Annex 2 | Sample hypotheses, sub-questions and sources

Sample hypotheses

A hypothesis is a supposition that sets out what is expected to be found in the research. It is therefore essentially an expectation or assumption. Hypotheses focus on

- The variables you are researching;
- The group you are studying;
- The expected outcome.

Example of a research question: *An extra practice session in VR strengthens the presentation skills of third-year Technical Medicine students in comparison with the presentation skills of third-year Technical Medicine students who did not have an extra practice session in VR. Another example of a hypothesis: A practice session in VR makes third-year Law students feel better prepared for the session in student court.*

Sources

Three sources can be consulted in formulating and testing the hypotheses, namely:

1. Experiential knowledge
2. Knowledge generated from research
3. Own data: data of the school or organisation and system information

Below is a diagram that sets out, for each hypothesis, which evidence or combination of evidence (literature, experiential knowledge, and own data (school, organisation and system information)) is needed to answer the hypothesis.

Experiential knowledge

An important source for testing hypotheses is experiential knowledge, which is a broad source of information. It involves wisdom and know-how acquired through reflection on personal experience. Consider, for instance, experiential knowledge of lecturers and students.

Academic literature

Another source of information for testing hypotheses is academic literature. It is important for this literature to be peer reviewed, in other words, an academic article is subjected to a peer review process before it is published (quality control requirements). The best way to search for an academic article is in a database, such as general databases (Google Scholar, Scopus, Web of Science, ERIC) or discipline-specific databases (you can find these through your institution's library catalogue).

Education data

Finally, education data is also an important source of information for answering hypotheses. Education data, not to be confused with data on studies, is a collective term for a wide range of structured information that can be used within educational institutions to improve education. Here, a distinction is made between three improvement directions: the quality of teaching, the effectiveness of teaching and the efficiency of teaching. Most education data is held in information systems for teaching, administration of enrolments and study results, quality assurance and administering of assessments, among others (for more information on education data, see: doe-meer-met-studiedata.nl).

Evidence for each hypothesis

Meeting 1			
Hypothesis/ sub-question	**Evidence**	**Type**	**Why do you believe this evidence to be relevant to the hypothesis (or hypotheses)?**
An extra practice session in VR provides further benefits regarding the development of presentation skills among students.	Reviewing the literature on VR and performance anxiety.	Literature	A lot of research has already been conducted on the effect of VR on performance anxiety and/or presentation skills.
	Interviews with lecturers as well as students involved in skills education.	Experiential knowledge	The experience of lecturers as well as students is a valuable source: they can indicate what difference they notice when VR is used.
	Look at difference in presentation skills when practising two or three times.	Own data	This can be used to see whether an additional practice session in VR improves presentation skills.
Feedback in VR is as effective as feedback from the lecturer.	Reviewing literature on effective feedback.	Literature	A lot of research has already been conducted on effective forms of feedback.
	Interviews with lecturers and students involved in teaching skills using VR.	Experiential knowledge	This allows us to examine whether the experiences with different forms of feedback were different.
	Exploring difference in effectiveness of feedback (both feedback in VR and feedback from the lecturer).	Own data	This allows us to examine whether feedback in VR leads to the same knowledge and attitude towards presentation as feedback from the lecturer.

Meeting 2	
What insight does this evidence provide?	**To what extent does it confirm or refute the hypotheses/sub-questions you have set out?**
Several studies show that practising presentation skills in VR reduces performance anxiety tendencies among students.	All evidence (literature, experiential knowledge and own data) confirms the hypothesis that an extra practice session in VR provides additional benefits for the development of students' presentation skills.
Interviews with students show that they find practising presentation skills in VR less stressful, which allows them to practice better and ultimately improve their presentation skills.	
A randomised pre-assessment/post-assessment design was used to examine the hypothesis. A significant difference was found in presentation skills between two and three practice sessions. Both students with and without presentation anxiety improve equally on presentation skills when they can practice one more time in VR.	
Various sources show that feedback in VR is as effective as feedback from the lecturer.	All the evidence (literature, experiential knowledge and own data) confirms the hypothesis that feedback in VR is as effective as feedback from the lecturer.
In self-assessment interviews, students indicated that the different forms of feedback were different; feedback in VR was mainly perceived as detailed and feedback from the lecturer as positive and constructive.	
An experimental field study was used to investigate the hypothesis. In the experimental group, students practised in VR and also received feedback in the VR app. In the control group, students had to practise face-to-face and received feedback from the lecturer. At the end, another post-measurement was taken on presentation skills through a face-to-face presentation and knowledge and attitude towards presenting. No significant differences were found between the two modes of receiving feedback.	