



DIGITS

**DIGITAL INTERACTIVE GAMIFIED
TEACHING WITH SOCIAL MEDIA AND
GEOGEBRA**

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Online, 4 June 2025



**TEHNIČKO VELEUČILIŠTE U
ZAGREBU ZAGREB UNIVERSITY
OF APPLIED SCIENCES**



Content:

- **Topic**
 - **DIGITS: Digital Interactive Gamified Teaching with Social Media and GeoGebra**
- **Challenge / Objective**
 - **Making abstract concepts tangible and engaging**
- **Methodology**
 - **From planning to implementation and evaluation**
- **Tools & Technologies**
 - **GeoGebra, LMS, Quizizz, YouTube and more**
- **Outcomes & Impact**
 - **Student success, feedback and academic recognition**
- **Lessons Learned**
 - **What worked, what to avoid and key takeaways**
- **Transferability**
 - **How DIGITS can be applied in other subjects and institutions**

TOPIC

- **DIGITS** – Digital Interactive Gamified Teaching with Social Media and GeoGebra
- The DIGITS methodology enhances STEM education by integrating digital tools (GeoGebra, LMS, graphic tablets), social media and gamification.
- It's implemented in the course *Fundamentals of Electrical Engineering* at the **Zagreb University of Applied Sciences**, promoting active learning, engagement, and digital skills development.



CHALLENGE / OBJECTIVE

The Challenge:

- Electrical engineering students often struggle to understand abstract theoretical concepts.
- Traditional methods lack interactivity, flexibility and real-time feedback, limiting student engagement and deeper understanding.

The objective:

- To develop a methodology that:
 - Improve engagement and learning outcomes
 - Makes complex content easier to understand through interactive simulations
 - Encourages independent exploration and experimentation
 - Supports the development of digital skills
 - Enables flexible access to learning materials anytime and anywhere
- DIGITS responds to these challenges by combining digital tools with traditional teaching methods to create a blended, student-centred learning environment that supports both classroom interaction and self-study.



DIGITS METHODOLOGY

DIGITS follows a structured three-phase process that blends

- planning,
- digital implementation and
- feedback-driven evaluation

Planning

- Define learning goals and content
- Select tools: GeoGebra, LMS, QR codes, Quizizz, YouTube
- Prepare materials and create access via QR codes and digital platforms



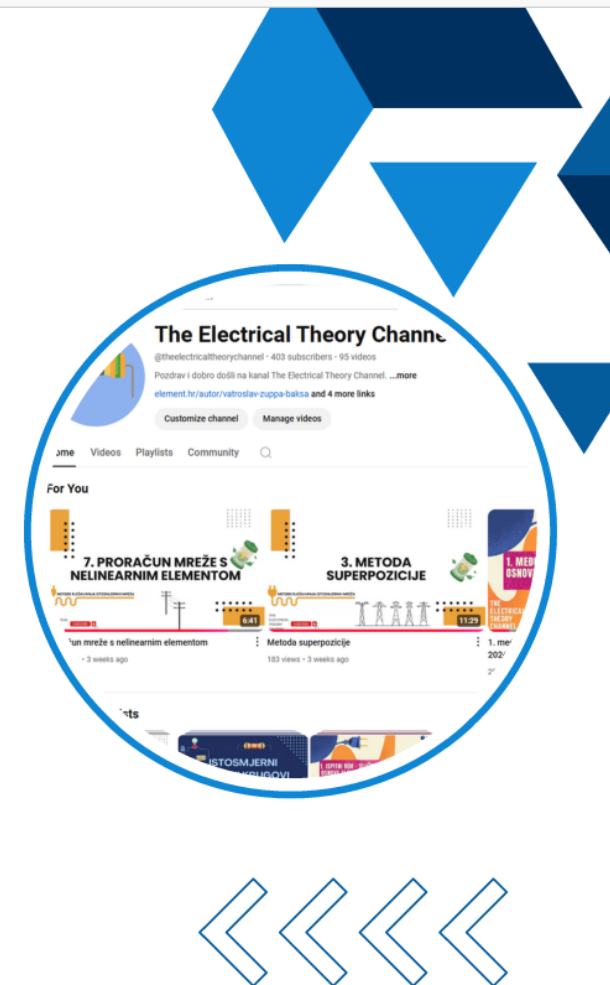
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Implementation

