



7. KONFERENCA UČITELJEV/-IC NARAVOSLOVNIH PREDMETOV – NAK 2023:

Z ZNANJEM IN RAVNANJEM NASLAVLJAJMO PODNEBNE SPREMEMBE IN TRAJNOSTNOST

17. DO 18. APRIL 2023, LAŠKO

e-učno okolje pri poučevanju biologije

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in matematiko

Laško,
18. april 2023



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA OKOLJE,
PODNEBJE IN ENERGIJO



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA VZGOJO IN IZOBRAŽEVANJE



Zavod
Republike
Slovenije
za šolstvo

Dogodek delno financira Ministrstvo za okolje, podnebje in energijo s sredstvi Sklada
za podnebne spremembe, v okviru projekta Podnebni cilji in vsebine v vzgoji in izobraževanju.






MOVIE MAKER

CREATED WITH
MOVIE MAKER TRIAL VERSION



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How can you
prepare students
for the future, if
you are stuck
in the past?



App Selection Criteria

Remembering Criteria

Remembering: Apps that fit into the "remembering" stage improve the user's ability to define terms, identify facts, and recall and locate information. Many educational apps fall into the "remembering" phase of learning. They ask users to select an answer out of a line-up, find matches, and sequence content or input answers

Understanding Criteria

Understanding: Apps that fit into this "understanding" stage provide opportunities for students to explain ideas or concepts. Understanding apps step away from the selection of a "right" answer and introduce a more open-ended format for students to summarise content and translate meaning.

Applying Criteria

Applying: Apps that fit into the applying stage provide opportunities for students to demonstrate their ability to implement learned procedures and methods. They also highlight the ability to apply concepts in unfamiliar circumstances.

Analyzing Criteria

Analysing: Apps that fit into the "analysing" stage improve the user's ability to differentiate between the relevant and irrelevant, determine relationships, and recognise the organisation of content.

Evaluating Criteria

Evaluating: Apps that fit into the "evaluating" stage improve the user's ability to judge material or methods based on criteria set by themselves or external sources. They help students judge content reliability, accuracy, quality, effectiveness, and reach informed decisions.

Creating Criteria

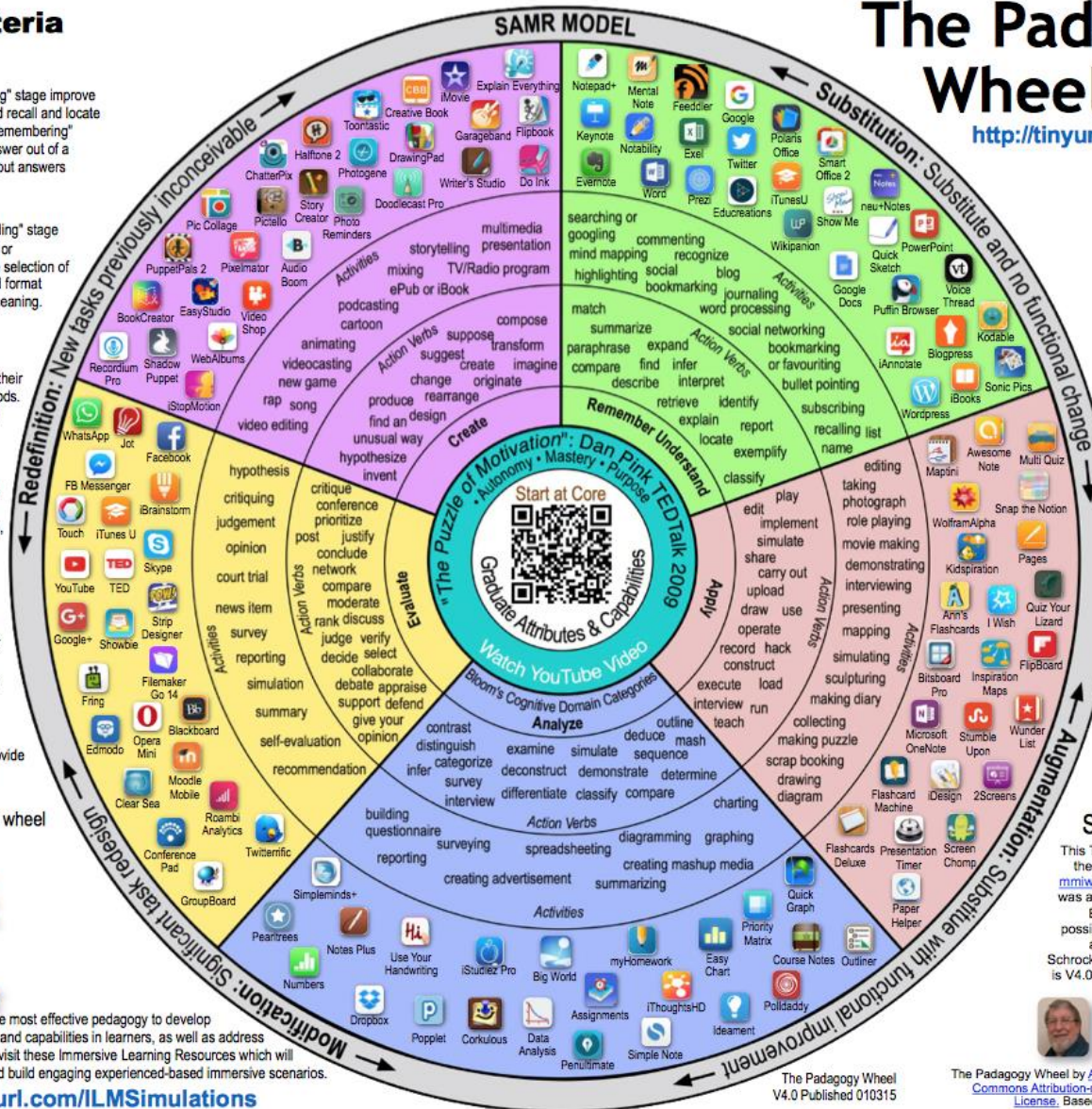
Creating: Apps that fit into the "creating" stage provide opportunities for students generate ideas, design plans, and produce products.

