A QUALITATIVE EVALUATION ON USABILITY OF EDUCATIONAL SIMULATIONS

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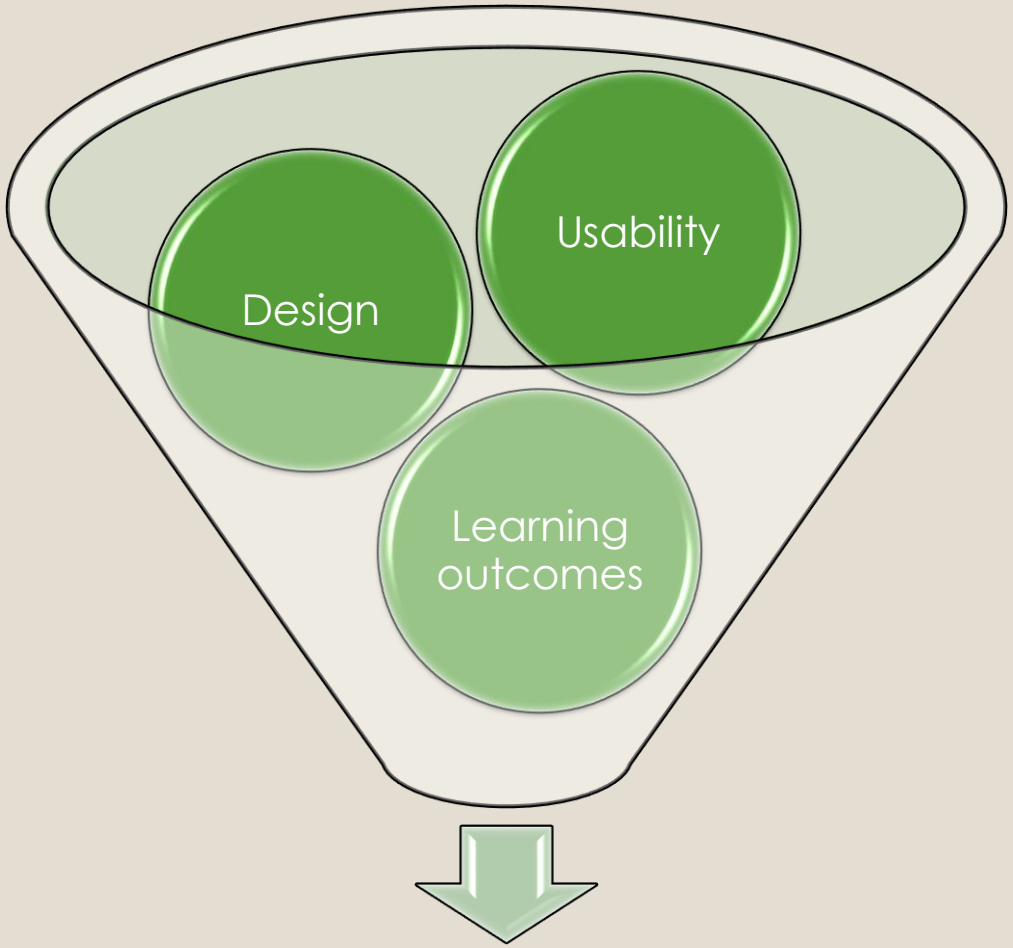
- The expediency of instructional design is important considering the variety of teaching materials. When viewed from this aspect, making correct instructional design is a necessity to deliver the desired outcomes of the simulations [2]. Instructional design of the training materials and evaluating expediency have been made by educational technologists. One of the important points is analyzing the sufficiency of the education process.



Perfect Instructional Design

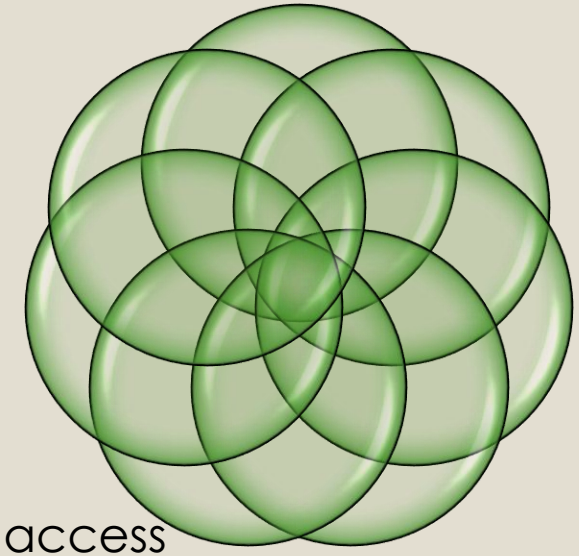
To increase teachability and effectiveness of simulations through usability

