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Rural teachers' sharing of digital educational resources: From motivation to behavior

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ABSTRACT

Research indicates that knowledge sharing promotes teacher professional learning opportunities and development. However, it is yet to be known what motivates teachers in rural schools in sharing their knowledge as they may face more challenges than teachers in urban areas when sharing. This study examined factors explaining rural teachers' sharing behavior regarding digital educational resources, both within and outside school, as posited by combining motivation theory and the integrative model of behavior prediction. Self-reported questionnaires from 709 rural teachers were collected and analyzed employing the Structural Equation Modeling. Different motivational factors were found to be related to sharing behavior within school and outside school. More specifically, internal motivation was positively and external motivation was negatively related to sharing behavior in both contexts. Moreover, sharing intention and sharing climate significantly explained teachers' sharing behavior, but only outside school. A mediation analysis using a bias-corrected bootstrapping method revealed that the effect of internal motivation on sharing intention within school was mediated through self-efficacy and attitudes whereas the effect of external motivation on sharing intention outside school was only mediated by attitudes. These findings contribute to a better understanding of how to support teachers' sharing behavior in different contexts.

Credit author statement

Jingxian Wang: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization, Funding acquisition, Project administration. Dineke E.H. Tigelaar: Conceptualization, Methodology, Formal analysis, Writing - review & editing, Supervision, Project administration. Wilfried Admiraal: Conceptualization, Methodology, Formal analysis, Writing - review & editing, Supervision, Project administration.

1. Introduction

Knowledge sharing has received significant attention in areas all over the world as it is considered a key activity to improve organizational capabilities, including team performance (Singh, 2019; Zhu, Chiu, & Holguin-Veras, 2018), innovation (Jiang & Chen,

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2018; Yang, Nguyen, & Le, 2018), and creativity (X. H. Guan, Xie, & Huan, 2018). Beyond its importance to managers, employees, technology experts and users, knowledge sharing is emerging as a professional learning activity in the online world where teachers not only professionalize themselves but also promote the professional development of colleagues (Oddone, Hughes, & Lupton, 2019; Runhaar & Sanders, 2016). Sharing of teaching-related knowledge will allow teachers across geographical regions to take different perspectives and to solve various problems they face, which in turn contributes to support teachers' learning and functioning (Hood, 2018; Liou & Canrinus, 2020).

With the development of the Internet, a remarkable trend has been the broad distribution of digital resources that have the potential to supersede textbooks and a direct effect on teacher behavior (e.g., Artuso & Graf, 2020; Baron & Zablot, 2015). Massive Open Online Course (MOOC) viewed as both an object and a service is a good example of a higher educational book (Bruillard, 2017). However, the realized didactic potential of digital resources involves bringing more perspectives into play related to a specific digital resource and adapting it to its particular community and school climate (Hansen & Gissel, 2017), in particular the development of didactic materials that meet the needs of rural education and comply with the curriculum content (de Souza & Dias Garcia, 2019). Moreover, since the use of digital resources can merely increase the resources without changing fundamental practices when teachers continue teaching based on direct instruction (Santana Bonilla & Rodríguez Rodríguez, 2019), exchanging teaching-related knowledge and making digital resources available to all students are the strategies to better handle the growing diversity of students, thus providing potentially new methodologies of teaching and learning. In the process of digital transformation, digital educational resources (often referred to as 'DERs') such as teaching materials, software, and tools that are used in pedagogical practices are important sources of teaching-related knowledge that primary and secondary teachers share with others on a daily basis.

However, as has often been documented in the literature, a number of potential obstacles, such as unwillingness to share, lack of time and background knowledge, or the risk of losing their own advantages, may make people hesitant to engage in knowledge sharing (see e.g., Ahmed, Ahmad, Ahmad, & Zakaria, 2019; Xue, Hu, Chi, & Zhang, 2019). In the educational field, teachers seem to be more refrained than enterprise employees to share, when it comes to sharing outside school (Hou, Chang, & Sung, 2010; van Acker, Vermeulen, Kreijns, Lutgerink, & van Buuren, 2014), when they are not confident that the resources are of good value or adequately distinctive (Baas, Admiraal, & van den Berg, 2019). Furthermore, especially situations where primary and secondary school teachers do not fully embrace emerging technologies and cannot contribute and share adequately may impede teacher interactions and communications in community networks (Yang, Song, Zhao, & Yu, 2018) Teachers in rural and remote areas in Oman, for example, often have a relatively lower degree of technology acceptance and face more challenges than teachers in urban areas (Al-Huneini, Walker, & Badger, 2020), and their conventional thoughts and opinions may also discourage knowledge sharing (Charband & Navimipour, 2016). Teachers' active involvement in sharing is crucial, given that knowledge sharers benefit far more than knowledge receivers (Zhu et al., 2018) and gaps exist in teachers' various needs and available resources (Xie, Di Tosto, Chen, & Vongkulluksn, 2018). Therefore, it is important for researchers and policymakers to consider why teachers (especially those in rural settings) share or not share DERs, and thus to establish potential ways to enable teachers to share.

Previous research found that individual and environmental variables such as intrinsic and extrinsic motivation, self-efficacy, attitude, intention, organizational climate, and support were significant predictors of knowledge sharing (Al-Kurdi, El-Haddadeh, & Eldabi, 2018; Guan, Wang, Jin, & Song, 2018; Safa & Von Solms, 2016; Sedighi, Lukosch, Brazier, Hamedi, & van Beers, 2018; T. Guan, Wang, Jin, & Song, 2018; Wang & Hou, 2015). Current knowledge-sharing research within the educational field, however, focuses on higher academic institutions (see e.g., Akosile & Olatokun, 2020; Xue et al., 2019), while lacking empirical research into knowledge sharing in the primary and secondary sectors, particularly in the rural areas. In this regard, school teachers' knowledge sharing is mainly motivated by teachers' professional needs, such as expectations to achieve better education for students, leading to learning being primarily individually rather than socially oriented (Hood, 2017). Based on other knowledge-sharing research, effects of various motivation types influencing knowledge sharing can be argued to be inconsistent and inconclusive, depending on the research contexts (Wang & Hou, 2015). Since understanding school teachers' motivation is essential to knowledge sharing, this study focuses on the process of knowledge sharing, from motivation to behavior.

Furthermore, it is important to note that individual teachers' sharing behavior is better understood when the particular context is considered (Schuwer & Janssen, 2018), as beliefs, values, and culture vary across countries and regions. In this study, sharing DERs in two types of contexts seems relevant: sharing with colleagues at their school (within school sharing) and sharing with others through the Internet (outside school sharing). Sharing DERs within and outside school may differ substantially, because teachers may encounter specific educational challenges in the two different contexts of knowledge sharing. A previous review (Wang & Noe, 2010) revealed important differences in knowledge sharing between a face-to-face and electronic context. Moreover, van Acker et al. (2014) found that teachers shared a variety of learning materials more often interpersonally than through websites. Although knowledge sharing among teachers in different situations has become a growing research trend, we cannot assume that every teacher shares DERs within and outside school in a similar way.