Immersive Learning at the core of the wheel is the New Instructional Design



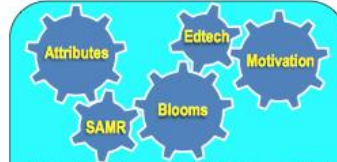
Simulations are the most effective pedagogy to develop graduate attributes and capabilities in learners, as well as address motivation. Please visit these Immersive Learning Resources which will help you design and build engaging experienced-based immersive scenarios.

<http://tinyurl.com/ILMSimulations>



The Padagogy Wheel V4.1

<http://tinyurl.com/posterV4>



Getting the best use out of the Padagogy Wheel

Use it as a series of prompts or interconnected gears to check your teaching from planning to implementation

The Attributes Gear: This is the core of learning design. You must constantly revisit things like ethics, responsibility and citizenship. Ask yourself the question what will a graduate from this learning experience "look like" i.e. what is it that makes others see them as successful? Ask "how does everything I do support these attributes and capabilities?"

The Motivation Gear: Ask yourself "How does everything I build and teach give the learner autonomy, mastery and purpose?"

The Blooms Gear: Helps you design learning objectives that achieve higher order thinking. Try to get at least one learning objective from each category. Only after this are you ready for technology enhancement.

The Technology Gear: Ask "How can this serve your pedagogy? Apps are only suggestions, look for better ones & combine more than one in a learning sequence.

The SAMR Model Gear: This is "How are you going to use the technologies you have chosen?"

I would like to thank [Tobias Rodemker](#) for the idea of the gears. Tobias is a teacher & works for the State Institute for School Development Baden-Württemberg (LS), Germany

Allan Carrington



The Padagogy Wheel First Language Project: 21 languages are planned for 2016. For the latest languages see bit.ly/languageproject

Standing on the Shoulders of Giants

This Taxonomy wheel, without the apps, was first discovered on the website of Paul Hopkin's educational consultancy website mniweb.org.uk. That wheel was produced by Sharon Arley and was an adaptation of Kathwohl and Anderson's (2001) adaption of Bloom (1956). The idea to further adapt it for the pedagogy possibilities with mobile devices, in particular the iPad, for V2.0 and V3.0 I have to acknowledge the creative work of Kathy Schrock on her website [Bloomin' Apps](#). For the major revision that is V4.0 I have to thank the team of ADEs who created APPTitc: the App Lists for Education Project which has now closed



Developed by Allan Carrington Designing Outcomes Adelaide South Australia Email: allan@designingoutcomes.net

