Factors Influencing the Adoption of Open Educational Resources in Vocational Education: A UTAUT-Based Study

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Foreword

As I finalize this report, I would like to take a moment to reflect on the invaluable support I have received throughout this journey. Writing this report has been both a challenging and rewarding experience, and I am deeply grateful to those who have contributed to its completion.

First and foremost, I would like to express my sincere gratitude to my supervisor, Ilona Friso - van den Bos, for her unwavering support and guidance. Her expertise and constructive feedback have been instrumental in shaping this work, and her encouragement has been a constant source of motivation.

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A special thank you goes to Pascal van der Kaa, whose inspiring ambition has been a driving force throughout this process. His enthusiasm and determination have served as a great source of inspiration, reminding me of the importance of persistence and vision.

Finally, I am immensely grateful to my girlfriend, whose unwavering support and encouragement helped me get started, especially during moments when motivation was hard to find. Her belief in me has been invaluable, and I am truly thankful for her presence throughout this journey.

To all of you, thank you for your support, encouragement, and belief in my work. This report would not have been possible without you.

Summary

This study explores the factors influencing the adoption of Open Educational Resources (OER) in vocational education using the Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical framework. Vocational education presents unique challenges due to its focus on practical, industry-relevant skills, requiring adaptable and customizable educational resources. The research investigated the behavioral intention of vocational education teachers to adopt OER, emphasizing key UTAUT constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC).

The study employed a mixed-methods approach, incorporating both quantitative surveys and qualitative interviews with vocational teachers. The quantitative phase involved a survey of 90 respondents, with 60 usable responses, assessing the relationships between UTAUT variables and teachers' intention to adopt OER. The qualitative phase consisted of six interviews, providing deeper insights into the teachers' experiences and challenges with OER adoption.

Key findings revealed that PE, particularly the perceived adaptability of OER and its relevance to vocational practices, is a significant predictor of teachers' intent to use OER. Effort expectancy played a moderate role, with teachers highlighting the difficulty of integrating OER into existing curricula as a barrier. Social influence, while not statistically significant, emerged as important in qualitative findings, with peer support and industry professionals influencing teachers' attitudes towards OER. Facilitating conditions, such as technical infrastructure and time allowances, were crucial for both intention and actual usage of OER, with many teachers citing time constraints and difficulty in finding relevant resources as major obstacles.

Practical recommendations regarding the enhancement of OER adoption in vocational education are: improving the customizability of OER, providing comprehensive teacher training, fostering peer support networks, and investing in technical infrastructure. By addressing these factors, educational institutions can better support the integration of OER, ultimately enriching the teaching and learning experience in vocational settings.

Problem Statement

Open Educational Resources (OER) are freely accessible materials for research, teaching, and learning that offer significant potential to enhance education globally (Hylen & Schuller, 2007). They provide numerous advantages, such as reducing costs (Hilton III & Laman, 2012), increasing flexibility, enabling the sharing of best practices (Petrides et al., 2011), ensuring relevance to evolving educational needs (Jhangiani et al., 2016), and supporting diverse teaching methods (Wiley & Hilton III, 2018). Despite these benefits, the integration of OER into educational institutions is not always straightforward. This challenge is particularly evident in vocational education, where institutions like the ROC van Amsterdam are striving to develop OER for all ROCs in the Netherlands, highlighting the pressing need for effective implementation strategies in this sector (Kromhout & De Waal, n.d.). However, the implementation of OER within the ROC van Amsterdam faces challenges, notably due to limited information on OER implementation in this specific educational context.

Research on the adoption of OER has not extensively covered the vocational education sector, which possesses unique characteristics that likely influence OER utilization. These characteristics call for research within this context. Teachers in vocational education, often equipped with practical job experience and differing educational backgrounds compared to their counterparts in higher education (Zitter, 2018), may interact with OER in different ways. Understanding how these differences impact OER adoption is crucial to understanding the adoption of OER in vocational education. Therefore, it is important to thoroughly investigate factors that influence OER to gain deeper knowledge about technology adoption among this specific teacher population. This study aims to explore the factors

The vocational education context significantly differs from other educational environments (Katz & Westera, 2019; te Wierik et al., 2015; Zitter, 2018). By exploring how the UTAUT framework applies in this specific setting, the study seeks to provide a comprehensive theoretical insight into OER integration in vocational education. Guided by the central research question: "How do the constructs of the UTAUT framework influence and explain vocational education teachers' adoption of OER". The main aim is to better understand how the predictors in the UTAUT model relate to the adoption of OER; therefore, the focus is mainly on theoretical advancements. This goal, however, also has practical implications. It is anticipated that the findings aid in the adoption of OER in vocational education, thereby benefiting both educators and learners in this field.

Therefore, this study is important because it addresses a significant gap in the understanding of OER adoption in vocational education, a sector that has unique demands and characteristics compared to other educational environments. While OER offer many benefits, such as cost reduction, flexibility, and adaptability, their integration into vocational education remains underexplored. Given the practical experience and diverse backgrounds of vocational educators, it is crucial to investigate what factors influence OER adoption.

Theoretical Framework

Defining OER

Open Educational Resources (OER) have emerged as a transformative force in education, offering freely available materials with minimal usage restrictions, emphasizing accessibility and adaptability (Hylén, 2006). The Organization for Economic Co-operation and Development recognizes OER as digitized materials for teaching, learning, and research (Hylen & Schuller, 2007). UNESCO (2002) defines OER as "The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes." However, as quoted stated by Pawlowski & Bick (2010), this definition does is somewhat incomplete. Pawlowki & Bick (2010) defined as "freely accessible resources for educational purposes". This definition is elaborated upon by Pirkkalainen & Pawlowski (2010) giving a list, which includes but is not limited to; 1) Recourses (documents, simulations or websites), 2) Articles, textbooks and digital equivalents, 3) Software tools, 4) Experiences (sharing learning experiences about lessons and materials), 5) Web Assets (Pictures, short texts, videos). The broad scope of this definition makes OER a multi-interpretable concept, which may lead to variations in understanding and implementation across different educational contexts.

There are multiple benefits that OER bring to education. The main benefit of OER is that it helps make education more affordable and accessible for everyone, no matter where they are or how much money they have (Wiley & Hilton III, 2018). By removing the cost of expensive textbooks and learning materials, OER ensures that all students have access to high-quality education resources. This can also encourage collaboration between teachers and students since they can share and improve the resources together (Hilton & Laman, 2012). Moreover, OER supports lifelong learning by providing people with the tools to continue learning outside of formal education settings, such as schools and universities (McGreal et al., 2013). For instance, a person wanting to learn new skills can use OER to study a subject without enrolling in a formal class, helping bridge the gap between formal and informal learning.

OER Adoption

The adoption of Open Educational Resources (OER) by teachers varies widely across educational settings, influenced by factors such as institutional support, teacher awareness, and technological infrastructure (Cox & Trotter, 2017; Rolfe, 2012). High requirements for creating OER materials and complexities surrounding Creative Commons (CC) licenses are significant barriers to widespread adoption

(Otto, 2019). Additionally, educators in higher education often prefer smaller, adaptable OER materials rather than full courses, aiming to enrich their existing teaching resources (Otto, 2019). Despite interest and willingness to engage with OER, educators and institutions often face challenges related to legal concerns, particularly regarding copyright and intellectual property (Tlili et al., 2019). Limited awareness and understanding of CC licenses exacerbate these issues, resulting in hesitancy to publish or adopt OER (Tlili et al., 2019).

Technological infrastructure also plays a crucial role in OER adoption. In countries like China, disparities in internet access and institutional resources hinder the use of OER (Wang & Zhao, 2019). It should be noted, that technological hindrances in the sence of internet access are almost none existent in developed countries. However, many students and educators struggle with discovering and using OER due to unfriendly interface designs and a lack of awareness about repositories (Hu et al,. 2015). Encouragement and recognition for publishing OER are also lacking, with many institutions failing to include open-access contributions in career progression or rewards (Hu et al., 2015; Yawan & Ying, 2019). Quality concerns further hinder adoption, as many published OER are reported to be of low quality or irrelevant to users' needs (Shen, Ye, Wang, & Zhao, 2019).

Awareness of OER among teachers remains low, with many perceiving them as equivalent to any digital resource, highlighting a need for greater education about the unique benefits of OER (Belikov & Bodily, 2016; Ozdemir & Bonk, 2017). Teachers also face technical and pedagogical challenges when integrating OER into their curricula, underscoring the importance of institutional support and capacity building (Baas, Admiraal, & Berg, 2019). Recommendations for fostering OER adoption include increased involvement of librarians in curating and advocating for OER and leveraging semantic search technologies to improve resource discoverability (Miller & Homol, 2016; Little, Ferguson, & Rüger, 2012).

The researches about OER adoption are mostly limited to the adoption in Higher Education (Baas et al., (2019); Belikov & Bodily (2016)). Otto, (2019), however, also includes vocational education in their research, however of the 25 schools studied only 9 include vocational education. Furthermore only one of these 25 schools is specialized in vocational education, the other studied schools offer different kinds of education next to vocational education. Therefore, there is a lack of research towards adoption in the specific context of vocational education. This is significant because vocational education is a significantly different context than higher education.

The significance of vocational education

There are reasons to suggest that the vocational educational context differs from other educational contexts. The first difference lies in the training they receive to become teachers, and the second is the significant focus on practical skills in education. Working in vocational education often places high demands on teachers. They need to possess expertise in their field and the profession they are training for, connect education with professional practice, have pedagogical expertise, be didactically skilled, and demonstrate a higher professional education level (Aalsma et al., 2014). Not every teacher is equally developed in all areas of expertise, nor is it necessary. Teachers have their preferences and strengths. For example, the typical 'practical teacher' has strong affinity/expertise with the professional domain and practice, while another may excel in pedagogy and didactics (Zitter, 2018). While colleagues in secondary education and higher education typically have more similar educational backgrounds, the backgrounds of vocational educators are very diverse. Teacher training is not the only route to becoming a vocational education teacher (Zitter, 2018). They are trained in various ways, including professionals from the field who have obtained a pedagogical-didactic certificate or those with a professional education, such as a bachelor's degree in nursing, who have also acquired teaching qualifications. Then there are the teachers who followed the regular teacher training programs to become teachers in secondary education or vocational education. This unique difference between teachers in practical experience and pedagogical skills could affect their approach to integrating OER into their teaching. This, in terms, might influence their preferences and competencies in selecting and utilizing OER, which could differ from the approaches adopted by academically focused higher education faculty.

Furthermore, the Dutch vocational education system is characterized by a strong emphasis on practical skills combined with theoretical knowledge (Katz & Westera, 2019). This approach aligns with the unique learning styles and needs of vocational learners (te Wierik et al., 2015), suggesting that OER used in this context may need to be tailored differently compared to resources designed for different educational settings. Resulting that quality of OER can be perceived entirely different across different educational settings. Recognizing the unique needs and challenges faced by vocational education teachers in adopting OER paves the way for exploring technology acceptance as a construct that can effectively describe and address these aspects. This approach is crucial for developing more effective and context-specific OER integration strategies. To better understand the barriers and facilitators of OER adoption in vocational education, multiple models can be applied. These models help explain how and why individuals adopt new technologies, such as OER, and identify the factors that influence their decision-making.

Models for adopting new technologies

The **Technology Acceptance Model (TAM)**, developed by Davis (1989), is a widely used theory that focuses on two main aspects: perceived usefulness (how effective the technology is in helping users perform their tasks) and perceived ease of use (how easy the technology is to operate). TAM suggests that if users believe a technology is useful and easy to use, they are more likely to adopt it. While TAM is simple and effective in predicting technology use, it does not consider other important factors, such as the social environment or organizational support, which can influence technology adoption in more complex settings like education.

The **Theory of Planned Behavior (TPB)**, proposed by Ajzen (1991), takes a broader psychological approach to understanding human behavior. It argues that an individual's intention to use a technology is influenced by their attitudes (positive or negative feelings about the technology), subjective norms (perceived social pressure to use or not use the technology), and perceived behavioral control (the ease or difficulty of using the technology based on available resources). TPB is valuable in educational contexts where social influences and self-confidence in using technology play a crucial role. However, TPB's focus on intention rather than actual behavior may not fully capture the complexities of technology use in practice, where unforeseen barriers or contextual factors can influence outcomes. As Si et al. (2019) point out, whether the existing predictors can fully represent the influencing factors of a particular behavior needs further consideration, suggesting that TPB may overlook additional determinants that shape technology adoption in real-world scenarios.

The UTAUT Model

One of the most comprehensive models for understanding technology adoption is the **Unified Theory of Acceptance and Use of Technology (UTAUT)**. This model, developed by Venkatesh et al. (2003), combines elements from several other theories, providing a broad framework to predict the acceptance and usage of technology. UTAUT includes key factors such as performance expectancy (the belief that using the technology will improve job performance), effort expectancy (the ease of use), social influence (the impact of others' opinions), and facilitating conditions (the availability of resources and support). These factors work together to predict a user's behavioral intention to use a technology and their actual usage behavior.

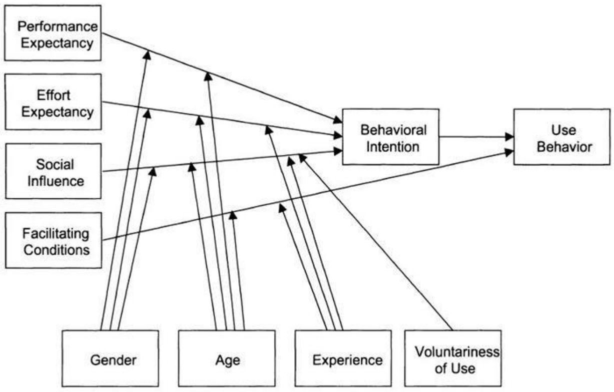
UTAUT is particularly useful in educational settings because it considers how various external factors, such as institutional support and the user’s experience with technology, influence the adoption process. By integrating these factors, UTAUT offers a more holistic view than other models.

Dulle and Miishi-Majanja (2011) argue that UTAUT provides a more comprehensive understanding of the factors that lead to technology adoption compared to other models. By incorporating aspects from TAM, TPB, and other theories, UTAUT offers a detailed framework for analyzing the adoption of OER in vocational education. Vocational education often involves unique challenges, such as the need for industry-relevant content and teachers’ diverse professional backgrounds, which can impact their acceptance and use of OER. UTAUT's ability to account for these factors—such as performance expectations related to practical skills and the role of facilitating conditions like technical support—makes it especially useful in this context. There are several OER studies that have used the UTAUT framework (Dulle & Minishi-Majanja, 2011; Percy & Van Belle, 2012). Percy and Van Belle discussed how UTAUT has proved to be a consistent model with high validity and reliability ratings (2012). However, despite its widespread adoption and validation across various domains, the model has faced criticism regarding its applicability and methodological limitations. For instance, many studies utilizing UTAUT rely on cross-sectional surveys and structural equation modeling, which may not fully capture the dynamic and evolving nature of technology adoption over time. This reliance on specific methodologies can introduce biases and limit the generalizability of findings (Williams et al., 2015).

Moreover, while UTAUT primarily focuses on individual-level predictors within organizational settings, its applicability in more informal or personal technology adoption scenarios has been questioned. Blut et al. (2022) emphasize the need for further exploration of how individual-level factors influence outcomes at higher levels, such as team and firm performance, to ensure the model's relevance across different organizational contexts.

Figure 1:

UTAUT Model (Venkatesh et al., 2003)



The UTAUT framework explains technology adoption by examining key factors that influence both individuals' behavioral intention (BI) and their actual use (AU) of technology. It considers how perceptions of usefulness and ease of use, external conditions such as resources and support, and social influences work together to shape adoption behavior (Venkatesh et al., 2003).

Behavioral Intent refers to the degree to which an individual plans to use a technology. It is influenced by a combination of personal attitudes, perceived usefulness, and social pressures (Venkatesh et al., 2003). According to Venkatesh et al. (2003), this intention serves as a strong predictor of AU which gauges the practical adoption and integration of the technology into an individual's daily practices. In the context of OER, BI could reflect a teacher’s intent to incorporate these resources into their teaching, while AU represents how regularly they actually use them in the classroom. These constructs are crucial because they determine the end goal of the adoption process—whether the technology is effectively utilized in practice (Venkatesh et al., 2012).

Performance Expectancy (PE) is the belief that using a particular technology will improve job performance (Venkatesh et al., 2003). The underlying mechanism here is that individuals are more likely to adopt a technology if they perceive it as helping them achieve better outcomes in their work. In the case of OER, PE would measure how much teachers believe that using these resources will enhance their teaching effectiveness, improve student engagement, or lead to better learning outcomes. The stronger the perception that OER will positively affect their teaching, the more likely they are to develop the intention to use it. Research has shown that **perceived benefits** (such as enhanced student performance or ease of access to resources) significantly drive BI, making PE one of the strongest predictors of technology adoption (Venkatesh et al., 2003; Dulle & Minishi-Majanja, 2011).

Effort Expectancy (EE) captures how easy or difficult the technology is to use (Venkatesh et al., 2003). The mechanism behind this construct is that individuals are less likely to adopt a technology if it requires substantial effort or if they perceive it as complex (Davis, 1989). This is particularly relevant in educational contexts, where teachers may have limited time and resources to invest in learning new technologies (Cox & Trotter, 2017). For OER, if the materials are seen as difficult to find, adapt, or integrate into existing lessons, teachers may be discouraged from using them (Sadaf et al., 2012). Conversely, if OER is perceived as straightforward and user-friendly, adoption becomes more likely. Therefore, **ease of use** and the minimization of barriers play a key role in forming positive behavioral intentions toward OER adoption (Venkatesh et al., 2003; Sadaf et al., 2012).