User friendly interface and satisfactory design

Scenerio

- Manipulate and animate circumstances with interactivity

Embedded simulations



Social Media connection

Reminder, notes

Convenient access to results

- To compare and discuss on students' theoretical and practical obtained result

Error messages

Purpose

To examine the usability of simulations in an educational portal that is supported by Ministry of National Education and is extensively used by many teachers and students in Turkey.

To determine sufficiency in evaluating simulations' usability of educational technologist candidates as CEIT students having taken CBI courses in their bachelor are expected to evaluate training materials professionally.

In this study, the following questions have been answered:

- Are the instructions of simulations sufficient to usability?
- What are the views of participants about the opportunities to control and manipulate the simulations?
- Do the simulation assessment of the educational technologist candidates have a consistency each other?
- What are the determining impediments when using simulations?

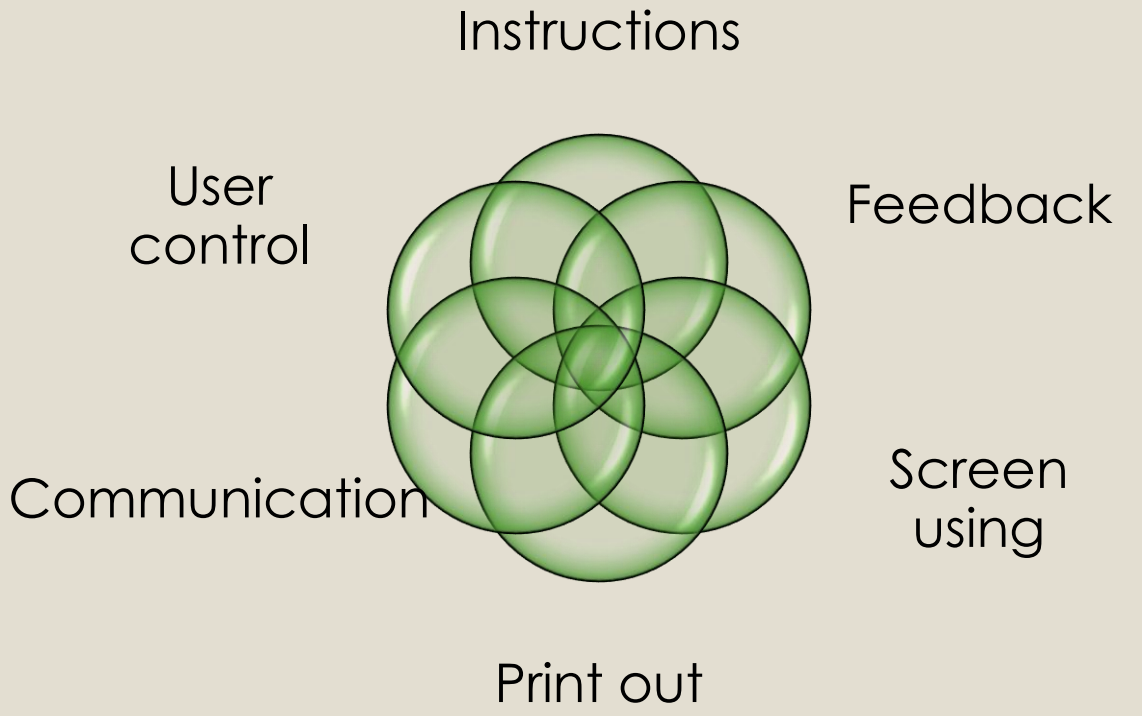
Methodology

Phase 1
- Evaluating simulations according to usability criteria.

Phase 2
- Determining sufficiency of educational technologist candidates in the field of evaluating simulations.

Phase 3
- Determining impediments when using simulations.