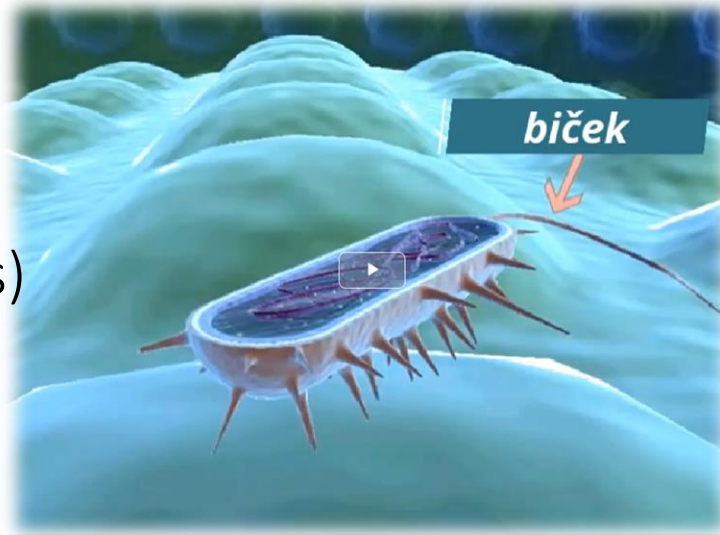
The Padagogy Wheel by Allan Carrington is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](#). Based on a work at <http://tinyurl.com/bloomsblog>



Zavod Republike Slovenije za šolstvo

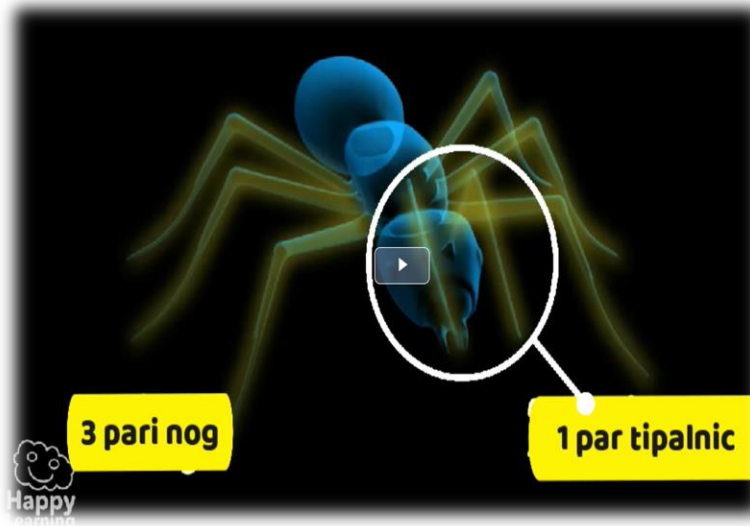
Video gradiva

- **Bakterije:** (dolžina: 16 min 52 s)



- **Pipalkarji in stonoge:** (dolžina: 15 min 55 s)

- **Žuželke in raki:** (dolžina: 15 min 30 s)



Mnenje učencev o vsebini bakterije glede na učno metodo

Trditve za video		M	SD	M	SD	Trditve za delovne liste
primerjava trditev glede na metodo dela	Posnetek mi je bil všeč.	4.34	0.92	4.22	1.12	Gradivo mi je bilo všeč.
	Vsebina o bakterijah mi je po ogledu posnetka, razumljiva.	4.00	0.98	3.71	1.22	Vsebina o bakterijah mi je, po reševanju gradiva, razumljiva.
	Po ogledu posnetka si bakterije bolje predstavljam, kot bi si jih le s pomočjo slik.	4.37	0.98	3.41	1.27	Po obdelavi gradiva si predstavljam, kako bakterije izgledajo v resnici.
	Pri pouku na daljavo si želim več takšnega načina učenja.	3.84	1.32	3.75	1.23	Pri pouku na daljavo si želim več takšnega učenja.
	S tem posnetkom sem se naučil/-a več kot bi se v razredu.	3.40	1.08	2.96	1.19	S pomočjo gradiva sem se naučil/-a več, kot bi se v razredu.
	Ob posnetku bi želel/-a učitelja kaj vprašati.	3.31	1.21	3.06	1.46	Med reševanjem delovnega lista bi učitelja želel/-a kaj vprašati.
	Posnetek je bil predolg.	3.24	1.07	2.07	1.11	Gradivo je bilo predolgo.



Rezultati učencev pri vsebini **bakterije** glede na učno metodo

metoda	N*	min.**	max.***	Mean	SD	Σ točk
video	62	2	14	9.56	3.02	593
delovni listi	62	3	14	9.94	2.65	616

Rezultati učencev pri vsebini **Žuželke in raki** glede na učno metodo

metoda	N*	min.**	max.***	Mean	SD	Σ točk
video	61	1	12	8.36	2.68	510
delovni listi	61	3	12	7.36	2.06	449

Rezultati učencev pri vsebini **Pipalkarji in stonoge** glede na učno metodo

metoda	N*	min.**	max.***	Mean	SD	Σ točk
video	60	3	14	10.82	3.02	649
delovni listi	60	3	14	10.18	3.10	611





Za učinkovit učni proces je s strani učencev ključno sprejemanje učne metode.

Iz rezultatov raziskave sklepamo, da je učencem ljubša video metoda, skladnost z rezultati Choi in Johnson (2005).