As outlined above, DERs sharing as a way of promoting teacher professional learning opportunities and development yields great potential as well as significant challenges. The aim of this research is, therefore, to develop a deeper understanding of the motivation-behavior relationship, especially for rural teachers with little experience in sharing DERs. This study pays close attention to factors that influence sharing and distinguishes rural teachers' within school sharing from their outside school sharing. The findings will help advance the identification of teachers' motives and obstacles in the early stages of knowledge sharing in different contexts.

2. Factors related to teachers' sharing behavior

To gain insight into variables explaining teachers' sharing behavior, the Integrative Model of Behavior Prediction (IMBP; Fishbein

& Ajzen, 2011) has been used in various studies. This model extends the Theory of Planned Behavior (TPB; Ajzen, 1991), by including the construct of self-efficacy (Bandura, 1986) rather than perceived behavior control. In IMBP, three dispositional variables, i.e. attitude, subjective norm, and self-efficacy, predict intention. Furthermore, IMBP has been extended by hypothesizing that except for intention, actual knowledge and skills, current environmental affordances and constraints also influence behavior.

According to IMBP, attitude pertains to the positive or negative stance of an individual towards behavior, which is shaped by assuming that behavioral success contributes to a particular outcome. Subjective norm is characterized as perceived societal expectations from important people for adopting a certain behavior. Self-efficacy is described as the perception of an individual's capability to execute the behavior. Behavioral intention reflects an individual's subjective will to engage in a certain behavior. Environmental affordances and constraints are concerned with external environmental controls. The behavior may occur if the conditions facilitate it. Knowledge and skills show the abilities required to execute a particular action.

Kreijns and colleagues (Kreijns, Vermeulen, Kirschner, van Buuren, & van Acker, 2013) proposed to adopt the IMBP to explain ICT integration in educational practices, with a special emphasis on teaching-related knowledge. In the domain of teachers' ICT using behavior, the IMBP has been applied to various educational research settings, such as primary and secondary education (Kreijns, van Acker, Vermeulen, & van Buuren, 2013), teacher education (Admiraal, Lockhorst, Smit, & Weijers, 2013) and rural education (Wang, Tigelaar, & Admiraal, 2019). Although these studies have shown the relevance of the IMBP model, Kreijns, Vermeulen, van Acker, and van Buuren (2014) have argued that adding the concept of motivation potentially provides a more precise picture of teachers' volitional behavior. In the following, we elaborate on motivation as a variable in teachers' sharing behavior.

2.1. Motivation

In the available literature, different conceptualizations of motivation have been used. Following the Self-Determination Theory (SDT; Deci & Ryan, 1985), individuals may be both externally (i.e., controlled motivation) and internally (i.e., autonomous motivation) motivated to perform a specific behavior (Cockrell & Stone, 2010). Based on the controlled-to-autonomous continuum, two essential categories associated with motivation are further developed: intrinsic and extrinsic motivation (Deci & Ryan, 1985). The motivation that leads to intrinsically interesting and pleasant behavior is intrinsic motivation. Extrinsic motivation refers to four different types of regulations, involving regulation driven by external expectations (i.e., external regulation), feelings of shame or guiltiness (i.e., introjected regulation), personal importance (i.e., identified regulation), or fully volitional (i.e., integrated regulation).

In cases where teachers refrain from sharing their knowledge, experiences, and ideas, motivation may play a vital role and positive correlations among motivation and knowledge sharing have been reported in empirical studies. Research has reported that intrinsic benefits are more important than extrinsic benefits for exchanging knowledge within organizations (e.g., Akosile & Olatokun, 2020; Sedighi et al., 2018). Moreover, Lai and Chen (2014) compared differences in online knowledge-sharing behavior between community members, by reporting that posters who posted messages in the forum were largely influenced by intrinsic motivation, and instead lurkers who only visited the forum were mainly affected by extrinsic motivation. Yet a recent study found that autonomous motivation was related to teachers' learning performance and engagement positively (Jansen in de Wal, van den Beemt, Martens, & den Brok, 2020). Park and Gabbard (2018) in a study on scientists' intention to share implicit and explicit knowledge in an online environment, however, did not find a significant impact of intrinsic motivation. Opposed to commonly accepted practices associated with initiatives of sharing knowledge, expectations for rewards have been found more likely to hinder the development of employees' favorable attitudes toward knowledge sharing (Bock, Zmud, Kim, & Lee, 2005). In addition, intrinsic motivation and identified regulation were positively correlated with self-efficacy, while other types of motivation were negatively correlated with self-efficacy (Fernet, Senécal, Guay, Marsh, & Dowson, 2008). These differences in findings suggest that motivators for knowledge sharing may depend heavily on practical circumstances and how these are perceived.

2.2. Self-efficacy toward sharing

According to IMBP, two critical and frequently researched constructs are self-efficacy and knowledge and skills, both determining teachers' sharing behavior. The former is associated with teachers' perceived capabilities, and the latter is defined as the essential acquired teacher professional knowledge for knowledge sharing. High correlations between knowledge and skills, and self-efficacy have been found in earlier research (e.g., Instefjord & Munthe, 2017; Teo & van Schaik, 2012), involving difficulties in examining perceived capabilities (self-efficacy) and actual capabilities (knowledge and skills) at the same time. Recently, more attention has been given to teacher self-efficacy which is a multifaceted affective construct that enhances job performance of primary and secondary teachers. For instance, in about one-third of countries of the Teaching and Learning International Survey (TALIS) 2018, teachers working in challenging schools employed part-time and short-term contracts were the most likely to have lower levels of self-efficacy (OECD, 2020). In this study, we focus on self-efficacy, which reflects teachers' capability to address possible obstacles in their knowledge sharing.

Self-efficacy, i.e., perceived capabilities to share knowledge, has often been found to be critical for understanding teachers' intention to share knowledge (Tseng & Kuo, 2014). Rural teachers who are less educated and trained are relatively in a less advantageous status compared with urban teachers. Gao and Sun (2019) used Social network analysis to study Teaching Design knowledge needs of Chinese rural teachers in the WeChat community, and proposed providing them training and guidance on the application of DERs. This finding implies that rural teachers experience comparatively lower self-efficacy toward sharing. However, teachers with high levels of self-efficacy were found to be able to better cope with the negative consequences, such as being taken advantage of or being criticized, as a result of playing a significant role in knowledge sharing (Runhaar & Sanders, 2016). Furthermore, in research on

virtual learning communities (Chen, Chen, & Kinshuk, 2009), positive relationships between college students' web-specific self--efficacy (e.g., the capability of using the website functions, and exploiting or exploring existing knowledge resource), intention to share, and knowledge sharing behavior, have been found. In other studies related to teachers' sharing behavior or innovative behavior, similar findings were reported (Klaeijsen, Vermeulen, & Martens, 2018; van Acker et al., 2014). In short, the available studies suggest that self-efficacy exerts a strong influence on knowledge-sharing behavior.

