
Olivia Wohlfart & Ingo Wagner
"It feels like we're building the plane while we're flying it and the destination keeps changing on us."

(Heidi Crumrine, high school English teacher; cited in Cardoza, 2021)
Content

- Introduction: „What we (think to) know so far“
- Research Questions: „What we don't know“
- Theoretical Background: „How to understand“
- Method: „Searching for answers“
- Findings: „Revealing answers“
- Discussion: „Understanding better“
- Conclusion and Outlook: „So what?“
- References
Introduction: „What we (think to) know so far“

Teachers are crucial for the process of digitalization (Bridwell-Mitchell, 2015; Lockton & Fargasson, 2019; Wohlfart & Wagner, 2023)

Technology integration and application are closely linked with technology acceptance (Davis, 1986)

Teachers’ digital literacy is more important for digitalization than rich access to digital technologies (Pettersson, 2018; Wohlfart & Wagner, 2023)

Organizational, technological and individual factors influence teachers’ technology acceptance and integration (Scherer & Teo, 2019)

Difference between intent to integrate technology vs. actual integration (Lee et al., 2003; Scherer et al., 2019)

Teaching experience (rather than age) influences technology acceptance/integration (Spiteri & Chang Rundgren, 2020; Wohlfart et al., 2021)
Introduction: „What we (think to) know so far“

Pre-Pandemic:
- External vs. internal obstacles for integrating digital tools (Al Mulhim, 2014; Bingimlas, 2009; Hatlevik, 2017; Lockton & Fargason, 2019; Schmid et al., 2017; Wohlfart et al., 2023)

Post-Pandemic:
- Teachers’ professional role changed complicatedly during the Covid-19 pandemic (Li & Yu, 2022)
- Teachers’ career satisfaction declined during the Covid-19 pandemic (e.g. Aktan & Toraman, 2022)
- Teachers’ digital literacy/competence increased during the Covid-19 pandemic (e.g. Myyry et al., 2022)
Research Questions: „What we don‘t know“

- How has teachers‘ acceptance and usage of digital tools developed across time since the outbreak of the Covid-19 pandemic?

- Which factors influence a lasting integration of digital tools in teaching?
Theoretical Background: „How to understand“

Figure 1. Technology acceptance model (own illustration based on Davis, 1989).
Method: „Searching for answers“

- Qualitative semi-structured interview study with longitudinal design (Denzin & Lincoln, 2011)
  - 1st round: 15 teachers in May/June 2020
  - 2nd round: 12 teachers in May/June 2021
  - 3rd round: 10 teachers in May/June 2022

- 37 interviews (each 29-66 minutes)

- Transcription & anonymization (Dresing & Pehl, 2020)

- Qualitative content analysis based on Mayring (2015)
# Method: Participants

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age*</th>
<th>Subjects Taught</th>
<th>Teaching experience (in years)*</th>
<th>Teaching load (in hours)**</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>M01</td>
<td>50</td>
<td>Music, Physical Education (P.E.), Maths</td>
<td>14</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M02</td>
<td>45</td>
<td>Biology, Geography, Ethics, Science &amp; Technology</td>
<td>15</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M03</td>
<td>37</td>
<td>Maths &amp; P.E.</td>
<td>2</td>
<td>12,5</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M04</td>
<td>45</td>
<td>Maths &amp; Geography</td>
<td>16</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>M05</td>
<td>31</td>
<td>Maths &amp; P.E.</td>
<td>1</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M06</td>
<td>38</td>
<td>German, History, Social Studies</td>
<td>6</td>
<td>22</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M07</td>
<td>38</td>
<td>Spanish, History, Social Studies</td>
<td>6</td>
<td>24</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M08</td>
<td>31</td>
<td>Maths &amp; P.E.</td>
<td>1</td>
<td>25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M09</td>
<td>36</td>
<td>Chemistry, Biology, Science &amp; Technology</td>
<td>6</td>
<td>25</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>F01</td>
<td>29</td>
<td>Maths, Biology, Computer Science, Science &amp; Technology</td>
<td>3</td>
<td>12,5</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>F02</td>
<td>60</td>
<td>German &amp; Geography</td>
<td>26</td>
<td>22</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F03</td>
<td>41</td>
<td>Biology, Chemistry, Science &amp; Technology</td>
<td>11</td>
<td>16</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F04</td>
<td>28</td>
<td>Biology &amp; Maths</td>
<td>0</td>
<td>20</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F05</td>
<td>28</td>
<td>Physics, Maths, Science &amp; Technology</td>
<td>0</td>
<td>23</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>F06</td>
<td>38</td>
<td>P.E. &amp; German</td>
<td>9</td>
<td>8</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Sociodemographic information based on responses in 2020.

