Descriptive Network Modeling and Analysis for Investigating User Acceptance in a Learning Management System Context

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LWDA 2019
Introduction

- Acceptance Level of LMSs using Technology Acceptance Model (TAM)

Methods

[Descriptive Analysis] Basic statistical analysis
[Network Analysis] Degree centrality and Motifs

Descriptive Analysis
- Student satisfaction with the usage as a whole

Degree centrality
- Level of variability of the different networks for the individual questions

Motifs
- Specific patterns of satisfaction levels for the different networks
Technology Acceptance Model (TAM)

- Perceived Usefulness
- Attitude Towards Using
- Behavioral Intention
- Actual Technology Use

External Variables
Perceived Ease of Use
Perceived Usefulness (PU)  The degree to which individuals believe that using the system would enhance their job performance

Perceived Ease of Use (PEU)  The degree to which individuals believe that using the system would be free of physical and mental effort

Behavioral Intention to use the Technology (BIT)  The users interest in using the system

Attitude Towards Using the Technology (ATUT)  The individuals view towards using the system

Actual Technology Use (ATU)  The degree to which the system can meet the users needs
Technology Acceptance Model (TAM) was developed to model the individuals choice of adopting technology

Previous studies on TAM shows that there is a substantial relationship between PU and PEU (Cowen, 2009)

Most previous studies investigated the impact of demographics on TAM contexts:

- There is no considerable correlation between users demographics and PU (Raman., 2011; Shen et al., 2015)
- The greater the age of users, the greater their understanding of usefulness of the innovation (Dias et al., 2014; Kurkinen, 2013)

Important: include descriptive network analysis of the model from the students perspective to determine which properties of LMS have a large impact on user satisfaction
Research questions

- What is the current extent of Blackboard acceptance as an LMS?
- What is the level of students satisfaction considering the use of LMS?
- How descriptive network analysis methods can be used to extract understandable patterns of users acceptance?
- Which patterns can we identify based on statistical as well as network-based methods?

On-going research:
- How generally applicable are the results?
Dataset

- 51 Pre-master students
- Tilburg School of Humanities and Digital Sciences
- 2018–2019 (fall and winter quarters)
- Data collected using a survey in the shape of closed-ended questions
Dataset

Questionnaire 1: Demographic Information
- Gender
- Age
- School

Questionnaire 2: TAM Items
- PU: Q1 – Q6
- PEU: Q7 – Q11
- BIT: Q12 – Q15
- ATUT: Q16 – Q23
- ATU: Q24 – Q30
<table>
<thead>
<tr>
<th>Q</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>Blackboard (BB) helps me to increase my learning productivity</td>
</tr>
<tr>
<td>Q2</td>
<td>BB helps me to find the course materials</td>
</tr>
<tr>
<td>Q3</td>
<td>BB helps me to submit the assignments</td>
</tr>
<tr>
<td>Q4</td>
<td>BB increases my academic performance</td>
</tr>
<tr>
<td>Q5</td>
<td>BB helps me in the learning process</td>
</tr>
<tr>
<td>Q6</td>
<td>BB helps me to ask and discuss some topics w/ the lecturer</td>
</tr>
<tr>
<td>PEU</td>
<td></td>
</tr>
<tr>
<td>Q7</td>
<td>BB is easy to operate</td>
</tr>
<tr>
<td>Q8</td>
<td>BB uses understandable language</td>
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<tr>
<td>Q9</td>
<td>BB uses the appropriate background color and font</td>
</tr>
<tr>
<td>Q10</td>
<td>BB has a systematic menu</td>
</tr>
<tr>
<td>Q11</td>
<td>BB is accessible, from w/in and outside of the university</td>
</tr>
<tr>
<td>BIT</td>
<td></td>
</tr>
<tr>
<td>Q12</td>
<td>I have an intention to use BB every day</td>
</tr>
<tr>
<td>Q13</td>
<td>I have an intention to check the latest materials on BB</td>
</tr>
<tr>
<td>Q14</td>
<td>I have an intention to check my grade through BB</td>
</tr>
<tr>
<td>Q15</td>
<td>I have an intention to encourage my fellow students to use BB</td>
</tr>
<tr>
<td>ATUT</td>
<td></td>
</tr>
<tr>
<td>Q16</td>
<td>I use BB w/out any compulsion from anyone</td>
</tr>
<tr>
<td>Q17</td>
<td>I need BB</td>
</tr>
<tr>
<td>Q18</td>
<td>I am happy when I use BB</td>
</tr>
<tr>
<td>Q19</td>
<td>Using BB to submit the assignment is an innovative idea</td>
</tr>
<tr>
<td>Q20</td>
<td>Using BB to download the course materials is an innovative idea</td>
</tr>
<tr>
<td>Q21</td>
<td>Using BB to discuss w/ lecturer/fellow students is a positive idea</td>
</tr>
<tr>
<td>Q22</td>
<td>Using BB is good and wise decision</td>
</tr>
<tr>
<td>Q23</td>
<td>I am going to encourage my fellow students to use BB</td>
</tr>
<tr>
<td>ATU</td>
<td></td>
</tr>
<tr>
<td>Q24</td>
<td>I use BB to support the learning activities</td>
</tr>
<tr>
<td>Q25</td>
<td>I always access BB every day</td>
</tr>
<tr>
<td>Q26</td>
<td>I get the course materials from BB</td>
</tr>
<tr>
<td>Q27</td>
<td>I download and upload assignments through BB</td>
</tr>
<tr>
<td>Q28</td>
<td>I use BB to check my grades</td>
</tr>
<tr>
<td>Q29</td>
<td>I am satisfied using BB</td>
</tr>
<tr>
<td>Q30</td>
<td>I tell my fellow students about my satisfaction using BB</td>
</tr>
</tbody>
</table>
Statistical Data Analysis (Individual Questions)

Perceived Usefulness

Perceived Ease of Use

Behavioral Intention to Use Technology

Attitude Towards Using Technology

Actual Technology Use

Total scores - contexts

Shayan, Rondinelli, van Zaanen, Atzmueller
Descriptive Network Modeling and Analysis
LWDA 2019
Positive answers (scores 4 or 5) by gender
Overview of considered network (User/Question)
Network Modeling and Analysis (Degree Centrality)

Normalized coefficient of variation of the degree centrality distribution on Users/Questions
Overview of considered network motifs
Relative Motif Frequencies on User/Question Networks
Results

- **Statistical analysis**
  - Most scores are positive
  - Little difference between male and female students degree of satisfaction

- **Degree Centrality**
  - Equal to 3/ Less than 3: more variability
  - More than 3: less variability
  - High relative frequency of 4 and 5 scores (as found in the descriptive statistics)

- **Motifs**
  - Equal to 3/ Less than 3: low scores
  - More than 3: high scores
  - The prevalence of high score answers for motifs 4 and 5 (similar results as above)
Limitations

- Most previous work uses more demographic information
  - Intervention requires more demographics such as different level of education, different field of study, ... 
- In this survey, age is negligible
  - Between 51 participants, just 6 were 31-40, and only 1 was 41+.
Discussion

- Analyze the acceptance of LMS (Blackboard) among students:
  - Statistical analysis
  - Descriptive network modeling (degree centrality and motifs)
- High score of five TAM variables (PU, PEU, BIT, ATUT, and ATU)
  - Consistent behaviour of participants
  - High acceptance of LMS
Conclusion

- Investigate the acceptance of LMS (Blackboard) using Technology Acceptance Model (TAM)
  - Descriptive statistics overall level of acceptance
  - Network Analysis in depth patterns
- The future work would be with a larger dataset and more demographic features
Questions?

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