2.3. Attitude toward sharing

In the IMBP model, attitudes toward knowledge-sharing behavior are described as determining sharing intention. This means, for example, that teachers tend to shy away from contributing to knowledge if they think making such contributions is worthless and unimportant. Karahanna, Straub, and Chervany (1999) indicated that people with innovative characteristics, e.g. early adopters, seldom see new technologies as complex or incompatible with what they do. Rural teachers tend to have a lower level of technology acceptance than urban teachers and may have a very negative attitude to emerging DERs and related sharing behavior. In a study conducted in Taiwan, Chen (2011) found teachers' attitudes toward knowledge sharing to be an important predictor of knowledge-sharing intention. In addition, positive attitudes are seen as significant factors in enhancing teachers' knowledge-sharing behavior. For instance, Zhang and Liu (2019) found that the more valuable online-sharing behavior was perceived by teachers, the more efforts they made towards online learning. However, it is noteworthy that negative attitudes of pursuers have been found to discourage participation in online knowledge sharing (Hew & Hara, 2007).

2.4. Subjective norm toward sharing

Subjective norm shapes individuals' intention to conduct a behavior. This means that teachers who feel more pressure from important people will be inclined to have a stronger sharing intention (Ryu, Ho, & Han, 2003). In recent research it has been found that subjective norm predicted college students' intention to share knowledge (Arpaci & Baloğlu, 2016). However in a study conducted by Jolaee, Nor, Khani, and Yusoff (2014) subjective norm toward knowledge-sharing behavior did not influence intention among academic staff in universities. Several studies have considered subjective norm as a direct antecedent of sharing behavior. For example, a study regarding knowledge sharing in online Q&A communities found reciprocity norm to be a vital factor in predicting users' knowledge contribution (T. Guan, et al., 2018). However, in many other studies, low contributions of subjective norm with regards to predicting general behavior have been reported (Hagger, Chatzisarantis, & Harris, 2006; Kreijns et al., 2014).

2.5. Sharing intention, environmental affordances and constraints

Behavioral intention is considered to be one of the most critical components in research within the domain of sharing behavior. Among rural teachers, teachers with degrees above the undergraduate level were more willing to engage in online knowledge sharing (Gao & Sun, 2019). Based on the percentage of advanced-degree teachers, teacher quality in China is less favorable among rural schools (Yang, Zhu, & Macleod, 2018), meaning that urban teachers outperform their counterparts in rural schools in terms of sharing intentions. In a study on determinants of sharing knowledge, Chen (2011) found that high school teachers' knowledge-sharing intention affected their actual behavior of sharing their own knowledge. Likewise, the results of Bock and Kim's (2002) study showed that knowledge-sharing behavior was directly explained by an individual's intention, but only 1.4% of the knowledge-sharing behavior was explained. Although the potential impact of behavioral intention on teachers' contributions to knowledge sharing has been identified in the available research, evidence from other studies seem to contradict the impact of behavioral intention. For example, Kuo and Young's (2008) in longitudinal study testing four competing models for studying knowledge-sharing behavior, found that an intention–behavior gap was existing in knowledge-sharing practices and therefore these authors suggested moving beyond the construct of intention when studying sharing behavior. Recently, based on a meta-analytic study involving teachers, it has been argued that the usually unchallenged assumption of a strong significant link between intention and behavior must be reexamined by adding contextual variables as well (cf. Scherer, Siddiq, & Tondeur, 2020). This line of thinking challenges postulations with regards to the intention-behavior link and thus calls for including alternative proxies of teachers' sharing behavior, taking into account that motivated behavior may be for a large part explained by the interaction between individual and environment or situation.

In the IMBP model, environmental affordances and constraints also are considered as factors that influence behavior. With regards to sharing behavior within and outside school two environmental variables might be relevant. The first important environmental variable is sharing climate in schools. According to Bock et al. (2005), climate refers to a specific contextual situation associated with individuals' perceptions. Research has consistently shown that positive relations between organizational climate and effective knowledge sharing exist in organizational climates where embracing new ideas and learning from failure are emphasized (Al-Kurdi, El-Haddadeh, & Eldabi, 2020; Taylor & Wright, 2004). Similarly, it was found that in a professional community where teachers were respectful and responsible with regards to their online behavior, teachers were encouraged to share high-quality resources (Trust, 2017). A similar concept to climate is culture which refers to evolved context and is often delved into qualitative studies (Bock et al., 2005). Teachers in rural schools in many countries faced a significantly much lower collaborative culture than their colleagues in cities (OECD, 2020). Because research has shown that organizational culture alone cannot promote sharing (Hislop, 2009), informal activities or environments may be important to fostering a knowledge-sharing climate (Hou et al., 2010), and such events and atmospheres could be realized by administrators through organizing open discussions, seminars, or workshops (Lee, Shiue, & Chen, 2016).

Another important environmental variable is work pressure. Work pressure is characterized as aspects of a job such as workload

and the work pace that are perceived as quantitatively challenging (Jansen in de Wal et al., 2020). TALIS 2018 also reports on the difference in work pressure perceived by teachers who work in different geographical areas and it was found that rural school teachers were less likely to feel stressed than their colleagues in urban schools (OECD, 2020). Many studies have identified that work pressure is an important determinant of teachers' sharing behavior, either by promoting teachers to share teaching materials with colleagues (Kwakman, 2003) or by preventing them from engaging in online knowledge-sharing communities of practice (Hew & Hara, 2007). This raises the question whether work pressure can be regarded as a threat or a challenge for teachers regarding sharing DERs (see e.g., Crawford, LePine, & Rich, 2010; Evers, van der Heijden, Kreijns, & Vermeulen, 2016).

2.6. This study

The current study aims to increase knowledge of factors influencing DER-sharing behavior among rural school teachers. Based on the literature with regards to sharing behavior of teachers, and drawing on the IMBP model, we have developed the research model that guided our study (see Fig. 1). Within the context of this research, the list of determinants is extended with motivation, since the literature indicates that teachers' sharing behavior cannot be fully understood without taking individuals' underlying motivation into consideration (Leonard, Beauvais, & Scholl, 1999). In addition, inspired by the distinction between interpersonal knowledge sharing and internet-based sharing through a database made in the study of van Acker et al. (2014), we derive the relative effects of the determining factors for knowledge sharing in two different contexts: sharing with colleagues within their school and sharing with others outside their school. As mentioned earlier in section 2.2, because of the high correlations between knowledge and skills and self-efficacy, we left out knowledge and skills and only included self-efficacy.

Given that motivation and sharing behavior are the main constructs, we have formulated the following main research question: How is motivation related to DERs-sharing behavior within and outside school?

To answer the main research question, in a stepwise approach the following sub-questions were answered.