Subtopics of usability criteria



FINDINGS

Table 1. Simulation evaluation criteria

No	Evaluating criteria	Yes		Partially		No	
		%	f	%	f	%	f
1	Works performed in simulation may be taken back or forward [18] control is left to the user.	5.9	2	35.3	12	58.8	20
2	It offers taking note opportunity.	0	0	17.6	6	82.4	28
3	There is a communication platform.	0	0	100	34	0	0
4	There is an accessible help function.	91.2	31	0	0	8.8	3
5	Simulation gives the ability to cancel during the study.	100	34	0	0	0	0
6	It is possible to use the entire screen during simulation.	100	34	0	0	0	0
7	The simulation is embedded in the platform [17].	100	34	0	0	0	0
8	The animations are used to support understandability of instructions.	61.8	21	20.6	7	17.6	6
9	The experiment results obtained can be examined and users can continue from the rest part.	11.8	4	26.5	9	61.8	21
10	The obtained data can be print out.	14.7	5	0	0	85.3	29
11	The points that user wants to see are supported by focusing or swelling method at the end of obtained simulation results.	17.6	6	38.2	13	44.1	15
12	Error messages are intended to reduce problems [18]	67.6	23	14.7	5	17.6	6
13	**Oral and written instructions are used.**	**76.5**	**26**	**23.5**	**8**	**0**	**0**
14	The snap ability is used to place the objects easily and correctly [10].	23.5	8	11.8	4	64.7	22

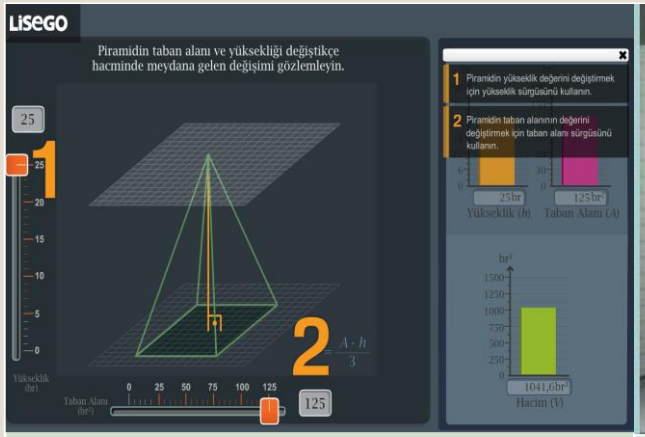
Table 2. Points of simulations according to usability criteria

No	Simulation Name	Average of Participant Evaluations (x)
1	Converting units	13,0
2	Converting given units to international units	17,0
3	Measuring mass, volume and length	17,2
4	Effects of floor area and height of squre perpendicular prism on volume	11,6
5	Effects of floor area and height of rectengular pyramid on volume	16,9
6	Calculating density	19,5
7	Discovering the relationship between surface and volume	21
8	Location, times and speed graphs	17,4
9	Drawing location-time and speed-time graph of the uniform linear movement	18,0
10	Drawing location-time graph with using speed-time graph of the uniform linear movement	17,2
11	Drawing constant acceleration motion graph	13,8
12	Examining the graph of movement with creating different types of motion with constant acceleration	15,0
13	Friction force	14,6
14	Factors affecting the static friction	21,3
15	Discovering the effects of balanced force on to the movement of objects	18,0
16	The resultant vector calculation with decompose	7,0
17	The resultant force calculation with decompose	10,0
18	Applying the thought experiment of Galileo	22,0
19	Examining the movement of the force applied on objects	23,0
20	Discovering the effects of objects movements of unbalanced forces	16,7
21	Discovering the effects of objects movements of balanced and unbalanced forces	17,7
22	Discovering action and reaction	14,0
23	Gripping Newton's third law of motion	16,7
24	Mechanical energy conservation and calculation	12,4
25	Discovering conservation of mechanical energy on friction surface	13,0
26	Discovering the types of renewable energy	19,1
27	Discovering the types of nonrenewable energy	16,0
28	Showing the relationship between the amount of material and boiling time on heat	19,0
Average		**16,36**

Fleiss Kappa parameter is calculated through these evaluation results (κ=0, 21).

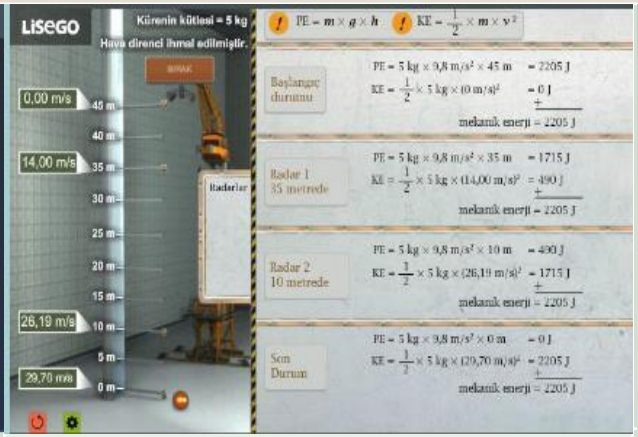
The consistency of education technologist candidates has determined lower than expected.

