



WP4-A6. Pedagoško testiranje i implementacija IT poboljšanja interaktivnog RockChain alata.



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1. UVOD

Ovaj dokument prikazuje rezultate aktivnosti WP4-A6 "Pedagoško testiranje i implementacija IT poboljšanja interaktivnog RockChain alata", razvijene unutar Radnog paketa 4 projekta RockChain.

Nakon rada na usavršavanju i stabilizaciji provedenom u prethodnim WP4 aktivnostima, Interaktivni alat RockChain testiran je s vanjskim pedagoškim stručnjacima (profili za obrazovanje odraslih i strukovno osposobljavanje) kako bi se potvrdila njegova prikladnost kao ozbiljne igre spremne za učionicu te identificirala realna poboljšanja koja poboljšavaju ishode učenja, olakšavanje i uključivost.

Svrha ovog izvještaja je sažeti povratne informacije prikupljene putem strukturiranog online upitnika, istaknuti glavne snage i slabosti koje su identificirali evaluatori te dokumentirati IT poboljšanja koja su prioritetizirana i implementirana u ažuriranoj verziji korištenoj za pripremu pilota.

Interaktivni alat RockChain i drugi rezultati javnih projekata dostupni su putem web stranice projekta RockChain: <https://rockchain.eu/>



2. EVALUACIJSKI UPITNIK

Svaki partner poslao je upitnik vanjskim pedagoškim stručnjacima, osiguravajući uravnotežen panel koji pokriva komplementarne perspektive: trenere odraslih/VET u kružnoj ekonomiji i upravljanju otpadom, istraživače ozbiljnih igara i dizajna učenja, stručnjake za pristupačnost i inkluziju te menadžere za industrijsku obuku.

Ukupno je 6 stručnjaka ispunilo upitnik (stopa završetka 100%). Upitnik sadrži 7 pitanja, kombinirajući stavke na Likertovoj skali (opće zadovoljstvo, jasnoća sadržaja, vizualni dizajn, integracija u učionicu, inkluzija i motivacija) te otvoreno pitanje za prikupljanje konkretnih prijedloga za poboljšanje.



2.1. EVALUACIJSKI UPITNIK

Ispod je upitnik proveden za tehničku evaluaciju ovog projekta i njegovih proizvoda:

Pedagogical questionnaire of Interactive RockChain Tool.

TRANSVERSAL TECHNOLOGICAL SKILLS FOR THE ORNAMENTAL ROCK INDUSTRY
FOCUSING ON THE
APPLICABILITY OF BLOCKCHAIN IN A CIRCULAR ECONOMY
REFERENCE: 2023-1-DE02-KA220-ADU-000166863

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No compartido



1. Overall, how satisfied were you with the RockChain Interactive Tool?

	1	2	3	4	5	
Not satisfied at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfied



2. General questions. To what extent do you agree with the following statements?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
The content is relevant and appropriate for the age and level of the student	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tool present the information clearly and accurately.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The vocabulary used is understandable to students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tool show how to use the blockchain in the waste management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tool enable user training for applied blockchain technology in the rock waste management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. In terms of technical contents to what extent do you agree with the following statements?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
The design is visually appealing and appropriate for the audience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Images and graphics support or reinforce the textual content of the Tool.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Text size is legible.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The colors and format make the content easy to understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is easy to integrate into daily classroom activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tool allow group work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Encourage collaborative learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. In terms of diversity and inclusion:

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is designed to accommodate different learning styles (visual, auditory, kinesthetic).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tool is accessible to students with special needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



6. Finally, on motivation and participation how do you agree with the following:

	Fully disagree	Rather disagree	Neither agree nor disagree	Rather agree	Fully agree
Tool is motivating for students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tool includes elements that encourage interest or curiosity about the topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Do you have any further comments and recommendations on the Tool? What could have been done better?