RQ1 (a–e). Is motivation related to each of the dispositional variables (a) self-efficacy, (b) attitudes, and (c) subjective norm, (d) sharing intention within school, and (e) sharing behavior within school?

RQ2 (a–e). Is motivation related to each of the dispositional variables (a) self-efficacy, (b) attitudes, and (c) subjective norm, (d) sharing intention, and (e) sharing behavior outside school?

Moreover, since the link between intention and behavior remains questionable, the relationships between sharing intention and sharing behavior was examined, together with environmental variables.

RQ3 (a–c). Is (a) sharing intention, (b) sharing climate, and (c) work pressure related to sharing behavior within school?

RQ4 (a–c). Is (a) sharing intention, (b) sharing climate, and (c) work pressure related to sharing behavior outside school?

According to IMBP, distal variables (e.g., motivation) are those variables whose influences on behavioral intention are mediated by the dispositional variables. Therefore, the following research questions were raised:

RQ5. Is there an indirect effect of the motivation on the sharing intention within school through the dispositional variables?

RQ6. Is there an indirect effect of the motivation on the sharing intention outside school through the dispositional variables?

3. Methods

3.1. Research context

The urban-rural divide in educational access and quality has received much attention in China and is linked to a general disparity between rural and urban socio-economic development led by urbanization and industrialization (Schulte, 2015). The educational gap

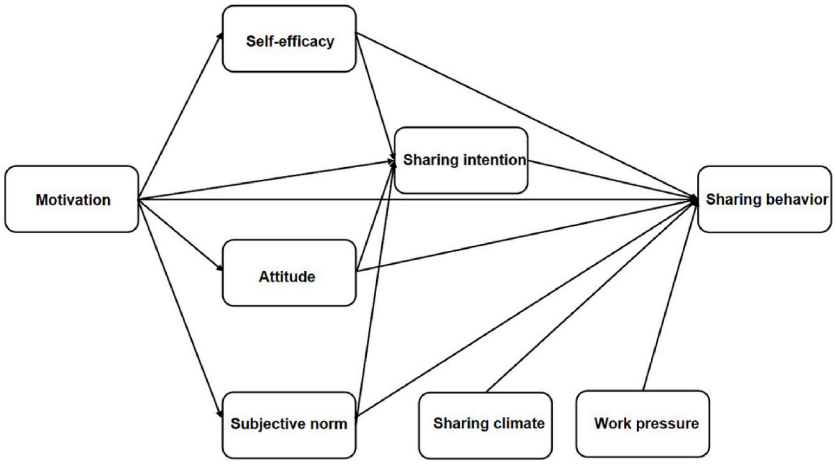

Fig. 1. The proposed research model.

continues to expand with large differences in regional growth. For example, counties with a "very high" value of rurality index are mainly located in the southwest of China with poor rural, small-town, mountainous, and minority areas (Li, Long, & Liu, 2015). Owing to the failure of rural areas to attract teachers and inadequate local government finances, many rural schools employed substitute or temporary teachers who were typically less educated and paid far less than teachers with permanent contracts. Nonetheless, this poses a significant structural issue in rural schools where there is a mismatch between teacher qualifications and specialist subjects (Peng et al., 2014).

Under these conditions, the national government is making further efforts to optimize the distribution of educational resources. The "Internet Plus" strategy to create ties between rural schools and the wider education system is seen as an effective approach to promoting educational equity and quality for rural compulsory education, in particular to improving the degree of access and integration of digital resources (Qiao, 2018). Teachers in China have been actively encouraged in the last five years to create DERs and share these with others, as a strategy to equip all teachers with the knowledge and skills in the unique contexts of their practice. Ultimately, this would promote a more balanced development of education across regions, particularly between urban and rural areas. However, acquaintance society is still a typical characteristic of Chinese rural societies where everyone is accustomed with others and people do not easily accept new things (Fei, 1992).

For this study, schools located in either a village or remote town were identified as rural schools. Since school leaders (i.e., principals and directors) with teaching obligations are particularly common in rural areas, both school leaders and teachers from rural schools in southwest China were purposefully selected. Within this selection, all types of rural schools were identified, i.e., teaching sites and primary schools in villages, and primary schools, secondary schools, and nine-year schools in towns.

3.2. Participants and procedures

The participants were teachers in primary and secondary schools in rural areas in southwest China. First, we develop a new questionnaire by merging existing instruments covering all factors because no such questionnaire existed in previous studies. Some instruments also tested in the Chinese context proved to be effective. Second, a draft questionnaire was pilot tested with eight rural teachers in China to collect feedback on the instruments. The questionnaire has been improved based on their input. Finally, the study adopted a convenient sampling method to collect data with an online survey. Specifically, we recruited participants through sending a hyperlink or QR code via WeChat to teacher educators, rural school leaders, and teachers from the network of the first author and participation was voluntary. We rejected questionnaire data from the same IP address to prevent the same respondents from submitting the questionnaire repeatedly. To allow participants to respond openly and honestly, the online survey using an anonymous link from Qualtrics was sent directly to teachers and school leaders and indirectly through teacher educators to ensure that more participants involved. Completing the questionnaire took about 10–15 min. With the completion of the questionnaire, teachers gave their consent. The data collection period lasted from October 8th to October 30th, 2019. Of the 1047 teachers approached, 709 (67.7%) returned a completed questionnaire, exceeding the suggested sample size of 150 cases (Kline, 2005) or 10 cases per variable (Nunnally, 1978) for the particular analyses (see section 3.3). This sample is close to the main characteristics (age, gender, and degree) of the distribution of the rural teacher population in China (Wu & Qin, 2019). The above demographic data of participants are shown in Table 1 and additional information is presented in Table A.1 in Appendix A.

3.3. Measures

Except for the demographic information of respondents, the questionnaire included all the constructs in the proposed model. All measures came from existing instruments (elaborated on below) with good validity and reliability based on earlier studies. In order to fit the current research contexts, we made minor modifications to the items in these instruments. To prevent semantic biases, a Chinese researcher translated the original English instruments into Chinese, then an English and Chinese language teacher did back translations. In Appendix B, we have included all items for each variable that were kept in the final analyses.

Table 1
Demographic statistics of participants (N = 709).

Measures	Items	Frequency	Percent
Gender	Female	478	67.4
	Male	231	32.6
Age	<26	79	11.1
	26–30	123	17.3
	31–35	132	18.6
	36–40	102	14.4
	41–45	125	17.6
	46–50	73	10.3
	51–55	67	9.4
	>55	8	1.1
Degree	Secondary Vocational School Education	18	2.5
	Three -year college Education	121	17.1
	Bachelor	555	78.3
	Master	15	2.1

3.3.1. Motivation

Motivation for sharing was evaluated with the scale of The Academic Self-Regulation Scale (Vansteenkiste, Soenens, Sierens, Luyckx, & Lens, 2009). The scale includes four regulations, each of which has four items. The subscale of Intrinsic Motivation offers explanations for pleasure and interest in sharing. The subscale of the Identified Regulation provides reasoning for the personal value of sharing behavior. The Introjected Regulation subscale presents reasons for sharing DERs comes with feelings of guilt, shame, anxiety, or pride. The External Regulation subscale assesses reasons for sharing DERs to meet external expectations. The 16 items were included with a 5-point scale scoring from 1 (absolutely inapplicable) to 5 (absolutely applicable).