Slednje pojasnujemo s **kognitivno teorijo multimedijskega učenja** (Mayer, 2014), kjer trdijo, da se informacije obdelujejo preko dveh ločenih kanalov:

slušno/verbalni in vizualni/slikovni

kjer ima vsak kanal omejeno zmogljivost obdelave (predpostavka o omejeni zmogljivosti).

R. E. Mayer. (2014). Cognitive theory of multimedia learning. In The cambridge handbook of multimedia learning (2nd ed., p. 72). Cambridge University Press.

H. J. Choi, & S. D. Johnson, (2005) The Effect of Context-Based Video Instruction on Learning and Motivation in Online Courses, *The American Journal of Distance Education*, 19(4), 215-227, doi: 10.1207/s15389286ajde1904_3



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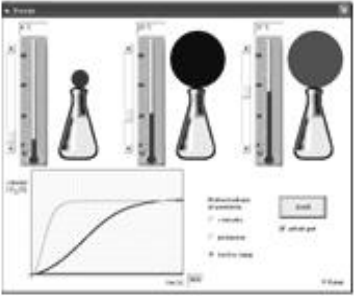


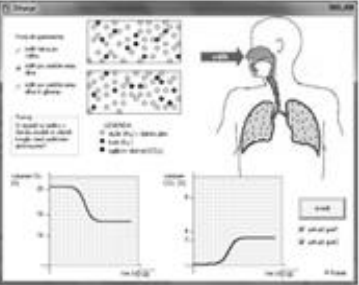







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ŠPERNJAK, Andreja, ŠORGO, Andrej. Differences in acquired knowledge and attitudes achieved with traditional, computer-supported and virtual laboratory biology laboratory exercises. *Journal of biological education*. 2018, vol. 52, iss. 2, str. 206-220, ilustr. ISSN 0021-9266. DOI: 10.1080/00219266.2017.1298532

<i>Technology</i> <i>Exercise</i>	<i>tradicionalen lab</i>	<i>računalniško podprt lab</i>	<i>virtualen lab</i>
delovanje kvasovk			
pljučno dihanje			
srčni utrip			



- Učitelji so lahko najbolj učinkoviti pri uporabi različnih metod poučevanja (O'Day, 2008), vključno z IKT.
- A kdo je največja težava pri vključevanju IKT v biološki laboratorij? Učitelji in ne učenci (Kubiatko in Haláková, 2009; Špernjak in Šorgo, 2009).

O'Day, D. H. 2008. "Using Animations to Teach Biology: Past & Future Research on the Attributes That Underline Pedagogically Sound Animations." *The American Biology Teacher* 70 (5): 274–278. doi:10.1662/0002-7685(2008)

Špernjak, A., and A. Šorgo. 2009a. "Perspectives on the Introduction of Computer-supported Real Laboratory Exercises into Biology Teaching in Secondary Schools: Teachers as Part of the Problem." *Problems of Education in the 21st Century* 14: 135–143.

Kubiatko, M., and Z. Haláková. 2009. "Slovak High School Students' Attitudes to ICT Using in Biology Lesson." *Computers in Human Behavior* 25 (3): 743–748. doi:10.1016/j.chb.2009.02.002



Ne pripravljajmo učečih za nekaj.

Pripravljajmo jih za karkoli.

Don't prepare students for something. Prepare them for anything.
@€_Sheninger

Image credit: kidoovation.com/



Priprave za prihodnost, a ne še danes.

Prihodnost je že danes!

By 2022 everyone will need
an extra

101

days of
learning

Proaktivnost je, zaradi hitrih družbenih sprememb, nujna.

Od leta 400 do 1500 = **ZNANJE ×2 (1100 let).**

Podvojeno ZNANJE od 1500 do 1750 (**250 let**).

Leta 1900 povečanje znanja za 2,5× (**150 let**).

Leta 2015 = **2× na 20 let**

Leta 2020 = 2× v 180 dneh (6 mesecih!!!)

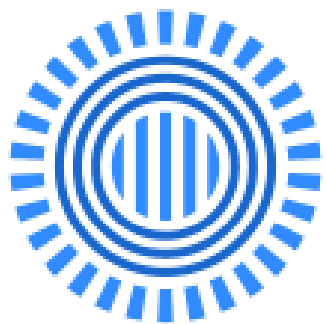


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Quizlet



Prezi

Actionbound



Wordwall



EDpuzzle

ZYGOTE BODY



Audacity

Mentimeter

PHET
INTERACTIVE SIMULATIONS



nearpod

socrative
by MasteryConnect



POWTOON

filmora

plickers
clickers, simplified



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moodle





Technically, Moses



**was the first person
with a tablet
downloading data
from the cloud**



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