Social influence (SI) refers to the extent to which individuals perceive that important others—such as colleagues, supervisors, or institutional leaders—believe they should use a technology (Venkatesh et al., 2003). The underlying mechanism here is rooted in **social pressure** and **norms** (Ajzen, 1991). In educational settings, teachers might be influenced by recommendations from peers, or they may feel institutional pressure if their school or educational board promotes the use of OER. SI can vary significantly across contexts; in some cases, teachers may rely heavily on peer recommendations or institutional mandates, while in others, their personal motivation might outweigh external social factors (Wang et al., 2017). Social networks, professional communities, and peer recognition are essential mechanisms that either facilitate or hinder the acceptance of OER depending on the strength of these influences (Venkatesh et al., 2003).

Facilitating Conditions (FC) refer to the extent to which individuals believe that the organizational and technical infrastructure exists to support their use of a technology (Venkatesh et al., 2003). The mechanism at play here is the availability of **resources** and **support systems**. Even if teachers have a high intention to use OER, they may be unable to do so if they lack the necessary tools, training, or institutional backing (Cox & Trotter, 2017). Facilitating conditions include access to technical support, professional development, and appropriate resources (such as hardware or stable internet access) (Baker et al., 2012). In vocational education, where hands-on teaching tools and practical resources are essential, FC becomes especially crucial. Without proper support, even the most well-intentioned teachers may struggle to incorporate OER effectively into their curriculum (Katz & Westera, 2019).

The UTAUT model also includes several moderating variables, such as gender, age, experience, and voluntariness of use; however, the applicability of these moderators differs in each context. “Although moderators can be valuable, they may be applicable and become relevant only when there is significant variation in those moderators across individuals within the same context.” (Dwivedi et al., 2019). So Dwivedi et al. (2019) claim that moderators may not be universally applicable to all contexts and hence run the danger of being non-relevant in certain settings. Since no research has yet been conducted in this context, there is no knowledge on whether these moderators are applicable to this research. Moreover, the inclusion of moderator variables can add complexity to research designs and analyses. There is often confusion about how to define and identify these variables, which can complicate the interpretation of results (Koeske, 1993). Without a clear understanding of how moderators function within the specific context of this study, their inclusion could introduce ambiguity rather than clarity.

UTAUT in vocational education

The relationship between the UTAUT predictors, intent to use, and actual usage of OER has been researched in various educational contexts (Seely Brown & Adler, 2008; Smith et al., 2017), however, there is a lack of research in vocational education. While no extensive research has been conducted on the UTAUT predictors within vocational education, different studies hypothesize potential differences compared to higher education and secondary education. In terms of performance expectancy, teachers with industry expertise might favor OER that aligns with industry practices (Zitter, 2018). These teachers often have a close connection to the work field, contributing practical knowledge such as work processes and rules for specific situations (e.g., nursing procedures, work protocols, and regulations), which plays a crucial role in their teaching content. The diversity of vocational practices, such as the difference in knowledge, skills, and attitudes required for nursing in a community team versus a general hospital or elderly care, underscores the need for adaptable and relevant OER (Zitter, 2018; Becker et al., 2013).

Effort expectancy is crucial, as vocational educators, with their blend of practical experience and pedagogic-didactic training (Zitter, 2018), may prefer OER that is straightforward to integrate into their teaching methodologies. Dennen and Burner (2008) highlight that in vocational settings, where educators often have diverse backgrounds, the simplicity and user-friendliness of educational resources are key adoption factors.

The role of social influence in vocational education may differ from more academically oriented settings. Vocational educators, as Dennen and Burner (2008) note, often rely more on their industry experience than academic or peer recommendations, potentially reducing the impact of social influence on OER adoption. However, there could be a crucial role for the work field as a predictor in social influence. Facilitating conditions, like technical and organizational support, are vital in vocational training (Katz & Westera, 2019). This however does not seem to differ from other educational contexts. There is no reason, yet, to hypothesize why FC would differ from other educational contexts.

In short, the literature highlights several critical factors influencing OER adoption in vocational education, including the need for institutional support, increased teacher awareness, and technological infrastructure tailored to the unique needs of vocational learners. Existing research primarily focuses on higher education, with limited insights into the specific challenges faced in vocational settings. Challenges such as, a lack of pedagogical and technical support, and quality assurance have been identified as key barriers to adoption. Additionally, the diverse backgrounds and pedagogical approaches of vocational educators suggest that traditional models of technology acceptance may require adaptation to better reflect the vocational education context. Given these findings, there is a clear need to explore factors such as performance expectancy, effort expectancy, and social influence within this setting to develop effective strategies for fostering OER adoption.

The current study

The ROC van Amsterdam (Regional Education and Training Centre of Amsterdam) is an institution in Dutch vocational education aiming at vocational education. It offers a wide range of programs in technology, healthcare, business, and the creative industries. The ROC van Amsterdam has initiated the Content Creation Team. This team is dedicated to producing OER for vocational education teachers across the Netherlands. The Content Creation Team aims to address the increasing commercial pressures from traditional publishers and costly educational platforms by developing and sharing high-quality, accessible learning materials. While the objectives and advantages are clear, the first results are quite disappointing. The first OER modules were hardly adopted by teachers. The aim of this research is to aid the ROC van Amsterdam by giving advice to the content creation team. To give advice, a complete understanding of the adoption of OER in vocational education is necessary.

This study aims to understand the factors influencing the adoption of OER by vocational education teachers, guided by the central research question: 'What do vocational education teachers require to effectively adopt OER?' Utilizing the UTAUT model as a theoretical lens, this research formulates its research questions based on key UTAUT constructs and their relationships with behavioural intent to use and actual usage of OER. The research employs both qualitative and quantitative research questions to not only identify but also comprehend the factors.

Assessing the influence of UTAUT predictors on BI and AU.

- What is the impact of performance expectancy on the likelihood of vocational education teachers adopting OER?
- What is the impact of effort expectancy on the likelihood of vocational education teachers adopting OER?
- What is the impact of social influence from colleagues and educational authorities on vocational education teachers' intention to adopt OER?
- What is the impact of facilitating conditions, including institutional support and technical infrastructure, on the adoption of OER by vocational education teachers?

Explaining the relationships between UTAUT predictors (BI and AU).

- How do vocational education teachers describe their experiences regarding performance expectancy in adopting or rejecting OER in their teaching practices?
- How do vocational education teachers describe their experiences regarding effort expectancy in adopting or rejecting OER in their teaching practices?
- How do vocational education teachers describe their experiences regarding social influence in adopting or rejecting OER in their teaching practices?
- How do vocational education teachers describe their experiences regarding facilitating conditions in adopting or rejecting OER in their teaching practices?

By answering these research questions, this study aims to develop a comprehensive understanding of the factors that facilitate or hinder the adoption of OER in vocational education. By examining the influence of key predictors from the UTAUT model—performance expectancy, effort expectancy, social influence, and facilitating conditions— the specific needs and preferences of vocational education teachers regarding OER aim to be specified.

Method

Research Design

This study employs a cross-sectional sequential mixed-methods approach. This approach is selected to investigate the relationships between variables and gain a deeper understanding of these associations. A questionnaire assesses the relationships between UTAUT constructs and OER adoption. This approach allows for the measurement of the strength and significance of these relationships in a broad sample of vocational education teachers. The qualitative aspect, consisting of semi-structured interviews, helps understand relationships in the UTAUT model. By integrating the quantitative and qualitative findings, the study synthesizes statistical trends with in-depth personal experiences.

Participants

Sampling quantitative part

In this study, the sampling method varied depending on the quantitative and qualitative phases of the research. In the quantitative phase of this study, a diverse group of vocational education teachers from various subjects and institutions across the Netherlands have been invited to fill out the questionnaire. Using both social media and the networks within the institutions respondents were gathered. This multi-site approach, recommended by Han, et al. (2023), enhances the study's external validity and captures a broader perspective on OER adoption. Aiming for 15-20 respondents per variable (Creswell & Creswell, 2018), the study aimed for 120 teachers to ensure a representative sample.

Respondent Information quantitative part

For this research, only teachers who have worked with OER have been selected in the data collection. As stated, the aim for this study was a total of 120 respondents. A total of 90 responses were recorded; however, only 60 of them were viable for this research. Some respondents were not working in the vocational education field, resulting in a drop in viable responses. Many other respondents did not finish the questionnaire, where no data was actually gathered on the UTAUT constructs. resulting in a total loss of 30 responses. The distribution of the respondents is shown in Table 1.

Table 1

Respondent Information Quantitative Phase (n = 60)

Cbaracteristic	*n*	%
Work Location		
Curio College	1	2.33
Deltion College	11	25.58
Graafschap College	1	2.33
Noorderpoort College	1	2.33
ROC van Amsterdam	16	37.21
Other	13	30.23
Age		
18 - 25	1	2.08
26 - 35	2	4.17
36 - 45	15	31.25
46 - 55	16	33.33
56 - 65	13	27.08
65 +	1	2.08
Experience		
0 - 5 years	7	14.58
6 - 10 years	14	29.17
11 - 20 years	15	31.25
21 - 30 years	9	18.75
31 + years	3	6.25
Educational Background		
Practical experience in the professional field	6	12.5
Practical experience in the professional field supplemented with education about teaching	14	29.17
Teacher training	24	50
Other	4	8.33

The survey involved respondents from various educational institutions, with a significant concentration at ROC van Amsterdam (37.21%) and Deltion College (25.58%), highlighting a diverse representation from leading colleges. The 'Other' category (30.23%) suggests a substantial proportion of respondents from other unspecified institutions, which could indicate a broad range of perspectives in the dataset. Age distribution among the respondents is fairly skewed towards older age groups, with a majority falling within the 36-55 age range, comprising 64.58% of the total respondents.

Experience levels of respondents varied, with a notable concentration having 6-20 years of experience (60.42%). In terms of educational background, half of the respondents (50%) have a formal teaching qualification, which emphasizes a strong foundation in educational methodologies. The remaining 50% either have practical experience in their field or a combination of practical experience and educational training, suggesting a blend of hands-on skills and pedagogical knowledge among the participants. The respondent data align with the suggestion that teachers in vocational education come from various backgrounds (Zitter, 2018).

Sampling qualitative study

For the qualitative phase of the study, teachers with prior experience working with OER were selected. Purposeful sampling is a suitable approach in this context, as it allows for the selection of participants who possess experiences that are relevant to the research (Patton, 2002). This kind of study requires at least 6 respondents (Morse, 1994). Beatty and Willis (2007) highlight that reliability in qualitative research is closely linked to the depth of understanding achieved, where deep saturation should be the objective.

Respondent information qualitative part

The aim for the interviews was to reach deep saturation. After six interviews, deep saturation was reached; for the last two interviews, no new information was added. Once again, the choice was for a multi-site approach, resulting in 6 interviewees from 5 different schools and different educational fields. Table 2 shows the distribution of the respondents by their age, their teaching fields, and their experience teaching. The broad sample represents the broad context in which this research took place.

Table 2

Respondent information qualitative phase

Respondent	*Age*	*Teaching Field*	*Work location*
#1	25-35	Healthcare	MBO College Hilversum
#2	36 – 45	Economics	MBO College Amstelland
#3	46 - 55	Technology	ROC van Twente
#4	36 - 45	Didactics	Noorderpoort
#5	56 - 65	Technology	Nova College
#6	56 - 65	Language	MBO College Lelystad

Instruments

Questionnaire

The study revolved around the two dependent variables, both measured on a scale, BI and AU. The independent variables (PE, EE, SI & FC) are measured as scale variables using a structured questionnaire. The questionnaire, adapted from De Witte and Van Daele (2017), features Likert-type scale questions. The original questionnaire, comprising 31 items, assesses multiple variables related to technology adoption. To maintain focus and relevance, moderators such as age, experience, and gender were left out of this research. Additionally, to gauge actual OER usage, elements from Al-Qeisi et al. (2015) have been incorporated. Resulting in a total of 24 measured items. Appendix A shows the statements in the questionnaire and their sources; Appendix B shows the full questionnaire as given to the respondents.

The questionnaire started with demographic information, which helps filter out non-vocational education teachers. After the demographics, the statements corresponding to the UTAUT variables are given in random order. 24 statements are given to the respondents, which are to be answered according to a five-point Likert scale (Disagree, somewhat disagree, neutral, somewhat agree and agree). Four statements measure AU, for example: “My tendency is towards using OER whenever possible”. Three statements measure BI, all similar to: “I intend to use Open

Educational Resources in the next 6 months.” EE is measured with three different statements, FC with four different statements, PE with four different statements, and lastly, SI is also measured with four different statements. For the total score of each construct, the average score is taken of the Likert-scores. Building on the theoretical evolution of UTAUT, recent studies (e.g., Venkatesh et al., 2012) suggest that facilitating conditions can directly influence behavioral intention by increasing users' confidence and reducing perceived barriers to technology adoption. Given the practical considerations of vocational education, where resource availability plays a crucial role in decision-making, incorporating FC as a predictor of BI aligns with these updated perspectives."

Semi-Structured interviews

As for the qualitative phase, semi-structured interviews have been conducted. The aim for these interviews is to better understand the experiences of teachers regarding OER usage and the role of the predictors. To align with the research purposes, a semi-structured interview was chosen, as the number of statements regarding an experience adds weight that would get lost in full structured interviews. The outline of the semi-structured interviews is based on the UTAUT model. After the introduction, some general questions are asked regarding the construct; each has some suggested follow-up questions. This outline is only suggestive; therefore, the follow-up questions should not act as limiting.

An example of a introductory question about Effort Expectancy is: “Can you describe the learning curve involved in finding, adapting and integrating open educational resources into your curriculum? How has this affected your use?” Suggested follow-up questions are:

- What tools or strategies have you found helpful in overcoming this learning curve?
- “What challenges have you faced in terms of ease of use of open educational resources, and how did you overcome them?”
- What support or resources would have made these challenges easier to overcome?

The complete outline of the semi-structured interviews has been added to APPENDIX C: Outline semi-structured interviews. The coding procedures entail open coding, axial coding, and selective coding. ATLAS.ti was used for the coding process of the qualitative data. The coding process, comprising open, axial, and selective coding, was tailored to align with the study's specific focus on behavioural intentions and usage patterns of OER, as well as the UTAUT framework's constructs. Appendix

D: CODING BOOK has full explanations of each code created during the coding process, which made it easier to organize the interview data in a structured and detailed way.

Procedure

Initially, only teachers who work at the ROC van Amsterdam were sent the questionnaire in their weekly notices. However, to improve the response rate, the questionnaire was publicized using social media. In the survey phase, participant anonymity is ensured, with no personal data collected that could lead to identification. Participants received an informed consent statement before the questionnaire, detailing the study's purpose, their role, and data usage, highlighting voluntary participation and the option to withdraw anytime. For interviews, a detailed consent form outlined the interview's purpose and procedures, reiterating the voluntary nature of participation. The study received ethics committee approval, ensuring adherence to ethical standards, including data handling, participant anonymity, and informed consent. This approval confirms the study's commitment to addressing potential ethical issues.

After analysing the quantitative data, the relationships between constructs were clear. The outline of the interviews was made following the completion of the initial quantitative analysis. However, the questionnaire remained open during the interviews, aiming to increase the response rate. Together with the ROC van Amsterdam, teachers were approached from different schools to create a multi-site approach. After initial contact, interviewees received a consent form prior to the interviews. Interviews were conducted and transcribed using Microsoft Teams. After 6 interviews of approximately 40 minutes each, deep saturation had been reached. As during the last two interviews, no new information had been gathered. To ensure reliability and validity in the qualitative analysis, member checking was employed. Participants had been given the opportunity to review and comment on the findings before the coding process started, ensuring that the interpretations accurately reflect their perspectives and experiences.

The initial stage of the analysis involved a thorough examination of the transcribed interviews. During this phase, key points and themes were identified as they naturally emerged from the texts. For instance, comments regarding the ease of accessing Open Educational Resources (OER) were categorized under “Ability to find OER". Similarly, remarks on the effort required to locate and use these resources were classified as " Time Consumption". A significant challenge in this phase was ensuring the initial codes were neither too expansive nor too restrictive to meaningfully capture the essence of the data. To address this, the coding scheme was iteratively refined. This refinement involved developing subcodes to address specific aspects more precisely within broader categories, such as “Time Restraints”, “Alignments with Curriculum” and “Findability”. The axial coding stage categorized the initial codes into broader themes, linking them to the UTAUT framework. These subcodes were grouped under the main variables, e.g., alignment with curriculum became EE: align with curriculum. Multiple iterations were made to best divide the open coding into the subsets defined by the variables. In the final stage of coding, selective coding was used to distil and integrate the data around the research questions. Using Sankey diagrams to visualize the co-occurrence of different codes of the independent variables and the dependent variables.

Data analysis

Validity and Reliability Measures

Analysis of gathered data has been conducted using R statistics, using the two-step method developed by Anderson and Gerbing (1988). Initially, the validity and reliability of the measurement model were assessed. To ensure the validity and reliability of the findings, the internal consistency of scale items was verified using Cronbach's alpha. Confirmatory factor analysis was used, and the construct validity of the measurement model is further examined by estimating its convergent and discriminant validity. Correlation and regression analysis were employed to provide a deeper understanding of the relationships between the independent variables and the dependent variables. Table 3 summarizes the reliability and validity measures for each construct, highlighting key metrics such as Factor loadings, Cronbach's Alpha (α), Average Variance Extracted (AVE), and Maximum Shared Variance (MSV).

