#)," compiled and published by the [International Committee of Medical Journal Editors \(ICJME\)](#). Authors are also encouraged to refer to the [guidelines on good publication practice](#) produced by the [Committee on Publication Ethics](#).

*No Prior Publication or Duplicate Submissions.* Manuscripts are considered for publication only if they are not under consideration by other journals and have not been published previously in the same or substantially similar form. Submitting authors should attest to their compliance with this requirement in their cover letters. Should a prior or duplicate publication be discovered, the Editor will address the matter with the affected author/s and the other journal's editor following guidelines published by the [ICJME](#) and by the [Committee on Publication Ethics](#).

*Plagiarism.* Plagiarism is a violation of scholarly standards and will not be tolerated. If a case of plagiarism is alleged or discovered, the Editor will address it with the affected author/s, following [ICJME guidelines](#). Authors should exercise extreme care in quoting or paraphrasing material from published sources, so as not to risk plagiarism.

*Conflict of Interest.* A conflict of interest exists when professional judgment concerning a primary interest may be influenced by secondary interests (professional, personal, financial, etc.). Forms declaring any conflict of interest must be submitted for each author when the manuscript is submitted for consideration. The form can be found on ScholarOne

Manuscripts in the upper right-hand corner under "Instructions & Forms." Note: Other forms (Publication Agreement, Affirmation of Authorship) are only signed upon acceptance of an article for publication.

*Human Subjects.* It is the author's responsibility to obtain approval or exempt status from his or her institution's Institutional Review Board for studies involving human subjects; this approval or exempt status must be mentioned at the very beginning of the Methods section. Failure to meet these requirements is likely to place the manuscript in jeopardy and lead to a rejection.

*Editorial Assistance.* Manuscripts considered for submission must be written in standard academic English that is comprehensible to English-speaking readers. The American Medical Writers Association (AMWA) offers a Freelance Directory with contact information for editors who provide assistance in the writing of medical literature, especially for authors whose first language is not English. Please visit their [website](#) for further information.

### **III. Document Preparation, Organization and Formatting**

Manuscripts submitted for consideration should be prepared in the following parts, each beginning on a new page:

- Title page
- Abstract and keywords
- Text
- Acknowledgments
- References
- Tables Figures
- Figure titles if figures are provided as images

*Blinding.* Both blinded and unblinded manuscripts should be prepared once the original manuscript has been completed. To blind a manuscript, all identifying institutional (including Institutional Review Board names) and author names (including in an Acknowledgments section) should be removed from the body of the manuscript (e.g., change State University to XXX University); please indicate in the file name which version is blinded. Please double-check the manuscript to ensure it is blinded.

*Document Format.* Create the documents on pages with margins of at least 1 inch (25 mm) and left justified with paragraphs indented with the tab key, not the space bar. Use double-spacing throughout and number the pages consecutively. Do not embed tables and figures in the body of the text but place them after the references; include callouts for each table or figure in the text (e.g., see Table 1). Unless tables vary significantly in size, include all in one document. If any figures are large files, submit them as separate documents.

*Title Page.* The title page should carry 1) the title, which should be concise but descriptive, limited to 15 words and no more than 150 characters; 2) first name, middle initial and last name of each author, with his or her professional and/or graduate degrees (if no professional or graduate degrees, provide undergraduate degree); 3) an affiliations

paragraph with the name of each author or coauthor and his or her job title, department and institution, written in sentence style; 4) disclaimers if any; 5) name, address, phone and email of author responsible for correspondence about the article and requests for reprints; and 6) support or sources in the form of grants, equipment, drugs, etc. See published articles for examples.

Individuals listed as authors must follow the guidelines established by the ICMJE: 1) substantial contributions to conception and design, or acquisition of data or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. It is the submitting author's responsibility to make sure that authors have agreed to the order of authorship prior to submission.

