DIGITS

DIGITAL INTERACTIVE GAMIFIED TEACHING WITH SOCIAL MEDIA AND GEOGEBRA

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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.

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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

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Evaluation

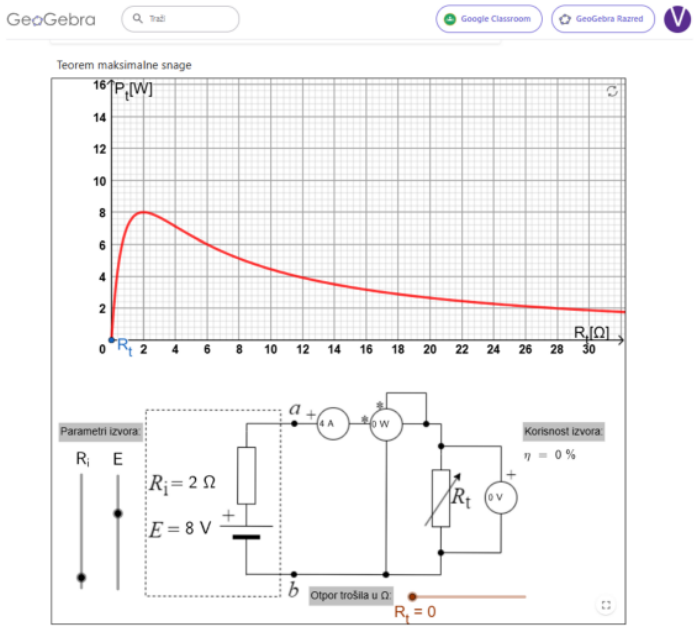
- Analyze student learning via Quizizz results and feedback surveys
- Monitor exam performance to assess concept comprehension
- Refine methods based on reflection and student input

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.

TOOLS & TECHNOLOGIES

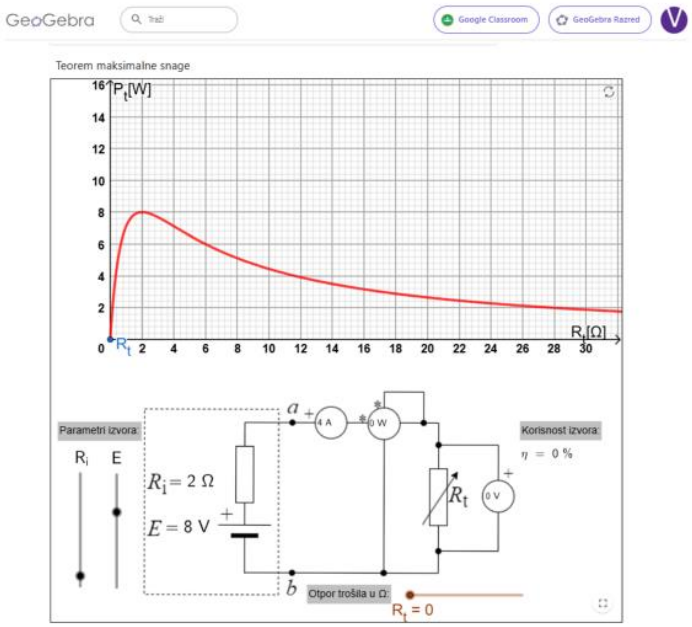
- **GeoGebra**: For dynamic, interactive learning of complex concepts.