Table 3

Reliability and Validity Measures

Construct	*Item*	*Factor Loading*	*Alpha* ($\alpha > 0.7$)	*AVE* ($AVE > 0.7$)	*MSV*	*SQRT.AVE* $MSV < \sqrt{AVE}$)
AU	AU1	0.63	0.85	0.38	0.62	0.61
	AU2	0.88				
	AU3	0.80				
	AU4	0.83				
EE	EE1	0.80	0.90	0.83	0.17	0.91
	EE2	0.87				
	EE3	0.87				
	EE4	0.82				
SI	SI1	0.40	0.70	0.70	0.30	0.84
	SI2	0.46				
	SI3	0.75				
	SI4	0.76				
PE	PE1	0.76	0.86	0.62	0.38	0.79
	PE2	0.62				
	PE3	0.83				
	PE4	0.89				
FC	FC1	0.51	0.61	0.37	0.63	0.61
	FC2	0.82				
	FC3	0.12				
	FC4	0.73				
BI	BI1	0.85	0.93	0.61	0.39	0.78
	BI2	0,95				
	BI3	0,93				

The reliability analysis, using Cronbach's Alpha, demonstrated strong internal consistency for most constructs ($\alpha > 0.7$). Specifically, PE, EE, AU, and BI all showed high values, indicating strong reliability. However, FC recorded a lower value, suggesting the need for closer examination.

Convergent validity assesses whether the items of a construct that are supposed to be related are related. It is typically measured using the Average Variance Extracted (AVE), where a value greater than 0.7 is desired. Only EE met this criterion, suggesting strong convergent validity. The AVE for SI was exactly 0.70, indicating a borderline case, while the AVE values for other constructs were below the threshold, suggesting weaker convergent validity.

Discriminant validity evaluates whether a construct is truly distinct from other constructs. This is determined by comparing the Maximum Shared Variance (MSV) with the AVE, and ideally, the square root of the AVE should be greater than the MSV. Constructs such as PE and EE demonstrated discriminant validity, with $\sqrt{AVE}$ values exceeding their MSV values. However, FC and AU did not meet this criterion, suggesting potential overlap with other constructs. BI showed discriminant validity by surpassing its MSV.

The factor loadings, which indicate how well each item represents its underlying construct, provide further insight into the reliability and validity of the constructs. High factor loadings (>0.70) indicate strong representation, whereas moderate loadings (0.40 to 0.70) suggest acceptable but potentially needing review. Low loadings (<0.40) are problematic and may indicate that the item does not adequately represent the construct. The factor loadings for EE, AU, BI, and PI suggest that the items are relatively strong predictors for their respective constructs. Items SI3 (0.75) and SI4 (0.76) had strong loadings, but SI1 (0.40) and SI2 (0.46) had weaker loadings, suggesting potential issues with these items. The FC construct had a mix of loadings, with FC2 (0.82) and FC4 (0.73) showing strong loadings, but FC1 (0.51) and FC3 (0.12) showing weaker contributions, raising concerns about their effectiveness in measuring the intended construct. The marginal Alpha value and AVE for FC, along with the AVEs for SI and BI, suggest a possible revision of these constructs to enhance their reliability and validity.

The outcomes of the CFA, outlined in table 4, shed light on various fit indices that gauge the goodness-of-fit between model and the empirical data. Notably, these fit indices include the chi-square statistic (χ^2), the chi-square to degrees of freedom ratio (χ^2/df), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Standardized Root Mean Square Residual (SRMR).

Table 4

Model Fits for the CFA model

Model	*Value*	*Treshold*
Chi-square (χ^2)	384	
Degrees of Freedom (df)	215	
χ^2/df Ratio	1.79	≤ 3.0
RMSEA	0.12	≤ 0.06 or ≤ 0.08
CFI	0.82	≥ 0.95
TLI	0.79	≥ 0.95
SRMR	0.10	≤ 0.08

Examination of these fit indices shows that while some indices fell below the recommended thresholds, the overall model demonstrated a less than optimal fit to the data. While the chi-square statistic (χ^2) yielded a value of 385.52 with 215 degrees of freedom, resulting in a χ^2/df ratio of 1.79. Also the χ^2/df ratio exceeded the ideal threshold of 3.0. However, the RMSEA value of 0.13, although slightly above the recommended threshold of 0.08, indicating a suboptimal model fit. Similarly, both the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) values were observed to be 0.80 and 0.77, respectively, below the ideal threshold of 0.95. Moreover, the Standardized Root Mean Square Residual (SRMR) value of 0.10, although slightly above the recommended threshold of 0.08. While certain fit indices fell slightly below the recommended thresholds, the evidence from the CFA indicates that our measurement model captures the underlying constructs.

Examination of these fit indices shows that while some indices fell outside the recommended thresholds, the overall model demonstrated an acceptable fit to the data. Specifically, the chi-square statistic (χ^2) yielded a value of 385.52 with 215 degrees of freedom, resulting in a χ^2/df ratio of 1.79, which falls within the acceptable threshold range (less than 3.0), indicating reasonable model fit. The RMSEA value of 0.13, however, exceeds the recommended threshold of 0.08, suggesting room for improvement. Similarly, both the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values were 0.80 and 0.77, respectively, which fall below the ideal threshold of 0.95. Additionally, the Standardized Root Mean Square Residual (SRMR) value of 0.10 is above the recommended threshold of 0.08.

Results

Descriptive Statistics

The descriptive statistics presented in table 5 offer valuable insights into the distribution and central tendencies of responses for each construct. Across all constructs, the mean scores ranged from 2.95 to 3.67, reflecting varying levels of agreement with the measured variables. Notably, respondents exhibited moderate to high levels of agreement with items measuring BI, as evidenced by the mean score of 3.67. However, there was variability in responses, as indicated by the standard deviations ranging from 0.80 to 1.00, suggesting diverse perceptions among respondents regarding constructs such as EE and AU.

Table 5

Descriptive Statistics of Constructs Related to Behavioral Intention and Actual Usage

Construct	*mean*	*median*	*sd*	*min*	*max*
PE	3.53	3.50	0.80	1.00	5.00
EE	3.46	3.50	0.97	1.00	5.00
SI	2.95	3.00	0.84	1.00	5.00
FC	3.36	3.25	0.80	1.50	5.00
BI	3.67	4.00	1.00	1.00	5.00
AU	3.27	3.13	0.99	1.00	5.00

Correlation and Regression Analysis

The correlation matrix in table 6 shows the relationships between pairs of constructs. Notably, there were significant positive correlations between most pairs of constructs, with coefficients ranging from 0.28 to 0.78. For instance, there was a moderately positive correlation between PE and AU (r = 0.77), indicating that as perceived performance benefits increase, so does actual usage behavior. Similarly, a strong positive correlation was observed between EE and AU (r = 0.78), suggesting that ease of use is positively associated with actual usage behavior.

Table 6

Correlation Matrix of Key UTAUT Constructs

	PE	*EE*	*SI*	*FC*	*BI*	*AU*
PE	1					
EE	0,60	1				
SI	0,21	0,39	1			
FC	0,45	0,76	0,42	1		
BI	0,56*	0,66	0,35	0,69*	1	
AU	0,78	0,75	0,36	0,54	0,60*	1

* Correlation is significant at the 0.05 level

Table 7 presents the Shapiro-Wilk test results for residuals, indicating the normality of distribution across the predictor variables (PE, EE, SI, FC, BI) with p-values ranging from 0.17 to 0.40 , suggesting the adequacy of the regression model assumptions.

Table 7

Shapiro-Wilk test for the Residuals of Predictor Variables

Predictor Variable	$p - value$
PE	0.23
EE	0.23
SI	0.36
FC	0.17
BI	0.40

Relationship between UTAUT variables and OER adoption

As shown in Table 8, PE and FC were identified as significant predictors of BI, among the UTAUT variables. PE showed a significant positive relationship with BI (*Estimate = 0.30, p = 0.029*), indicating that higher performance expectancy is associated with increased intent to adopt OER. Likewise, FC demonstrated a significant and stronger positive effect on BI (*Estimate = 0.54, p = 0.005*), suggesting that supportive facilitating conditions greatly enhance teachers' intent to adopt OER.

In contrast, Effort Expectancy (EE), with a coefficient of 0.17 (*p = 0.314*), did not reach statistical significance, indicating a minimal influence on BI in this context. Social Influence (SI) also shown a non-significant effect on BI (*Estimate = 0.06, p = 0.634)*, indicating it is not a meaningful predictor in this model.

Table 8

Regression Analysis for predicting behavioral Intent (BI)

	Estimate	*SE*	*t value*	*p*
(Intercept)	0,13	0,49	0,27	0,791
PE	0,30	0,13	2,25	0,029
EE	0,17	0,17	1,02	0,314
SI	0,06	0,12	0,48	0,634
FC	0,54	0,18	2,94	0,005

Table 9**Fout! Verwijzingsbron niet gevonden.** further examines the predictive relationships for AU, where BI shows a strong positive relationship with AU (Estimate = 0.46, p = 0.004), indicating that higher behavioral intent significantly increases the likelihood of actual OER usage. Although FC did not reach statistical significance (Estimate = 0.29, p = 0.130), it suggests a marginal influence on AU, implying that supportive conditions might still play a minor role in enhancing actual usage behaviors.

Table 9

Regression Analysis for predicting Actual Usage (AU)

Variable	Estimate	Std..Error	t-Value	p-value
(Intercept)	0,47	0,49	0,96	0,341
BI	0,46	0,15	2,98	0,004
FC	0,29	0,19	1,54	0,130

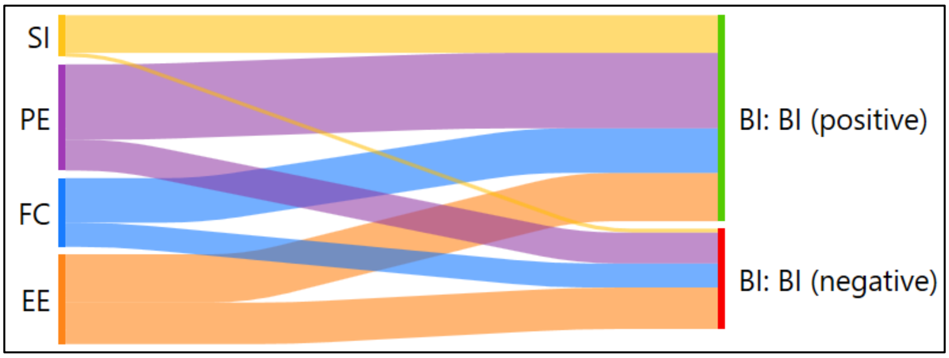
Qualitative Results

The Sankey diagrams presented provide a visual exploration of how various factors influence the BI to use OER. These diagrams delineate the flow and relative strength of both *positive* and *negative* influences originating from four main variables: PE, EE, SI and FC. Thickness of the flow is defined by quantity. In this context, *positive influences* refer to elements that increase BI by enhancing teachers' perception of OER's value. When teachers experience these positive traits, they are more likely to view OER favorably, which encourages their intent to adopt them. Conversely, *negative influences* denote factors that decrease BI by creating obstacles or diminishing teachers' motivation.

Predictors of behavioral Intent

Figure 2

General Relationships Between BI and Variables



The first Sankey diagram presents an overview of how both positive and negative aspects of PE, EE, FC, and SI contribute to BI. This visualization is based on the coded interview data, where participants shared their perceptions and experiences regarding OER adoption. Here, we observe that: Positive factors from all variables generally contribute to a positive BI, indicating that when vocational education teachers perceive OER as beneficial, easy to use, well-supported, and socially endorsed, they are more likely to show a strong intention to use them. Interview responses frequently highlighted PE and EE, showing that these variables were most considered when talking about behavioural intent to use OER. Figure 2 also shows that, often, respondents talked about positive parts that influence their intent to use rather than negative parts. Conversely, the negative aspects of these variables contribute to a negative BI, showing that barriers in these areas can significantly deter intentions to use OER. SI, however, has never been noted as a negative factor for BI. To better understand the relationships, a look is taken at the subcodes for each variable. Each subsequent diagram provides a detailed breakdown of the contributions of individual elements within PE, EE, FC, and SI to BI.

Detailed relationships predictor variables and BI

Figure 3

Detailed Relationship between PE and BI

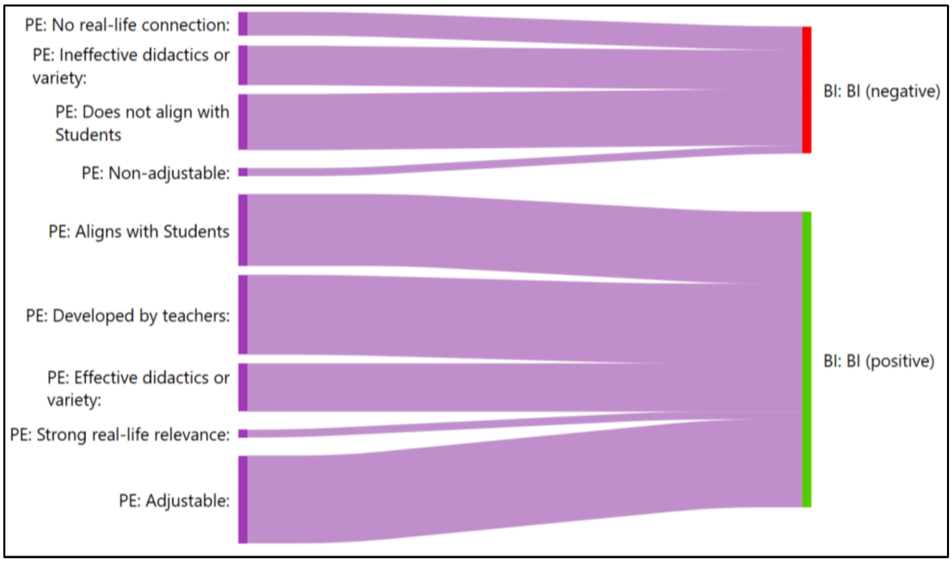


Figure 3 presents further information on how PE influences BI, with some recurring themes from the interviews. One prominent theme is **adjustability**; it was mentioned that adjustable OER materials lead to a higher intent to use them, while non-adjustable materials decrease this intent. One participant explained this:

> Now, I haven't come across much where I say, 'Yes, I can fully use this.' So, I tend to grab materials from here and there and develop them myself. I take what I find useful. And, of course, you want to make it your own thing, right? You can't just use someone else's lesson. It just doesn't work that way. There's a story behind a lesson, and that has to align with your own.

This clearly illustrates the need for adaptable materials that fit into the teacher's personal teaching approach.

The chosen didactics in OER also show a similar relationship. Attention to didactics and variety leads to a higher intent to use OER; but when there is no variety in didactics, teachers are less inclined to use them. Didactics is a broad term, however the essence is highlighted by another participant:

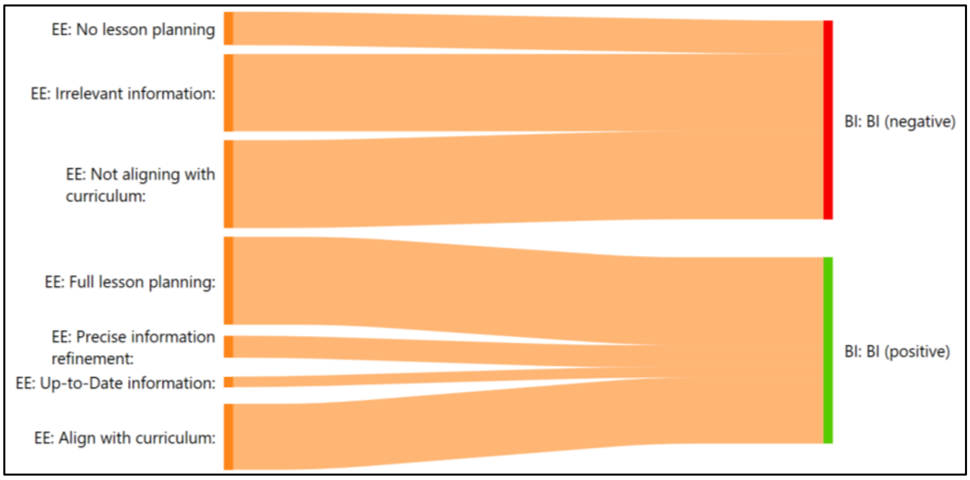
> When you're in front of a class, it doesn't work to just say, 'Go to that site, click through the questions, watch the video, and answer a multiple-choice question.' That's not our way of teaching.

This emphasizes that OER needs to cater to varied teaching methods; otherwise, it risks becoming irrelevant to educators. So, when talking about effective didactics, it means that resources created should take classroom interaction in perspective, and not only focus on an individual student clicking through the materials. This aligns with the notion that materials developed by teachers themselves often lead to higher intent to use, as they better meet classroom demands, as stated by all of the respondents. Interestingly, the presence of a comprehensive lesson plan alongside OER correlates with higher intent, though the absence of such a plan doesn't necessarily decrease it. This suggests that while additional instructional support is valued, it isn't a decisive factor for OER adoption.

In short, many of the PE themes can be directed back to a vision on teaching. Each teacher has their own vision on their classroom, and very often a wish of autonomy. Adjustability and effective didactics are factors in the underlying theme of vision on materials and having autonomy in their classroom. Being able to put that vision and autonomy into the OER would increase BI.

Figure 4

Detailed Relationship between EE and BI



In terms of effort expectancy, the precision of the information and its alignment with the curriculum seem to have the most impact. Interviewees often mentioned that if OER materials need substantial refinement or don't align with their curriculum, they are less inclined to use them. One respondent noted:

> "It takes a lot of time to develop something, and everything is connected. Changing one project means adjusting many other things, like switching to a different book or publisher. You'd have to change all the assignments and lessons that reference them."

This highlights the significant time commitment required to adapt OER materials, acting as a barrier for many educators.

