

**ViSiCAST Milestone M6-6: Evaluation of Signing Tutor**

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## **Signing Tutor: Evaluation of user trials**

### **1.1 Introduction**

The Signing Tutor, in contrast to earlier demonstrators, does not employ motion capture technology for generating the avatar movements but relies on synthetic signing as delivered in workpackage 5. This Signing Tutor prototype is designed for hearing learners of sign language for interactive use. While typical multimedia programs for learning sign language provide scenarios, movies, or dialogues, more advanced learning programs offer interactive exercises to provide feedback to the understanding of the learner, the receptive language competence. None of these programs, however, can give feedback to the productive language competence of the learner. This Signing Tutor is the first technology that is able to visualize the sign language production of the learner and to give feedback regarding the correctness of a chosen sign sequence. Sign language learners can get feedback to their cognitive concept of signing in situations outside the classroom.

Using a tutor in learning has some advantages over a live seminar:

- The student can study according to her individual pace.
- The student can study independent of time and location.
- The student may repeat tasks as often as needed or wanted.
- The system is able to assist the memory of the learner whereas the information in a seminar is difficult to memorize.

The same advantages are offered by using a CD-ROM. However, using an avatar for learning instead of stored video sequences on a CD-ROM has additional advantages:

- The storage space on a CD-ROM is limited. The avatar can generate an unlimited amount of signs and signed phrases.
- The student can produce any sign or signed sequence with the help of the avatar, i.e. there is no need to foresee what the student creates and to store all possible phrases as videos on the CD-ROM.
- The student may use the avatar to test her own productive language competence.
- The student may even test herself by letting the avatar make mistakes.

Moreover, the advantage of using an avatar is its versatility: The student is able to rotate the avatar and zoom in and out as necessary in order to better recognise the 3D physical movements constituting the signs.

This tutorial consists of two units, number incorporation and directional verbs. We have chosen these two areas because they cover sign language specific phenomena and because there already exist teaching materials for both that we could use as a basis for our tutorial. Structure and design of the Signing Tutor are described in detail in Deliverable D5-4.

### **1.2 Evaluation**

The Signing Tutor was tested with two different groups of students: a group of students without sign language knowledge, and a group of sign language learners.

In the first group (the Non-DGS group), 14 students of “Media and Culture” tested the first unit of the tutorial: they had to learn number incorporation with the avatar. The test lasted one hour per student. The second group (DGS group) consisted of 14 students with a limited knowledge of DGS. Some had just started to learn sign language, others were in their second year.

At the end, the students in both groups were asked to fill in a usability questionnaire. The questionnaire comprised of 41 questions. Students had to give an answer on a scale from 1 (“strongly disagree”) to 5 (“strongly agree”). This questionnaire has also been administered in the Netherlands and in other university contexts (Usability of Learning Management Systems) in different forms.<sup>1</sup>

All students had to indicate their computer literacy: They were asked if they owned a computer, what kind of programmes they used, if they already had experience with learning programmes or programming, etc. All of them owned and used a computer. Almost all of them had experience with different types of applications (text, graphics, spreadsheets). Most participants in the second group mentioned that they had used the sign language learning programme “Die Firma”, designed at the IDGS. We can therefore say that the whole sample consisted of experienced users.

The table lists the arithmetic means (AM) and standard deviation (SD) for both groups and the differences (diff) of the arithmetic means for each of the 41 variables.

