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DIGITAL REVOLUTION IN EDUCATION: THE WHAT AND HOW OF LEARNING



"If you can not measure it, you can not improve it." Kelvin

CSEDU 2021 13th International Conference on Computer Supported Education April 23-25. 2021

edia.hu

Center for Research on Learning and Instruction

A POTENCIAL REVOLUTION IN EDUCATION

WILL THE PANDEMIC CHANGE SCHOOLS?

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Global monitoring of school closures caused by COVID-19

online

31.03.2020 affected: 84% of learners

Partially open

seeme,

Closed due to COVID-19

iency

Fully open

equcatio

Academic break

Highcharts.com

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Unprecedented challenges

- for students and teachers
- proper infrastructure
- technical assistance
- reinvent themselves in record time to keep school running.



Effects of school lockdowns in response to COVID-19

- Only a few days for transforming "new normal",
- accelerated the spread of the application of technologies, digitalization,
- enhanced teachers' cooperation + opportunities



FRSITA

Expected



- Teachers can reinvent and renew education in only a few days
- a rapid pedagogical shift
- adaptation to new learning methods and environments
- forgeting the fitting for all approach



- not enough infrastructure
- not enough digital competencies ->

"Children of today have been surrounded by digital technology" (Livari et al., 2020) But

Used not for learning

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- => Much larger digital divide
- Need for proactive technology usage: critically considering how it could and should be used





- not enough infrastructure
- not enough digital competencies
- explore good practices
- accelerated the spread of the application of technologies
- lack of proper methodological knowledge
- frontal teaching methods in digital environment
- mostly unmotivated kids

Positive effects

- **Students**
 - Technology + learning
 - Self-direction + New learning methods
- **Teachers:**
 - ICT competencies + cooperation with other teachers
 - The What of teaching
 - "Fitting for all" not working
 - Alternative assessment methods (e.g. portfolio)



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We have learnt

- more than just technology
- highly complex
- whoever lags behind, is ultimately lagging behind
- personalised education
- rething and redesing ed.
- methodologies, competencies, and assessment methods
 - First step: insfrastructure



The present situation have created not only fertile opportunities for reshaping education but also highlighted the difficulties and challenges in this process.

SZEGEDIENSIS SZEGEDI TUDOMÁNYEGYETEM



CSEDU 2021 13TH INTERNATIONAL CONFERENCE ON COMPUTER SUPPORTED EDUCATION

ONLINE STREAMING

23 - 25 APRIL, 2021



Technology in education NIVERSITAS SCIENTIARUM SZEGEDIENSIS SZEGEDI TUDOMÁNYEGYETEM (Scopus) 973 \odot က Ć တ



how to maximize to increase the effectiveness of learning

learning outcome + motivation + engagement

2020

Technology supported education – focus

1990

2000

media comparison studies adapt these technologies to the human mind

2010

Today

- fine-grained, process-oriented data
- Intelligent tutors formative feedback
- learning analytics
- require development of new learning theories
- reconceptualization of research





Educational technologies have brought about developments and challenges in theory, methods, and practice.



How can we best use technology to help students learn?

- rigorous experimental research is needed
- to identify instructional features in technology-rich environments
- that maximize learning outcomes and
 - promote appropriate learning processes.

Why is this important?

Why is the "one size fits all" approach inefficient?

Why do we need to change to what and how of learning?

Age does not determine skills and abilities.





Technology can help to address this issue and personalise education.



Questions for teaching and learning

- how the use of technology can reshape the methods of traditional teaching
- how it could be maximized to
 - increase learning effectiveness,
 - support differentiated instruction,
 - boost student concentration,
 - raise their limits of endurance,
 - and maintain their motivation?

COVID-19: opportunity for reimagining and digitally transforming (starting) education



The WHAT of teaching

- Leaving the "fitting for all approach" and personalise education
- What do we need to know?
 - How skilled our students are?
 - What do they know in the most important domains of education?
- The profile of assessment from a summative approach to a diagnostic, more learning-centred view use assessment to facilitate learning.

Possibilities of technology based assessment

- among the most dynamically developing areas
- huge improvement of data transfer technology and data analysis methods
- qualitative change of assessment needed



Computer-based assessment

- extraordinary opportunities
- more realistic, application-oriented, engaging and authentic context
- innovative item development opportunities, producing dynamic, interactive multimedia items
- more valid assessments



- provide instant, objective, standardised feedback
- adaptive test algorithms

Instant feedback+adaptivity

- make video games so popular
- technology-based assessment and gamebased learning are converging



What do we know in 2021?