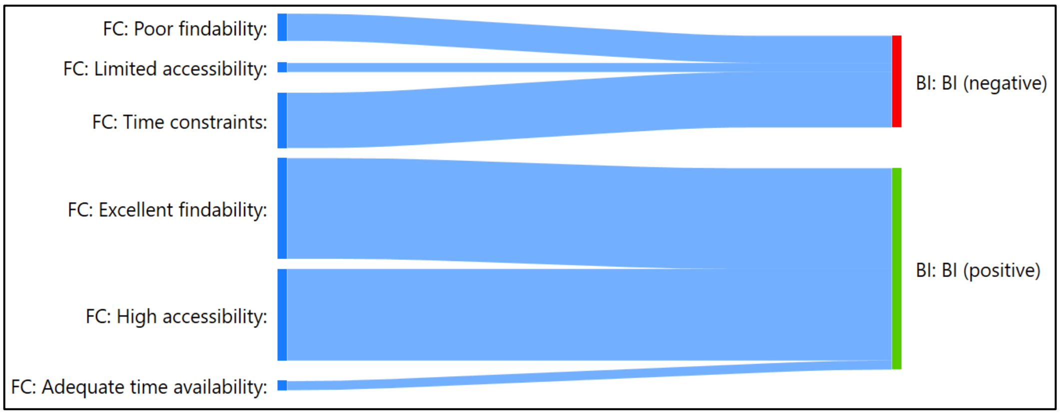
Another respondent elaborated on the difficulty of integrating OER into their lessons:

> “For example, I found a lesson on media literacy, fully written out from start to finish with objectives and links to videos. But if I want to use it myself, I still have to adapt it—it’s just a PDF with an entire lesson description.”

This indicates that while resoure outlines are available, it still takes a lot of time to get from the outline to the materials needed for a lesson.

Figure 5

Detailed Relationship between FC and BI



When it comes to FC, **findability**, **accessibility**, and **time constraints** were the most frequently mentioned conditions in the interviews. Accessibility, defined as having the software, databases, and devices necessary to access OER, has a relatively small influence compared to findability. The distinction between findability and accessibility can be challenging, but we define accessibility as the ability to locate OER, which encompasses software, databases, and device access. As can be seen, this has a relatively small influence compared to findability. Findability of OER entails having the knowledge to successfully find what you are looking for and effectively filter out unnecessary materials. Interviewees have described databases often as not-user-friendly, thereby opting out of looking for OER. One participant stated:

"Once this campaign is over, it'll disappear again. Sure, it’ll still be somewhere, but I find the search process really important. It’s honestly quite difficult to find good open materials. What search term do you even use?”

It could be argued that this is a case of professional competency, which could be trained, however as all of the respondents had similar difficulties the problem could be broader than just the professional competencies. Time constraints were another barrier, as many teachers described a structural shortage of time to explore OER deeply.

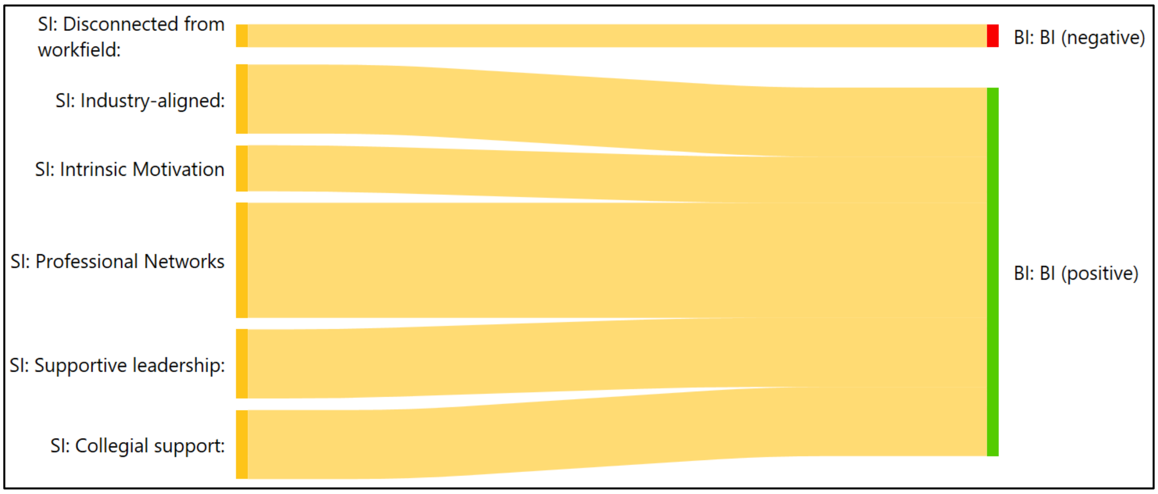
Finally, it is evident that time constraints also negatively impact BI; these constraints result in teachers experiencing a structural lack of time to initiate or delve deeper into OER. Time constraints were another significant barrier, with teachers frequently describing a structural shortage of time to explore OER deeply. As one interviewee highlighted:

"In reality, I only have about 15 to 20 minutes to prepare a lesson. That's really not much time, especially when I have an entire series of lessons to teach over eight weeks."

This illustrates how limited time severely impacts teachers' ability to search for, adapt, and integrate OER into their teaching practice.

Figure 6

Detailed Relationship between SI and BI



The factors of SI are shown in figure 6, where it can be noticed that no negative factor of SI is mentioned in the interviews. This implies that SI primarily facilitates BI, yet its absence does not diminish the inclination to utilize OER. The support of leadership and industry professionals has a slight influence compared to the collegial support. The role of industry specialists is an interesting one, as multiple respondents have mentioned that the wishes of industry professionals are important in the materials they use. Stating that in Vocational Education the objective is to have students into the workfield, therefore the opinion of industry specialists matters to them.

Collegial support is the main factor of SI, as every interviewee mentioned the value of working together with colleagues, and feeling support from colleagues makes their intent to use OER grow. One respondent explained:

"For example, we try to get all the Dutch teachers together in one room. It’s a huge organizational effort, but it works because they start sharing lessons with each other, and it helps build connections."

This highlights the crucial role of collaboration in promoting the use of OER. Another respondent reflected:

"We have a kind of 'good practice' session every week, where someone shares something they do at their location. I find that really valuable because it saves a lot of time, and I believe in the positive influence of people on each other."

Lastly, supportive leadership was referred to in the interviews. Hardly ever did someone mention a negative role for the adoption of OER. A lack of support did not mean a decrease in BI according to many respondents. However, more support could create a increase in BI among the teachers, as respondents stated that leadership is not actually focused on OER.

"Well, I think the school leadership isn’t really involved with this at the moment, but they could be. It’s not that they’re unwilling, it’s just that, well, they believe it's more up to the team to come up with these ideas."

This quote suggests more direct involvement or active endorsement from leadership could strengthen social influence and increase teachers’ intent to adopt OER. By taking a more hands-on role, leadership could actively signal the importance of OER, thereby creating a stronger push and encouraging a more unified approach within the team.

Predictors of Actual Usage

This section utilizes Sankey diagrams to illustrate how different factors impact AU of OER among vocational education teachers. The diagrams display both positive and negative influences stemming from the variables Facilitating Conditions (FC) and Behavioural Intention (BI), showing how they contribute to either promoting or hindering the actual use of OER.

Figure 7

General Relationships Between AU and Variables

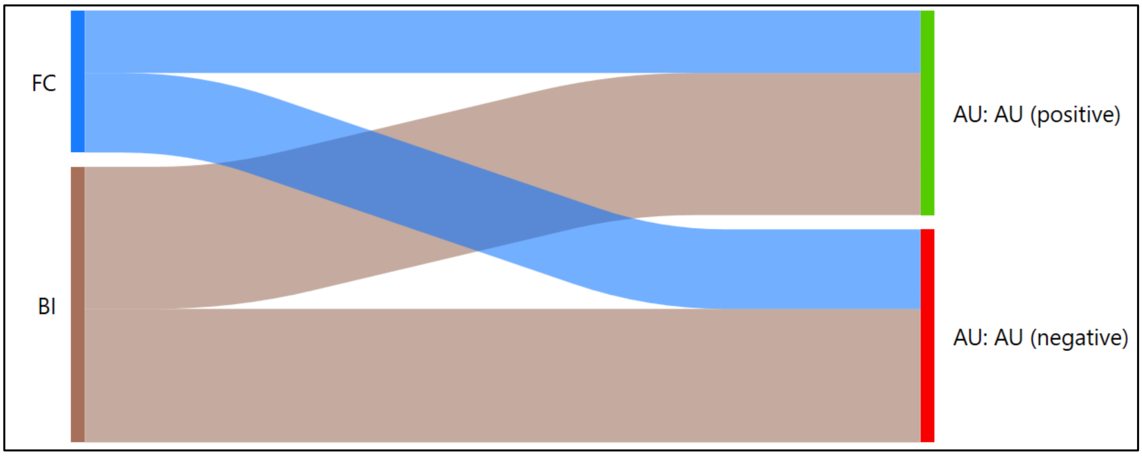
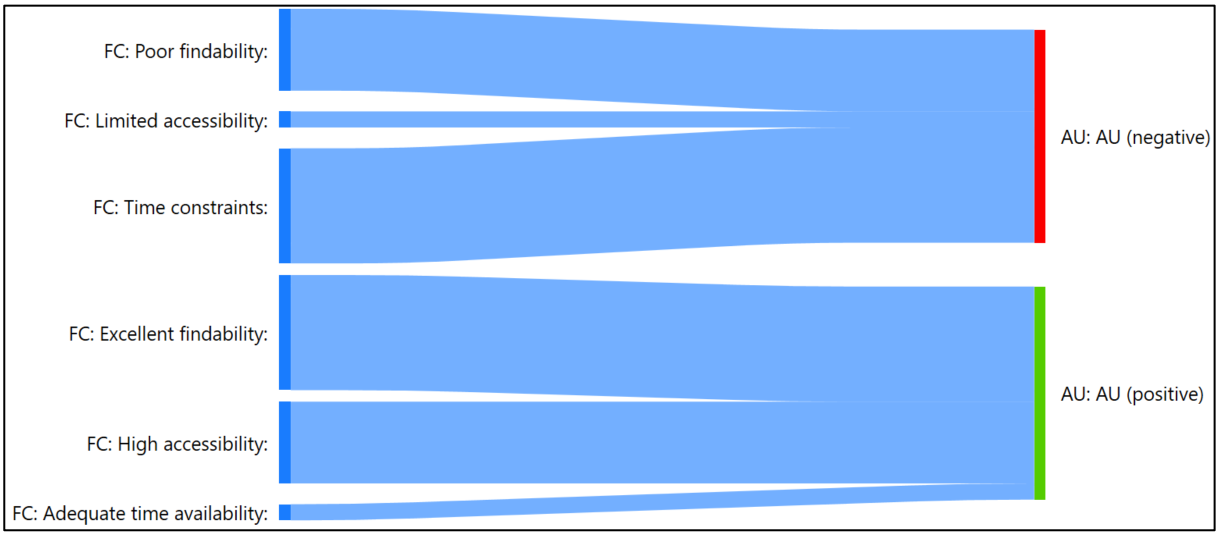


Figure 7 presents a broad overview of the relationship between AU and the contributing factors of BI and FC. A significant flow from positive BI directly leads to positive AU, underscoring the fundamental role of strong behavioral intentions in actual usage behavior. However, when talking about actual usage, respondents talked about FC a similar amount of time as talking about their intent. nterestingly, respondents perceive both BI and FC as major contributors to actual usage, with FC appearing to be the main restrictor.

Figure 8

Detailed relationship between FC & AU



Findability within the realm of Open Educational Resources (OER) plays a crucial dual role, significantly influencing both the adoption and effective use of these resources. As illustrated in the Sankey diagrams, findability can act as both a strong enabler and a significant barrier to the use of OER. Additionally, structural time shortages — where educators feel they consistently lack the time needed to search for or delve deeper into OER — further impede the adoption and effective use of these resources. Findability seems to be the main factor that influences AU negatively.

Discussion

In this study, guided by the central research question, "How do the constructs of the UTAUT framework influence and explain vocational education teachers' adoption of OER". The quantitative phase assessed the impact of UTAUT constructs—Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions—on teachers' likelihood to adopt OER. It explored the relationships between these constructs and the dependent variables: behavioral intention to use OER and actual usage of OER. The qualitative phase delved into how these constructs influence teachers' decisions and attitudes towards OER adoption. This combination of quantitative and qualitative research questions, grounded in the UTAUT model, aimed to provide a holistic view of OER adoption in vocational education, addressing a knowledge gap in this specific context.

Performance Expectancy (PE)

Addressing the research questions, "what is the impact of performance expectancy on the likelihood of vocational education teachers adopting OER?"

And "How do vocational education teachers describe their experiences regarding performance expectancy in adopting or rejecting OER in their teaching practices?", our analysis highlights the significant role of Performance Expectancy (PE). The quantitative data show that PE is a significant predictor of BI. This suggests that teachers' perceptions of the benefits of using OER significantly influence their intention positively to adopt these resources. Qualitatively, key factors within PE such as the adaptability of the OER to educational goals, effective didactics, and the relevance of content significantly impact teachers' adoption decisions. All leading back to a vision on teaching and autonomy in their classroom. Teachers are more inclined to adopt OER that are adjustable and were made with classroom dynamics in mind. Because teachers often seek alignment between resources and their own pedagogical approach, resources that offer flexibility not only enhance their perceived utility but also foster a sense of ownership and autonomy in the classroom, strengthening their intent to use OER.

The significant role of performance expectation in predicting OER adoption in our study aligns with the theoretical framework posited by Venkatesh et al. (2003). This confirms that vocational educators' perceptions of the benefits of using OER—

including their adaptability and relevance—influence their intention to adopt these resources. Such findings resonate with Becker et al. (2013), who emphasize the necessity for resources that not only meet educational goals but also integrate seamlessly with industry practices. The adaptability and effective didactics of OER, as highlighted in our results, significantly impact teachers' decisions, supporting the need for resources that can be customized to meet diverse educational needs. Furthermore, the need for customization, as indicated by Fowler et al. (2023), emphasizes that the flexibility in adapting OER to specific vocational requirements is critical for their adoption.

This comprehensive understanding of performance expectancy underscores the essential nature of practical, adaptable, and industry-relevant OER in vocational education settings. Additionally, as suggested by Ferrari and Traina (2013), the development of OER should involve the input of faculty and support staff to ensure these resources are effectively tailored to meet educational needs. This approach not only aids in customizing content but also in securing the necessary support structures like stipends or release time for educators to adopt, modify, and create OER, as emphasized by Lantrip and Ray (2020).

Effort Expectancy (EE)

Addressing the research questions, “What is the impact of effort expectancy on the likelihood of vocational education teachers adopting OER?” and “How do vocational education teachers describe their experiences regarding effort expectancy in adopting or rejecting OER in their teaching practices?”, our study provides insights through quantitative and qualitative lenses. Quantitatively, EE has been identified as a potential predictor of BI to adopt OER, however not significantly in this research. Reasons for the relationship not being significant could vary. However, it's possible that the lack of respondents is the primary reason this relationship is not significant. The study aimed for 120 teachers to ensure a representative sample, with 15-20 respondents per variable (Creswell & Creswell, 2018). This aim was not met. Furthermore, ff the respondents had similar levels of technological experience and comfort, there may have been little variation in their perceptions of effort expectancy, making it difficult to detect a significant relationship. Qualitatively, the preciseness of information and its alignment with curricular goals are critical. Teachers often resist adopting OER when it requires substantial adjustments to the existing curriculum or when the OER information is not precisely aligned with their teaching goals. Concerns were expressed about the cascading changes needed in teaching materials if they were to integrate disparate OER, which could disrupt the curriculum continuity. This qualitative feedback underscores the challenges in adopting OER when effort expectancy barriers, such as content refinement and curricular misalignment, are present.

The findings indicate that effort expectancy serves as a potential predictor of behavioral intention to adopt OER. This underscores that while effort expectancy positively influences teachers' intentions to use OER, the effect is moderate. This aligns with the challenges highlighted by Dennen & Burner (2008), particularly in vocational settings where OER require significant adaptation to fit existing curricula. The ability of OER to align seamlessly with practical curricula and integrate real-world applications underscores the sector's preference for skills over theoretical knowledge.

The qualitative data emphasizes the critical nature of the preciseness of information and its alignment with curricular goals. Teachers often express reluctance to adopt OER that necessitates adjustments to existing curricula or when the OER content does not precisely align with their teaching goals. This resistance has also been observed by Fowler et al. (2023), who noted that the lack of integration often makes OER less attractive, as they can introduce disruptive changes to teaching materials. This means that teachers are less likely to adopt OER if it means that integrating it into their curriculum requires a full change of curriculum.

The study reinforces the need for OER to be packaged as comprehensive educational tools that cater to the specific needs of different educational settings. This includes providing detailed content overviews, learning outcomes, and suggested assessment methods to support self-directed learning and reduce the effort required for educators to integrate these resources effectively, which aligns with the findings of Ferrari & Traina (2013).

Social Influence (SI)

Addressing the research questions "What is the impact of social influence from colleagues and educational authorities on vocational education teachers' intention to adopt OER?" and "How do vocational education teachers describe their experiences regarding social influence in adopting or rejecting OER in their teaching practices?", our analysis combines quantitative data and qualitative insights for a comprehensive view. Quantitatively, SI shows minimal predictive power for BI to adopt OER. This indicates that SI, statistically, does not significantly affect teachers' decisions to adopt OER. However, qualitatively, the influence of SI is more pronounced and complex. The quantitative survey questions may not have fully captured the nuances and depth of social influence that were revealed through qualitative interviews. Teachers might perceive social influence differently in practice than when responding to a survey. In a structured survey, they may consider institutional or policy-level influences, while during interviews, they may focus more on interpersonal relationships and informal support. Possibly explaining the difference in results between qualitative and quantitative data.

In the qualitative data, hardly any negative impacts of SI were noted in interviews, implying that a lack of social influence does not deter OER adoption. Instead, positive social interactions, particularly collegial support, significantly enhance BI. Teachers emphasized the value of collaboration and the encouragement from colleagues as major factors fostering their willingness to adopt OER. Additionally, the support from leadership and industry professionals, though less influential than collegial support, was still noted as important for aligning educational materials with industry standards and educational goals. These qualitative findings suggest that, while SI may not directly correlate with increased adoption rates quantitatively, the supportive social environment within educational settings plays a role in shaping positive attitudes and intentions toward OER usage among teachers.

