EssayCritic: The Critiquing Approach to Learning with Interactive Media

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Overview

- InterMedia, University of Oslo
- Research activities
- Communication and learning
- Critiquing approach to interactive media
- EssayCritic system
- Experiment and results
- Related work and theory
- Plans for further work
InterMedia, Oslo

• Research center in ICT & learning at the University of Oslo
• 12 senior researchers, 10 PhD students
• Many international partners
• 40 articles, chapters and books published in 2010
• Main research area is computer supported collaborative learning (CSCL)
• We also offer courses at the master and PhD levels (in CSCL and interaction analysis)
Research projects

- SCY: Science Created by You (EU)
- KP-Lab: Knowledge Practices Laboratory (EU)
- CONTACT: Communicating Organizations in Networks of Art and Cultural Heritage Technologies (NFR)
- MIRACLE: Mixed Reality Interactions across Contexts of Learning (NFR)
- EssayCritic: Computer-supported Essay Writing (UiO/HKBU)
- CAMO: Cultural Awareness in Military Operations (new)
- Several doctoral projects, post.doc.-projects and smaller projects for the public sector
Research methods

• Observation and field notes
• Video analysis and virtual ethnography
• Intervention studies (action research and activity theory)
• Participatory design
• Integrating learning support with existing work tools
• Software development
• End-user development
Communication and learning

• Our approach to studying learning is informed by socio-cultural theory
• According to Vygotsky, learning takes place on two planes, the social plane and the individual plane, and the two planes are interdependent
• For example, thought is understood as inner speech and internalization and externalization are reciprocal processes that model the social learning process
• Language and communication is essential to learning
• Learning must take place in meaningful interactions with others and mediated by socio-cultural artifacts
The critiquing approach to learning with interactive media

- Critiquing means to provide a reasoned opinion about an artifact under construction (e.g. a house, a drawing, a plan)
- Modeled after how design critics give feedback to students in a design studio, standing behind their shoulder while pointing, drawing and talking
- A goal with EssayCritic has been to provide feedback on essays to English as foreign language (EFL) students, so they can improve their essays before sending to the teacher for grading; essays are treated as textual artifacts
Rationale for essay critiquing

• Many EFL students find it difficult to write essays of sufficient length
• The run out of ideas before the class is over
• Students of today are more exposed to oral literature (TV, film) than written literature (e.g. books)
• It is demanding for a teacher to help all those who ask for assistance during writing classes
• It is also demanding for parents to help at home when they don’t know the context for the assignment
EssayCritic system

- EssayCritic identifies uncompleted essays (missing themes) for a given topic, based on advanced text comparison, and gives feedback
  - Critique (missing themes)
  - Praise (covered themes)
- It makes use of a computational technique called latent semantic analysis (LSA) for comparing the semantic similarity between two texts (student and model), based on matrix algebra and statistical methods
System architecture

Text Segmentation & Pre-processing

Latent Semantic Analysis Engine
\[ D = P \ Q^T \]

Segment Semantic Matching

Corpus from external sources

Essays Sub themes

Student Essays

System Feedbacks

Essays
EssayCritic: User interface, login window, classroom setting
The assignment

UNHEALTHY FOOD AND OVERWEIGHT

The popularity of McDonald’s amongst children is responsible for the growth of overweight amongst high school children. There should be rules against fast food in schools.

Do you agree or disagree with the statement? Use specific reasons and examples to support your opinion. Write 250-300 words about the topic.

Treatment group were asked to submit and revise their essays via EssayCritic up to three times before submitting to teacher. Control group were submitting their essays directly to teacher.
User interface: critique mode

Text written by student22 on unhealthy food topic

Unhealthy food and overweight

I think there should be rules against fast food in schools because it's unhealthy. You don't only get fat but also unconcentrated tired more sick then usual and so on. Teenagers does less exercise in 2009 then before and therefore it's impotent to eat healthy food. People eat fast food because it taste good and it's cheap that maces sense but what most people don't think about is that fast food makes people addicted. If you eat every single meal from McDonald's you are getting tired and sick but even you don't feel good you want to eat more fast food. If the only food the students eat in school is fast food the bigger is the chance to eat it whenever you feel hungry. If children begins to eat fast food and we don't do anything about it the number of young people dying of cardiovascular disease will be higher.