Please, tell us what kind of improvement you can suggest:

Tu respuesta



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2.2. REZULTATI UPITNIKA

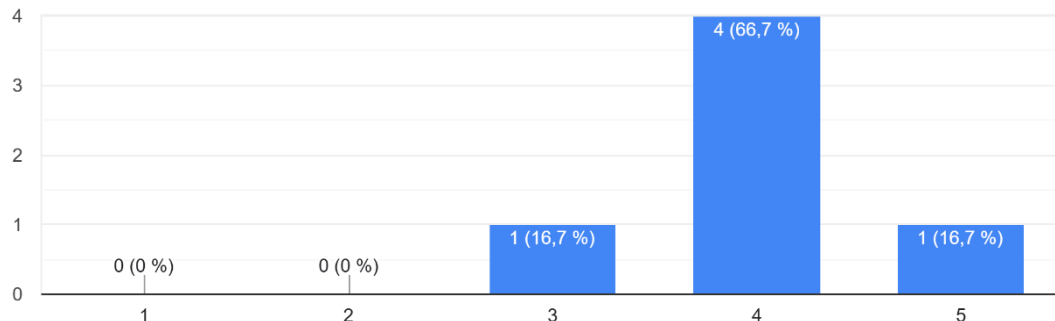
Ukupno je šest pedagoških stručnjaka ispunilo upitnik.

Q1 – Opće zadovoljstvo (Skala 1–5):

Prosječni rezultat bio je 4,0/5, s sljedećom raspodjelom: jedna ocjena 3, četiri ocjene 4 i jedna ocjena 5.

1. Overall, how satisfied were you with the RockChain Interactive Tool?

6 respuestas

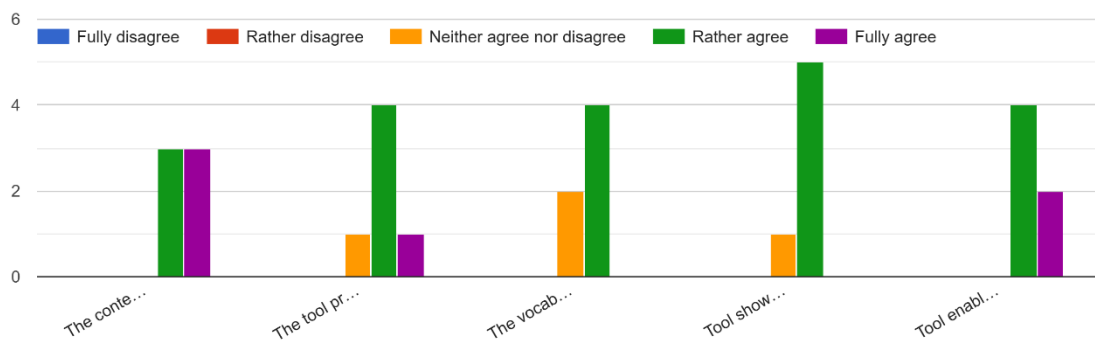


Q2 – Opća percepcija (Sadržaj i relevantnost):

Svi ispitanici složili su se da je sadržaj alata relevantan i prikladan za ciljanu skupinu te da može učinkovito podržati primijenjenu obuku o blockchainom omogućenoj sljedivosti u upravljanju otpadom. Manje rezervacije uglavnom su bile povezane s:

- prisutnost specijalizirane terminologije koja može biti izazovna za početnike, i
- Potreba da se koncepti "blockchaina" učini konkretnijima kroz jasnije primjere u aplikaciji ili pojednostavljena objašnjenja.