- Deliver simulations with GeoGebra for interactive concept exploration
- Conduct gamified quizzes using Quizizz
- Share digital notes instantly via LMS
- Upload lecture videos on YouTube
- Promote academic visibility via LinkedIn and scientific publications



DIGITS METHODOLOGY

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Evaluation

- Analyze student learning via Quizizz results and feedback surveys
- Monitor exam performance to assess concept comprehension
- Refine methods based on reflection and student input



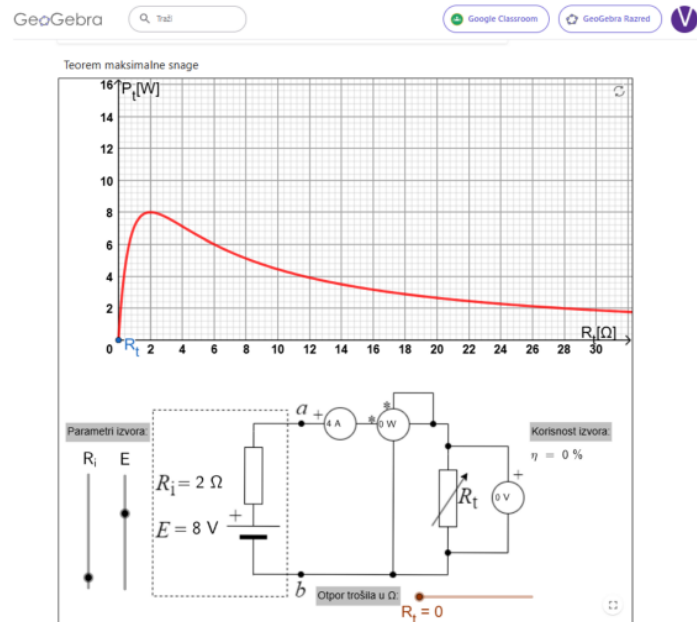
TOOLS & TECHNOLOGIES

- **GeoGebra:** For dynamic, interactive learning of complex concepts.
- **QR codes:** Easy access to additional resources.
- **Graphics tablet:** For digital notes in real time.
- **LMS:** Central hub for resources and communication.
- **Quizziz:** Gamified quizzes for engaging assessments and instant feedback.
- **YouTube:** Recorded lecture summaries and tutorials for flexible, on-demand learning.
- **LinkedIn:** Spread the methodology to a global network of educators.