Covered Sub-themes:

Suggested Sub-themes:
- Say more about: Ingredients of fast food.
- Say more about: Harmful effects on health.
- Say more about: Clear guidelines on fast food sold in school.
- Say more about: Education by school.
- Say more about: Amount of exercises.
- Say more about: Responsibility of parents.
User interface: praise mode

Feedback from Essay Critiquing System:

Unhealthy food and overweight

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3 week experiment in high school

- We studied 3 first year high school classes (age 16-17), in the health and social science study program, spring semester 2009
- Students worked together in groups of 3-4, but all handed in individual essays
- The experiment were spread over three 1/2 days meetings (3 consecutive weeks)
  1. Introduction and trial writing
  2. Running the experiment
  3. Evaluation and group interviews
- We made a video of the study (show segment 1:18-3:20)
  (URL: http://www.uv.uio.no/intermedia/tjenester/intermedia-formidler/essay-critic.html)
Data collection

- Essays in different stages of completion
- Video and sound recording from 3 classrooms
- Interview with selected students and teachers
- Teachers’ grading of essays
- Questionnaire
- Observation notes
- Triangulation of data (drawing on multiple data sources to illustrate same phenomenon)
Tentative results

- On average, the students who used EssayCritic scored better (higher grades) and wrote longer essays than those without (control group).
- Grading scale in Norwegian high schools: 0 (lowest) - 6 (highest)
Other findings

- Most students found the EssayCritic useful 😊
- They incorporated the critique provided by the system in the next version of their essays 😊
- In some cases, the students modified their essays by verbatim copy/paste from critique message 😞
- About 10% of the students found the critique distracting and believed it would inhibit creativity, and wanted to search for the topics themselves, 😞
- Lower achieving students found the critique most useful, as it motivated them to write longer essays 😊
Related work and theory

- **Over-the-shoulder learning (Vygotsky, 1978)**
  - A pedagogical model for informal learning
- **Reflection-in-action (Schön, 1983)**
  - Bringing new knowledge to bear on a problematic situation when the need for learning occurs
- **Domain-oriented design environments (Fischer et al. 1991)**
  - Computer-based critiquing for learning on demand
- **Latent semantic analysis (Landauer, Foltz & Laham, 1998)**
  - Computing the semantic similarity between two text segments using matrix algebra
Comparing semantic similarity

<table>
<thead>
<tr>
<th>(\cos \theta)</th>
<th>Semantic Similarity between Segments A &amp; B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\cos \theta \to 1)</td>
<td>Very High (good match)</td>
</tr>
<tr>
<td>(\cos \theta \to 0)</td>
<td>Very Low (poor match)</td>
</tr>
</tbody>
</table>
Plans for further work

• Critiquing can be directed at
  • Artifacts (e.g. commercial products, film, text)
  • Services (e.g. hotel experience)
  • People (e.g. interaction in social media)

• EssayCritic applied critiquing to textual artifacts

• Currently we explore critiquing for military training in 3D worlds (Second Life)
  • Knowledge domain is multicultural awareness for military personnel (soldiers, officers) going to Afghanistan for duty
  • An alternative to preplanned training programs
  • Exploring “good-enough” alternatives to reach a successful outcome in the scenarios we explore
Summary and conclusions

- EssayCritic is a web application for automated feedback on student essays on given topics.

- All students could use the program and most of them found it useful to support in class essay writing.

- Providing critique so that it will stimulate critical reflection and not lead to copy/paste is an important direction for further work.

- Future work aims at applying critiquing to collaborative activity in social media and 3D worlds.