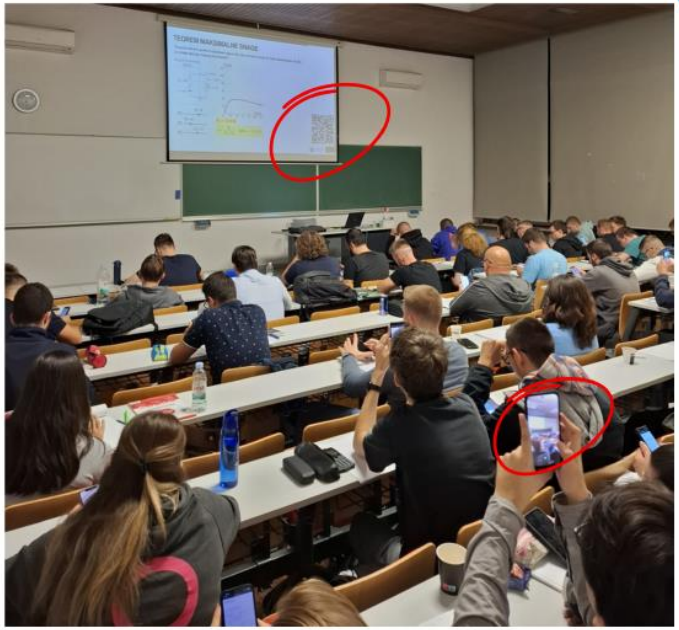


GeoGebra

TOOLS & TECHNOLOGIES

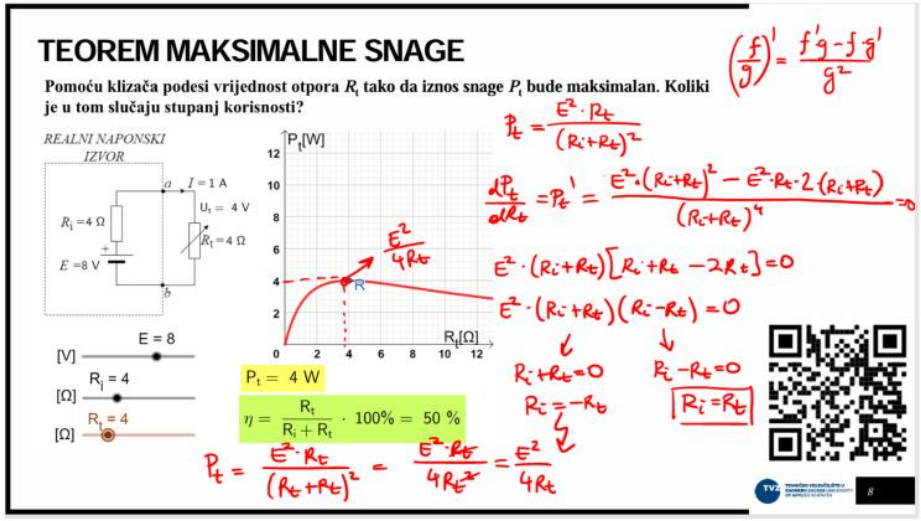
- **QR Codes:** Easy access to additional resources.

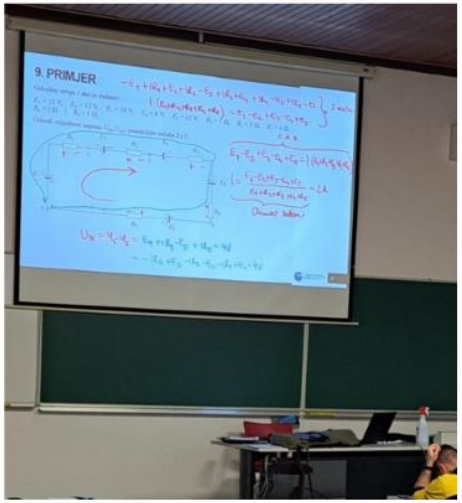




TOOLS & TECHNOLOGIES

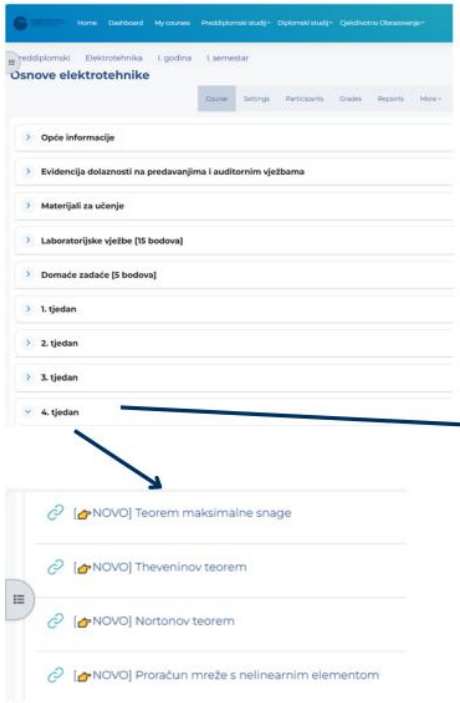
- **Graphic Tablet:** For real-time digital notes.