Our findings resonate with studies like those by Liu (2015), who noted the importance of social support in educational settings, albeit in different contexts. Additionally, the role of professional networks and institutional culture, as discussed by Wang et al. (2017), underscores the complex social dynamics that influence technology acceptance and OER adoption. Our study adds to these ideas by going into more detail about how social influence works in the context of open educational resources (OER). It stresses how important it is to have collaborative spaces, professional endorsements, and institutional support.

Moreover, collaborative agreements and trust relationships, such as those fostered by programs like Erasmus, are likely to enhance the exchange and adoption of OER among vocational educators (Ferrari & Traina, 2013). However, contrary findings from Padhi (2018) indicate that not all educational environments encourage OER usage, school leadership therefore should take an active stance in the adoption of OER.

The inclusion of **industry professionals** as a social influence on adoption of OER within vocational education, though rarely highlighted in the literature, aligns closely with the distinctive characteristics of this educational sector. Unlike other educational fields, vocational education has a unique dual focus: it not only aims to develop theoretical knowledge but also emphasizes the acquisition of practical, industry-specific skills that students can directly apply in the workplace. This dual objective means that vocational educators must often possess deep expertise in their specific industries, and they frequently bring practical, on-the-ground experience to their teaching roles (Aalsma, Van den Berg, & De Bruijn, 2014). In vocational education, the role of industry professionals and their opinions are valuable, ensuring that educational resources stay aligned with current industry standards and practices.

Facilitating Conditions (FC)

Addressing the research questions, “What is the impact of facilitating conditions, including institutional support and technical infrastructure, on the adoption of OER by vocational education teachers?” and “How do vocational education teachers describe their experiences regarding facilitating conditions in adopting or rejecting OER in their teaching practices?, this study integrates quantitative findings with qualitative insights. Quantitatively, FC significantly predict BI, however it does not significantly predict AU.

From a qualitative perspective, the factors of findability, accessibility, and time constraints are crucial. The interviews highlighted that findability—teachers' ability to efficiently locate relevant OER—is the most critical condition, often compromised by poorly designed databases. Accessibility, which includes having the necessary software, databases, and hardware, plays a smaller role but is still essential for enabling OER usage. Time constraints are notably detrimental, with many educators reporting insufficient time to effectively search for and integrate OER into their teaching, thereby negatively influencing both their intention to adopt and actual usage of these resources.

The qualitative finding underscores the critical role of institutional support and technical infrastructure in promoting OER adoption, aligning with broader educational technology literature (Venkatesh et al., 2012).

From a qualitative perspective, three main factors—findability, accessibility, and time constraints—emerge as critical to the practical integration of OER in vocational education. Teachers expressed significant concerns over the findability of OER, noting that existing course repositories often lack comprehensive descriptions, competencies, and assessment methods, which complicates their ability to efficiently locate relevant resources. This has also been shown in the findings from Ferrari and Traina (2013), who advocate for the creation of a unified portal or platform that standardizes the structure and formalizes existing models to enhance findability and validity.

Furthermore, the issue of accessibility is noted to be less about the availability of resources and more about having the appropriate technical tools and infrastructure, which are essential for effective integration in the curriculum. Supporting this infrastructure, as suggested by Lantrip and Ray (2020), through faculty support in finding, adapting, or creating quality OER is vital for overcoming these barriers.

The qualitative data also highlighted that time constraints significantly hinder OER adoption. Educators reported that the time required to find and integrate OER effectively is a major barrier, as noted by Sarfraz, Muslim, and Kausar (2022). Their study indicates that despite a positive perception of OER's potential impact, practical challenges such as non-familiarity with OER platforms, difficulties in accessing them, and the time-consuming nature of integrating these resources into existing curricula deter educators from adopting them.

Theoretical Implications

The findings of this study offer several important theoretical contributions to the understanding of OER adoption within vocational education, particularly through the lens of the UTAUT. These contributions can be divided into two main sections: practical considerations and the role of teachers' values and beliefs.

This study confirms PE as a critical determinant in shaping vocational education teachers' BI to adopt OER. Findings validate the UTAUT framework’s core premise that users are more likely to adopt technology when they perceive tangible benefits, such as improved teaching effectiveness and alignment with educational goals (Venkatesh et al., 2003). However, in the vocational education context, PE is closely tied to the adaptability and relevance of OER to industry practices. This supports prior research by Becker et al. (2013), which emphasizes that OER must be customizable to meet specific requirements.

EE in this study demonstrated a moderate influence on BI, similar to findings in other sectors, but our results introduce a new nuance specific to vocational education. Vocational educators face additional challenges in aligning OER with practical, real-world applications and diverse curricula. This suggests that the standard understanding of EE in UTAUT should account for the greater effort required to adapt OER in vocational education. As Dennen and Burner (2008) have noted, the role of EE can vary depending on the sector, and our study reinforces this by highlighting the unique complexities vocational teachers encounter when integrating OER.

The strong influence of FC in predicting both BI and AU of OER underscores the importance of institutional support and robust technical infrastructure in vocational education. This aligns with Venkatesh et al.’s (2003) original findings but also expands them by emphasizing the specific needs of vocational settings. Vocational educators require not only easy access to OER but also sufficient time allowances to explore, adapt, and integrate these resources into their teaching. Our study suggests that for OER adoption to be successful, FC must also include flexible time provisions for educators, refining the UTAUT model's application in vocational education.

A key underlying theme in our findings PE is the strong desire for autonomy and alignment with teachers' personal visions of teaching. Teachers in vocational education place great importance on the ability to customize OER to fit their specific instructional approaches and goals. The flexibility and adaptability of OER are not only practical needs but also align with educators' deeper values of control over their teaching environment. According to Worth and Brande (2020), autonomy in setting professional development goals is particularly associated with higher job satisfaction, and teachers who have control over their professional growth are more likely to remain in the profession. This suggests that OER adoption is not just about perceived utility but also about how these resources allow teachers to express their professional autonomy and pedagogical vision, ultimately contributing to their commitment and satisfaction in the profession.This indicates that successful OER adoption is not just about perceived utility but also about how these resources allow teachers to express their professional autonomy and pedagogical vision.

Although SI did not quantitatively predict BI in this study, qualitative data revealed a nuanced role for social interactions. Peer support, collegial relationships, and leadership endorsements are crucial in creating an environment conducive to OER adoption. More importantly, the study highlighted the influence of industry professionals as a critical factor in vocational education. Teachers often place high value on the opinions of industry specialists because their students are being trained to enter specific work fields. This represents a new contribution to the theoretical understanding of SI in vocational education, suggesting that industry endorsements may carry more weight than traditional peer or authority influence, as also supported by Wang et al. (2017). In this context, the role of industry professionals introduces a distinct social dynamic that is vital for OER adoption in vocational education.

Practical Implications

The practical implications of this study provide valuable insights for policymakers, educational institutions, and OER developers looking to enhance the adoption of OER in vocational education. First, given the significant role of PE, OER developers should focus on creating resources that are not only adaptable and relevant but also align closely with industry standards. Research by Wiley and Hilton (2018) highlights the importance of OER being perceived as beneficial and adaptable by educators, which directly influences their behavioral intent to adopt these resources. OER must cater to the practical skills and knowledge required in vocational education, ensuring that educators see clear benefits in terms of student outcomes and relevance to real-world applications.

To address the moderate influence of EE educational institutions should invest in comprehensive training programs that help educators integrate OER seamlessly into their teaching. Resulting from this study, teachers often resist adopting OER when they feel the effort required to align these resources with their curricula is too great. Training initiatives could ease this burden by providing practical guidance on how to adapt and use OER effectively, which could enhance their intention to adopt these resources. Dennen and Burner (2008) found that educators are more likely to adopt new resources when they feel supported in learning how to implement them efficiently.

When it comes to SI, our research shows that schools should create a space where teachers can collaborate and share their experiences with OER adoption. Peer networks and professional learning communities play an essential role in fostering informal support among teachers. As noted by Kociuruba (2017), collegial support significantly influences teachers' attitudes toward new technologies. Leadership within schools and vocational institutions should also promote OER usage through endorsements and professional development programs, although this may have a more indirect effect compared to peer influence.

Finally, the study underscores the importance of FC, especially the need for improved technical infrastructure and institutional support. Institutions should ensure that teachers have access to well-organized, easily searchable OER databases. The availability and accessibility of OER are critical to their adoption. Improving the findability and accessibility of OER will significantly enhance adoption rates, as many teachers in our study reported that time constraints and difficulty in locating relevant resources hindered their usage. Moreover, providing teachers with sufficient time to explore, adapt, and implement OER in their classrooms is essential.

Limitations

Although our study provides valuable insights into the adoption of Open Educational Resources (OER) in vocational education, several limitations should be acknowledged. These limitations may affect the generalizability, reliability, and validity of our findings, as well as the broader applicability of the study’s conclusions.

First, while the UTAUT model provided a comprehensive framework for analyzing the adoption of OER in vocational education, it is important to critically reflect on its suitability for this specific context**.** The UTAUT primarily focuses on technology acceptance from a general perspective, emphasizing factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. However, as the model was not originally designed for educational settings, certain aspects relevant to teaching and learning may not have been fully captured. For instance, factors such as pedagogical beliefs, instructional design preferences, and student-centered teaching approaches are not explicitly considered within UTAUT, yet they play a significant role in teachers' adoption decisions.

Moreover, the model's emphasis on individual-level predictors may overlook the collaborative and institutional dynamics that are particularly relevant in educational contexts. Teachers often rely on peer collaboration, institutional policies, and pedagogical goals, which may not be adequately reflected within the UTAUT framework (Cox & Trotter, 2017). Additionally, the model does not explicitly address the role of students in influencing adoption, despite their critical role in shaping teachers' decisions to integrate OER into their instructional practices. In hindsight, the UTAUT model might not fully cover the complex nature of the educational field and the driving forces of teachers.

Second, **generalizability** is constrained by the study's focus on vocational education settings within the Netherlands. Vocational education systems vary significantly across regions and countries, each with distinct educational structures, cultural contexts, and industry-specific requirements. As a result, our findings may not be fully representative of vocational education contexts outside the Netherlands. As stated by Zitter (2018), teacher training is not the only route to becoming a vocational education teacher. They are trained in various ways, including professionals from the field who have obtained a pedagogical-didactic certificate or those with a professional education, such as a bachelor's degree in nursing, who have also acquired teaching qualifications. Teacher education differs substantially across countries, further limiting the broader applicability of the results. When compared to other countries, the unique teacher preparation pathways and multiple ways to become a teacher in vocational education in the Netherlands may influence how vocational educators adopt and use Open Educational Resources (OER), thereby limiting the generalizability of the findings.

Third, there are limitations concerning **data collection and reliability**. Our study relied heavily on self-reported data, which is susceptible to bias. Teachers' perceptions and reports of their OER usage may not always align with their actual behavior. Moreover, the qualitative insights were derived from a small set of interviews and limited questions, potentially omitting more complex or varied experiences with OER. This constraint, coupled with the fact that coding was conducted by a single researcher, might affect the reliability and objectivity of the qualitative analysis, potentially leading to subjective interpretations of the data. More data could have given a deeper insight into understanding the relationships between PE, EE, FC, SI and BI/AU.

Furthermore, although **quantitative methods** were used to assess reliability and validity, certain areas require further attention. Through Cronbach's alpha, constructs like performance expectation, effort expectation, behavioral intention, and actual use had high reliability. On the other hand, constructs like social influence and facilitating conditions had lower reliability scores, which suggests that they need to be improved. The study also used the average variance extracted (AVE) to check for convergent validity. Most of the constructs met the standards, but Facilitating Conditions and Actual Use did not, which shows that they need to be improved.Additionally, while discriminant validity was generally confirmed, some items within the Social Influence and Facilitating Conditions constructs displayed overlapping characteristics, as suggested by factor loading analysis. This highlights the need for further evaluation and refinement of these constructs to ensure their distinctiveness. This lack of validity could stem from a variety of factors. By opening up to self-reported data, teachers perceptions and interpretations of questions could result in multiple interpretations of questions. As each respondent has their own working field, which most likely focuses on different aspects of the job, they could be influenced by others. Given that each teacher has their own network, each with its own unique teaching vision, it's possible that the focus of their network influences their interpretation of questions.Resulting in a decrease in internal consistency.

Despite these limitations, the study offers meaningful contributions to understanding the adoption of OER in vocational education settings. While the findings are specific to the context of Dutch vocational education, they offer broader insights into the challenges and opportunities of implementing OER in similar settings worldwide.

Future Research:

Future studies should address these limitations by incorporating a more diverse sample, using a longitudinal design, and employing mixed methods to capture a broader range of data. Exploring the long-term impact of OER adoption on student outcomes and industry readiness, and investigating the role of individual differences in technology adoption, would enrich our understanding. Comparative studies across different educational contexts are also recommended to evaluate the scalability of the UTAUT model. Future research could explore longitudinal impacts of these factors on OER adoption and extend the investigation to different educational contexts to generalize the findings and develop more robust strategies for promoting OER adoption.

Additionally, several new areas of research have emerged based on the current study:

1. **The Role of Software in OER Adoption**: Future research should explore the role of the software used to create and implement OER. The ease with which teachers can interact with and adapt OER materials is often influenced by the platforms or software used to create them. Identifying which software platforms are most effective, familiar, and user-friendly for teachers in vocational education could be critical to improving OER adoption. Additionally, research should investigate whether the choice of software impacts teachers' willingness to adopt and adapt OER. Questions such as "Which software provides the most flexibility for vocational teachers?" and "How does the software's learning curve affect OER integration?" would be valuable in optimizing software choices for OER.
2. **The Role of Professional Competencies**: Another critical area of future research involves understanding how teachers search for OER and how their search terms can be optimized. Resulting form our findings, teachers struggle to find relevant OER due to poor search functionalities or because they are unaware of how to effectively search for materials. Future research could explore how teachers use search terms when looking for OER, the barriers they face in finding suitable materials, and how metadata and keywords can be optimized to improve the discoverability of OER. Studies might examine questions like "What terms do vocational teachers typically use when searching for OER?" and "How can the organization and metadata of OER platforms be improved to better align with teachers' search behaviors?"

By exploring these new dimensions—software and search optimization—future research can offer more practical guidance for both OER developers and educational institutions, ultimately facilitating a smoother and more effective integration of OER into vocational education settings.

Conclusions and recommendations.

In conclusion, this research highlights key factors that influence OER adoption within vocational education. **Performance Expectancy** stands out as the most influential predictor, with teachers more likely to adopt OER when they perceive clear educational benefits and relevance to their teaching. **Effort expectancy** also plays a role, though its impact could be amplified through targeted training and support programs. **Social influence**, while not a strong predictor quantitatively, remains crucial in fostering a positive environment for OER adoption through collegial and institutional support. Finally, **facilitating conditions** such as technical infrastructure and time allowances are critical to both the intention to adopt and actual usage of OER.

Based on the findings of this study, several key recommendations are proposed to enhance the adoption of Open Educational Resources (OER) in vocational education. These recommendations are grounded in both the results of this research and existing literature on OER adoption and technology acceptance in education.

1. Develop Industry-Relevant OER

One of the most significant findings from this study is the critical role that **Performance Expectancy (PE)** plays in influencing vocational education teachers' adoption of OER. Teachers are more likely to adopt OER when they perceive that the resources will improve their teaching practices and align with industry standards. This aligns with Becker et al. (2013), who emphasize that OER must be designed to be adaptable to specific educational and industry needs. Therefore, OER developers

should prioritize creating resources that are not only theoretically sound but also **tailored to practical, industry-relevant contexts**. This means incorporating real-world examples, case studies, and hands-on learning activities that reflect the vocational environment.

The flexibility and adaptability of OER are crucial for vocational education, where curricula often need to be customized to match the changing demands of various industries (Becker et al., 2013). As shown by Fowler et al. (2023), teachers are more inclined to use OER when they can adjust content to meet their specific teaching objectives. Thus, **OER developers should collaborate closely with vocational educators and industry professionals** to ensure that the resources they create are practical, relevant, and easily adaptable to different vocational settings. This collaboration would not only enhance the relevance of the materials but also encourage educators to feel more ownership over the resources, increasing the likelihood of adoption (Lantrip & Ray, 2020).

This study highlights that OER with practical applications is more likely to be adopted in vocational education, where the focus is often on skills-based learning. By integrating industry-specific content and making OER more customizable, educational institutions and developers can create a more compelling case for their adoption. Without these adaptations, OER may fail to meet the needs of vocational educators, limiting their potential impact.

2. Develop OER that align with teaching practices and are easily adaptable.

The results of this study emphasize the critical role that the **adaptability and effective didactics** of OER play in influencing teachers' decisions to adopt these resources. Vocational education teachers, in particular, need OER that are flexible enough to meet diverse educational needs, especially when considering the alignment of content with industry practices. Regarding PE, the underlying cause is teachers beliefs and vision regarding teacher, this results in a critical need for adaptable materials that fit into teachers' unique approaches and curriculum requirements.

Additionally, the research revealed the importance of including a variety of didactic strategies in OER. One participant highlighted this by stating, with one respondent stating that it just doesn't work if students have to click through learning materials without interaction. This underscores that OER must cater to a range of teaching methods, particularly those that are more interactive and hands-on, which are critical in vocational education. Without such variety, teachers may find OER irrelevant or impractical to their pedagogical approaches.

