

BÖLÜM 9

ENDODONTİ EĞİTİMİNDE YAPAY ZEKÂ VE DİJİTAL TEKNOLOJİLERİN ROLÜ

Berk KAYA ¹
Mevlüt Sinan OCAK ²

GİRİŞ

Endodonti, diş pulpası ve periapikal dokuların sağlığını koruma ve tedavi etme açısından temel bir klinik disiplindir. Pulpanın korunması, dişin fonksiyonel olarak ağızda tutulabilmesini sağlayarak bireyin yaşam kalitesini doğrudan etkiler . Bu nedenle endodonti, hem diş hekimliği eğitiminin hem de meslek içi gelişim süreçlerinin vazgeçilmez bir parçası olmuştur(1).

Son yıllarda sağlık alanında yaşanan dijital dönüşüm, diş hekimliği gibi multi-disipliner uygulama gerektiren klinik branşlarda çarpıcı bir ivme kazanmıştır. Bu dönüşümün en önemli bileşenlerinden biri, yapay zekâ (YZ) (1) teknolojilerinin klinik karar destek sistemlerine entegre edilmesidir. Tıp ve diş hekimliğinde tanı, tedavi planlaması ve uygulama süreçlerinde giderek artan bir şekilde kullanılan YZ algoritmaları; hızlı, güvenilir ve standartlaştırılmış veri analizleriyle hekimlerin karar süreçlerini desteklemektedir(2).

Geleneksel olarak endodontik eğitim, temel bilgi aktarımı, simülasyonlarla klinik beceri gelişimi ve doğrudan hasta uygulamalarıyla sürdürülmektedir (3). Ancak son yıllarda eğitimde dijitalleşme, hibrit yaklaşımlar ve yapay zekâ destekli teknolojiler gibi yenilikçi araçlar, öğretim süreçlerini önemli ölçüde dönüştürmektedir (4).

Bu eğitimsel çerçevenin ötesinde, özellikle pandemi sonrası dijital dönüşümün hız kazanmasıyla birlikte, YZ tabanlı sohbet robotları ön plana çıkmaktadır. Bu

¹ Uzm. Dt., Özel Dentalıgn Ağız ve Diş Sağlığı Polikliniđi, berk.kaya@firat.edu.tr,
ORCID iD: 0009-0005-5739-7007

² Dr. Öğr. Üyesi, Fırat Üniversitesi, Diş Hekimliği Fakültesi, Endodonti AD., msocak@firat.edu.tr,
ORCID iD: 0000-0002-3121-2116

