Chemistry app for children with cerebral palsy based on the eye-tracker



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Goal and Tasks	Research questions
Goal: To identify the best methods for teaching children with cerebral palsy chemistry based on eye-tracker	RQ1: How to ensure an effective approach in teaching children with disabilities?
Tasks:	RQ2: How can individual abilities or skill levels be taken into account in personalized learning?
1. To investigate gamification mechanics of interaction of students with cerebral palsy with digital educational content through " bodily involvement »	RQ3: How important is "bodily involvement"?
2. Develop a methodology for education process management in a virtual learning	
environment based on eye-tracking, taking into account physical, intellectual and other characteristics of the learners	Results

3. To develop and test a digital application for chemistry education with the possibility of managing content through eye movements

The sampling

- 10 participants (age ranged from 17 to 19 years old)
- Students with cerebral palsy, (ICD-10: G80)

- 1. For the first time, an app for children with cerebral palsy involving "body engagement" based on an eye tracker has been developed
- 2. It is revealed that a specific, common button for children with cerebral palsy is not suitable for use
- 3. The optimal number of clicks per page is up to 10
- 4. Optimal number of tasks 7-9 (video+lab+test)
- 5. Pupils with cerebral palsy with normal intelligence need special tasks.



Psychodiagnostic techniques

	N	M±SD	95% confidence interval		Min	Max
Parameter			Lower	Upper		
Number of correct answers	10	30,2±10,7	22,52	37,9	18	48
Percentage of correct answers (%)	10	50,3±17,9	37,51	63,1	30	80
Series A (%)	10	77,4±25,1	59,46	95,3	17	100
Series B (%)	10	75,1±24,3	57,70	92,5	33	100
Series C (%)	10	43,3±15,1	32,50	54,1	17	67
Series D (%)	9	49,2±24,2	30,6	67,9	17	83
IQ	10	82,2±14,5	71,80	92,6	66	108

18	20	2	22	10
19	16	6	9	3
5	23	1	21	24
13	25	4	15	8
12	7	11	17	14

Tapping test



Figure 1. Moving objects as a method of investigating the usability of drag and drop mechanics with a mouse and joystick: a) stimulus test material b) the number of objects moved by each participant in 20 seconds.



Figure 2: Testing the range of switch ability between interactive objects: a) stimulus test material; b) average speed of cursor movement and clicking.

Table 1. Statistics of measurement parameters for intelligence of children with cerebral palsy





Press each square as many times as you can

 1
 2
 3

 6
 5
 4

Figure 3. Correlation of intelligence test results in a sample of adolescents with cerebral palsy 18-19 years old, average IQ in the corresponding normotypical age group and upper limit IQ in intellectual disabilities

Schulte tables

🗄 Mill Mouse **Chemical application** درمی Innstillinger fo Mill Mouse う Angre 🛗 Lim inn Start X Klipp ut \mathbf{k} \mathbf{E} ≣ Slå av øyekontroll € Oppgavevisning C Kopier Giør om Slett Klikk Tastatur Forstørr orstørrelsesprogram





What needs to be mixed to make a blue precipitate of Cu(OH)2?



Training video. It shows an experiment, the reaction, and a voice explains what's going on.

Lab. This is where the children repeat the experiment they saw on the video. "Body Engagement" Allows you to do the reaction yourself.

Test part with elements of the eye-tracker zone of interest. For better assimilation of the material, the pupil answers the questions.

Literature

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