The need for adaptable OER is further supported by Lantrip and Ray (2020), who emphasize the importance of involving faculty in the development of OER. Faculty input ensures that resources are practical and customizable, allowing educators to integrate them seamlessly into their teaching. Fowler et al. (2023) also highlight that the ability to customize OER to meet specific vocational and industry requirements is essential for their successful adoption. This comprehensive understanding of Performance Expectancy (PE) in vocational education, as discussed by Ferrari and Traina (2013), underscores that both faculty and support staff should be involved in the OER development process. Such collaboration not only allows for better customization but also helps secure institutional support, including providing teachers with stipends or release time to develop, adapt, and implement OER (Lantrip & Ray, 2020).

To effectively support the adoption of OER in vocational education, institutions must prioritize the development of **adaptable and customizable OER** that align with teachers' pedagogical practices and industry standards. Institutions should actively involve faculty and support staff in the design and development of these resources to ensure they are practical and meet diverse educational needs. There should be a full explanation on how to use the materials and what learning goals are in it. Besides that, the software used for the materials is crucial. To effectively let teachers adopt and adapt the materials, it should be made in a software known to the teachers. There should be limited time spent in learning a new software to work with the OER.

3. Invest in Comprehensive Training and Professional Development for OER

Another key finding from the study is that **Effort Expectancy (EE)**, while a potential predictor of OER adoption, has a moderate effect on teachers' Behavioral Intention to use OER. This suggests that while teachers are open to using OER, they may feel that significant effort is required to integrate these resources into their existing curricula, which can be a barrier to adoption. Dennen & Burner (2008) and Ferrari & Traina (2013) similarly argue that the ease with which teachers can adopt new technologies, such as OER, is critical to their success.

To address this, educational institutions should invest in **comprehensive training and professional development programs** that help teachers become more comfortable with using and adapting OER. This should follow to recommendation 2. Training should focus not only on how to access and modify OER but also on integrating them into daily teaching practices. Studies have shown that when teachers receive adequate support and training, they are more likely to adopt new educational technologies (Baker et al., 2012).

This recommendation is crucial because vocational educators often deal with hands-on, practical teaching scenarios that require specialized resources. Providing tailored professional development will reduce the perceived effort required to use OER, making it easier for teachers to incorporate these resources into their instruction. **Training programs should also include peer collaboration components**, allowing educators to share strategies and solutions for using OER effectively in vocational settings (Liu, 2015). By creating a supportive professional learning environment, institutions can help mitigate the barriers related to effort expectancy and enhance the overall adoption of OER.

4. Foster Peer Support and Institutional Networks for OER Adoption

The role of **social influence (SI)** in this study, while not statistically significant, is qualitatively shown to have a notable impact on teachers’ willingness to adopt OER. The findings suggest that **collegial support and collaborative environments** can encourage teachers to explore and use OER, even if direct pressure from leadership is not a strong predictor. This aligns with the work of Wang et al. (2017), who argue that social dynamics and professional networks play a vital role in the adoption of educational technologies.

Educational institutions should foster **peer support networks and communities of practice** where teachers can exchange ideas and share experiences regarding OER use. These networks can serve as informal support systems that help educators feel more confident in adopting new resources. Liu (2015) emphasizes the importance of collaboration among educators, suggesting that professional learning communities can be effective in promoting the adoption of new teaching practices, including the use of OER.

In addition to fostering collegial support, **institutional leaders should actively promote OER** and create opportunities for teachers to engage with these resources. However, as our study indicates, social influence may operate more subtly in vocational education, meaning that direct pressure from educational leaders may not always result in higher adoption rates. Instead, **peer endorsements** and the sharing of best practices among colleagues may be more effective. Programs like Erasmus, which facilitate collaboration and resource sharing among vocational educators across institutions, could serve as a model for increasing OER adoption (Ferrari & Traina, 2013).

5. Improve Technical Infrastructure and Time Allocation for OER Integration

The study's findings also highlight the strong predictive power of **Facilitating Conditions (FC)** in both Behavioral Intention and Actual Usage of OER. Teachers identified technical infrastructure, such as **findability and accessibility** of OER, as key barriers to adoption. This aligns with Sarfraz, Muslim, and Kausar (2022), who found that practical challenges, such as unfamiliarity with OER platforms and time constraints, significantly hinder the adoption of OER.

To address these barriers, educational institutions should invest in **improving the technical infrastructure** that supports OER. This includes creating **user-friendly, searchable databases** where teachers can easily find relevant resources. Ferrari & Traina (2013) advocate for the creation of a unified platform that standardizes the structure of OER to improve their accessibility and findability. Such platforms should provide detailed descriptions of content and learning outcomes to make it easier for teachers to identify OER that fit their curricular needs. Using meta-data this should be possible.

In addition to improving technical infrastructure, institutions should also allocate **sufficient time for teachers to explore, adapt, and integrate OER** into their teaching. Many teachers in this study reported that time constraints were a significant obstacle to OER adoption, echoing findings from Sarfraz et al. (2022). Providing educators with dedicated time for professional development or OER integration can help overcome this barrier. Institutions might also consider offering **financial incentives or stipends** for teachers who invest time in creating or adapting OER, as suggested by Lantrip & Ray (2020).

6. Encourage Long-Term Research on OER Adoption

Finally, this study underscores the need for **ongoing research** into the factors that influence OER adoption, particularly in vocational education. While this study provides valuable insights into the adoption of OER, it is limited by its focus on the Dutch vocational education system. Future research should explore how these findings apply to different educational contexts, both within and outside of the Netherlands.

Longitudinal studies are needed to assess the **long-term impact of OER adoption** on student outcomes, industry readiness, and curriculum development. Additionally, research should examine how individual differences—such as teachers' experience with technology or their attitudes toward innovation—influence OER adoption. Comparative studies that evaluate the scalability of the UTAUT model across various educational contexts would also enrich our understanding of how to promote OER adoption in different settings.

In summary, this research provided valuable insights into the factors influencing OER adoption in vocational education. While the findings offer concrete recommendations for enhancing OER adoption—such as developing industry-relevant and adaptable resources, investing in comprehensive training, and improving technical infrastructure—success ultimately depends on a collaborative effort between educators, institutions, and policymakers. By fostering a culture of innovation, collaboration, and continuous professional development, vocational education institutions can empower teachers to integrate OER effectively into their teaching practices, enriching the learning experience for students and better preparing them for the evolving demands of the workforce. Continued research and practical implementation of the recommendations outlined here can pave the way for a more open, accessible, and effective vocational education system in the future.

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Appendices.

Appendix A: Sources for the Questionnaire

The questionnaire uses a five point likert scale.

1. Helemaal niet akkoord - Strongly Disagree
2. Enigszins niet akkoord - Somewhat Disagree
3. Noch akkoord, noch niet akkoord - Neither Agree nor Disagree
4. Enigszins akkoord - Somewhat Agree
5. Helemaal akkoord - Strongly Agree

Variable	Question	Source
AU	I consider myself a regular user of OER	Al- Qeisi et al. (2015)
	I prefer to use OER when available	
	I use OER in most lessons	
	My tendency is towards using OER whenever possible	
BI	I intend to use Open Educational Resources in the next 6 months.	De Witte and Van Daele (2017)
	I predict that I will use Open Educational Resources in the next 6 months.	
	I plan to use Open Educational Resources in the next 6 months.	
EE	Dealing with Open Educational Resources is clear and understandable to me.	De Witte and Van Daele (2017)
	Becoming proficient in using Open Educational Resources is easy for me.	
	Open Learning Materials are easy for me to use.	
	Learning to use Open Educational Resources is easy for me.	
FC	I have the necessary resources to use Open Educational Resources.	De Witte and Van Daele (2017)
	I have the necessary knowledge to use Open Learning Materials.	
	Open Learning Resources are not compatible with other methods I use.	
	A specific person (or service) is available to assist with problems with Open Educational Resources.	
PE	I find Open Educational Resources useful in my work.	De Witte and Van Daele (2017)
	Using Open Educational Resources allows me to complete tasks	

	faster.	
	Using Open Educational Resources increases my productivity.	
	Using Open Educational Resources can further my career.	
SI	People that influence my behavior think that I should use Open Educational Resources.	De Witte and Van Daele (2017)
	People who are important to me think that I should use Open Educational Resources.	
	The management of this school supports the use of Open Learning Materials.	
	In general, the school supports the use of Open Educational Resources.	

Appendix B: The full questionnaire (Dutch)

Beste collega,

Hartelijk bedankt voor je deelname aan onze vragenlijst over het gebruik van open leermaterialen in het mbo.

Achtergrondinformatie van het onderzoek

Voor wie is deze vragenlijst?

Docenten die geïnteresseerd zijn in of betrokken zijn bij het gebruik van open leermaterialen in het mbo-onderwijs, ongeacht hun ervaringsniveau.

Doel van het onderzoek

De vragenlijst is onderdeel van het onderzoek “"Factoren die de adoptie van open leermiddelen in het beroepsonderwijs beïnvloeden" dat namens het ROC van Amsterdam | Flevoland wordt uitgevoerd door de Universiteit van Twente. In het onderwijs worden steeds meer open leermaterialen ontwikkeld én gebruikt. Maar wat vinden mbo-docenten hiervan? Dit onderzoek richt zich op de adoptie van Open Lesmaterialen in het beroepsonderwijs, een sector waar het gebruik van deze materialen opvallend weinig onderzocht is. Het adresseert de centrale vraag: 'Wat hebben docenten in het beroepsonderwijs nodig om Open Lesmaterialen effectief te adopteren?'

Definitie open leermaterialen

Open Leermaterialen zijn leermaterialen en bronnen die vrij beschikbaar zijn voor iedereen om te gebruiken, aan te passen en te delen.

Dit moet je weten over de enquête

De deelname aan deze vragenlijst is volledig vrijwillig.

Op elk moment kun je besluiten om te stoppen. In dat geval worden je antwoorden niet opgeslagen.

Vertrouwelijkheid en anonimiteit

We behandelen je antwoorden vertrouwelijk en met anonimiteit.

Geschatte duur

10 minuten

Bedankt voor je bijdrage aan ons onderzoek!

Voordat we verdergaan, hebben we uw toestemming nodig. Door akkoord te gaan, geeft u ons toestemming om:

- De resultaten van uw vragenlijst te gebruiken voor ons onderzoek.
- Deze resultaten te delen op diverse platforms.
- Uw anonimiteit te waarborgen, aangezien er geen gegevens verzameld worden die direct te herleiden zijn naar u als persoon.

Door verder te gaan met deze vragenlijst geef je toestemming om deel te nemen aan dit onderzoek. Klik op "Ik ga akkoord" en "Verder" om het onderzoek te starten.

V1 Ik ga akkoord met de voorwaarden

○ Ik ga akkoord (1)

V2 Ik geef les op het:

○ MBO (1)

○ HBO (2)

○ WO/Universiteit (3)

○ Primair Onderwijs (4)

○ Voortgezet Onderwijs (5)

○ Anders (6) ____

Skip To: V4 If Ik geef les op het: != MBO

V3 Werkzaam op school:

- ○ Curio College (2)
- ○ Deltion College (3)
- ○ Graafschap College (4)
- ○ Noorderpoort College (5)
- ○ Nova College (7)
- ○ ROC van Amsterdam-Flevoland (8)
- ○ Anders (6) ____

V4 Je leeftijd:

- ○ 18 - 25 (1)
- ○ 26 - 35 (2)
- ○ 36 - 45 (3)
- ○ 46 - 55 (4)
- ○ 56 - 65 (5)
- ○ 65 + (6)

V5 Jaren ervaring in het onderwijs:

○ 0 - 5 jaar (1)

○ 6 - 10 jaar (2)

○ 11 - 20 jaar (3)

○ 21 - 30 jaar (4)

○ 31 + jaar (5)

V6 Wat is uw hoogsgenoten opleiding?

○ MBO (1)

○ HBO Bachelor (2)

○ HBO Master (3)

○ Universiteit Bachelor (4)

○ Universiteit Master (5)

○ Anders (6) ____

V7 Hoe bent u in het onderwijs terecht gekomen?

- Praktijkervaring in beroepsgebied (1)
- Praktijkervaring in beroepsgebied aangevuld met opleiding over het onderwijs (2)
- Lerarenopleiding (3)
- Anders (5) ____

V8 Ik geef les in een:

- Beroepsgericht vak (1)
- AVO vak (NL, ENG, REK, Burgerschap etc.) (2)
- Anders: (3) ____

V9 Ervaring met het gebruik van Open Leermaterialen:

- Ja (1)
- Nee (2)

De vragenlijst Geef bij elke stelling aan in hoeverre u het er mee eens bent.

	Helemaal niet mee eens (1)	Niet mee eens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Open Leermaterialen zijn voor mij gemakkelijk te hanteren. (229)	o	o	o	o	o
Ik kan Open Leermaterialen makkelijk vinden. (252)	o	o	o	o	o
Collega's vinden dat ik gebruik zou moeten maken van Open Leermaterialen. (251)	o	o	o	o	o
Ik ga in de komende 6 maanden gebruik maken van open leermaterialen. (230)	o	o	o	o	o
Mijn leidingevenden vinden dat ik gebruik zou moeten maken van Open Leermaterialen. (231)	o	o	o	o	o

In mijn organisatie is hulp aanwezig als ik vragen heb over open leermaterialen. (232)	○	○	○	○	○
Leren omgaan met Open Leermaterialen is gemakkelijk voor mij. (233)	○	○	○	○	○
lk neem me voor om Open Leermaterialen te gebruiken in de komende 6 maanden. (234)	○	○	○	○	○
lk beschik over de nodige middelen om gebruik te maken van Open Leermaterialen. (235)	○	○	○	○	○
Ik geef er de voorkeur aan om Open Leermaterialen te gebruiken, indien beschikbaar. (236)	○	○	○	○	○
Open Leermaterialen	○	○	○	○	○

gebruiken scheelt mij tijd. (237)					
Gebruikmaken van Open Leermaterialen, kan mijn loopbaan bevorderen. (238)	○	○	○	○	○
Ik beschouw mezelf als een regelmatige gebruiker van Open Leermaterialen. (239)	○	○	○	○	○
Omgaan met Open Leermaterialen is duidelijk en begrijpelijk voor mij. (240)	○	○	○	○	○
Over het algemeen steunt de organisatie het gebruik van Open Leermaterialen. (241)	○	○	○	○	○
Vaardig worden in het omgaan met Open Leermaterialen is gemakkelijk voor mij. (242)	○	○	○	○	○

Open Leermaterialen passen onvoldoende bij mijn onderwijspraktijk. (243)	○	○	○	○	○
lk voorspel dat ik gebruik ga maken van Open Leermaterialen in de komende 6 maanden. (244)	○	○	○	○	○
De directie van deze school ondersteunt het gebruik van Open Leermaterialen. (245)	○	○	○	○	○
lk heb de nodige kennis om gebruik te maken van Open Leermaterialen. (246)	○	○	○	○	○
Ik vind Open Leermaterialen nuttig in mijn werk. (247)	○	○	○	○	○
Mijn neiging is om waar mogelijk Open	○	○	○	○	○

Leermaterialen te gebruiken. (248)					
Gebruikmaken van Open Leermaterialen verhoogt mijn productiviteit. (249)	○	○	○	○	○
In de meeste lessen maak ik gebruik van Open Leermaterialen. (250)	○	○	○	○	○

End of Block: Vragenlijst

Start of Block: Open Vragen

Vindbaarheid Wat is nodig om de vindbaarheid van open leermateriaal voor het mbo te vergroten?

____

Gebruik Wat is nodig om het gebruik van open leermateriaal in het mbo te bevorderen?

____

E-mail Mocht u eventueel kans willen maken op een prijs omwille het invullen van deze vragenlijst, laat dan uw e-mailadres hieronder achter.

____

Appendix C: Outline semi-structured interviews

Inleiding tot het gebruik van OER

Algemene ervaring :

- "Kunt u uw algemene ervaring delen met het gebruik van OER in uw praktijk van beroepsonderwijs?"
- Wat heeft u gemotiveerd om OER in uw onderwijs te gaan gebruiken?

Prestatieverwachting

“Kunt u situaties beschrijven waarin OER qua prestaties volledig aansloot bij verwachtingen?

- Wat maakte dat de OER goed aansloot?
- Hoe beoordeelt u de geschiktheid van OER voor uw specifiek onderwijsbehoeften?
- Kunt u een voorbeeld geven waarbij OER de betrokkenheid of het begrip van studenten aanzienlijk beïnvloedde?
- Heeft u verbeteringen in de leerresultaten gemeten of waargenomen die rechtstreeks aan OER toe te schrijven zijn?

"Zijn er gevallen geweest waarin OER niet presteerde zoals u had verwacht?

- Met welke specifieke uitdagingen werd u in deze gevallen geconfronteerd?
- Hoe heeft u deze uitdagingen aangepakt?
- Hebben deze ervaringen uw benadering van het selecteren of gebruiken van open leermiddelen veranderd?
- Welke veranderingen of ontwikkelingen op het gebied van open leermiddelen zou u graag zien om uw onderwijs beter te ondersteunen?
- Zijn er specifieke gebieden of onderwerpen waar u meer potentieel ziet voor de impact van open leermiddelen?

Inspanningsverwachting (EE)

"Kunt u de leercurve beschrijven die gepaard gaat met het vinden, aanpassen en integreren van open leermiddelen in uw curriculum? Welke invloed heeft dit gehad op uw gebruik?"

- Welke hulpmiddelen of strategieën heb je nuttig gevonden bij het overwinnen van deze leercurve?
- "Met welke uitdagingen bent u geconfronteerd op het gebied van het gebruiksgemak van open leermiddelen, en hoe heeft u deze overwonnen?"
- Welke steun of middelen zouden deze uitdagingen gemakkelijker te overwinnen hebben gemaakt?

"Welke verbeteringen of ondersteuning zouden u ertoe aanzetten om OER vaker of effectiever in uw onderwijs te gebruiken?"

- Hoe kunnen instellingen of OER-gemeenschappen docenten zoals zij beter ondersteunen?

