Learning From Spatiotemporal Stories With Storix - One Size Fits All?

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Outline

1. Storytelling
2. Experiment
3. Learning styles
4. Selected findings
5. Final remarks
Storytelling

Storytelling is a fundamental tool in education

Today, most stories are non-orally distributed and consumed

Cave paintings, Lascaux, 13000 BC: Persistent stories

Gutenberg, 1450: Mass distribution

Roundhay Garden Scene, 1888: First movie

John Logie Baird, Scotland, 1926: First TV broadcast

Tim Berners-Lee, 1990: First Web browser
Story browsing

- All stories have a *structure*
- A common way to structure a story is to decompose it into atomic parts, often referred to as *events* [Bal, 97].
- However, events may be embedded in various *dimensions* (or *contexts*), for instance:
  - Narrative order (default)
  - Time
  - Space
- Stories may be accessed (browsed) along their dimensions:
  - Enhanced user experience
  - Novel insights [Eccles, 08]
Storix: A spatiotemporal story browser

Open a story
Classical Philosophers, 600-400 BCE

Socrates
Classical Philosophers, 600-400 BCE
Wed Jan 01 - 0470 00:00:00 GMT+0100 (CET) @ Athens

Socrates (Greek: Σωκράτης, c. 470 BC–399 BC) was a classical Greek philosopher. He is best known for the creation of Socratic irony and the Socratic Method, or elenchus. Specifically, Socrates is renowned for developing the practice of a philosophical type of pedagogy, in which the teacher asks questions of the student in order to elicit the best answer, and fundamental insight, on the part of the student.

Socrates is credited with exerting a powerful influence upon the founders of Western philosophy, most particularly Plato and...
Storix: A spatiotemporal story browser

Agenda
Storytelling
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Event [Bal, 97]
Storix: A spatiotemporal story browser

Map
Storix: A spatiotemporal story browser
Storix: A spatiotemporal story browser

Table of content (TOC)
Spatiotemporal Storytelling

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Agenda

Storytelling Experiment Learning styles Selected findings Final remarks

Storix: A spatiotemporal story browser

All story elements are synchronized: Clicking on a map marker updates event view, timeline and TOC, and so on.
Storix as a learning tool: Research questions

1. Will spatiotemporal story browsing, with a rich and potentially confusing interface, work in a realistic educational setting in primary school?
   - Will they manage to operate the tool?
   - Will the tool provide satisfactory learning outcomes?

2. Will spatiotemporal stories favor particular learning styles?
Grade seven class (11 yrs), 8 girls, 6 boys

“Regular” class setting: Lecture in local history (however, on our campus)

Activity: Solving tasks by browsing a spatiotemporal story
Setup (2)

- Teams of two
- 10 min Storix intro, 20 minutes assignment
- Assignment: 23 tasks, given on sheets of paper; combination of crossword (11 tasks), filling out missing words in statements (8) and questions (4)
- Some tasks encouraged map searching, others were temporally biased, and yet others inquired examination of textual content
The story

- Fredriksten Fortress, Halden, Norway
- 25 events; some only text, other combination of text and image(s)
- Time span: 111 year (1659 - 1770)
- Geographic area: Approx one square kilometer
- Focus on buildings and their associated events
Data collection

- Observations
- Teacher interviews
- Click data: All clicks recorded with team ID, event number, timestamp, and origin (map, timeline, TOC)
- Evaluation of committed assignments
- Assessment of the teams’ learning styles
Learning styles: Convergers and Divergers, 1

- Kolb’s four types of “learning styles” [Kolb, 84]:
  1. Accomodator
  2. Diverger
  3. Assimilator
  4. Converger

- The teacher was asked to categorize the teams based on his knowledge of how they performed in regular educational contexts.

- The teacher identified four groups as Convergers, and four as Divergers, and none as Assimilators or Accomodators.
Learning styles: Convergers and Divergers, 2

- **Convergers:**
  - Pragmatists favoring abstract conceptualization and active experimentation.
  - Solve problems relying on methodical and predictable approaches
  - They often achieve good scores

- **Divergers:**
  - Reflectors preferring concrete experience and reflective observation
  - Approach problem solving in a more nonlinear and unpredictable fashion
  - Normally not among the best performers

- The absence of *accommodators* and *assimilators* may reflect classroom practice were neither theoretical conceptualization nor pure practical tasks are emphasized.
Click categories for each event

- 775 recorded clicks
- Map is the dominating click origin, with 49.5%, then comes TOC (40%), and the timeline (9.5%)
Clicking efficiency

- We needed a way to characterize the *browsing behavior*
- Introduced *clicking efficiency* as a ratio between the total number of required clicks (in worst case), related to score, and the performed clicks
- No extra clicks yields 100% efficiency
By plotting efficiency, achieved scores, and number of clicks (all as percentages), we notice a large variation in number of clicks (from 32 to 217) and efficiency (from 26% to 100%).
The two groups with best scores, exhibit radically different behavior. One group has many clicks and, thus, low efficiency, opposed to the other, which has been more restrictive in their clicking.
Scores, click rates and efficiency: Convergers

- High level of efficiency, few clicks
- Scores: As expected by the teacher
Scores, click rates and efficiency: Divergers

- Low level of efficiency, many clicks
- Surprisingly: The average score is higher among the *Divergers* than the *Convergers* (70.7% against 57.6%)
- The teacher anticipated significantly lower scores for these teams
Scores, click rates and efficiency: Convergers and Divergers

Is this indicating that Storix is an educational tool that in particular supports the *Divergers*, a traditionally “weak” group?
Research limitations

- Small scale pilot study; questionable validity
- Using assignment score as the (only) indication of learning outcome; naïve approach
- Kolb’s model of learning styles is developed for college/university students; rarely applied to primary-school pupils
- Used the teacher to categorize the teams according to learning styles; formal methods would yield more valid characterizations
We have demonstrated that the 7th graders understand, accept and enjoy spatiotemporal storybrowsing.

The pupils preferred the map as the main navigation tool, secondly the table of contents.

Using Storix as a learning tool, the *converger* type pupils performed as expected.

*Divergers* performed far better than expected.

Is Storix a “one size fits all” concept? Further research needed!
Questions?

STORIX demo available on
http://asia.hiof.no/storix

...and as free and open source from
http://storix.sourceforge.net

...and there is more to read in Øyvind’s master thesis
[Håkestad, 07]

Thank you for your attention!
References

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  *Narratology: Introduction to the Theory of Narrative.*  
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  Dr. Mashup or, Why Educators Should Learn to Stop Worrying and Love the Remix.  