Students' Knowledge Construction on Web Based Design Tools for Industrial Design Engineers

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The faculty of Industrial Design Engineering (IDE)

- Founded in 1969
- Largest university-based design course worldwide
- 1980 students
- >4300 alumni
- 3 departments
- 1 BSc programme
- 3 MSc programmes
- 3 Specialisations
‘Creating successful products people love to use’

Products which…

• are durable,
• are mass- or series produced,
• are used in daily life,
• offer significant interaction
Industrial Design Engineering is

- Design Form giving
- Ergonomics
- Marketing & Management
- Technology

Integration in design projects
Web 2.0 enables users to share and generate content (see figure). A Web 2.0 site allows its users to interact with other users or to change website content, in contrast to non-interactive websites where users are limited to the passive viewing of information that is provided to them.
1 Our experimental exercise: cont’d

In our web 2.0 exercise “Find your tool and share”, students will learn to find and evaluate a web based design tool. And to share their knowledge through an open content repository.

For the searching part the students will use collaborative search tools.

In our online repository WikID (www.wikid.eu), a collection of search tools is available: http://www.wikid.eu/index.php/Search_tools
Web based design tools are available on the web and can be used without the need of downloading the software. A web based design tool is software combined with knowledge contents available on the web that somehow helps a designer in his design activities.

An example of a web-based design tool is the Snap-fit Design calculator of BASF. With which one can create his own snap fit designs based upon five snap types. The software calculates stress and strength requirements.

http://www2.basf.us/businesses/plasticportal/pp_techRes_tools_snapfit_en.html
2. Applying the tool to gain experience

An important step in the experimental exercise is the step in which the students had to apply the found web based design tool in their design process. This was helpful in deciding whether or not the tool might be helpful in their design process.

But we consider this step also important because the application of the tool by the students also ensures the practical experience with the tool before the students write up an article about the tool. This way the information to be shared about the tools is much richer for the fellow students.
3. The knowledge sharing

The students had to share their experiences:

1. in articles on the online wiki and
2. through a power point presentation for each other.
3. The knowledge sharing – cont’d

For the sharing in our WikID, we provided a one-hour software demonstration of the search software and the wiki software. The articles in the wiki should tell at least:

- For what type of design activities the tool is intended.
- What kind of input parameters or values are required or optional.
- What kind of results can be expected.
- Their first experience with the tool, illustrated with a practical design example
- Their opinion about the tool.
3. The knowledge sharing – cont’d

When they had finished their article:

1. the students had to send us an email containing a link to their article in the wiki and
2. they had to prepare a presentation of 5 minutes to open up the evaluated tool for their fellow students.
4. An example

The tool can be used to find the right material for the canopy of Nuna5, this was an assignment of the course AE4T39 'Sustainable Mobility and Vehicle Design' 2010. Some demands apply to the physical properties of the canopy, with these demands a method and material can be selected using Vircon.

Demands
• Heat resistant to 80°C (typical solar panel temperature)
• Dimensionally stable in use
• Protects driver in case of a rollover
• High dimensional accuracy compared to CAD model

Wishes
Low weight
• Smooth surface for aerodynamics
4. An example – cont’d

The result of this materials selection is shown on the right of the screenshot, the top 3 is; Carbon Bismaleimide, Carbon PEEK and Aramid Epoxy. In practice, Aramid/epoxy was used for manufacturing reasons. These and more properties can be found by clicking the material links.

Some 60 web based design tools have been applied, evaluated and described. They have been classified in the following categories:

1. Construction
2. Sustainability
3. Financial
4. Fuzzy front end and Marketing
5. Production and Materials
6. Transport
7. Electronics
8. Aesthetics and Creativity
9. Team work
10. Ergonomics

Combined tools can be linked to from multiple categories.
6. The learning result

- In a web 2.0 exercise, students have learned to find and evaluate a web based design tool. And they have learned how to share their knowledge through an open content repository.
- Together they have created a design tools collection in this repository including valuable evaluative information and peer opinions.
- Besides they have presented their experiences with the design tools to each other to get direct feedback on the tools, applications and articles of their fellow students.
6. The learning result – cont’d

- The exercise has been a rich learning experience for design students. Within only 15 hours they have gained practical experience in several web 2.0 technologies including collaborative search, web based design tools and knowledge sharing. Moreover they have collectively created the learning material for themselves and their fellow students for further exploring the area of web based design tools.
7. Conclusions

Besides the learning conclusions that are stated in the former slides, we have the following conclusions:

• The experiment extended the findability of design tools. The tools have been classified and brought together in a wiki especially targeted to industrial design engineers. By using the knowledge about existing design tools, new tools will be easier to find.

• A great advantage for the teachers is the limited preparation time to reach fairly updated instruction material in a fast developing area: a varied collection of web based design tools that the students had to be made aware of.

• Finally the exercise stimulates the self learning competences of the students.
Questions, comments or suggestions?

Please send them to:

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Thank you for your attention