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Cognitive Loads and Training Success in a Video-Based Online Training Course

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ITEMS OF THE QUESTIONNAIRES USED FOR ASSESSMENT

Table 1. Items used for measuring e-learning experience, computer attitude and computer anxiety.

Online learning experience items were rated on 5-point Likert scales from <i>no experience</i> (0) to <i>a lot of experience</i>" (4) and, respectively, <i>never</i> (0) to <i>very often</i> (4).	
1	How much experience do you have with online training?
2	Have you ever used instructional videos for learning (e.g., from YouTube or CD)?
Computer attitude items were rated on a 5-point Likert scale from <i>agree</i> (5) to <i>do not agree</i> (1) (scale "Personal experience / learning and working / autonomous entity" by Richter et al. [1, 2]).	
1	To me, the computer seems too unreliable to use as a learning tool.
2	I am often frustrated by the fact that the computer simply does not make sense to ordinary people.
3	When I use the computer for work, I constantly worry that it might break down.
4	Working with the computer is often frustrating because I do not understand the machine.
5	Sometimes my computer does things I do not understand.
6	When I work with a computer, I feel that the computer does what it wants.
7	If I have computer problems while I am working, I feel helpless.
Computer anxiety items were rated on a 5-point Likert scale from <i>agree</i> (5) to <i>do not agree</i> (1) (scale "Confidence in dealing with computers and computer applications" by Richter et al. [1, 2]).	
1	I feel confident in using the computer.
2	I panic when my computer crashes.
3	In working with the computer, I am easily frustrated when problems occur.
4	Working with the computer makes me uneasy.
5	When working with the computer, I am often worried that I might break something.
6	I feel that I cannot really control my computer.
7	If possible, I avoid working with the computer.
8	In the case of occurring computer problems, I stay calm.

Table 2. Items used for measuring domain-specific prior knowledge, intrinsic, extraneous and germane load.

Domain-specific prior knowledge item was rated on a 5-point Likert scale from <i>very bad</i> (1) to <i>very good</i> (5).	
1	Please rate your prior knowledge in reference to the instructional video you just watched. My level of prior knowledge was ...
Intrinsic load item was rated on a 7-point Likert scale from <i>very easy</i> (1) to <i>very difficult</i> (7).	
1	How easy or difficult would you consider the content?
Extraneous load item was rated on a 7-point Likert scale from <i>very pleasant</i> (1) to <i>very bothersome</i> (7).	
1	How pleasant or bothersome would you consider the presentation format?

(Table 4) contd.....

Germane load items were rated on a 5-point Likert scale from agree (5) to do not agree (1).	
1	I connected information from the video with information from other sources (e.g., journals, vocational training).
2	When I encountered new information, I thought of practical applications.
3	I tried to relate new information to my existing knowledge.
4	I took notes while watching the video.
5	I used the learned information for evaluating the marketing tools (e.g., business letter, home page) that are currently applied in the firm in which I work.
6	I came up with concrete examples to specific content in the video.
7	I related the video's content to my work experiences.
8	I reflected in which areas of my professional life the video's content has significance.
9	I directly used the learned material for improving my work performance (e.g., for image processing)
10	I will watch the video more often.

Table 3. Bipolar items used for measuring usability [3]. The ends of the rating scale are represented by two statements featuring opposite positions.

Suitability for the task items were rated on a 7-point rating scale from --- (1) to +++ (7).	
1	The learning environment is complicated to use. The learning environment is uncomplicated to use.
2	The learning environment does not offer all necessary functions to efficiently master all given tasks. The learning environment offers all necessary functions to efficiently master all given tasks.
3	The learning environment provides poor opportunities to automate frequently repeated steps. The learning environment provides good opportunities to automate frequently repeated steps.
4	The learning environment requires unnecessary input. The learning environment does not require unnecessary input.
5	The learning environment inappropriately meets the demands of the learning situation. The learning environment appropriately meets the demands of the learning situation.
Self-descriptiveness items were rated on a 7-point rating scale from --- (1) to +++ (7).	
1	The learning environment provides a poor overview of its functions. The learning environment provides a good overview of its functions.
2	The learning environment uses incomprehensible concepts, names, abbreviations, or symbols in its menus. The learning environment uses comprehensible concepts, names, abbreviations, or symbols in its menus.
3	The learning environment provides insufficient information about which entries are valid and necessary. The learning environment provides sufficient information about which entries are valid and necessary.
4	The learning environment does not provide on request context-sensitive explanations that are concretely helpful. The learning environment does provide on request context-sensitive explanations that are concretely helpful.
5	The learning environment does not automatically offer context-sensitive explanation that are concretely helpful. The learning environment does automatically offer context-sensitive explanations that are concretely helpful.
Controllability items were rated on a 7-point rating scale from --- (1) to +++ (7).	
1	The learning environment provides no possibility to interrupt work at any point and to continue later from that point without losses. The learning environment provides the possibility to interrupt work at any point and to continue later from that point without losses.
2	The learning environment forces the user to follow an unnecessarily rigid sequence of steps. The learning environment does not force the user to follow an unnecessarily rigid sequence of steps.
3	The learning environment does not support easy switching between individual menus or masks. The learning environment supports easy switching between individual menus or masks.
4	The learning environment is designed in a way that the user cannot influence how and which information will be presented on the screen. The learning environment is designed in a way that the user can influence how and which information will be presented on the screen.
5	The learning environment entails unnecessary interruptions of the work flow. The learning environment does not entail unnecessary interruptions of the work flow.
Conformity with user expectations items were rated on a 7-point rating scale from --- (1) to +++ (7).	
1	The learning environment complicates orientation because of an inconsistent design. The learning environment facilitates orientation because of a consistent design.
2	The learning environment does not provide any feedback whether an entry was successful or not. The learning environment does provide feedback whether an entry was successful or not.
3	The learning environment provides insufficient information regarding its current status. The learning environment provides sufficient information regarding its current status.
4	The learning environment responds with poorly predictable processing times. The learning environment responds with well predictable processing times.
5	The learning environment is not designed according to a consistent principle. The learning environment is designed according to a consistent principle.