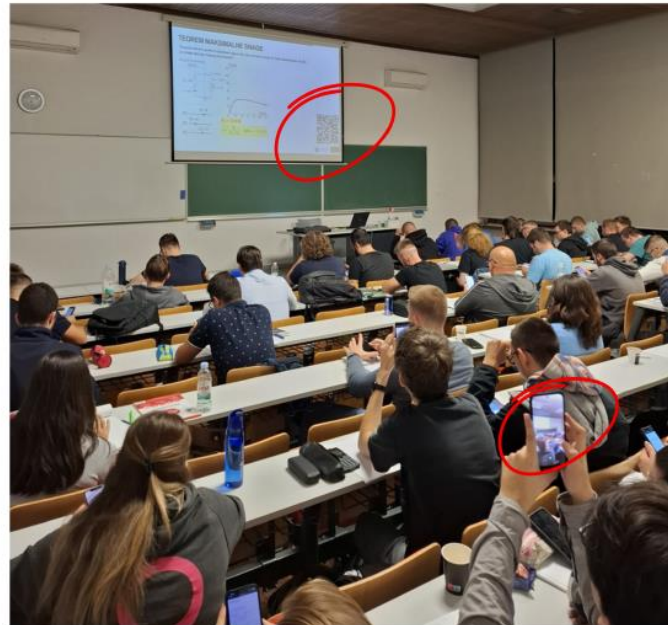
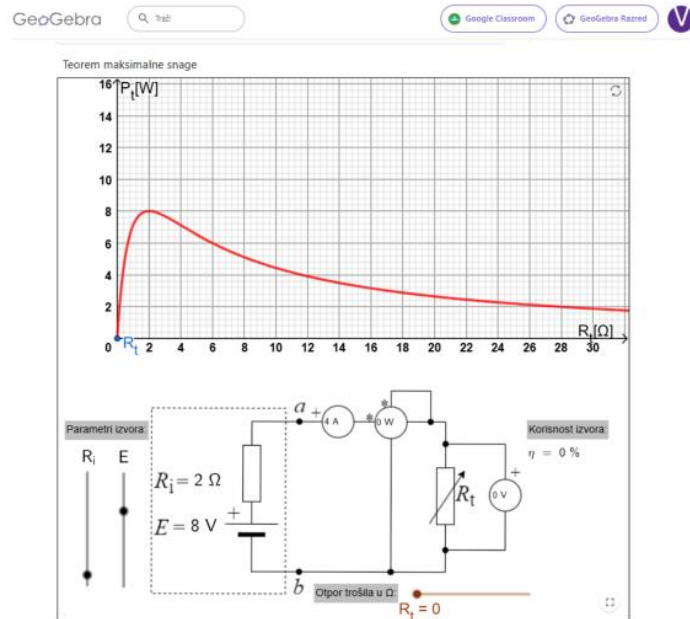
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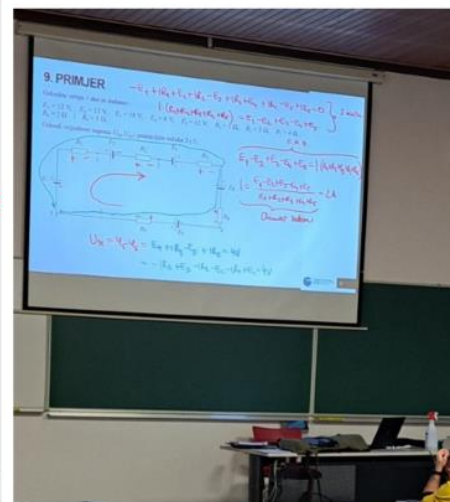
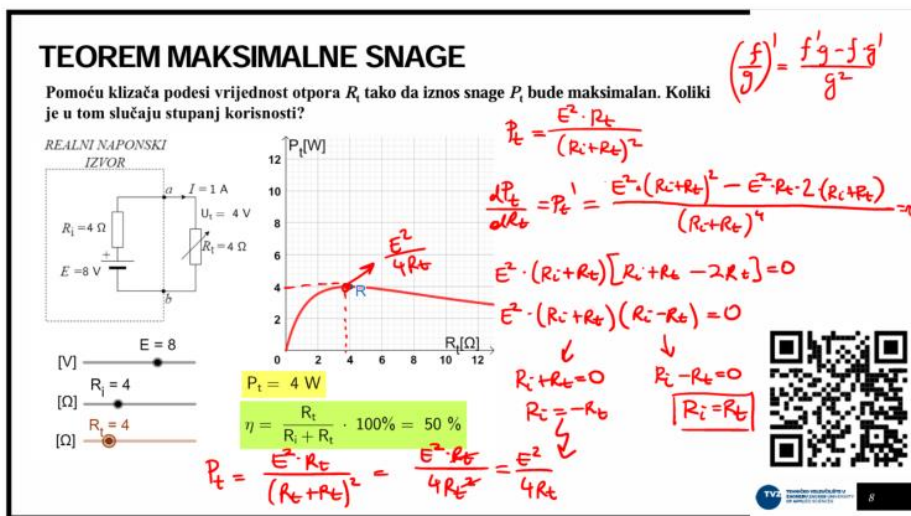
TOOLS & TECHNOLOGIES

- **QR Codes:** Easy access to additional resources.



TOOLS & TECHNOLOGIES

- **Graphic Tablet:** For real-time digital notes.



TOOLS & TECHNOLOGIES

- **LMS:** Central hub for resources and communication.