**Abstract and Key Words/MeSH terms.** The second page should carry the title and an abstract of no more than 250 words. For research studies, the abstract should be in the structured form described above. Abstracts should be written in the third person, and references should not be used in the abstract. The abstract should include the year of the study and, for survey-based research, the response rate. Below the abstract, provide three to five key words or phrases that will assist indexers in cross-indexing the article and will be published with the abstract. At least three terms should come from the Medical Subject Headings listed at the [National Library of Medicine](#). Guidelines for words found in the Medical Subject Headings can be found [here](#). Authors should confirm these terms still exist in the [Index Medicus](#) or should search for more accurate terms if not found in our list. NOTE: Authors will also be prompted to identify Key Words when submitting their manuscripts in ScholarOne. These Key Words may differ from the items presented here. The Key Words identified in ScholarOne are generated from a list that will best match the submitted manuscript to a Peer Reviewer with expertise in the area(s) identified.

**Text.** Follow American (rather than British) English spelling and punctuation style. Spell out numbers from one to ninety-nine, with the exception of percentages, fractions, equations, numbered lists and Likert scale numbers. The body of the manuscript should be divided into sections preceded by appropriate subheads. Major subheads should be typed in capital letters at the left-hand margin. Secondary subheads should appear at the left-hand margin, be typed in upper and lower case and be boldfaced. Tertiary subheads should be typed in upper and lower case and be underlined. For authors whose first language is not English, please use a [medical writer](#) or a native English-speaking colleague to edit the manuscript prior to final submission. Manuscripts will be rejected prior to peer review if there are numerous usage or grammatical errors.

Please Note: In preparing the main document for submission, save the original file with the word "unblinded" at the end of the file name. Please also remove all author names and affiliated institutions from the original manuscript, and save this version with the word "blinded" at the end of the file name.



*References.* Number references consecutively in the order in which they are first mentioned in the text. Each source should have one number, so *be careful not to repeat sources in the reference list*. Identify references by Arabic numerals, and place them in the text as superscript numerals within or at the end of the sentence. Do not enclose the numerals in parentheses, and be sure to follow American rather than British or European style conventions (e.g., the reference number follows rather than precedes commas and periods). Two important reminders: 1) references should not be linked to their numbers as footnotes or endnotes and 2) references to tables and figures should appear as a source note with the table/figure, not numbered consecutively with the references for the article.

Follow the style of these general examples. Titles of journals should be abbreviated according to the [Index Medicus](#) style. Do not use italics or boldface anywhere in the references. If the publication has one to four authors, list all of them; if there are more than four authors, list the first three followed by et al.

*Book*

1. Avery JK. Essentials of oral histology and embryology: a clinical approach. 2<sup>nd</sup> ed. St. Louis: Mosby, 2000.

*Chapter in an Edited Volume*

2. Inglehart MR, Filstrup SL, Wandera A. Oral health and quality of life in children. In: Inglehart MR, Bragranian RA, eds. Oral health-related quality of life. Chicago: Quintessence Publishing Co., 2002:79-88.

*Article in a Journal*

3. Seale NS, Casamassimo PS. U.S. predoctoral education in pediatric dentistry: its impact on access to dental care. *J Dent Educ* 2003;67(1):23-9.

*Report*

4. Commission on Dental Accreditation. Accreditation standards for dental education programs. Chicago: American Dental Association, 2010.

*Web Source*

5. American Dental Hygienists' Association. Position paper: access to care. 2001. At: [www.adha.org/profissues/access\\_to\\_care.htm](http://www.adha.org/profissues/access_to_care.htm). Accessed: November 27, 2012.

*Figures.* Figures may be charts or graphs, photographs, or scientific images; any illustration that consists of text should be called a table (see below). Each figure should have a title, numbered consecutively with Arabic numerals in the order in which they appear in the text. Figures may be provided pasted into an MS Word document or as a separate TIFF or JPEG. Do not put the title on the image itself. Rather, if the image is in a Word document, place the title below the image; if the image is in a TIFF or JPEG, provide the figure titles in a list at the end of the manuscript. For graphs, be sure to label both axes. Include a key to symbols, patterns or colors in the figure either as a legend on the image or as a note below the figure. Any sources should appear in a Source note below the figure. Remember that the total number of figures and tables submitted with an article must not exceed six.