Sociale invloed (SI)

"Kunt u zich een specifiek geval herinneren waarin de aanbeveling of mening van een collega of onderwijsautoriteit uw beslissing om OER in uw onderwijs te gebruiken aanzienlijk heeft beïnvloed? Welke invloed heeft dit gehad op uw huidige gebruik van OER?"

Hoe vaak bespreekt u OER met collega's of autoriteiten?
Bent u onder uw collega's een pleitbezorger voor OER geworden? Op welke manier?
Hoe evalueert u de geloofwaardigheid of het nut van aanbevelingen over open leermiddelen?

"Hoe beïnvloedt de cultuur of houding ten opzichte van open leermiddelen binnen uw instelling of onder uw collega's uw dagelijks gebruik van deze hulpmiddelen?"

- Kunt u de algemene houding ten opzichte van open leermiddelen binnen uw instelling beschrijven?
- Hebt u in de loop van de tijd veranderingen in deze houding opgemerkt? Wat heeft deze veranderingen beïnvloed?

"Gelooft u dat een grotere steun of goedkeuring van collega's of onderwijsleiders uw bereidheid om OER in de toekomst te gebruiken zou veranderen? Waarom wel of niet?"

- Welke vormen van steun of goedkeuring hebben voor u de meeste invloed?
- Hoe kan uw instelling of professionele gemeenschap effectievere ondersteuning bieden voor het gebruik van open leermiddelen?
- Heeft u binnen uw instelling een rol op zich genomen of bent u van plan dit te gaan doen in het pleiten voor OER?
- "Hoe kan de sociale druk of aanmoediging vanuit uw professionele netwerk van invloed zijn op uw plannen om OER te adopteren of te blijven gebruiken?"
- Kunt u een voorbeeld geven waarbij sociale invloed u ertoe bracht uw standpunt over open leermiddelen te heroverwegen?
- Hoe brengt u uw eigen evaluaties van open leermiddelen in evenwicht met de meningen binnen uw netwerk?
- Bent u op zoek naar netwerken of communities die zich bezighouden met open leermiddelen? Hoe beïnvloeden deze gemeenschappen uw mening?

Faciliterende Voorwaarden (FC)

"Welke specifieke hulpmiddelen of ondersteuningssystemen bij uw instelling hebben het voor u gemakkelijker gemaakt om open leermiddelen in uw onderwijs te integreren? Hoe hebben deze uw huidige gebruik vergemakkelijkt?"

- Kunt u beschrijven hoe deze middelen of systemen werden geïmplementeerd?
- Welke hiaten in ondersteuning of middelen zie je nog?
- Hoe overbrug je deze lacunes om OER te blijven gebruiken?

"Bent u technologische of infrastructurele barrières tegengekomen die uw gebruik van open leermiddelen hebben belemmerd? Hoe heeft u deze uitdagingen aangepakt?"

- Welke specifieke technologische verbeteringen zou u voorstellen om deze barrières te overwinnen?
- Hoe blijft u op de hoogte van technologische ontwikkelingen die het gebruik van OER kunnen ondersteunen?
- Hebben deze barrières uw motivatie om OER te gebruiken beïnvloed? Hoe?

"Welke aanvullende ondersteuning of middelen zouden u eerder geneigd maken om OER uitgebreider in uw onderwijspraktijk te gebruiken?"

- Zijn er specifieke soorten open leermiddelen of vakken waarvoor u meer ondersteuning nodig heeft?
- Hoe kan samenwerking met andere docenten of instellingen uw gebruik van open leermiddelen verbeteren?
- Welke rol ziet u voor professionele ontwikkeling bij het verbeteren van het gebruik van open leermiddelen?

Conclusie

"Is er verder nog iets aan uw ervaring met OER dat u belangrijk vindt om te delen?"

APPENDIX D: CODING BOOK

AU (Adoption and Usage)

AU (positive): Examples given by teachers when they successfully adopt and effectively use OER in their daily teaching practices.

AU (negative): Instances described by teachers where barriers hinder the adoption or effective use of OER.

BI (Behavioral Intention)

BI (positive): Descriptions by teachers of strong intentions to use OER due to benefits like accessibility, customization, or cost savings.

BI (negative): Instances where teachers express reluctance or refusal to use OER due to perceived drawbacks such as poor quality or lack of accreditation.

FC (Facilitating Conditions)

FC (positive)

Adequate time availability: Teachers have sufficient structural time to explore, adapt, and integrate OER into their curricula.

High accessibility: Teachers easily access necessary devices, software, and platforms to utilize OER.

Excellent findability: Teachers can easily locate relevant and suitable OER through well-organized repositories or search tools.

FC (negative)

Time constraints: Structural time shortages that hinder teachers from effectively exploring or integrating OER.

Limited accessibility: Limited access to necessary technology or other means required to effectively use OER.

Poor findability: Difficulties faced by teachers in locating appropriate or relevant OER.

EE (Effort Expectancy)

EE (positive)

Align with curriculum: OER that align with current curricular needs, enhancing integration into daily teaching. Requires little work to make them fit or adjust curriculum.

Precise information refinement: OER that are well written and have no redundant information.

Correct information: OER that provide accurate and relevant information, easily integrated into the curriculum.

EE (negative)

Outdated curriculum: OER that are no longer relevant or up-to-date.

Irrelevant information: OER containing information that does not align with current educational needs, requiring time to optimize and filter.

PE (Performance Expectancy)

PE (positive)

Adjustable: OER that can be easily adapted to fit diverse teaching styles and course requirements.

Strong real-life relevance: OER that provide practical content applicable to real-life scenarios.

Effective didactics or variety: OER that enhance teaching effectiveness through innovative and pedagogically sound content.

Developed by teachers: OER created with direct input from educators, ensuring relevance and practical utility.

Full lesson planning: OER that include comprehensive lesson plans providing all necessary resources.

PE (negative)

Non-adjustable: OER that lack flexibility, limiting their use across varied teaching styles.

No real-life connection: OER that fail to offer practical applications.

Ineffective didactics or variety: OER that do not support effective teaching methods.

Not created by teachers: OER developed without educator input, affecting their applicability.

Out-of-date: OER that are not regularly updated, leading to obsolete content.

SI (Social Influence)

SI (positive)

Industry-aligned: OER that align with industry standards, enhancing job readiness and professional practices.

Collegial support: Strong support from colleagues for the adoption and use of OER.

Supportive leadership: Leadership that actively promotes the use of OER, providing resources and support.

SI (negative)

Disconnected from workfield: OER that do not align with professional practices or job market demands.

Lack of colleague support: Limited support from peers in integrating OER into teaching.

Top-down pressures: External pressures that negatively influence the adoption and effective use of OER