(Table 5) contd.....

Suitability for learning items were rated on 7-point rating scale from --- (1) to +++ (7).	
1	The learning environment requires a lot of time to learn. The learning environment requires little time to learn.
2	The learning environment does not encourage trying new functions. The learning environment encourages trying new functions.
3	The learning environment requires the memorization of too many details. The learning environment does not require the memorization of too many details.
4	The learning environment is designed in a way that the learned material is poorly internalized. The learning environment is designed in a way that the learned material is well internalized.
5	The learning environment is difficult to learn without external support or a handbook. The learning environment is easy to learn without external support or a handbook.

Table 4. Items used for measuring subjective success of learning and professional competence.

Subjective success of learning items were rated on a 5-point Likert scale from agree (1) to do not agree (5).	
1	After completing the modules, my expertise has advanced [4].
2	I learned a lot of new things from the studied modules [4].
3	My level of knowledge is now significantly higher than at the beginning of the online training [5].
4	I learned something important from the studied modules [5].
5	I have learned something useful from the studied modules [5].
6	I am able to explain important concepts and matters from the studied modules [6, 7].
7	I am able to clearly visualize complex matters of the studied modules [6, 7].
8	I am able to work through the typical exercises in the studied modules [6, 7].
Professional competence items were rated on a 5-point Likert scale from agree (1) to do not agree (5) (scale "Professional competence" by Paechter et al. [8 - 10]).	
1	I acquired new knowledge while working on the modules.
2	I believe that the modules promote practical relevance.
3	I believe that the modules strongly promote critical thinking about the contents.
4	I believe that the online training promotes interdisciplinary thinking.
5	I believe that the provided materials promote integrated thinking.
6	I believe that the online training enables me to examine my own learning progress.
7	I believe that the modules support autonomous learning.

CORRELATIONS BETWEEN VARIABLES

Table 5. Correlations are shown above the diagonal, the sample size per measurement in the diagonal, and the sample size a correlation is based on below the diagonal (refer to Stiller and Bachmaier [11] to receive further information about the response rate to questionnaires).

		1	2	3	4	5	6	7	8	9	10	11	12
1	Online learning experience	74	.06	-.20	.25	.01	.10	-.14	.03	-.05	.00	.10	-.05
2	Computer attitude	74	74	-.65	.02	-.03	.01	.09	.03	.25	.12	.10	.02
3	Computer anxiety	74	74	74	-.15	.08	-.09	-.15	.01	-.20	-.05	-.06	.17
4	Prior knowledge	46	46	46	51	.04	-.29	-.10	-.37	-.20	-.15	-.18	-.18
5	Usability	38	38	38	30	38	-.26	-.56	.10	.57	.55	.33	.49
6	Intrinsic load	46	46	46	51	30	51	.23	.07	-.07	.13	.23	-.41
7	Extraneous load	46	46	46	51	30	51	51	-.13	-.34	-.37	-.13	-.15
8	Germane load	46	46	46	51	30	51	51	51	.47	.58	.20	.11
9	Subjective success of learning	36	36	36	33	31	33	33	33	36	.71	.24	.15
10	Professional competence	36	36	36	33	31	33	33	33	36	36	.35	.08
11	Number of completed modules	53	53	53	44	37	44	44	44	44	35	35	58
12	Performance ⁽¹⁾	18	18	18	18	18	18	18	18	18	18		18

Note. ⁽¹⁾ Correlations were calculated for a subsample of 18 students, which have studied at least 12 of 13 modules.

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