3.3.2. Self-efficacy, attitude, and subjective norm

The teachers' self-efficacy toward sharing DERs was assessed applying an adaptation of the Technology and Teaching scale (Admiraal et al., 2017). This scale assesses teachers' beliefs in their abilities to share DERs. This scale included 5 items which participants rated on a 5-point scale, ranging from 1 (absolutely inapplicable) to 5 (absolutely applicable).

The teachers' attitude toward sharing DERs was adapted from the Attitude toward Knowledge Sharing scale (Ryu et al., 2003). Teachers indicated to what extent they felt a certain attitude if they share DERs. Using a 5-item bipolar scale (unpleasant-pleasant, bad-good, worthless-valuable, harmful-beneficial, and unenjoyable-enjoyable), respondents rated several aspects of sharing DERs on a 5-point rating scale ranging from 1 to 5.

The teachers' subjective norm toward sharing DERs was measured using the scale of Subjective Norm toward Knowledge Sharing (Ryu et al., 2003) including 5 items. This scale assesses teachers' beliefs that most colleagues may think that they should share DERs (e.g., "Most colleagues who are important to me think that I should share digital educational resources"). Participants scored on a 5-point rating scale which ranges from 1 (absolutely inapplicable) to 5 (absolutely applicable).

3.3.3. Sharing intention within and outside school

Teachers' intention to share DERs was measured by adapting the Intention scale (van Acker et al., 2014). This 6-item instrument assesses teachers' intention to share DERs within schools and outside schools. The six items were measured on a 5-point scale, ranging from 1 (extremely unlikely) to 5 (extremely likely).

3.3.4. Sharing climate and work pressure

In order to assess sharing climate, Knowledge Sharing (Schenke et al., 2015) including 4 items was applied. This scale assesses sharing climate in schools. Teachers gave responses on a 5-point scale ranging from 1 (absolutely inapplicable) to 5 (absolutely applicable).

Teachers' work pressure was measured by means of subscales from the Dutch Questionnaire Social Psychological Work Demands (van Veldhoven & Meijman, 1994). This instrument presents 7 items measuring the frequency of experiencing the workload and work pace. All items were scored on a 5-point scale ranging from 0 (never) to 5 (always).

3.3.5. Sharing behavior within and outside school

Teachers' sharing behavior scale was developed by two subscales related to sharing within school (8 items) and outside school (8 items). The instrument assesses the frequency that teachers share DERs over the last year in the form of electronic lesson plans, presentations, classroom videos, exercises, tests, digital text, micro lecture/micro video, and subject software and tools. The sixteen items were scored on a 5-point scale, ranging from 1 (never) to 5 (always).

3.4. Data analyses

Four steps were taken for data analysis. Firstly, two exploratory factor analyses (EFA) using IBM SPSS 25 were used to examine the underlying structure of motivation (including four regulations) and dispositional variables (i.e., attitude, subjective norm and self-efficacy). Second, confirmatory factor analyses (CFA) using Mplus 8.3 (Muthén & Muthén, 1998–2017) was applied to test data for measurement models. Based on these data, we obtained the internal consistency using Cronbach's alpha, two reliability indices of the coefficient of Composite Reliability (CR), and the Average Variance Extracted (AVE) (Fornell & Larcker, 1981), and the discriminant validity using the Pearson correlations between variables. Third, to answer RQ1-RQ4, we employed a structural equation modeling (SEM) with maximum likelihood (ML) estimation. We chose SEM as the main analyses because it is the most suitable approach to test the strength of relationships among latent constructs (Kline, 2005). Finally, to answer RQ5-RQ6, we performed the mediated relations using a bias-corrected bootstrapping of 5000 samples (Preacher & Hayes, 2008).

In the two-step approach to build a SEM model, the following fit indices were used: chi-square (χ^2), chi-square divided by degrees of freedom (X^2/df), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Value of chi-square divided by degrees of freedom is smaller than 5 is considered an acceptable fit (Carmines & McIver, 1981). For both comparative fit index (CFI) and Tucker-Lewis index (TLI), values greater than 0.90 show good fit for the structural model (Kline, 2005). Values less than 0.08 for RMSEA and SRMR exhibit an acceptable fit (Hu & Bentler, 1999).

4. Results

4.1. Preliminary analyses

Prior to conducting the EFA, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity was employed to check the suitability of the analysis. Hutcheson and Sofroniou (1999) suggest that KMO values should be above 0.5. The KMO values for the data sets of motivation and dispositional variables were 0.853 and 0.935 respectively, yielding that the sampling was sufficient. The X^2 value of Bartlett's sphericity test for the data set of motivation was 4699.02 ($p < 0.001$, df = 120) and for the data set of dispositional variables was 6844.82 ($p < 0.001$, df = 120). Both results confirmed the appropriateness of the EFA.

We used principal components analysis (PCA) with Oblimin rotation and looked for eigenvalues greater than 1.0, and items with factor loading values below 0.4 on their own scales or above 0.4 on each of the other scales were removed. 16 motivation items were entered into an EFA, yielding three indicators of motivation: 1) external regulation, 2) introjected regulation, and 3) identified regulation and intrinsic motivation. These factors explained 60.82% of the total variance. In addition, all items from subjective norm were dropped after the PCA on all items from dispositional variables. Thus, subjective norm was removed from the research model and two retained factors of attitude and self-efficacy were extracted explained 65.33% of the total variance.

4.2. Measurement model

To simplify the model, we used three sub-constructs as indicators of motivation. However, the CFA did not support a model with three first-order factors linked to a single second-order factor representing overall teachers' motivation, as a negative residual variance was found for the indicator introjected regulation. Moreover, it is difficult to explain the meaning of the higher-order factor (motivation). Therefore, we decided to delete introjected regulation from the model and only include two first-order factors in which external regulation was regarded as external motivation, and intrinsic motivation and identified regulation were seen as internal motivation. The aforementioned relationships were adjusted, resulting in the final model presented in Fig. 2. The final items and supporting citations appear in Appendix B.

For the within school model, the CFA included 8 latent variables and 26 indicators. For the outside school model, the CFA included 8 latent variables and 28 indicators. Table A.2 in Appendix A presents the remaining constructs and items, and the analysis results show acceptable convergent validity and internal reliability of the measurement model. The standardized factor loadings of all the items in the measurement range from 0.645 to 0.919, and all are significant at the $p < 0.001$ level. The composite reliability (CR) values are larger than 0.7, confirming all constructs have good reliability. The average variance extracted (AVE) values for all constructs are above 0.5, supporting the convergent validity (Hair, Ringle, & Sarstedt, 2011). In addition, all the Cronbach's values are larger than 0.7, indicating all constructs have appropriate internal consistency (Nunnally, 1978).