	Non-DGS group		DGS group		ldiff
	AM	SD	AM	SD	
1. In general, I am satisfied with the tutor.	4.57	.51	3.62	.77	.95
2. The tutor can speed up my learning process.	4.29	.73	3.14	1.10	1.15
3. The tutor can improve my learning process.	4.38	.87	3.23	1.01	1.15
4. The tutor is easy to use.	4.71	.47	4.50	.65	.21
5. I would recommend the tutor to other students.	4.57	.76	3.21	1.05	1.36
6. For the development of the tutor, learning requirements were sufficiently considered.	4.08	.64	3.62	.96	.46
7. I would prefer not to use the tutor too often in this way.	1.50	.76	3.50	1.22	2.00
8. I find it too cumbersome to learn with the tutor.	1.43	.65	2.77	1.09	1.34
9. Learning to use the tutor is difficult.	1.00	.00	1.21	.58	.21
10. The tutor encourages the user to try new signs.	3.92	.95	4.00	1.36	.08
11. One forgets easily how to use the tutor.	1.29	.61	1.29	.47	.00
12. The tutor often requires too many operations to solve a task.	1.64	1.01	2.36	.93	1.72
13. It is easy to ask the tutor to produce other signs.	4.75	.46	3.78	.83	.97
14. It is easy to pass the tests.	3.57	.65	3.38	.51	.19
15. It is easy to ask the tutor to produce new exercises.	4.00	1.32	4.40	.84	.40
16. It is difficult to find the required functions in the tutor.	1.67	.78	2.29	.99	.62
17. One has to remember too many details to be able to pass the tests.	1.93	.83	1.92	.86	.01
18. The functions offered by the tutor are easy to understand.	4.43	.51	4.50	.52	.07
19. The tutor uses terms and symbols that are easy to comprehend.	4.21	.89	3.93	1.07	.28
20. Without outside help the tutor is difficult to use.	1.36	.50	2.38	1.19	1.02
21. The tutor has more options than I need for learning.	2.80	1.40	2.00	.85	.80
22. The functions of the tutor are arranged logically.	4.57	.76	4.36	.74	.21
23. The tutor has an attractive design.	3.92	.67	3.92	1.08	.00
24. The tutor offers the learner a good orientation.	4.69	.48	3.46	1.05	1.23
25. It is always clear what I have to do when using the tutor.	4.29	.61	4.00	.96	.29
26. The tutor doesn't always do what I expect it to do.	1.92	1.12	2.85	.99	.93
27. I am unable to make the tutor do what I want it to do.	1.45	.82	2.23	1.01	.78
28. The tutor interferes with the way I like to learn.	1.21	.43	2.25	.97	1.04
29. The tutor gives sufficient feedback.	4.00	.78	3.21	.97	.79

<sup>1</sup> Cf. Schulmeister, Rolf. 2002. *Lernplattformen für das virtuelle Lernen*. München/Wien: Oldenbourg; pp. 119-137.

30. The tutor offers the opportunity to test unknown signs.	4.91	.30	3.64	1.34	1.47
31. The tutor makes many mistakes.	1.91	1.14	3.33	1.15	1.42
32. The tutor helps me with correcting my mistakes.	3.29	1.33	3.00	.88	.29
33. The tutor produces new mistakes.	2.33	1.32	2.67	.89	.34
34. The learning assistance offered by the tutor is useful.	4.64	.63	3.69	.75	.95
35. The tutor helps me with learning.	4.85	.55	3.43	.85	1.07
36. The tutor suits my individual learning needs.	4.54	.66	3.00	1.29	1.54
37. The tutor relates to my previous knowledge and ability.	4.54	.78	3.07	1.07	1.14
38. The tutor works reliably.	4.29	.83	3.54	1.33	.75
39. It is cumbersome to use the tutor.	1.29	.47	2.07	1.07	.78
40. The lessons are too easy.	3.85	.69	3.00	.58	.85
41. I find Visia's signs comparatively easy to comprehend.	4.36	.63	2.86	1.17	1.50

The majority of the differences between the arithmetic means of the two groups are very low (less than one scale value). The standard deviation is regularly below 1. But there are some differences: Whereas the approval of positive items is higher in the Non-DGS group than in the DGS group, the refusal of negatively formulated items is more extreme in the Non-DGS group than in the DGS group. It is understandable that the Non-DGS group tends to underestimate the difficulties involved in using the tutor for learning. The DGS group, on the other hand, sometimes finds it difficult to forget about the intricacies of sign language. DGS learners are more sceptical as to whether it is useful to use the avatar more often for learning. This may result from the fact that students with DGS knowledge assume that there are many problems with modelling sign language artificially, whereas students of Media and Media Culture are more optimistic regarding the possibilities of future technologies. In general, positive items receive high approval, while negative items are clearly rejected. Thus the result of the tests with two groups of students ascertain that

- the user interface is appropriate and easy to learn;
- the tutor functions well and does not make many mistakes;
- the tutor offers some advantages for learning and is useful;
- the tutor provides help and feedback for individual learners.