Figure 1. Participants' reviews and screenshots for the ending simulations and instructions



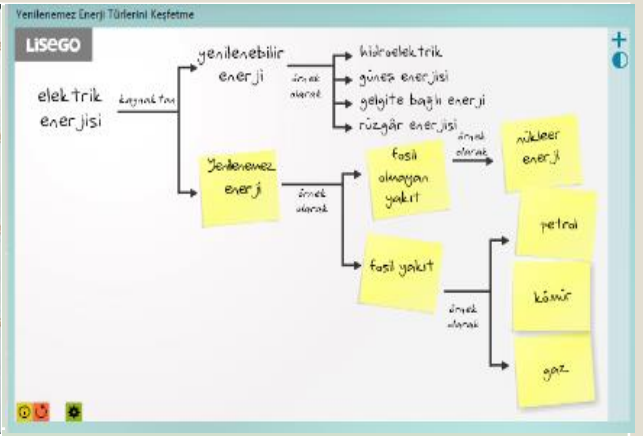
KG1: Instructions didn't disappear. Users have to click somewhere to do it. It should be supported with audio such as "Click to continue" or "Start to try"

(a)



KG6: …there is no problem for time and present. However, when the simulation is finished, there is no audible or written instruction for guidance.

(b)

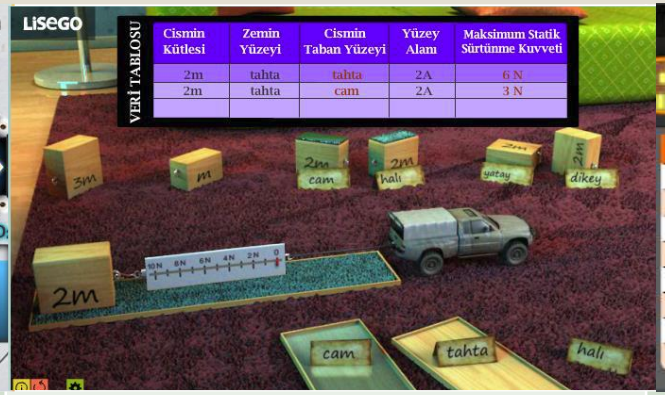


KG7: When I was using the simulation, I said "so what is going on, is it finished? When I clicked on the screen, it passed to practice part.

KG8: There is deficiency because the end is not clear…

(c)

Figure 2. Participants review and screenshot for user control



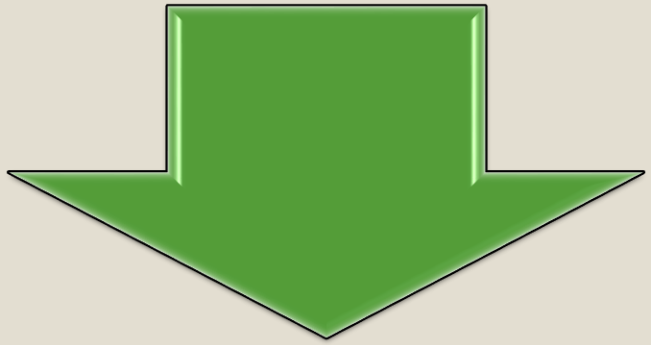
KG1: Any of us could not enter the rocket. When we thought that we entered inside, it threw us to the outside. Students do not strive with this.. KG3: It didn't work, I tried 3 times. The astronaut have not gone to the correct side..	KG1: When I chose the surface, the substance changed. It is incoherent…. KG3: What I do, just the wooden surface changed. KG5: I couldn't change the mass and surface…	KG2: you have 3 trial rights and error that is insufficient to new learners. If the learner can manipulate the values between distances, it would be more beneficial. KG8: In my opinion, users should enter the values…
(a)	(b)	(c)