Table 2 lists means, standard deviations, and discriminant validity of constructs. The findings showed that the square roots of the AVEs exceeded the correlations between any two constructs, proving discriminant validity.

4.3. Sharing behavior within and outside school

To answer RQ1-RQ4, we performed a SEM to examine the relationships between constructs (Fig. 2). For the within school model, the indices showed that the model matches the data well, $X^2 = 1009.447$, df = 278, $X^2/df = 3.631$, CFI = 0.921, TLI = 0.908, RMSEA = 0.061, SRMR = 0.070. In addition, the indices for the outside school model also indicated that the model fits well with the data, $X^2 = 1067.695$, df = 329, $X^2/df = 3.245$, CFI = 0.934, TLI = 0.924, RMSEA = 0.056, SRMR = 0.064. Table A.3 in Appendix A presents the

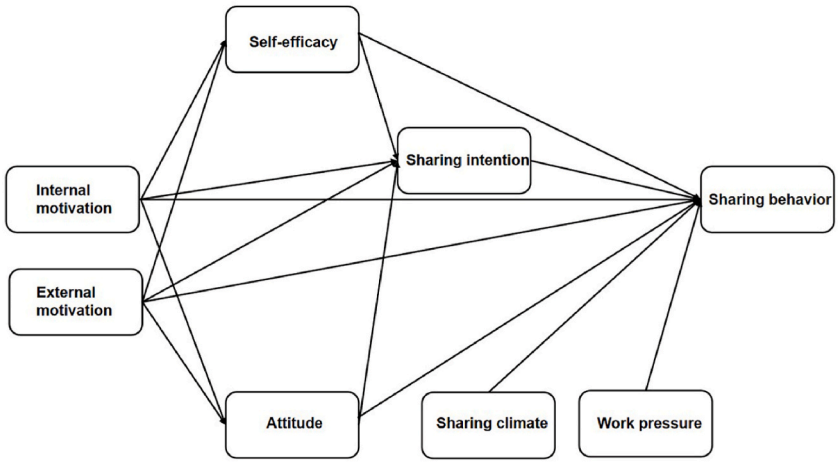

Fig. 2. The revised research model.

Table 2
Descriptive statistics and discriminant validity.

Constructs	Mean	SD	AVE	INT	EXT	SE	ATT	SC	WP	SI	SB
Within school											
INT	3.689	0.783	0.541	**0.736**							
EXT	2.773	1.003	0.559	0.087	**0.748**						
SE	3.450	0.942	0.677	0.425	0.116	**0.823**					
ATT	3.967	0.683	0.678	0.625	−0.078	0.590	**0.823**				
SC	3.755	0.811	0.645	0.506	−0.036	0.650	0.767	**0.803**			
WP	3.992	0.662	0.561	0.082	0.187	0.053	0.178	0.086	**0.749**		
SIIS	3.818	0.765	0.661	0.476	0.007	0.680	0.681	0.677	0.141	**0.813**	
SBIS	2.696	0.882	0.577	0.395	−0.025	0.520	0.396	0.459	0.062	0.443	**0.760**
Outside school											
INT	3.689	0.783	0.541	**0.736**							
EXT	2.773	1.003	0.559	0.087	**0.748**						
SE	3.450	0.942	0.677	0.424	0.116	**0.823**					
ATT	3.967	0.683	0.678	0.625	−0.079	0.588	**0.823**				
SC	3.755	0.811	0.645	0.507	−0.036	0.648	0.766	**0.803**			
WP	3.992	0.662	0.561	0.080	0.187	0.051	0.177	0.085	**0.749**		
SIOS	3.427	0.941	0.722	0.449	0.046	0.693	0.520	0.569	0.055	**0.850**	
SBOS	2.393	0.878	0.674	0.374	−0.014	0.447	0.329	0.415	0.039	0.416	**0.821**

Notes: Boldface numbers on the diagonal are the square root of the average variance extracted. INT = internal motivation, EXT = external motivation, SE = self-efficacy, ATT = attitude, SC = sharing climate, WP = work pressure, SIIS = sharing intention within school, SIOS = sharing intention outside school, SBIS = sharing behavior within school, SBOS = sharing behavior outside school. SI = sharing intention, SB = sharing behavior.

results of path analysis, and Fig. 3 and Fig. 4 show the direct effects between constructs for both within and outside school respectively.

4.3.1. Sharing behavior within school

Regarding RQ1 of the within school model, internal motivation positively predicted self-efficacy (β = 0.587, p < 0.001), attitudes (β = 0.790, p < 0.001) and sharing behavior within school (β = 0.274, p = 0.003), but had a non-significant effect on sharing intention within school (β = 0.078, p = 0.282). In addition, external motivation only negatively predicted attitudes (β = −0.172, p < 0.001) and sharing behavior within school (β = −0.104, p < 0 0.001), but had a non-significant effect on self-efficacy (β = 0.029, p = 0.494) and sharing intention within school (β = −0.022, p = 0.548). Regarding RQ3 of the within school model, sharing intention (β = 0.073, p = 0.300), sharing climate (β = 0.122, p = 0.070), and work pressure (β = 0.028, p = 0.495) did not significantly predict sharing behavior. The proportions of explained variance for the within school model were 34.9% for self-efficacy, 62.5% for attitude, 57.4% for sharing intention, and 33.1% for sharing behavior.

4.3.2. Sharing behavior outside school

Regarding RQ2 of the outside school model, internal motivation positively predicted self-efficacy (β = 0.583, $p < 0.001$), attitudes (β = 0.787, $p < 0.001$), and sharing intention outside school (β = 0.216, $p = 0.003$) and sharing behavior outside school (β = 0.318, $p <$ 0.001). Furthermore, external motivation negatively predicted both attitudes (β = −0.172, $p < 0.001$) and sharing behavior outside school (β = −0.092, $p = 0.036$), but had a non-significant effect on self-efficacy (β = 0.030, $p = 0.473$) and sharing intention outside school (β = −0.038, $p = 0.311$). Regarding RQ4 of the outside school model, sharing intention (β = 0.118, $p = 0.043$) and sharing

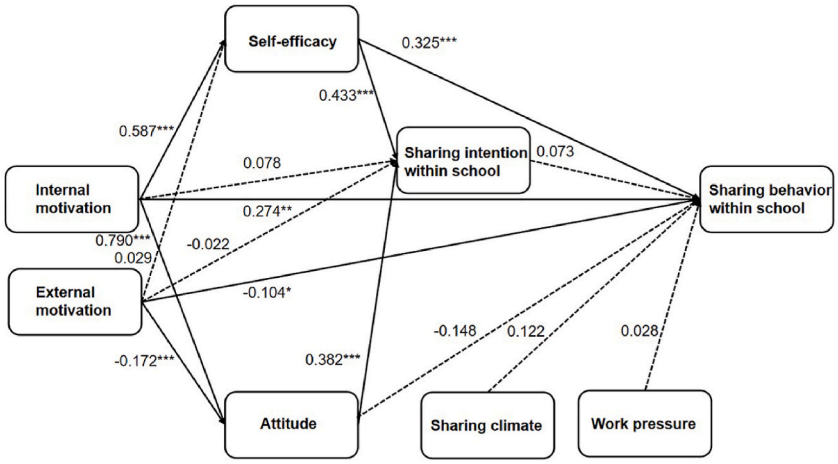

Fig. 3. Results of the structural model within school. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

