VLE Design Characteristics:
An Expert Study

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Agenda

- VLE & Design Characteristics
- Expert Study
- Implications
- Conclusions/Call for Further Research
Agenda

VLE & Design Characteristics

Expert Study

Implications

Conclusions/Call for Further Research
Virtual Learning Environments: Definition

- Virtual Learning Environments (VLE) can be understood as
  - electronic Information Systems (IS)
  - for the administrative and didactical support of learning processes
  - in vocational settings
  - by systematically providing corporate learners adequate
    - learning materials and
  - corresponding collaboration facilities so as to develop intended qualifications [8, 42, 49].
Virtual Learning Environments: Benefits

- VLE show the following benefits for corporate settings, among others:
  - efficiency,
  - individuality,
  - ubiquity,
  - convenience,
  - timeliness,
  - cost efficiency and
  - task orientation of VLE-based learning [15, 20, 41].

- Such advantages may also explain the ever increasing adoption of VLE in corporate training and development [15, 19, 48].
Virtual Learning Environments: How to Ensure VLE Success?

- The profit of applying VLE strongly depends on their appropriate development,
- implementation and
- (permanent) improvement

as this will ascertain VLE success [13, 29, 61].
VLE Design Characteristics: Definition

- VLE design characteristics are understood as
  - a set of properties inherent to VLE
  - by which they can be
    - developed,
    - implemented and
    - permanently improved [6, 7, 18, 45]
  - and which are
    - conceptually assumed or
    - empirically verified
to have a positive impact on system success.
Agenda

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- Expert Study
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- Conclusions/Call for Further Research
Expert Study: Foundation

- Expert studies are employed to gain insights in topical domains which are
  - theoretically not, or at least
  - not well developed.
- In certain respects, this applies to research into VLE design characteristics.
  - reason why: no completely developed theory of VLE design which allows for a direct elicitation of design characteristics.
- However, alternative foundations may be found in more general theories of the area of
  - general IS design or [e.g. 14, 35],
  - general IS success [e.g. 7, 45].
  These IS success theories can also be used to found design characteristic research.
Expert Study: Foundation

- The IS Success Model (ISSM) [6, 7, 40] presents general success relevant IS characteristics.
- Basically, the ISSM offers two major groups of success predictors:
  - system quality and
  - information quality [6, 7].
- The ISSM clarifies that system-related and information-related design characteristics constitute essential groups of VLE design characteristics.
- Being a general theory, the ISSM does not provide more detailed information about VLE design characteristics.
- It is hence the task of the expert study to ascertain
  - system as well as
  - information-related design characteristics of VLE empirically.
A plethora of over thirty different design characteristics could be identified.

- **Problem:** increasing number of design characteristics.
- **Hence, future research should strive for a limited set of major design characteristics.**

All identified design characteristics could be classified as either system-related or information-related.

- **Problem:** dissent concerning more concrete design characteristics.
- **Problem:** heterogeneity adds to the problem of the mere number, since it is still unclear which concrete design characteristics actually are relevant for success.
- **Hence, it is necessary to validate design characteristics to attain a set of resilient characteristics.**
Expert Study: Literature Review

- The design characteristics are of rather different granularities.
  
  Basically,
  
  - very general, coarse-granular characteristics such as “information quality”.
  
  - rather medium-granular characteristics (e.g. "personalization“, "clear terminology").
  
  - no fine-granular, detailed, i.e. very specific design characteristics.
  
  - granularity of design characteristics evidently is of major importance since expressiveness and usability increase with granularity.
  
  - to warrant general validity the expert study may have to get by with a medium granularity.

- Prevalent lack of explicit definitions of design characteristics.
  
  - The expert study mandatorily has to elaborate thorough and explicit definitions of design characteristics.
In summary, previous research suggests a set of design characteristics which is
- of limited congruence,
- of different granularity, and
- frequently unclear in meaning.

This clearly justifies the necessity of an expert study.

However, instead of just adding a further unconnected study, the current state of knowledge is to be used as a base to
- contrast, but also
- enrich the expert study and thereby integrate it with previous work.
The Delphi method was applied to ascertain success relevant system-, information-related characteristics of VLE [11, 12, 13, 22].

The Delphi methods supports practical forecasting, practical decisions, systematical analysis of complex and multifaceted scientific topics that are not directly and easily accessible via quantitative research approaches [11].