Determined impediments via content analysis

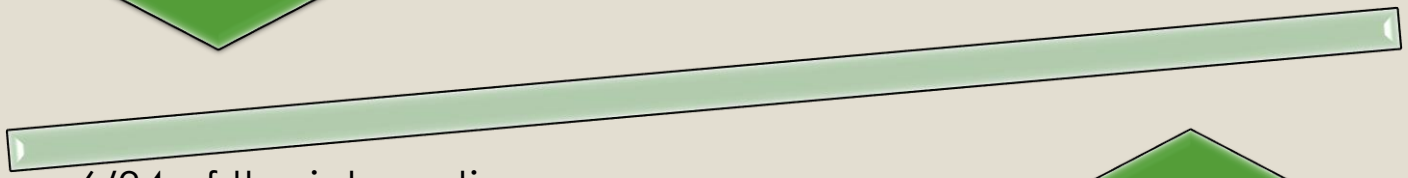
- Friendly-user interface
- Compatibility with internet browsers
- Offer for taking note
- Manipulating opportunity to users

RESULTS AND SUGGESTIONS

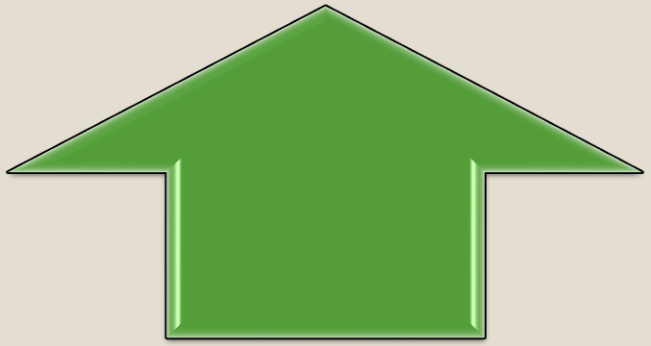
Result and Suggestion 1



Educational technologists of software developing companies should be more careful when making the classification.



6/34 of the interactive practices have not include interactivity and evaluated like animation. Despite of the fact that it is clear that computer-student interaction is necessary for them [13].

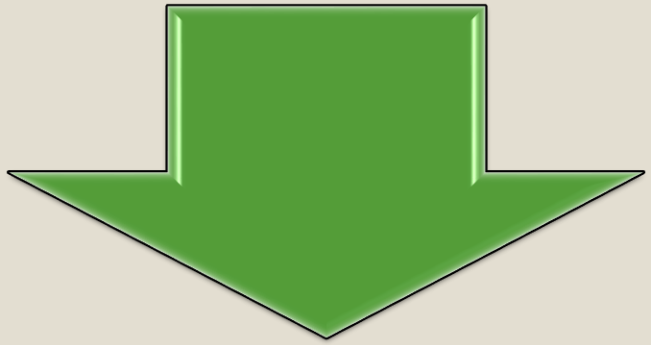


Result and Suggestion 2

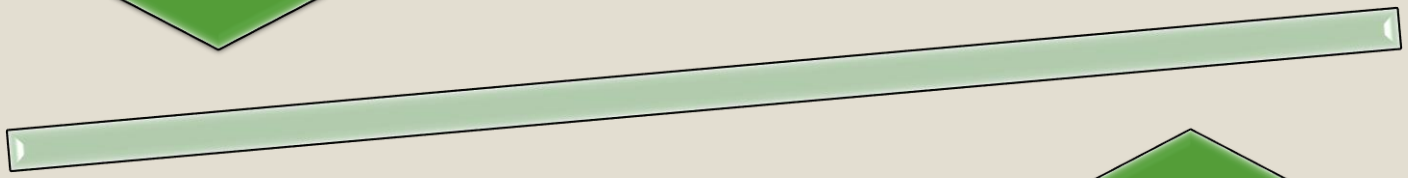
All of the educational softwares should be checked by education technologist experts according to clearty. Also, prototypes of the softwares should be used by target sample.

The expression of instructions used in the software is not clear enough and what students will do at the end of the simulation is not clear enough too.