The image displays a Learning Management System (LMS) interface with three main panels. The top panel shows a navigation menu with options like 'Home', 'Dashboard', 'My courses', 'Prediplomski studij', 'Diplomski studij', and 'Cjelokupno obrazovanje'. The middle panel, titled 'My courses', lists several courses with icons and lesson counts, including 'Diplomski rad', 'Elektreane', 'Elektricitet i mag...', 'Elektroenergetika', 'Elektroenergetsk...', 'Mjerenja u elektr...', 'Osnove elektrote...', and 'Programiranje'. The bottom panel shows a detailed view of the 'Osnove elektrotehnike' course, including a list of topics and a list of resources. Arrows indicate the flow from the course list to the course details and then to the resources.

Top Panel: Navigation menu with options: Home, Dashboard, My courses, Prediplomski studij, Diplomski studij, Cjelokupno obrazovanje.

Middle Panel: My courses section showing a grid of course cards. Each card includes a title, a lesson count, and a 'CONTINUE STUDYING' button.

Bottom Panel: Detailed view of the 'Osnove elektrotehnike' course. It includes a list of topics (Opće informacije, Evidencija dolaznosti na predavanjima i auditornim vježbama, Materijali za učenje, Laboratorijske vježbe (15 bodova), Domaće zadatke (5 bodova), 1. tjeđan, 2. tjeđan, 3. tjeđan, 4. tjeđan) and a list of resources (Teorem maksimalne snage, Theveninov teorem, Nortonov teorem, Proračun mreže s nelinearnim elementom).

Right Panel: Detailed view of the 'Predavanja' (Lectures) section for the 4th week. It shows a list of resources: 4. predavanje grupa I - oe 2024 25 rukopis.pdf, 4. predavanje grupa I - oe 2024 25.pdf, 4. predavanje grupe C i D.pdf, and Predavanje04AIB.pdf.

TOOLS & TECHNOLOGIES

- **Quizizz:** Gamified quizzes for engaging assessments and instant feedback.



QUIZIZZ



TOOLS & TECHNOLOGIES

- **YouTube:** Recorded lecture summaries and tutorials for flexible, on-demand learning.

TEOREM MAKSIMALNE SNAGE

$$P_i = I^2 \times R_i = \frac{E^2 R_i}{(R_i + R_t)^2}$$

$$\frac{dP_i}{dR_i} = 0 \quad R_t = R_i$$

THE ELECTRICAL THEORY CHANNEL

Teorem maksimalne snage, korisnost izvora

The Electrical Theo...
403 subscribers

127 views · 3 weeks ago

1. Primjer: 00:10:13
2. Primjer: 00:13:19

The Electrical Theory Channel
403 subscribers · 15 videos

Podrška i podrška dobi na kanal The Electrical Theory Channel... more

elementi za izračun nelinearnih supertekstova i 4 more links

Customize channel Manage videos

Home Videos Playlists Community

For You

- 7. PRORAČUN MREŽE S NELINEARNIM ELEMENTOM
- 3. METODA SUPERPOZICIJE
- 1. METODA... SLABOJNA RASPOJANJE ODREĐIVANJE 2024/25
- Određivanje struje i na pasivnim elementima

Created playlists

- 1. METODA KONTINUITETNE
- 2. METODA KONTINUITETNE
- 3. METODA KONTINUITETNE
- 4. METODA KONTINUITETNE
- 5. METODA KONTINUITETNE



TOOLS & TECHNOLOGIES

- **LinkedIn:** Dissemination of methodology to a global network of educators.



Vatroslav Zuppa Bakša · You
Lecturer at Zagreb University of Applied Sciences
1mo · 🌐

➦ Prošli tjedan smo na kolegiju Osnove elektrotehnike učili o teoremu maksimalne snage na interaktivan način, koristeći mobilne uređaje za pristup virtualnom pokusu u Geogebri putem QR koda!

Prednosti ovog pristupa su višestruke:

- 1 ****Interaktivnost Geogebre**** – Virtualni pokusi omogućavaju studentima da samostalno manipuliraju parametrima i odmah vide kako promjene utječu na rezultate. Na ovaj način lakše povezuju teoriju kroz praktične primjere.
- 2 ****Mobilni uređaji kao alat u učenju**** – Upotreba mobitela omogućava studentima brz i jednostavan pristup obrazovnim materijalima bilo gdje i bilo kada. QR kodovi olakšavaju pristup potrebnim resursima, čime se ubrzava tijek nastave i dodatno motiviraju studenti.
- 3 ****Praktičnost QR kodova**** – Jednostavno skeniranje QR koda omogućuje direktan pristup digitalnim materijalima bez kompliciranih prijava, što štedi vrijeme i omogućava više fokusiranog rada.