Figures should be used selectively to illustrate major points that cannot be expressed well in textual format. Authors should be able to articulate (for themselves, not as part of the submission) why a figure is necessary and what it adds to the understanding of the points made in the manuscript. Figures should be of the highest possible quality— typically 1,000 dots per inch (dpi) for monochromatic images and 600 dpi for images including halftones. Illustrations should not exceed 8½ x 11 inches, and all lettering should be at least 1½ mm high. If your article is accepted, we may request illustrations in higher resolution than those you've submitted.

*Display of Quantitative Information:* JDE readers expect authors to employ the highest standards of information design to display information in figures. It is recommended to review the seminal work by Edward R. Tufte, "The Visual Display of Quantitative Information," before designing figures that display quantitative information: Tufte, Edward R., *The visual display of quantitative information*. 2nd ed. Cheshire, Connecticut: Graphics Press; 2001, ISBN-13: 978-0961392147.

*Illustrations:* Illustrations should be employed to showcase complex relationships that can be explored by the reader to gain additional insight beyond what was already presented in the manuscript. While illustrations are part of the manuscript, they need to fulfill a purpose for themselves and must have value as standalone elements—telling a particular story or showcasing a relationship not easily expressed in words. It is recommended to review works on information design, such as *The Functional Art: an Introduction to Information Graphics and Visualization* by Alberto Cairo, before designing illustrations: PeachPit Press, 2012, ISBN-13: 978-0321834737.

*Figure Checklist:*

1. Planning:

- Small, noncomparative and highly labeled data sets belong in tables rather than figures.
- Show data variations, not design variations.
- The number of information-carrying (variable) dimensions depicted should not exceed the number of dimensions in the data; i.e., no 3D bars for pocket depths in mm.
- Above all else show the data (data ink) not design variations.
- Range frame should replace non-data-bearing frame.
- The same ink should often serve more than one graphical purpose.
- Organize and order the flow of graphical information presented to the eye. (adapted from E. Tufte: *The visual display of quantitative information*.)

2. Design:

- Variations in font size reflect importance and have meaning.
- Data sets are labeled directly, avoiding cognitive overhead for the reader to decode patterns or shades.
- All symbols (\*, #, etc.) are explained in the legend.

3. Execution:

- All source files are available on request, and minimal resolution guidelines have been followed.
- If JPEG images or other compressed formats are used, export has been done with maximal quality setting.
- Color is not used.
- Vector graphics are preferred (using drawing or illustration programs such as Adobe Illustrator).

*Tables.* Each table should have a title, numbered consecutively with Arabic numerals in the order in which they appear in the text. All tables should be in column format. Arrange column headings so that their relation to the data is clear. Indicate explanatory notes to items in the table with symbols or letters (note that asterisks should be used only with p-values) or in a general note below the table. Any sources should appear in a Source note below the table. All percentages in tables should include the % sign.

Note that tables may be uploaded in PDF form for initial consideration and peer review; however, *tables must be uploaded as MS Word documents for final review and, if accepted, for production.* Remember that the total number of figures and tables submitted with an article must not exceed six.

*Permissions.* Any aspect of the article that is not the author's original work (e.g., figures or tables from other publications) must be fully credited to the original publication. It is the author's responsibility to acquire permission to reprint the material and pay any fees. Evidence of required permissions must be in the author's hands before the article can be published.

*Manufacturers.* Manufacturers of equipment, materials and devices should be identified with the company name and location in parentheses immediately after the first mention.

*Commercial Products.* Do not use brand names within the title or text, unless the paper is comparing two or more products. If identification of a product is needed, a generic term should be used and the brand name, manufacturer and location (city/state/country) mentioned in parentheses.