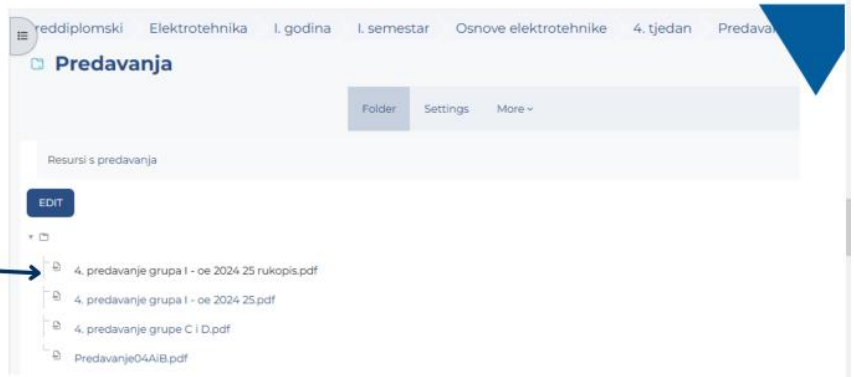




TOOLS & TECHNOLOGIES

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





TOOLS & TECHNOLOGIES

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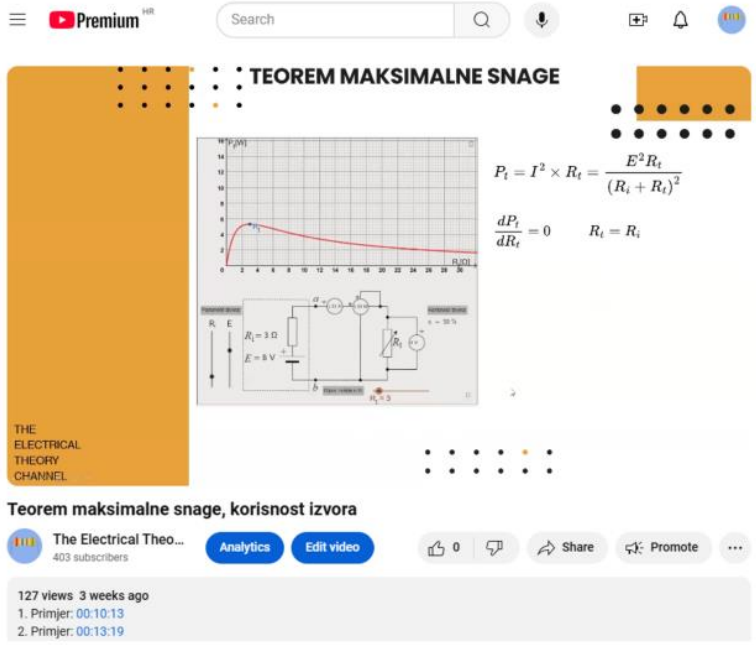
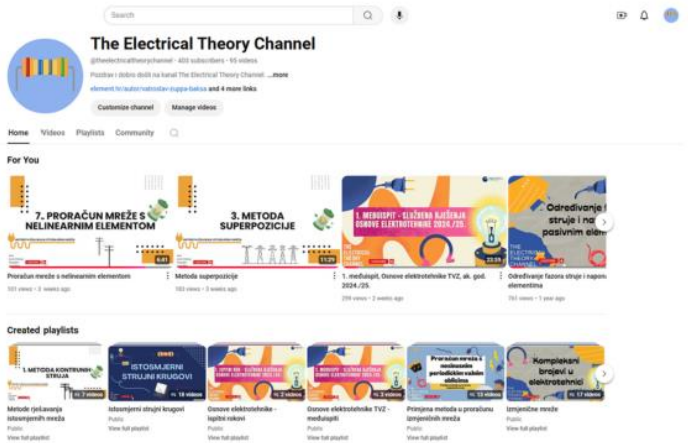
QUIZIZZ

TOOLS & TECHNOLOGIES

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

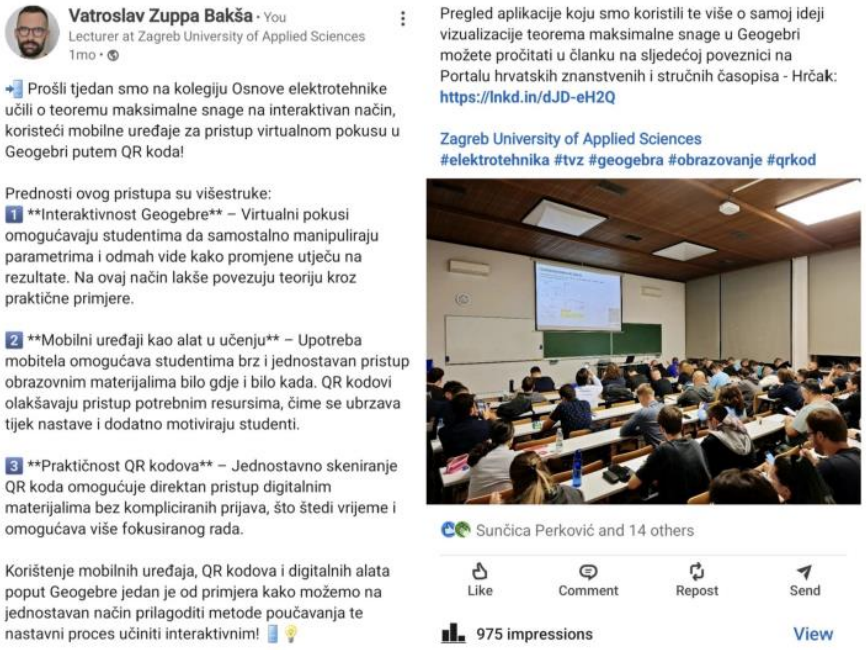




YouTube

TOOLS & TECHNOLOGIES

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



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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:
1️⃣ **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.

2️⃣ **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.

3️⃣ **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

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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

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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."

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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

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