**A full teaching load consists of 25 hours/week.

Table 1: Participants (sorted by gender)
Findings: „Revealing answers“

“And then it [the communication] simply worked” (M06)

“For me, digital tools are tools that I want to master, that are meant to benefit me. But I am not the slave of the digital tools I use.” (M02)

“[…] sometimes I would have liked a clearer statement from the school leadership.” (M09)

“no rocket science” (F05)
Findings: „Revealing answers“

“Revealing answers”

Perceived Usefulness

Core Variables: User Motivation

Perceived Ease of Use

Attitude Towards Using

Intention to Use

Actual System Use

“Core Variables: User Motivation

“I'm gradually trying to move to a paperless office.” (M02)

“When we first started talking, I was a digital Neanderthal. And now I'm one of those who are [...] ahead digitally.” (M01)

“…lessons will change fundamentally.” (F05)

External Factors

“You can't come back with xeroxed slides on the overhead projector.” (F02)

“...it's all about the change.” (F03)

2021

Introduction

Research Questions

Theoretical Background

Method

Findings

Discussion

Conclusion and Outlook

References
Findings: „Revealing answers“

"Digital tools really simplify things in the classroom. But I have to be careful with the students that they still think along in the classroom and don’t stop listening in class and rely on the digital media“. (M02)

"I perceive that more and more thought is being given to when it makes sense to use [digital tools] and how. The process is not yet complete, but it has already begun to be addressed." (M03)

"[...] more often have the courage to integrate digital tools into my lessons and that it’s not a bad thing if the technology doesn’t work sometimes.“ (F02)

"For me, digital tools have become part of everyday life as a teacher. For example, I use the digital class book on the laptop and show apps that I use on the tablet via the beamer.“ (M05)
Findings: „Revealing answers“

Fig. 2: Selection of identified categories influencing digital transformation
Quick reminder what we’re trying to understand better:

How has teachers’ acceptance and usage of digital tools developed across time since the outbreak of the Covid-19 pandemic?

Which factors influence a lasting integration of digital tools in teaching?
Discussion: „Understanding better“

How has teachers’ acceptance and usage of digital tools developed across time since the outbreak of the Covid-19 pandemic?

Impact of Covid-19??

Core Variables: User Motivation

- Perceived Usefulness
- Attitude Towards Using
- Intention to Use
- Actual System Use

External Factors

Perceived Ease of Use

Introduction  Research Questions  Theoretical Background  Method  Findings  Discussion  Conclusion and Outlook  References
Discussion: „Understanding better“

How has teachers’ acceptance and usage of digital tools developed across time since the outbreak of the Covid-19 pandemic?

- User motivation (Usefulness, Perceived Ease of Use, Attitudes) have developed and grown across time!
  - More specific -> clearer concepts -> less inhibitions
- External factors influenced motivation to varying degrees
  - External and internal support
  - Infrastructure
  - Heterogeneity of Students and Teachers
  - Rules and regulations

**BUT:** attitude towards use ≠ actual integration
Discussion: „Understanding better“

Which factors influence a lasting integration of digital tools in teaching?

(collected among others: Bridwell-Mitchell, 2015; Li & Yu, 2022; Scherer & Teo, 2019; Spillane, 2006; Wohlfart et al., 2021; Wohlfart & Wagner, 2023)
Conclusion and Outlook: „So what?“

- Covid-19 = catalyst for digital transformation of education!
- Acceptance and integration of digital tools among teachers has improved
- Will this transformation be sustainable?
- How can empirical educational research help?
"It feels like we're building the plane while we're flying it and the destination keeps changing on us."

(Heidi Crumrine, high school English teacher; cited in Cardoza, 2021)
References

- Cardoza, K. (2021). 'We Need To Be Nurttured, Too': Many Teachers Say They're Reaching A Breaking Point. NPR Online: https://www.npr.org/2021/04/19/988211478/we-need-to-be-nurtured-too-many-teachers-say-theyre-reaching-a-breaking-point
- OECD (2020). How prepared are teachers and schools to face the changes to learning caused by the coronavirus pandemic? Teaching in Focus, 32: https://doi.org/10.1787/7fe27ad7-en

Olivia Wohlfart & Ingo Wagner

Contact: olivia.wohlfart@kit.edu