- we can develop complex, real-world, authentic, high-quality tests
- the 'one-size-fits-all' approach is not effective
- summative test results do not meet the individual needs of students
- tests needed: improving the learning process -> re-think the essence of assessment
- more a learning-centred, low-stakes approach
 Diagnostic assessment to facilitate learning.

Diagnostic assessment – what do we need?

- Theory frameworks
- Assessment platform
- Tasks (based on theory) -> Itembank (runing in the assessment platform) -> Scaled itembank



Diagnostic assessment - theory

- identifying all important knowledge elements
- three main goals of schooling:
 - to cultivate students' minds, general cognitive abilities and thinking skills
 - to develop usable, applicable knowledge
 - to transmit content knowledge



NYEGYETEM Three-dimensional model of mathematical knowledge the interaction between Internal (psychological) students' cognitive dimension development and learning mathematics at school content knowledge Social and cultural described in the national dimension core curriculum literacy: the type of skills that make Disciplinary (content) mathematics useful in areas other than dimension the immediate school context

Diagnostic assessment – assessment platform

- learning centred
- easy-to-use, but innovative possibilities
- Item builder module for first-, second- and third-generation tasks
- administer both fix and adaptive tests
- any device + even low-speed internet



- prompt or quick scoring
- good feedback module embedded
- visualization

Diagnostic assessment tasks

- Several thousand tasks based on the theory
- Empirically scaled + labelled item bank

eDia online diagnostic assessment system for personalised learning

- Theory: three-dimensional model of knowledge
- Innovative assessment platform





eDia - diagnostic assessment - tasks

At about 25.000 tasks in the field of Mathematics, Reading and Science.



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Mathen	natical reasoning task: whole numbers + inductive reasoning
JDOMÁNYE	Dumpling Arthur got 20 bars of chocolate for his birthday. He ate a few pieces from each chocolate bar, and then he put the rest of the chocolate into groups according to a certain rule. There is an odd one out in each row. Which one is it? Click on it.
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/ERSITAS	



Mathematical literacy task: adding up to 10 in 'ERSITAS SCIENTIARUM SZEGEDIENSIS SZEGEDI TUDOMÁNYEGYETEM realistic application context



Keep putting Teddy bears on the bed till you have 8 bears there.





Which animal sound do you hear? Click on the right picture.



















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eDia partner schools



Technology-Based Assessment is Applicable in an Educational Context



Disciplinary, application and psychological dimensions of learning mathematics, reading and science can be empirically distinguished independent of the measured grade.



TUDOMÁNYEGYETEM

Item banks are well structured and fit the knowledge level of first- to sixth-graders in all three main domains of learning.

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The eDia-system is appropriate to make learning visible in the three main domains of learning and

beyond.



Continue the line!

Out of the images under the line drag the one which fits best to the yellow frame.







Main page Services Experiences Prices and opening hours Special offers



Next o

23. How many pictures are demonstrating the experience options on the main page?



Next •

Extra moduls

- eDia teacher test modul (<u>www.ovi.edia.hu</u>)
- eDia kindergarten test modul (<u>www.teszt.edia.hu</u>)



Effect of disruptive education in the last year (Sept-Oct)



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The HOW of teaching

- Learning strategies: virtual vs. traditional classroom – differ
- to recite, repeat and remember knowledge without of any meaning, without any attempt to tie to anything in their lives

VS

- for tomorrow, for the needs of the future
- proactive usage of technological tools
 Cooperative, collaborative, problem-based

• At all level of education

Educational technologies of the future

- intelligent systems incorporating sophisticated learner and teacher models
- monitor and model the emotional, metacognitive, and cognitive states of learners
- interact with them
- support collaborative and cooperative learning
 applying adaptive models of assessment

Key Takeaways

- Leave the "fitting for all approach"
- Integrate knowledge from different fields
- Change: what and how of teaching
- Evidence-based, theory-grounded, rigorous experimental research
- Use the advantages of technology as a tool, supportive medium – rather than expect adaptation to every new technology
- For personalize learning

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Thank you for your kind attention!

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