2. General questions. To what extent do you agree with the following statements?

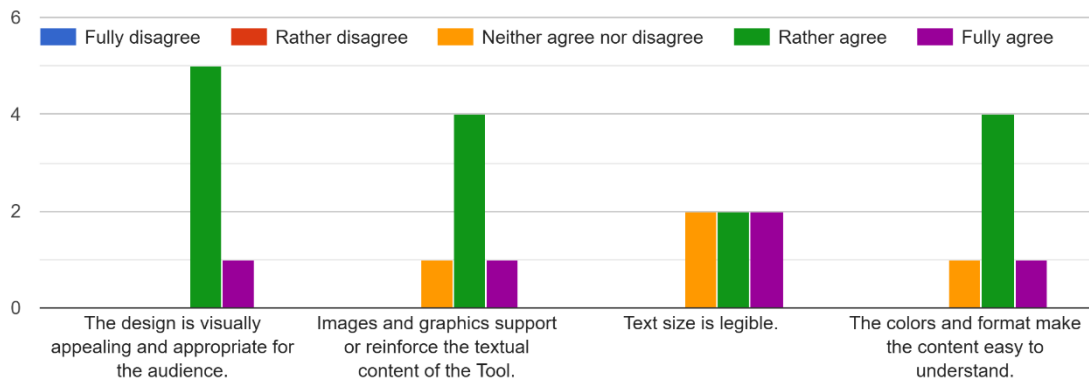


Q3, Q4 – Dizajn, upotrebljivost i obrazovna integracija:

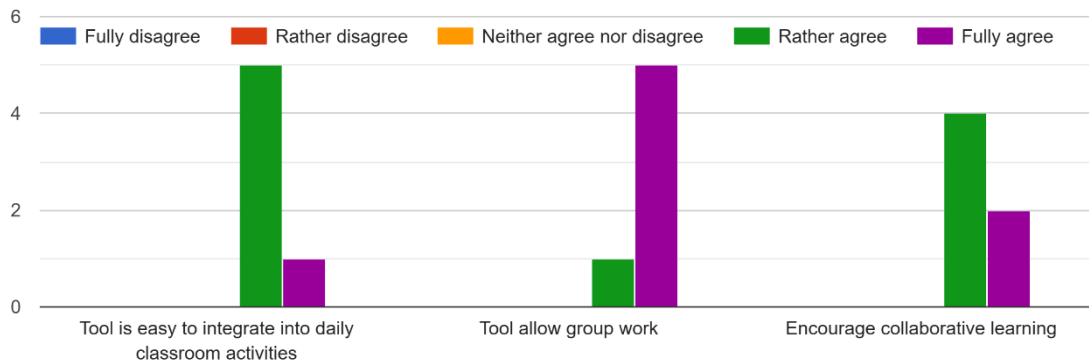
Povratne informacije bile su dosljedno pozitivne u pogledu vizualne koherentnosti, čitljivosti i praktične prikladnosti alata za upotrebu u učionici i radionicama, osobito u kontekstima učenja temeljenog na grupama. Stručnjaci su istaknuli da struktura s kružnom bazom:

- prirodno podržava suradnju, i;
- može se integrirati u vođene sesije s ograničenim vremenom pripreme.

3. In terms of technical contents to what extent do you agree with the following statements?



4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?



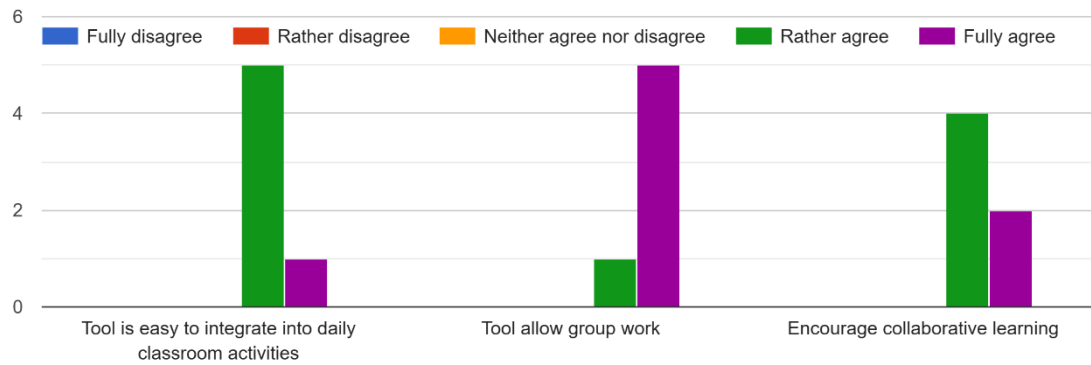
Q5 – Diversity and inclusion:

Iako su se stručnjaci uglavnom slagali da alat može prilagoditi različite stilove učenja, pristupačnost za učenike s posebnim potrebama postala je glavno područje poboljšanja. Odgovori su podijeljeni na:

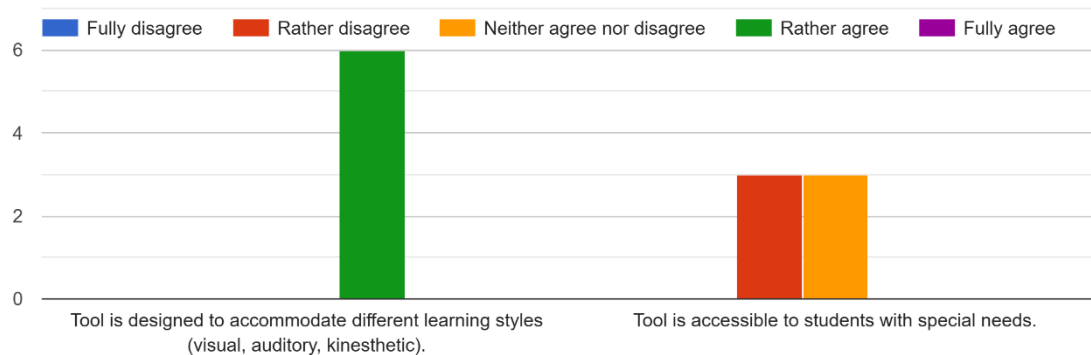
- 50% neslaganje,
- 50% neutralne ocjene, i

To ukazuje da mjere pristupačnosti još nisu dovoljno eksplicitne ili robusne.

4. Thinking about its use in the wing or educational setting, to what extent do you agree with the following sentences?



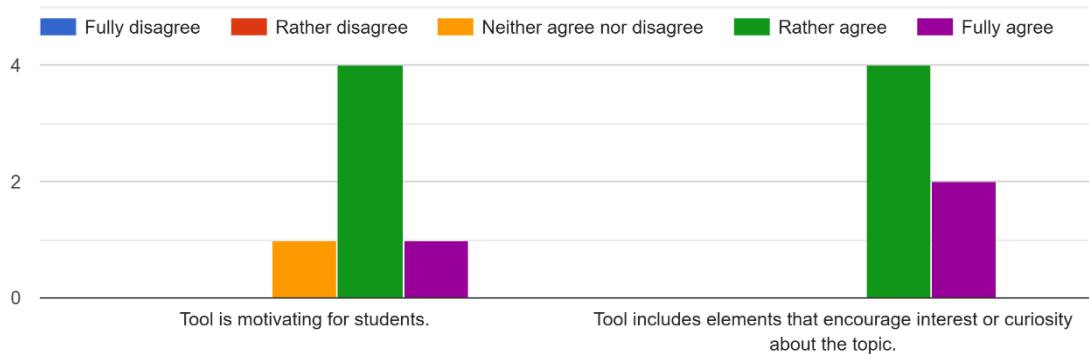
5. In terms of diversity and inclusion:



Q6 – Motivacija i angažman:

Alat je percipiran kao motivirajući i učinkovit u poticanju znatiželje, osobito kada se koristi kao poticaj za raspravu, nakon čega slijedi vođena analiza koja povezuje odluke o igranju s praksama iz stvarnog svijeta.