## **IV. Submission and Production Procedures**

Submissions should be made via the ScholarOne system, following these steps:

1. Launch your web browser and go to the *JDE's* submission homepage at <http://mc.manuscriptcentral.com/jdentaled>.
2. Log in, or click the "Register here" option if you are a first-time user of ScholarOne Manuscripts. Follow the instructions to create a new account. If you have forgotten your login details, go to "Password Help" on the journal's ScholarOne Manuscripts

homepage and enter your email address. You will be sent instructions on how to reset your password.

3. Prior to starting the process of submission, please review your manuscript against the [Author Submission Checklist](#) and make sure you have the following items prepared for uploading:
  - a) Separate [title page](#) (with all authors' position titles and academic degrees as requested)
  - b) Original manuscript (NOTE: MeSH terms must be provided as requested after abstract)
  - c) [Blinded](#) version of the manuscript as described
  - d) Unblinded version of the manuscript
  - e) [Figures](#)
  - f) [Tables](#)
  - g) [Institutional Review Board](#) letter granting approval/exemption for studies involving human subjects
4. After logging in, select "Author Center." Click the "Submit a Manuscript" link. Enter data and answer questions as prompted. Click on the "Next" button on each screen to save your work and advance to the next screen. Keep advancing until you reach the "upload" page.
5. To upload your files, click on the "Browse" button, locate the file on your computer and select the appropriate designation. Click the "Upload" button when all files have been selected. Please review your submission (in both PDF and HTML formats) before sending to the Editor. Click the Submit button.

*Review Process.* Manuscripts submitted as Original Articles, Perspectives, Brief Communications and Review Articles will be peer-reviewed by individuals, selected by the Editor or Associate Editor, who have expertise and experience pertinent to the topic. The journal follows a blind peer review process. The Editor and/or Associate Editor also review all manuscripts. The review process can take up to four months.

*From Review to Acceptance.* If the manuscript is accepted or changes are recommended, it will be returned to the author with the reviewers' comments for the author's responses and revisions. After the author has made changes, the manuscript is returned for final review to the Editor. If the Editor finds it acceptable, he notifies the author of its formal acceptance and assigns it to an issue.

On acceptance of the manuscript for publication, the corresponding author will receive an email from the ScholarOne platform about preparing the final manuscript and figure/table files for production by Wiley, Inc., the *JDE's* journal publisher. **Please note that Wiley will charge authors a fee for the use of color in figures, so please use color judiciously.**

Once the manuscript files have been passed to the Wiley production staff, the

corresponding author will receive an email from Wiley with instructions about setting up an account in Wiley's [Author Services](#) portal for reviewing the proof and signing the licensing agreement. For detailed information on Wiley's article production process, visit the [Production Process](#) web page.

Articles are put into production and, after review and approval by the author(s), are posted on the *JDE*'s [Early View](#) web page until they appear in a specific issue.

*Reprints.* Authors can order reprints at the proofing stage of their article, or visit Wiley's [Production Process](#) page to order reprints after publication.

*Article sharing.* Wiley provides [Article Sharing Guidelines](#) and an [Article Sharing Policy](#).

A copy of an individual article may also be acquired online, whether by the authors or other readers, by visiting the [JDE website](#). Electronic versions can also be downloaded if you are a subscriber or have access to the *JDE* through a library.

## **V. Key Contacts**

General questions (not for submission of manuscripts; see below). Contact Dr. Michael Reddy, Editor, *Journal of Dental Education*, University of California, San Francisco, School of Dentistry, 513 Parnassus Ave Rm S630, San Francisco, CA 94143-2205; [JDEeditor@adea.org](mailto:JDEeditor@adea.org).

Submission. Direct questions about submission of manuscripts through ScholarOne to Sue Kimner, Director of Publishing, *Journal of Dental Education*, 655 K Street, NW, Suite 800, Washington, DC 20001; 202-962-1173 phone; 202-289-7204; fax; [kimners@adea.org](mailto:kimners@adea.org).