Appendix E: Syntax Code

```
library(dplyr)
library(lavaan)
library(psych)
ProcessedData <- RawData %>%
select(
-StartDate, -EndDate, -Status, -IPAddress, -Progress,
-`Duration (in seconds)`, -Finished, -RecordedDate, -ResponseId,
-RecipientLastName, -RecipientFirstName, -RecipientEmail,
-ExternalReference, -LocationLatitude, -LocationLongitude,
-DistributionChannel, -UserLanguage, -Vindbaarheid, -Gebruik
)

if (!require("Hmisc")) install.packages("Hmisc")
library(Hmisc)
# Renaming variables and assigning variable labels
if (!require("Hmisc")) install.packages("Hmisc")
library(Hmisc)
ProcessedData <- ProcessedData %>%
rename(
Akkoord = V1,
WerkNiveau = V2,
WerkNiveau_anders = V2_6_TEXT,
Werklocatie = V3,
Werklocatie_ANDERS = V3_6_TEXT,
Leeftijd = V4,
Ervaring = V5,
OpleidingsNiveau = V6,
OpleidingsNiveauAnders = V6_6_TEXT,
AchtergrondOpleiding = V7,
AchtergrondOpleiding_ANDERS = V7_5_TEXT,
Vak = V8,
Vak_ANDERS = V8_3_TEXT,
ErvaringOER = V9,
EE1 = `De vragenlijst_1`,
ROC = `De vragenlijst_2`,
SI1 = `De vragenlijst_3`,
BI1 = `De vragenlijst_4`,
SI2 = `De vragenlijst_5`,
FC1 = `De vragenlijst_6`,
EE2 = `De vragenlijst_7`,
BI2 = `De vragenlijst_8`,
FC2 = `De vragenlijst_9`,
AU1 = `De vragenlijst_10`,
PE1 = `De vragenlijst_11`,
PE2 = `De vragenlijst_12`,
AU2 = `De vragenlijst_13`,
```

```
EE3 = `De vragenlijst_14`,
SI3 = `De vragenlijst_15`,
EE4 = `De vragenlijst_16`,
FC3 = `De vragenlijst_17`,
BI3 = `De vragenlijst_18`,
SI4 = `De vragenlijst_19`,
FC4 = `De vragenlijst_20`,
PE3 = `De vragenlijst_21`,
AU3 = `De vragenlijst_22`,
PE4 = `De vragenlijst_23`,
AU4 = `De vragenlijst_24`
)
# Assigning variable labels
label(ProcessedData$Akkoord) <- "Zijn akkoord gegaan met voorwaarden"
label(ProcessedData$WerkNiveau) <- "Geeft les op niveau"
label(ProcessedData$WerkNiveau_anders) <- "Geeft les op niveau: Anders"
label(ProcessedData$Werklocatie) <- "Werkzaam op school"
label(ProcessedData$Werklocatie_ANDERS) <- "Werkzaam op school: Anders"
label(ProcessedData$Leeftijd) <- "Leeftijd"
label(ProcessedData$Ervaring) <- "Jaren ervaring in het onderwijs"
label(ProcessedData$OpleidingsNiveau) <- "Hoogst genoten opleiding"
label(ProcessedData$OpleidingsNiveauAnders) <- "Hoogst genoten opleiding: Anders"
label(ProcessedData$AchtergrondOpleiding) <- "In het onderwijs terecht gekomen via"
label(ProcessedData$AchtergrondOpleiding_ANDERS) <- "In het onderwijs terecht gekomen via: Anders"
label(ProcessedData$Vak) <- "Geeft les als vak"
label(ProcessedData$Vak_ANDERS) <- "Geeft les als vak: Anders"
label(ProcessedData$ErvaringOER) <- "Heeft ervaring met het gebruik van Open Leermaterialen"
label(ProcessedData$EE1) <- "Open Leermaterialen zijn voor mij gemakkelijk te hanteren"
label(ProcessedData$ROC) <- "Ik kan Open Leermaterialen makkelijk vinden"
label(ProcessedData$SI1) <- "Collega's vinden dat ik gebruik zou moeten maken van Open Leermaterialen"
label(ProcessedData$BI1) <- "Ik ga in de komende 6 maanden gebruik maken van open leermaterialen"
label(ProcessedData$SI2) <- "Mijn leidinggevenden vinden dat ik gebruik zou moeten maken van Open Leermaterialen"
label(ProcessedData$FC1) <- "In mijn organisatie is hulp aanwezig als ik vragen heb over open leermaterialen"
label(ProcessedData$EE2) <- "Leren omgaan met Open Leermaterialen is gemakkelijk voor mij"
label(ProcessedData$BI2) <- "Ik neem me voor om Open Leermaterialen te gebruiken in de komende 6 maanden"
label(ProcessedData$FC2) <- "Ik beschik over de nodige middelen om gebruik te maken van Open Leermaterialen"
label(ProcessedData$AU1) <- "Ik geef er de voorkeur aan om Open Leermaterialen te gebruiken, indien beschikbaar"
```

```
label(ProcessedData$PE1) <- "Open Leermaterialen gebruiken scheelt mij tijd"
label(ProcessedData$PE2) <- "Gebruikmaken van Open Leermaterialen, kan mijn loopbaan bevorderen"
label(ProcessedData$AU2) <- "Ik beschouw mezelf als een regelmatige gebruiker van Open Leermaterialen"
label(ProcessedData$EE3) <- "Omgaan met Open Leermaterialen is duidelijk en begrijpelijk voor mij"
label(ProcessedData$SI3) <- "Over het algemeen steunt de organisatie het gebruik van Open Leermaterialen"
label(ProcessedData$EE4) <- "Vaardig worden in het omgaan met Open Leermaterialen is gemakkelijk voor mij"
label(ProcessedData$FC3) <- "Open Leermaterialen passen onvoldoende bij mijn onderwijspraktijk"
label(ProcessedData$BI3) <- "Ik voorspel dat ik gebruik ga maken van Open Leermaterialen in de komende 6 maanden"
label(ProcessedData$SI4) <- "De directie van deze school ondersteunt het gebruik van Open Leermaterialen"
label(ProcessedData$FC4) <- "Ik heb de nodige kennis om gebruik te maken van Open Leermaterialen"
label(ProcessedData$PE3) <- "Ik vind Open Leermaterialen nuttig in mijn werk"
label(ProcessedData$AU3) <- "Mijn neiging is om waar mogelijk Open Leermaterialen te gebruiken"
label(ProcessedData$PE4) <- "Gebruikmaken van Open Leermaterialen verhoogt mijn productiviteit"
label(ProcessedData$AU4) <- "In de meeste lessen maak ik gebruik van Open Leermaterialen"

# Converting variables to numeric
vars_to_convert <- c("EE1", "EE2", "EE3", "EE4", "SI1", "SI2", "SI3", "SI4",
"PE1", "PE2", "PE3", "PE4", "FC1", "FC2", "FC3", "FC4",
"BI1", "BI2", "BI3", "AU1", "AU2", "AU3", "AU4")
for (var in vars_to_convert) {
ProcessedData[[var]] <- as.numeric(as.character(ProcessedData[[var]]))
}
# Reversing Variables
ProcessedData$FC3 <- 6 - ProcessedData$FC3
# Converting nominal variables to factors with specified levels and labels
ProcessedData$WerkNiveau <- factor(ProcessedData$WerkNiveau, levels = 1:6, labels = c("MBO", "HBO", "WO/Universiteit", "Primair Onderwijs", "Voortgezet Onderwijs", "Anders"))
ProcessedData$Werklocatie <- factor(ProcessedData$Werklocatie, levels = c(2, 3, 4, 5, 7, 8, 6), labels = c("Curio College", "Deltion College", "Graafschap College", "Noorderpoort College", "Nova College", "ROC van Amsterdam", "Anders"))
ProcessedData$Leeftijd <- factor(ProcessedData$Leeftijd, levels = 1:6, labels = c("18 - 25", "26 - 35", "36 - 45", "46 - 55", "56 - 65", "65 +"))
ProcessedData$Ervaring <- factor(ProcessedData$Ervaring, levels = 1:5, labels = c("0 - 5 jaar", "6 - 10 jaar", "11 - 20 jaar", "21 - 30 jaar", "31 + jaar"))
```

```
ProcessedData$OpleidingsNiveau <- factor(ProcessedData$OpleidingsNiveau, levels = 1:6, labels = c("MBO", "HBO Bachelor", "HBO Master", "Universiteit Bachelor", "Universiteit Master", "Anders"))
ProcessedData$AchtergrondOpleiding <- factor(ProcessedData$AchtergrondOpleiding, levels = c(1, 2, 3, 5), labels = c("Praktijkervaring in beroepsgebied", "Praktijkervaring in beroepsgebied aangevuld met opleiding over het onderwijs", "Lerarenopleiding", "Anders"))
ProcessedData$Vak <- factor(ProcessedData$Vak, levels = 1:3, labels = c("Beroepsgericht vak", "AVO vak (NL, ENG, REK, Burgerschap etc.)", "Anders"))
ProcessedData$ErvaringOER <- factor(ProcessedData$ErvaringOER, levels = 1:2, labels = c("Ja", "Nee"))
ProcessedData$WerkNiveau_anders <- as.character(ProcessedData$WerkNiveau_anders)
ProcessedData$Werklocatie_ANDERS <- as.character(ProcessedData$Werklocatie_ANDERS)
ProcessedData$Vak_ANDERS <- as.character(ProcessedData$Vak_ANDERS)
ProcessedData$AchtergrondOpleiding_ANDERS <- as.character(ProcessedData$AchtergrondOpleiding_ANDERS)
ProcessedData$OpleidingsNiveauAnders <- as.character(ProcessedData$OpleidingsNiveauAnders)


variables_of_interest <- c("SI1", "SI2", "SI3", "SI4",
"BI1", "BI2", "BI3",
"PE1", "PE2", "PE3", "PE4",
"AU1", "AU2", "AU3", "AU4",
"FC1", "FC2", "FC3",
"EE1", "EE2", "EE3")

# Assuming your data frame is named ProcessedData
# Create a logical vector indicating rows with all non-NA values in the specified variables
complete_rows <- complete.cases(ProcessedData[variables_of_interest])
# Subset the original data frame to keep only these complete cases
CleanData <- ProcessedData[complete_rows, ]
# Now CleanData contains only rows where the specified variables have no missing values


# Calculate composite scores for each construct
CleanData$PEmean <- rowMeans(CleanData[,c("PE1", "PE2", "PE3", "PE4")], na.rm = TRUE)
CleanData$EEmean <- rowMeans(CleanData[,c("EE1", "EE2", "EE3", "EE4")], na.rm = TRUE)
CleanData$SImean <- rowMeans(CleanData[,c("SI1", "SI2", "SI3", "SI4")], na.rm = TRUE)
CleanData$FCmean <- rowMeans(CleanData[,c("FC1", "FC2", "FC3", "FC4")], na.rm = TRUE)
CleanData$BImean <- rowMeans(CleanData[,c("BI1", "BI2", "BI3")], na.rm = TRUE)
CleanData$AUmean <- rowMeans(CleanData[,c("AU1", "AU2", "AU3", "AU4")], na.rm = TRUE)

# Define the constructs and their corresponding items
constructs <- list(
AU = c("AU1", "AU2", "AU3", "AU4"),
EE = c("EE1", "EE2", "EE3", "EE4"),
SI = c("SI1", "SI2", "SI3", "SI4"),
PE = c("PE1", "PE2", "PE3", "PE4"),
```

```
FC = c("FC1", "FC2", "FC3", "FC4"),
BI = c("BI1", "BI2", "BI3")
)
# Assuming 'constructs' is a list of your constructs with corresponding item names
# Initialize an empty data frame to store Cronbach's alpha results
alpha_results <- data.frame(Construct = character(), Alpha = numeric(), stringsAsFactors = FALSE)

# Loop through each construct to calculate Cronbach's Alpha and store the results
for(construct in names(constructs)) {
  items <- constructs[[construct]]
  alpha_value <- psych::alpha(CleanData[, items], check.keys=TRUE)$total$raw_alpha
  alpha_results <- rbind(alpha_results, data.frame(Construct = construct, Alpha = alpha_value))
}

# Print the table of Cronbach's Alpha results
print(alpha_results)
# Save the alpha results to a CSV file
write.csv(alpha_results, "Cronbach's Alpha Table.csv", row.names = FALSE)

# Optionally, you can print a message to indicate the file has been saved successfully
print("Cronbach's Alpha Table has been saved.")

# Define the CFA model
cfa_model <- '
   # Measurement model
   AU =~ AU1 + AU2 + AU3 + AU4
   EE =~ EE1 + EE2 + EE3 + EE4
   SI =~ SI1 + SI2 + SI3 + SI4
   PE =~ PE1 + PE2 + PE3 + PE4
   FC =~ FC1 + FC2 + FC3 + FC4
   BI =~ BI1 + BI2 + BI3
'

# Fit the CFA model to your data
fit <- cfa(cfa_model, data = CleanData)

# Extract standardized factor loadings
standardized_loadings <- as.data.frame(standardizedSolution(fit))

# Save standardized factor loadings as a table and a CSV file
write.table(standardized_loadings, file = "standardized_factor_loadings.txt", sep = "\t")
write.csv(standardized_loadings, file = "standardized_factor_loadings.csv", row.names =
FALSE)

# Get model fit indices
fit_indices <- fitMeasures(fit)

# Select relevant fit indices
```

```
selected_fit_indices <- fit_indices[c("chisq", "df", "pvalue", "rmsea", "cfi", "tli", "nfi")]

# Convert selected fit indices to a data frame
fit_indices_df <- as.data.frame(t(selected_fit_indices))

# Save selected fit indices as a data table and a CSV file
write.table(fit_indices_df, file = "selected_fit_indices.txt", sep = "\t")
write.csv(fit_indices_df, file = "selected_fit_indices.csv", row.names = FALSE)

# Print the selected fit indices
print(fit_indices_df)

# Calculate the χ²/df ratio
chi_square_df_ratio <- fit_indices["chisq"] / fit_indices["df"]

# Organize the fit indices into a data frame
fit_table <- data.frame(
  Fit_Index = c("Chi-square (χ²)", "Degrees of Freedom (df)", "χ²/df Ratio", "RMSEA", "CFI",
"TLI", "SRMR"),
  Value = c(
   sprintf("%.2f", fit_indices["chisq"]),
   sprintf("%d", fit_indices["df"]),
   sprintf("%.2f", chi_square_df_ratio),
   sprintf("%.2f", fit_indices["rmsea"]),
   sprintf("%.2f", fit_indices["cfi"]),
   sprintf("%.2f", fit_indices["tli"]),
   sprintf("%.2f", fit_indices["srmr"])
  ),
  Acceptable_Thresholds = c(NA, NA, "≤ 3.0", "≤ 0.06 or ≤ 0.08", "≥ 0.95", "≥ 0.95", "≤ 0.08"),
  stringsAsFactors = FALSE
)

# Save the data frame as a CSV file
write.csv(fit_table, "CFA Model Fit Table.csv", row.names = FALSE)

# Correctly extract standardized factor loadings using the right operation code
factor_loadings <- standardized_loadings[standardized_loadings$op == "=~", c("lhs", "rhs",
"est.std")]

# Correctly rename columns for clarity
colnames(factor_loadings) <- c("Construct", "Item", "Factor Loading")

# Now, save the corrected factor loadings as a CSV file
write.csv(factor_loadings, "Factor Loadings Table Format 1.csv", row.names = FALSE)

# If you wish to view this corrected table in R
print(factor_loadings)
```

```
# Initialize constructs and items
constructs <- c("PE", "EE", "SI", "FC", "BI", "AU")
items <- c("PE1", "PE2", "PE3", "PE4", "EE1", "EE2", "EE3", "EE4", "SI1", "SI2", "SI3", "SI4",
"FC1", "FC2", "FC3", "FC4", "BI1", "BI2", "BI3", "AU1", "AU2", "AU3", "AU4")

# Create an empty data frame with constructs and items as columns
factor_loadings_wide <- data.frame(matrix(ncol = length(items) + 1, nrow =
length(constructs)))
names(factor_loadings_wide) <- c("Construct", items)
factor_loadings_wide$Construct <- constructs

# Fill in the data frame with factor loadings
for (i in 1:length(constructs)) {
  construct <- constructs[i]
  for (j in 1:length(items)) {
    item <- items[j]
    loading <- factor_loadings$`Factor Loading`[factor_loadings$Construct == construct &
factor_loadings$Item == item]
    if (length(loading) > 0) {
      factor_loadings_wide[i, j + 1] <- loading
    } else {
      factor_loadings_wide[i, j + 1] <- NA  # Use NA for missing factor loadings
    }
  }
}

# Save the wide format factor loadings table to a CSV file
write.csv(factor_loadings_wide, "Factor Loadings Table Format 2.csv", row.names = FALSE)

# Select only the columns representing the constructs
constructs <- c("PEmean", "EEmean", "SImean", "FCmean", "BImean", "AUmean")
constructs_data <- CleanData[, constructs]

# Calculate the correlation matrix
correlation_matrix <- cor(constructs_data)

# Print the correlation matrix
print(correlation_matrix)

# Save the correlation matrix as a CSV file
write.csv(correlation_matrix, "Constructs Correlation Matrix.csv")

# Select only the columns representing the constructs
constructs <- c("PEmean", "EEmean", "SImean", "FCmean", "BImean", "AUmean")
constructs_data <- CleanData[, constructs]
```

```
# Calculate the correlation matrix
correlation_matrix <- cor(constructs_data)

# Convert correlation matrix to dataframe
correlation_df <- as.data.frame(correlation_matrix)

# Print the correlation matrix
print(correlation_df)

# Save the correlation matrix as a CSV file
write.csv(correlation_df, "Constructs Correlation Matrix.csv", row.names = TRUE)


# Calculate the squared factor loadings and store them in a new column "Factor Loading Squared"
factor_loadings$Factor_Loading_Squared <- factor_loadings$`Factor Loading`^2
# Calculate AVE for each construct
AVE <- factor_loadings %>%
  group_by(Construct) %>%
  summarise(AVE = mean(Factor_Loading_Squared))

# Print the AVE for each construct
print(AVE)

# Print the updated data frame
print(factor_loadings)

# Extract AVE values
AVE_values <- AVE$AVE

# Compute the correlation matrix
correlation_matrix <- cor(correlation_df)

# Calculate MSV for each construct
MSV <- diag(correlation_matrix) - AVE_values

# Print MSV for each construct
print(MSV)

# Extract construct names
construct_names <- names(AVE_values)

# Define construct_names in the specified order
construct_names <- c("PE", "EE", "SI", "FC", "BI", "AU")

# Create dataframe for MSV
```

```
MSV_df <- data.frame(
  Construct = construct_names,
  MSV = MSV
)

# Print the dataframe
print(MSV_df)

# Calculate the square root of AVE
sqrt_AVE <- sqrt(AVE_values)

# Create the dataframe for the table
validity_table <- data.frame(
  Construct = construct_names,
  AVE = AVE_values,
  MSV = MSV,
  `Square Root of AVE` = sqrt_AVE
)

# Print the dataframe
print(validity_table)
# Save the dataframe as a CSV file
write.csv(validity_table, "Validity Assessment Table.csv", row.names = FALSE)

# Load the required library for qqplot
library(ggplot2)

# Define an empty dataframe to store results
normality_results_residuals <- data.frame(Predictor = character(), p_value = numeric(),
stringsAsFactors = FALSE)

# Define the list of predictors
predictors <- c("PEmean", "EEmean", "SImean", "FCmean", "BImean")

# Iterate over each predictor
for (predictor in predictors) {
  # Fit the regression model
  model <- lm(AUmean ~ ., data = CleanData[, c("AUmean", predictor)])

  # Extract residuals
  residuals <- residuals(model)

  # Shapiro-Wilk test for normality of residuals
  shapiro_test <- shapiro.test(residuals)

  # Add the result to the dataframe
```

```
  normality_results_residuals <- rbind(normality_results_residuals, data.frame(Predictor =
predictor, p_value = shapiro_test$p.value))

  # Visual inspection of residuals using a histogram
  hist(residuals, main = paste("Histogram of Residuals for", predictor), xlab = "Residuals")

  # Visual inspection of residuals using a Q-Q plot
  ggplot(data.frame(residuals = residuals), aes(sample = residuals)) +
    geom_qq() +
    geom_qq_line() +
    labs(title = paste("Q-Q Plot of Residuals for", predictor))
}

# Save the results to a CSV file
write.csv(normality_results_residuals, "Normality Residuals.csv", row.names = FALSE)

# First regression: BImean as independent variable, PE, EE, SI, FC as predictors
model1 <- lm(BImean ~ PEmean + EEmean + SImean + FCmean, data = CleanData)

# Extract coefficients and other relevant statistics
summary_table1 <- summary(model1)
coefficients1 <- summary_table1$coefficients

# Second regression: AU as independent variable, PE, EE, SI, FC, BI as predictors
model2 <- lm(AUmean ~ PEmean + EEmean + SImean + FCmean + BImean, data = CleanData)
summary_table2 <- summary(model2)
coefficients2 <- summary_table2$coefficients

# Third regression: AU as independent variable, BI, FC as predictors
model3 <- lm(AUmean ~ BImean + FCmean, data = CleanData)
summary_table3 <- summary(model3)
coefficients3 <- summary_table3$coefficients

# Combine into one dataframe
regression_tables <- list(model1 = coefficients1, model2 = coefficients2, model3 =
coefficients3)

# Save individual regression tables as dataframes
write.csv(coefficients1, "Regression Analysis Table 1.csv")
write.csv(coefficients2, "Regression Analysis Table 2.csv")
write.csv(coefficients3, "Regression Analysis Table 3.csv")
```

```
# Select only the columns representing the constructs
constructs <- c("PEmean", "EEmean", "SImean", "FCmean", "BImean", "AUmean")
constructs_data <- CleanData[, constructs]

# Calculate descriptive statistics for each construct
constructs_descriptives <- sapply(constructs_data, function(x) c(
  mean = mean(x),
  median = median(x),
  sd = sd(x),
  min = min(x),
  max = max(x)
))

# Convert to dataframe for better readability
constructs_descriptives_df <- as.data.frame(constructs_descriptives)

# Print the descriptive statistics
print(constructs_descriptives_df)

# Save the descriptive statistics as a CSV file
write.csv(constructs_descriptives_df, "Constructs Descriptives.csv", row.names = TRUE)
# Transpose the dataframe
transposed_descriptives <- t(constructs_descriptives_df)

# Print the transposed dataframe
print(transposed_descriptives)

# Save the transposed dataframe as a CSV file
write.csv(transposed_descriptives, "Transposed Constructs Descriptives.csv", row.names =
TRUE)

# Define function to create frequency tables with outlined structure
create_frequency_table <- function(variable_name, data) {
  # Create frequency table
  freq_table <- table(data)

  # Calculate total count
  total_count <- sum(freq_table)

  # Calculate percentages
  percentage <- round(prop.table(freq_table) * 100, 2)

  # Create data frame for the table
  table_df <- data.frame(
    Variable = variable_name,
    "Amount (N)" = as.numeric(freq_table),
    "Percentages (%)" = percentage
```

```
  )

  # Add total row
  total_row <- c("Total", total_count, 100)
  table_df <- rbind(table_df, total_row)

  return(table_df)
}

# Create frequency tables for each variable
werk_niveau_table <- create_frequency_table("WerkNiveau", CleanData$WerkNiveau)
werk_locatie_table <- create_frequency_table("WerkLocatie", CleanData$Werklocatie)
leeftijd_table <- create_frequency_table("Leeftijd", CleanData$Leeftijd)
ervaring_table <- create_frequency_table("Ervaring", CleanData$Ervaring)
opleidings_niveau_table <- create_frequency_table("OpleidingsNiveau",
CleanData$OpleidingsNiveau)
achtergrond_opleiding_table <- create_frequency_table("AchtergrondOpleiding",
CleanData$AchtergrondOpleiding)

# Print tables
print(werk_niveau_table)
print(werk_locatie_table)
print(leeftijd_table)
print(ervaring_table)
print(opleidings_niveau_table)
print(achtergrond_opleiding_table)
# Transpose tables
werk_niveau_transposed <- t(werk_niveau_table)
werk_locatie_transposed <- t(werk_locatie_table)
leeftijd_transposed <- t(leeftijd_table)
ervaring_transposed <- t(ervaring_table)
opleidings_niveau_transposed <- t(opleidings_niveau_table)
achtergrond_opleiding_transposed <- t(achtergrond_opleiding_table)

# Save as dataframes
save(werk_niveau_transposed, file = "WerkNiveau_Transposed.RData")
save(werk_locatie_transposed, file = "WerkLocatie_Transposed.RData")
save(leeftijd_transposed, file = "Leeftijd_Transposed.RData")
save(ervaring_transposed, file = "Ervaring_Transposed.RData")
save(opleidings_niveau_transposed, file = "OpleidingsNiveau_Transposed.RData")
save(achtergrond_opleiding_transposed, file = "AchtergrondOpleiding_Transposed.RData")

# Save as CSV files
write.csv(werk_niveau_transposed, "WerkNiveau_Table_Transposed.csv", row.names =
TRUE)
write.csv(werk_locatie_transposed, "WerkLocatie_Table_Transposed.csv", row.names =
TRUE)
```

```
write.csv(leeftijd_transposed, "Leeftijd_Table_Transposed.csv", row.names = TRUE)
write.csv(ervaring_transposed, "Ervaring_Table_Transposed.csv", row.names = TRUE)
write.csv(opleidings_niveau_transposed, "OpleidingsNiveau_Table_Transposed.csv",
row.names = TRUE)
write.csv(achtergrond_opleiding_transposed,
"AchtergrondOpleiding_Table_Transposed.csv", row.names = TRUE)

# Load required library
library(openxlsx)

# Create a new workbook
wb <- createWorkbook()

# List of table files
table_files <- c(
  "Cronbach's Alpha Table.csv",
  "standardized_factor_loadings.csv",
  "selected_fit_indices.csv",
  "CFA Model Fit Table.csv",
  "Factor Loadings Table Format 1.csv",
  "Factor Loadings Table Format 2.csv",
  "Constructs Correlation Matrix.csv",
  "Validity Assessment Table.csv",
  "Constructs Descriptives.csv",
  "Transposed Constructs Descriptives.csv",
  "Normality Residuals.csv",
  "WerkNiveau_Table_Transposed.csv",
  "WerkLocatie_Table_Transposed.csv",
  "Leeftijd_Table_Transposed.csv",
  "Ervaring_Table_Transposed.csv",
  "OpleidingsNiveau_Table_Transposed.csv",
  "AchtergrondOpleiding_Table_Transposed.csv",
  "Regression Analysis Table 1.csv",
  "Regression Analysis Table 2.csv",
  "Regression Analysis Table 3.csv"
)

# Add sheets for each table
for (file in table_files) {
  # Read CSV file
  table_data <- read.csv(file)

  # Extract sheet name from file name and truncate if necessary
  sheet_name <- gsub(".csv", "", file)
  if (nchar(sheet_name) > 31) {
    sheet_name <- substr(sheet_name, 1, 31)
  }
```

```
  # Add sheet to the workbook
  addWorksheet(wb, sheetName = sheet_name)

  # Write data to the sheet
  writeData(wb, sheet = sheet_name, x = table_data)
}

# Save the workbook
saveWorkbook(wb, "All TablesV2.xlsx")

library(lavaan)

# Define the CFA model
cfa_model <- '
  AU =~ AU1 + AU2 + AU3 + AU4
  EE =~ EE1 + EE2 + EE3 + EE4
  SI =~ SI1 + SI2 + SI3 + SI4
  PE =~ PE1 + PE2 + PE3 + PE4
  FC =~ FC1 + FC2 + FC3 + FC4
  BI =~ BI1 + BI2 + BI3
'

# Fit the CFA model to your data
fit <- cfa(cfa_model, data = CleanData)

# Check modification indices for potential improvements
mod_indices <- modificationIndices(fit)

# Filter the modification indices to show only significant suggestions
# (e.g., modification indices greater than 10, which is a common threshold)
significant_mod_indices <- mod_indices[mod_indices$mi > 10, ]

# Sort the significant modification indices in decreasing order of modification index
sorted_mod_indices <- significant_mod_indices[order(significant_mod_indices$mi,
decreasing = TRUE), ]

# Print the sorted modification indices
print(sorted_mod_indices)

# Save the sorted significant modification indices to a CSV file for further examination
write.csv(sorted_mod_indices, "significant_modification_indices.csv", row.names = FALSE)

# Optional: Display the top 10 modification indices
print(head(sorted_mod_indices, 10))
```

Appendix F: AI statement

During the preparation of this work the author(s) used ChatGPT in order to help organize thinking, line of argument and writing. Information gathering and reading of prior researches was done by the author, all the references to other researches therefore were created by the author. ChatGPT was then used as a form of feedback, rereading my line of argument and giving arguments on how to improve. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.