6. Finally, on motivation and participation how do you agree with the following:



7. Do you have any further comments and recommendations on the Tool? What could have been done better?

Please, tell us what kind of improvement you can suggest:

6 respuestas

As a group experience, it is fine, but it lacks a layer of explicit accessibility: configurable font size, high contrast, and clear alternatives when there is time pressure. It would also help to incorporate consistent iconography for waste/actions and a "low stress" mode (more time and fewer simultaneous elements) for certain groups.

The tool already feels like it belongs in the classroom: participants have a better understanding of the meaning of the awards and the phases, and reflection can be guided at the end of each round. As an improvement, I would suggest a downloadable summary for the trainer with simple indicators (waste reduced, best strategies, etc.), even if it is basic.

I like it as a decision simulation (buy/transform/reduce waste), but the term "blockchain" can be abstract: I would add a very simple "traceability log" type panel (what action was recorded and why it matters). And I would revise some of the text to make it even more "real industry" (examples of waste and typical destinations).

The round-based flow works well to energise a session and open up discussion. I would add a mini-glossary (waste streams, rewards, blockchain terms) accessible from the header and a final debrief screen with 3–4 guiding questions to connect decisions made in the game with real classroom/company practices.



Very good potential as a "discussion starter", but the action→concept relationship should be reinforced with more explicit micro-feedback (e.g., "this action improves traceability/reduces landfill"). I also recommend a difficulty/pace option (slow/standard timers) for audiences with low digital competence.

For the first session, I would add an optional "guided first round" (3 screens explaining objectives, resources, and what to look for in the header) and a contextual help button. It is also key to plan a more systematic usability evaluation with +45 and low digital competence to validate UX decisions.



3. ZAKLJUČCI

Sveukupno, pedagoška procjena *Interactive RockChain alata* bila je pozitivna i potvrdila je da su ažuriranja u WP4 dovela do ozbiljne igre spremne za korištenje u učionicama, osobito u obrazovanju odraslih i strukovnom osposobljavanju (VET).

Stručnjaci su istaknuli tri glavne prednosti:

- Relevantnost sadržaja za aktualne izazove u kružnom gospodarstvu i upravljanju otpadom unutar sektora ukrasnog kamena.
- Dinamičan format temeljen na rundama koji potiče timski rad i olakšava facilitaciju.
- Jasan potencijal za poticanje smislenih rasprava o sljedivosti, donošenju odluka i održivosti.

Na temelju kvalitativnih inputa (Q7), konzorcij je prioritetno dao i uključio nekoliko IT poboljšanja u ažuriranu verziju korištenu za pripremu pilota:

- Opcionalno vođeno uvođenje za korisnike koji prvi put putuju, s kratkim uvodnim ekranima koji objašnjavaju ciljeve, faze i ključne pokazatelje.
- Više izravnih mikro-povratnih informacija koje povezuju akcije u igri s konceptima kružnog gospodarstva poput praćenja, smanjenja otpada i ruta povrata.
- Lagane poruke o "logu praćenja" kako bi se metafora blockchaina učinila opipljivijom bez dodatnog kognitivnog opterećenja.
- Podesive postavke tempa za odrasle učenike, poput 'standardnih' i 'sporih' tajmera, kako bi se bolje prilagodile različitim razinama digitalnih vještina.
- Daljnje pojednostavljenje i dosljednost jezika igre, uključujući jasnije industrijske primjere, intuitivnije oznake otpada/odredišta te poboljšane poticaje za fazu analize.

Također su identificirana dodatna poboljšanja usmjerena na pristupačnost, poput skalabilnih veličina fontova, načina rada visokog kontrasta i opcija igranja s niskim stresom. Značajka izvoza sažetka sesije za trenere označena je kao vrijedan dodatak za buduće verzije. Ova poboljšanja bilježena su za nadolazeće iteracije, ovisno o povratnim informacijama pilota i tehničkoj izvedivosti.