Studying handwriting processes in school settings: Methodological approaches

An old controversy ...

Field research:
- high ecological validity +
- participants are already there +
- no randomization –
- limited control of environment –

Laboratory research:
- high generalizability +
- causal inferences +
- artificial setting –
- absence of relevant conditions –
... and a paradox for writing

- ecology of school vs. ecology of life
- didactical traditions (or „customs“) of composition have little ecological validity
- focus on (formal) text product characteristics
- little transfer to true-to-life text types
- school research suggests group testing (differential vs. general psychology)
- higher generalizability of process variables

Maintaining the classroom setting

- assessing covariates (tests, questionnaires)
- obtaining text products after instructions
- setting time limits (typical vs. optimal achievement)
- self-monitoring of time consumption
- collective dual-task conditions
- digital traces with graphic tablets
- digital traces with keystroke logging
Registration of handwriting

- digital tablet → graphical traces
  - basic motor patterns
  - speed, acceleration, direction of strokes
  - pen hold pressure, pressure on surface
- automatic letter recognition software?
- the „model“ of keystroke logging
  - time course of meaningful units
  - easy access to letter/word/sentence level
  - repeatability of the writing process

Video observation: technical equipment
**Video observation**

- video record of handwriting from above
- synchronization with writer’s behavior
- time scale inserted

![Images of right- and left-handers](image)

**Analysis I**

- product variables
  - number of deletions
  - number of orthographical errors
  - number of correspondence errors (copy task)
  - quality measures (creation task)
- total time on task
- temporal progression
- chunk size per gaze (copy task, description)
Exemplary result:
writing progression

![Graph showing writing progression of 5th and 8th grade students in keyboard and handwriting]

Analysis II

- treating the writing process like a sequence of events
- using classroom observation software
  - INTERACT V8
- coding visual events along a time scale (e.g., each 12 frames of 25 Hz)
  - pen up/pen down (pauses)
  - gaze to given text/gaze to writing sheet
  - which letters are being written
- detecting event patterns
- direct jumps to coded events in the movie
Video observation from below

- semi-transparent writing sheet
- double-mirror image
- no obstruction of writing trace

right-hander
left-hander
Conclusions

- eye-tracking needs
  - (expensive) technical equipment
  - restricted working place
  - strict laboratory conditions
- video equipment widely available
- classification/linguistic interpretation of written traces for each kind of writing record (beyond simple temporal analyses)
- organizational advantages through on-site experimentation in schools
  - availability of participants
  - little selection of participants/parents’ agreement
  - participants behave like in school

Grabowski/Schmitt/Weinzierl – Study of handwriting