A two-phased approach was chosen to elicit design characteristics systematically

*Phase 1*: inquiry, categorization, definition of design characteristics.
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Background</th>
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<tbody>
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</tbody>
</table>
Expert Study: Method

- The Delphi method was applied to ascertain success relevant system-, information-related characteristics of VLE [11, 12, 13, 22].
- The Delphi methods supports practical forecasting, practical decisions, systematical analysis of complex and multifaceted scientific topics that are not directly and easily accessible via quantitative research approaches [11].
- A two-phased approach was chosen to elicit design characteristics systematically
  - *Phase 1*: inquiry, categorization, definition of design characteristics.
  - *Phase 2*: adjustment and ranking of design characteristics.
<table>
<thead>
<tr>
<th>VLE Design Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable</td>
<td>A1: 3.08 (1.44)</td>
</tr>
<tr>
<td>Secure</td>
<td>A2: 4.38 (3.52)</td>
</tr>
<tr>
<td>Learning-Process-Supportive</td>
<td>A3: 4.46 (3.13)</td>
</tr>
<tr>
<td>Interactive</td>
<td>A4: 4.77 (3.11)</td>
</tr>
<tr>
<td>Appealing</td>
<td>A5: 5.08 (2.25)</td>
</tr>
<tr>
<td>Transparent</td>
<td>A6: 5.15 (2.79)</td>
</tr>
<tr>
<td>Structured</td>
<td>A7: 5.92 (2.22)</td>
</tr>
<tr>
<td>Standard-Supportive</td>
<td>A8: 6.46 (2.79)</td>
</tr>
<tr>
<td>Accessible</td>
<td>A9: 6.85 (2.15)</td>
</tr>
<tr>
<td>Platform-Independent</td>
<td>A10: 7.62 (2.90)</td>
</tr>
</tbody>
</table>
# Expert Study: Results

<table>
<thead>
<tr>
<th>VLE·Design·Characteristic</th>
<th></th>
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<tbody>
<tr>
<td>B·Information-Related</td>
<td></td>
</tr>
<tr>
<td>Understandable</td>
<td>B1·2.23·(1.48)</td>
</tr>
<tr>
<td>Consistent</td>
<td>B2·2.92·(1.66)</td>
</tr>
<tr>
<td>Credible</td>
<td>B3·3.23·(1.30)</td>
</tr>
<tr>
<td>Challenging</td>
<td>B4·3.54·(1.51)</td>
</tr>
<tr>
<td>Multimodal</td>
<td>B5·4.00·(1.78)</td>
</tr>
<tr>
<td>Enjoyable</td>
<td>B6·4.58·(1.44)</td>
</tr>
<tr>
<td>Design Characteristic</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------</td>
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</tr>
<tr>
<td>A - System Related</td>
<td></td>
</tr>
<tr>
<td>Transparent</td>
<td>VLE are transparent, if they allow the learners to keep an eye on their own and/or other learners’ learning history (i.e., completed and/or passed learning activities of a unit of learning) and current status in the learning process.</td>
</tr>
<tr>
<td>Standard-Supportive</td>
<td>VLE are standard-supportive, if they facilitate learning materials which are compiled based on approved eLearning standards such as IMS Learning Design [17], or SCORM [1] as these eLearning standards enable learning materials to be widely shared across VLE which also support these standards.</td>
</tr>
</tbody>
</table>
### Expert Study: Results

<table>
<thead>
<tr>
<th>Design Characteristic</th>
<th>Definition</th>
<th>Source</th>
<th>Exemplary Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consistent</strong></td>
<td>The information provided by VLE is <em>consistent</em>, if the learning materials themselves are without contradictions, coherent and presented in a logical order.</td>
<td>literature review</td>
<td>“The use of terms throughout the (E-library) is consistent.” [16]</td>
</tr>
<tr>
<td><strong>Credible</strong></td>
<td>The information provided by VLE is <em>credible</em>, if they originate from a trustworthy source (e.g. teacher, certified and/or reputable organizations, etc.).</td>
<td>expert study</td>
<td>“Sequencing of learning objects, tasks, and assessments.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>“[…] how much one trust the credibility of the material (i.e. it does not convey wrong concepts)”</td>
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</table>

**B. Information-Related**
Implications

- *Researchers* should deliberate theoretical foundations (e.g. amalgamations of TAM and the ISSM).
- *Researchers* should aim at increasing specificity of design characteristics without losing general validity (working out the facets).
- *Researchers* should taken into account interdependencies of design characteristics.
- *Researchers* should further elaborate
  - whether different design characteristics contribute rather individually and independently to VLE success or
  - whether whole bundles or entire configurations of design characteristic are triggering success.
- *Researchers* should apply pre-prototypes and experiments for evaluation purposes [5, 36].
Implications

- **Practitioners** could be equipped with comprehensive (check-)lists for either managing the
  - development,
  - implementation or
  - improvement of VLE.

- **Practitioners** should
  - refine and customize such (check-)lists towards individual corporate settings.
  - consider the (check-)list that may lead to practical HRIS
    - development-
    - implementation- and
    - improvement-processes to foster HRIS success.
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Conclusions/Call for Further Research

- A comprehensive literature review and an initial expert study were carried out yielding a systematic list of well-defined
  - system- and
  - information-related design characteristics of VLE.
- This hopefully will stimulate future research, especially quantitative studies which
  - evaluate and deepen the insights offered,
  - instruct future practical development, selection and evaluation projects,
  while both streams may finally contribute to improved VLE which support better corporate training and development endeavors.
Thank you for your attention!

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