DOI: 10.37609/akya.3813.c708

KAYNAKLAR

1. Setzer, F. C., Li, J., & Khan, A. A. (2024). The Use of Artificial Intelligence in Endodontics. *Journal of dental research*, 103(9), 853–862. <https://doi.org/10.1177/00220345241255593>
2. Aminoshariae, A., Kulild, J., & Nagendrababu, V. (2021). Artificial Intelligence in Endodontics: Current Applications and Future Directions. *Journal of endodontics*, 47(9), 1352–1357. <https://doi.org/10.1016/j.joen.2021.06.003>
3. Longridge, N. N., Dutta, A., & Fox, K. (2025). Endodontic education - present status and future directions. *British dental journal*, 238(7), 567–572. <https://doi.org/10.1038/s41415-025-8404-1>
4. Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International journal of educational technology in Higher education*, 15, 1-16 <https://doi.org/10.1186/s41239-017-0087-5>.
5. Mohammad-Rahimi, H., Setzer, F. C., Aminoshariae, A., Dummer, P. M. H., Duncan, H. F., & Nosrat, A. (2025). Artificial intelligence chatbots in endodontic education–Concepts and potential applications. *International endodontic journal*, 10.1111/iej.14231. Advance online publication. <https://doi.org/10.1111/iej.14231>
6. Baaij, A., Kruse, C., Whitworth, J., & Jarad, F. (2024). EUROPEAN SOCIETY OF ENDODONTOLOGY Undergraduate Curriculum Guidelines for Endodontology. *International endodontic journal*, 57(8), 982–995. <https://doi.org/10.1111/iej.14064>
7. Reymus, M., Fotiadou, C., Kessler, A., Heck, K., Hickel, R., & Diegritz, C. (2019). 3D printed replicas for endodontic education. *International endodontic journal*, 52(1), 123–130. <https://doi.org/10.1111/iej.12964>
8. Reymus, M., Stawarczyk, B., Winkler, A., Ludwig, J., Kess, S., Krastl, G., & Krug, R. (2020). A critical evaluation of the material properties and clinical suitability of in-house printed and commercial tooth replicas for endodontic training. *International endodontic journal*, 53(10), 1446–1454. <https://doi.org/10.1111/iej.13361>
9. Towers, A., Field, J., Stokes, C., Maddock, S., & Martin, N. (2019). A scoping review of the use and application of virtual reality in pre-clinical dental education. *British dental journal*, 226(5), 358–366. <https://doi.org/10.1038/s41415-019-0041-0>
10. Suebnukarn, S., Haddawy, P., Rhiennora, P., & Gajananan, K. (2010). Haptic virtual reality for skill acquisition in endodontics. *Journal of endodontics*, 36(1), 53–55. <https://doi.org/10.1016/j.joen.2009.09.020>
11. Toosi, A., Arbabtafti, M., & Richardson, B. (2014). Virtual reality haptic simulation of root canal therapy. *Applied Mechanics and Materials*, 666, 388-392. <https://doi.org/10.4028/www.scientific.net/AMM.666.388>.
12. Koolivand, H., Shoreshi, M. M., Safari-Faramani, R., Borji, M., Mansoory, M. S., Moradpoor, H., Bahrami, M., & Azizi, S. M. (2024). Comparison of the effectiveness of virtual reality-based education and conventional teaching methods in dental education: a systematic review. *BMC medical education*, 24(1), 8. <https://doi.org/10.1186/s12909-023-04954-2>
13. van der Meijden, O. A., & Schijven, M. P. (2009). The value of haptic feedback in conventional and robot-assisted minimal invasive surgery and virtual reality training: a current review. *Surgical endoscopy*, 23(6), 1180–1190. <https://doi.org/10.1007/s00464-008-0298-x>
14. Philip, N., Ali, K., Duggal, M., Daas, H., & Nazzal, H. (2023). Effectiveness and Student Perceptions of Haptic Virtual Reality Simulation Training as an Instructional Tool in Pre-Clinical Paediatric Dentistry: A Pilot Pedagogical Study. *International journal of environmental research and public health*, 20(5), 4226. <https://doi.org/10.3390/ijerph20054226>
15. Felszeghy, S., Mutluay, M., Liukkonen, M., Flacco, N., Bakr, M. M., Rampf, S., Schick, S. G., Mushtaq, F., Sittoni-Pino, M. F., Ackerman, K., Arias-Herrera, S., Audsley, B., Bágyi, K., Bell, S., Bistey, T., Byrne, S., Carpegna, G., Carramolino-Cuéllar, E., da Costa, J. B., Durham, M. R., ... Quinn, B. (2024). Benefits and challenges of the integration of haptics-enhanced virtual reality training within dental curricula. *Journal of dental education*, 10.1002/jdd.13800. Advance online publication. <https://doi.org/10.1002/jdd.13800>

16. Hasal, M., Nowaková, J., Ahmed Saghair, K., Abdulla, H., Snášel, V., & Ogiela, L. (2021). Chatbots: Security, privacy, data protection, and social aspects. *Concurrency and Computation: Practice and Experience*, 33(19), e6426. <https://doi.org/10.1002/cpe.6426>.
17. Daneshjou, R., Smith, M. P., Sun, M. D., Rotemberg, V., & Zou, J. (2021). Lack of Transparency and Potential Bias in Artificial Intelligence Data Sets and Algorithms: A Scoping Review. *JAMA dermatology*, 157(11), 1362–1369. <https://doi.org/10.1001/jamadermatol.2021.3129>
18. Shan, T., Tay, F. R., & Gu, L. (2021). Application of Artificial Intelligence in Dentistry. *Journal of dental research*, 100(3), 232–244. <https://doi.org/10.1177/0022034520969115>
19. Leung, A. L., Yeung, C., Chu, S., Wong, A. W., Yu, O. Y., & Chu, C. H. (2021). Use of Computer Simulation in Dental Training with Special Reference to Simodont. *Dentistry journal*, 9(11), 125. <https://doi.org/10.3390/dj9110125>
20. Fraser, H., Crossland, D., Bacher, I., Ranney, M., Madsen, T., & Hilliard, R. (2023). Comparison of Diagnostic and Triage Accuracy of Ada Health and WebMD Symptom Checkers, ChatGPT, and Physicians for Patients in an Emergency Department: Clinical Data Analysis Study. *JMIR mHealth and uHealth*, 11, e49995. <https://doi.org/10.2196/49995>
21. Abd-Alrazaq, A., AlSaad, R., Alhuwail, D., Ahmed, A., Healy, P. M., Latifi, S., Aziz, S., Damseh, R., Alabed Alrazak, S., & Sheikh, J. (2023). Large Language Models in Medical Education: Opportunities, Challenges, and Future Directions. *JMIR medical education*, 9, e48291. <https://doi.org/10.2196/48291>
22. Graf, L., Sykownik, P., Gradl-Dietsch, G., & Masuch, M. (2024). Towards believable and educational conversations with virtual patients. *Frontiers in Virtual Reality*, 5, 1377210 <https://doi.org/10.3389/frvir.2024.1377210>.