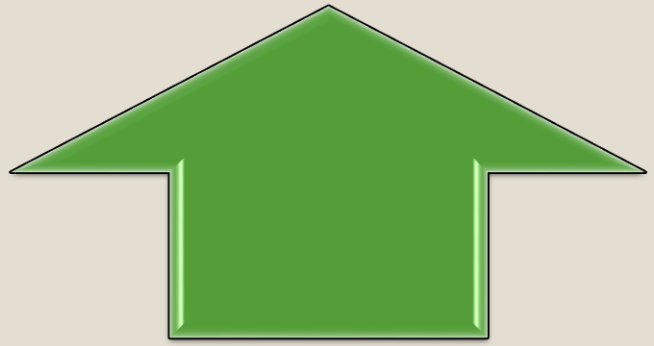
Result and Suggestion 3



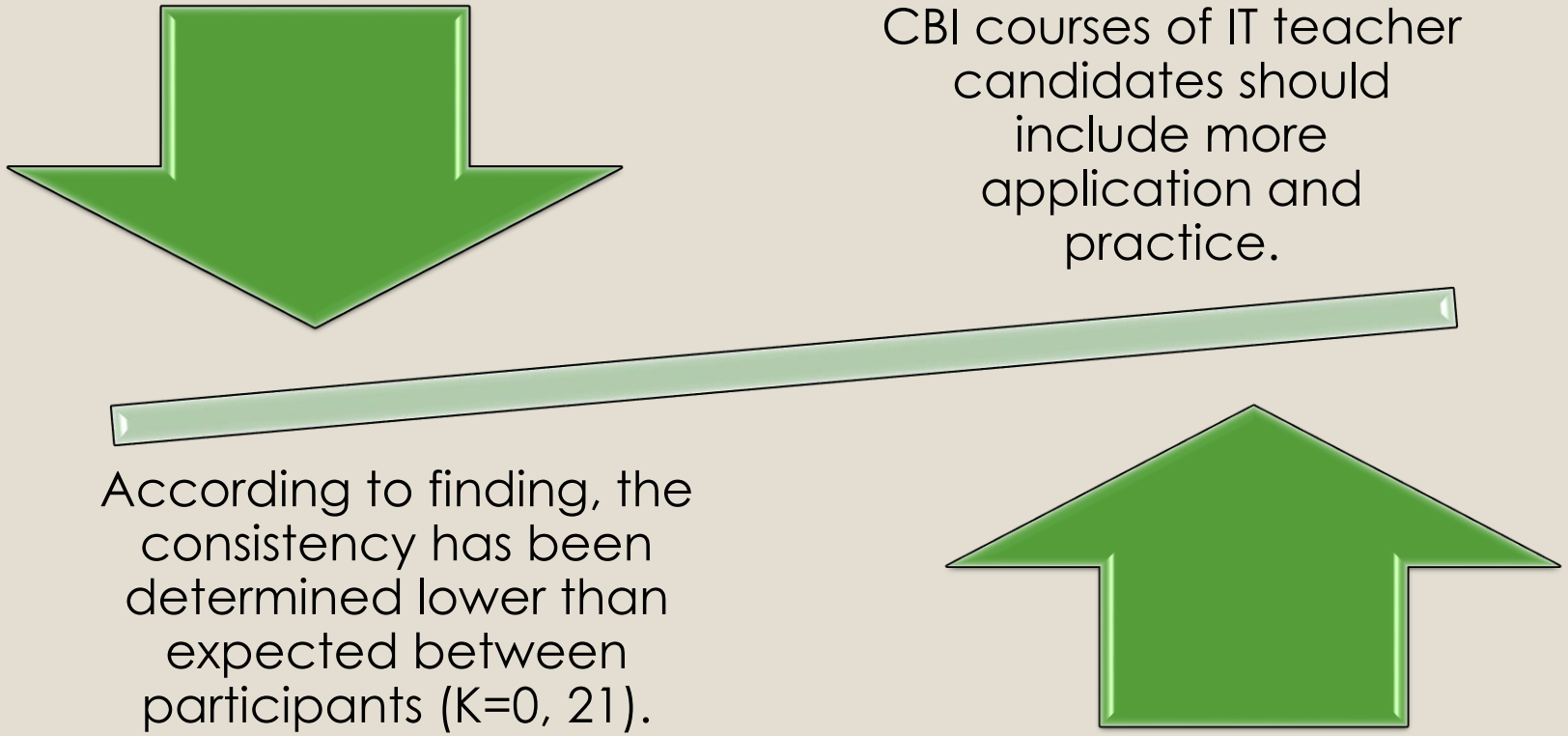
This result was consistent with other research result: the simulations developed for adolesence and adults should be more controllable.



The most highlighted problem of software by participants is user control. Participants want to change variables and if it was not possible they reported the situation as error.



Result and Suggestion 4



CBI courses of IT teacher candidates should include more application and practice.

According to finding, the consistency has been determined lower than expected between participants (K=0, 21).

Thanks for your attention…

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