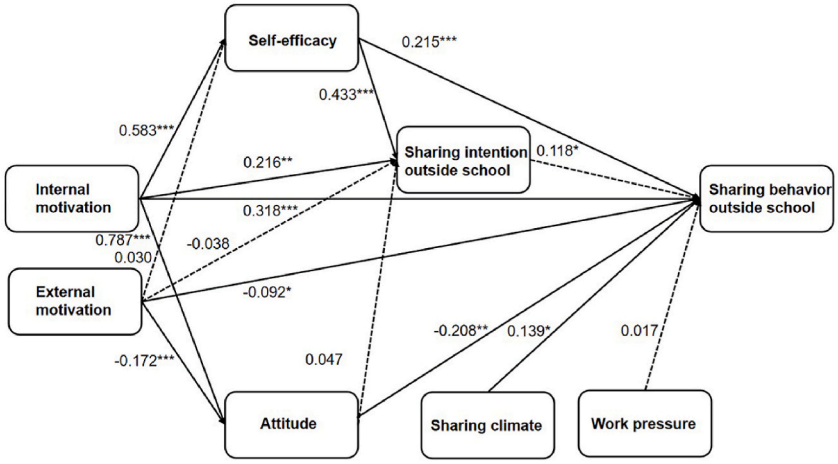

Fig. 4. Results of the structural model outside school. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

climate ($\beta = 0.139$, $p < 0.025$) positively predicted sharing behavior, but work pressure ($\beta = 0.017$, $p = 0.668$) did not. The proportions of explained variance for the outside school model were 34.5% for self-efficacy, 62.0% for attitudes, 51.6% for sharing intention, and 28.2% for sharing behavior.

4.4. Mediated relations

Lastly, the mediation analysis was applied to answer RQ5 and RQ6. Mplus 8.3 computed the indirect effects of mediated relations, with a 95% confidence interval using the bias-corrected bootstrap method. The results of the mediating effects within school model and outside school model are summarized in Table A.4 in Appendix A.

4.4.1. Mediated relations within school

Regarding RQ5 of the within school model, the results revealed that the indirect effect of internal motivation on sharing intention through two mediators of attitudes and self-efficacy was statistically significant ($B = 0.691$, 95%CI [0.470, 1.065]). Furthermore, the effect of external motivation on sharing intention within school was significantly mediated only by attitudes ($B = -0.060$, 95%CI [-0.131, −0.018]).

4.4.2. Mediated relations outside school

Regarding RQ6 of the outside school model, the mediating role of self-efficacy between internal motivation and sharing intention outside school ($B = 0.496$, 95%CI [0.350, 0.721]) was confirmed. However, the data did not support the mediation between internal motivation and sharing intention outside school via attitudes ($B = 0.057$, 95%CI [-0.362, 0.260]). Moreover, the indirect effect of external motivation on sharing intention outside school through self-efficacy ($B = 0.019$, 95%CI [-0.057, 0.088]) and attitudes ($B = -0.009$, 95%CI [-0.051, 0.047]) was not significant.

5. Discussion

Motivational factors were introduced into the integrative model of behavior prediction. The findings contribute to our knowledge of the factors for explaining sharing behavior in two contexts: DERs-sharing behavior within school and outside school. Different factors were found to be related to rural teachers' sharing behavior in the two contexts. Self-efficacy had a positive and relatively strong effect on sharing intention and sharing behavior in both contexts. Another important positive predictor of sharing intention within school was found to be attitude, but it was a negative predictor of sharing behavior outside school. One possible explanation may be that without trusting the receiving party, individuals are unlikely to share their hard-earned knowledge (Akosile & Olatokun, 2020; Norulkamar & Hatamleh, 2014).

Since this research's main purpose is to better understand the relationships between motivation and behavior in two contexts, we illustrate the main findings of the study below. First, among the motivational factors, in this study it was found that both internal motivation and external motivation significantly influenced attitudes, as well as sharing behavior within or outside school. However, internal motivation positively influenced whereas external motivation negatively influenced both attitude and sharing behavior. The outcome that internal motivation was significantly and positively related to sharing DERs is in line with the results of Jansen in de Wal et al. (2020). These authors showed that autonomous motivation including intrinsic motivation and identified regulation was significantly and strongly related to Dutch teachers' performance in professional learning activities. The finding that external motivation was negatively rather than positively related to sharing behavior coincides with previous research conducted in 27 companies across 16 industries showing that extrinsic rewards were negatively related to attitude towards knowledge sharing (Bock et al., 2005).

Similarly, recent research by Akosile and Olatokun (2020) concluded that external motivation (i.e., reward system) is only a weak incentive for long-term knowledge sharing among academics. Compared with Chinese urban areas, in rural areas with higher avoidance of uncertainty and power distance (Fei, 1992), regulations may contradict the fulfillment of teachers' psychological needs and social rewards might be viewed as empathy rather than autonomy. Therefore, these results suggest that, at least in the Chinese rural school context, favorable individual attitudes toward sharing behavior and actual behavior may be hindered by external expectations but promoted by internal motivation.

Second, intention and sharing climate were only found to be significantly associated with sharing behavior outside school, not with sharing behavior within school. Although intention is believed to be a good determinant of behavior, the result that sharing intention within school was not associated with sharing behavior within school is similar to findings from another study (Wang et al., 2019) conducted in western China. These authors showed that data from rural teachers' self-reported questionnaires did not support the hypothesized effect of intention on the use of DERs in teaching practices based on IMBP. This direct effect challenges the assumptions of the IMBP with regards to the intention-behavior relationship. More research is necessary to measure the relationship in this regard.

Sharing climate in this study was only found to have a positive relationship with sharing behavior outside school. This finding directly contradicts recent research regarding knowledge sharing among academics, which found that organizational climate was the strongest predictor for knowledge-sharing behavior in higher education (Al-Kurdi et al., 2020). In addition to the different research settings, another possible explanation for this finding may be that due to a rigid hierarchical structure educational system, the Chinese teacher community has a mistake-free culture, which may result in teachers refraining from sharing knowledge with their colleagues (Kuo & Young, 2008). Research also showed that positive organizational culture alone might not promote knowledge sharing (Hislop, 2009). However, the relative autonomy of the teacher regarding sharing outside school may promote teachers' involvement in open sharing DERs. These findings extend the current literature by exploring the effect of sharing climate on knowledge sharing. Although Bock et al. (2005) found that team climate directly affected knowledge sharing, they only used the intention to share knowledge as the dependent variable.