Korištenje mobilnih uređaja, QR kodova i digitalnih alata poput Geogebre jedan je od primjera kako možemo na jednostavan način prilagoditi metode poučavanja te nastavni proces učiniti interaktivnim! 💡

Pregled aplikacije koju smo koristili te više o samoj ideji vizualizacije teorema maksimalne snage u Geogebri možete pročitati u članku na sljedećoj poveznici na Portalu hrvatskih znanstvenih i stručnih časopisa - Hrčak: <https://lnkd.in/dJD-eH2Q>

Zagreb University of Applied Sciences
#elektrotehnika #tvz #geogebra #obrazovanje #qrkod



🌐 Sunčica Perković and 14 others



Like



Comment



Repost



Send

📊 975 impressions

[View](#)



OUTCOMES & IMPACT

DIGITS has significantly improved teaching effectiveness, student engagement and learning outcomes:

- **Improved understanding**

- Students have better understood complex concepts such as the Maximum Power Transfer Theorem
- GeoGebra simulations helped to visualize abstract principles

- **Increased student engagement**

- Gamified quiz games increased motivation and active participation
- Real-time interaction supports continuous feedback

- **Skills development**

- Strengthening digital skills through the use of LMS, quizzes and simulations
- Encouraging independent exploration and self-assessment



OUTCOMES & IMPACT

DIGITS has significantly improved teaching effectiveness, student engagement and learning outcomes:

- **Accessibility & flexibility**

- Materials available at any time via LMS, YouTube and QR codes
- Students can learn at their own pace and revisit lecture content

- **Positive feedback & recognition**

- Student surveys praised the clarity, innovation and support of the approach
- Published results in IEEE and national academic journals
- Presented at international conference (MIPRO 2024)
 - Zuppa Bakša, V. and Bednjanec, A., 2024, May. Teaching Electrical Engineering Fundamentals Using The GeoGebra Platform. In 2024 47th MIPRO ICT and Electronics Convention (MIPRO) (pp. 1333-1337). IEEE.
 - Zuppa Bakša, V. and Bednjanec, A., 2023. Vizualizacija teorema maksimalne snage pomoću Geogebre. Poučak: časopis za metodiku i nastavu matematike, 24(96), pp.49-55.



“The simulations helped us finally understand the theory.”

“Modernized lectures and summaries made a big difference.”



LESSONS LEARNED

Several important lessons were learned during the implementation of DIGITS:

- **It's all in the mix**
 - The combination of digital tools with traditional teaching leads to optimal results
 - Technology supports learning but does not replace human interaction
- **Accessibility is important**
 - Students appreciate flexible access to materials (LMS, YouTube)
 - Continuous access improves revision and exam preparation
- **Support is essential**
 - Not all students are equally familiar with digital tools
 - Guidance and digital onboarding improve acceptance and confidence
- **Avoid over-reliance on technology**
 - Balance is key: too much technology can overwhelm or isolate students
 - Direct communication, mentoring and feedback remain irreplaceable



TRANSFERABILITY

DIGITS is highly adaptable and can be used in various educational institutions:

- **Scalable across disciplines**
 - Although the approach was developed for electrical engineering fundamentals, it is also applicable to other STEM and even non-STEM courses
 - The focus on concept visualization, gamification and flexible access is universally applicable
- **Availability of the tool**
 - Uses free or widely available digital tools: GeoGebra, LMS, Quizizz, YouTube, QR codes
 - Easy to integrate into existing curricula and platforms
- **Cost-effective, sustainable implementation**
 - Requires minimal financial investment
 - Reduces paper consumption through digital notes and assessments
 - Supports the long-term reuse of digital resources
- **Dissemination and sharing**
 - Publication in peer-reviewed journals and presentation at international conferences
 - Promoted via LinkedIn, enabling peer learning and cross-institutional adoption





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THANK YOU