Moreover, and unexpected, the finding that work pressure did not significantly influence sharing behavior in both contexts, is in line with the results of Jansen in de Wal et al. (2020), who have noted that work pressure has no effects on secondary school teachers' performance in professional learning activities. This finding suggests that work pressure is two facets of the same coin in the influence on sharing behavior, for example, some teachers may feel too much workload to engage in other activities while others may appraise job demands as learning opportunities that trigger active actions. Furthermore, work pressure varies with school locations in China, depending on class size and the number of subjects teachers teach. For example, because small rural schools in villages suffering the shortage of teachers teaching minor subjects, teachers in these schools devote more of their time to classroom teaching compared to urban teachers. On the other hand, due to the rapid urbanization, teachers in urban schools with a relatively larger class size normally take on more responsibilities at work than teachers working in towns.

Finally, the mediation results reveal that for sharing within school, teachers who were more internally motivated showed relatively higher sharing intention within school because they had a higher level of self-efficacy and attitudes; teachers who were more externally motivated showed relatively lower sharing intention within school because they experienced more negative attitudes. In addition, for sharing outside school, teachers who were more internally motivated showed relatively higher sharing intention outside school because they had a higher level of self-efficacy. In the IMBP, all relationships between all motivational variables and intention are supposed to be mediated through the dispositional variables. However, this assumption is only supported for the relationships between the internal motivation and sharing intention within school context. Similarly, Hagger et al. (2006) found that attitude and perceived behavioral control to be significant mediators between autonomous motives and intention. Except for different motivation effects, the results of the mediation analysis have significant theoretical implications for the body of knowledge about the different mediating relationships between within and outside school contexts. This research supports Leonard et al.'s (1999) suggestion that self-concept-based motivation should be included when understanding the consistency and variability in individual behavior across contexts. Moreover, both findings from two contexts revealed the relative importance of self-efficacy in promoting sharing intention.

6. Limitations and future directions

Although this research has provided valuable insights into factors affecting sharing behavior regarding DERs by rural teachers, there are some limitations in this study. First, we used self-report frequency scales to obtain teachers' actual DERs-sharing behavior, which provides a limited understanding of the quality of the behavior. Future case studies using online monitoring systems to analyze teachers' sharing behavior may provide more in-depth understandings of effective knowledge sharing. Secondly, because the research context was limited to rural areas in China, generalizing the results of this study to larger populations should be done with caution. Future studies could test the research model in other countries or knowledge-sharing contexts to build a more robust conclusion. Third, based on our findings and together with Scherer et al. (2020), we argue that the intention-behavior link may not be positive and significant in all situations, which means that including alternative sources of information about the behavior variable (e.g., log file data) is needed to further investigate sharing behavior. Furthermore, since the effect of different environmental variables varies, future research should include more environmental variables affecting teachers' sharing behavior, such as perceived organizational support for knowledge sharing. Finally, many online sharing platforms exist and each platform has its own characteristics and attributes. Future research should focus on teachers' sharing behavior on different online sharing platforms. This study provides a general analysis of sharing behavior within and outside school which is the first and an important step for differentiating among the various situations where teachers share their DERs.

7. Conclusions

This study addresses the gap in the literature on rural teachers' sharing behavior regarding DERs, using the two-step SEM to investigate the motivation-behavior relationship in two contexts. Firstly, both internal motivation and external motivation were related to attitudes and sharing behavior within or outside school but in a different way. Secondly, intention and sharing climate only had a positive relationship with sharing behavior outside school and work pressure was not related to sharing behavior in both contexts. Finally, attitudes mediated the relationships of internal motivation and external motivation with sharing intention within school, and self-efficacy mediated the relationship between internal motivation and sharing intention outside school.

The research provides several contributions to the literature. The unique theoretical contribution is providing a comprehensive understanding of teachers' sharing behavior regarding DERs by introducing the concept of motivation in IMBP. While there are studies taking into account motivational factors for the adoption of technology (see e.g., Fathali & Okada, 2018; Khan et al., 2018; Nikou & Economides, 2017; Safa & Von Solms, 2016), no such study exists in the context of teachers' sharing behavior regarding DERs in primary and secondary education. Our study offers a further explanation for findings by Bock et al. (2005) who found that extrinsic rewards had a negative effect on attitudes toward sharing knowledge. Unlike people in cultures where knowledge sharing is encouraged, external incentives discourage teachers in rural schools with less focus on collaboration and on embracing new things to form a positive attitude and share DERs. Moreover, although several studies adopted motivational factors from interpersonal relationships (Al-Kurdi et al., 2020; Singh, 2019; T. Guan, et al., 2018), we examined the interaction between the individual and the environment that can lead to behavior.

From the empirical perspective, this study helps to identify the key motives and obstacles in the early stages of knowledge sharing based on rural teachers' own perspectives. Unlike previous studies focusing on only one context of teachers' general knowledge sharing behavior (Akosile & Olatokun, 2020), this study explores the motivation-behavior relationship in the context of DERs-sharing both within and outside school. The findings complement the study of van Acker et al. (2014) in which Open Educational Resources (OER) sharing behaviors of teachers in two situations were compared. This research highlights important reasons why teachers in rural school context share (because of internal motivation) or not share DERs (because of external motivation) as well as identifies two mediators (self-efficacy and attitudes) to improve DERs sharing. This indicates that the higher the internal motivation rural teachers have and the higher level of self-efficacy, the more they contribute their DERs. It is also important to emphasize that the role of variables in the research model might vary from context to context. Comparing these insights to distinguished contexts may contribute to the sharing of DERs in rural schools and to making DERs more contextualized and to enhancing new ways of teaching and learning.

This research offers practical implications to establish conditions that stimulate knowledge sharing in various contexts. Some suggestions are presented below. In schools, adjustments could be made with regards to the types of incentives used for stimulating knowledge sharing, for example, by moving from a focus on high organizational expectations to stimulating individuals' interests in sharing knowledge. Additionally, these conditions should include removing obstacles (e.g., individuals' concerns of losing their unique competitive advantages. As Joo, Lim, and Kim (2016) pointed out, teachers' emotions should be deemed vital to their use of technology. In addition to this, technical and pedagogical support in sharing in the formal training sessions are also needed. Observing others who effectively share is another way to boost teachers' self-efficacy (Instefjord & Munthe, 2017). Efforts aimed at creating a collaborative school climate by communities of practices may also help increase actions, particularly in the outside school setting (Yang, Yu, & Chen, 2019).

Declaration of competing interest

None.

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Appendix A

Table A.1
Additional demographic statistics of participants ($N = 709$).

Measures	Items	Frequency	Percent
Position	Teacher	654	92.2
	Director	37	5.2
	Principal	18	2.5
Years of sharing experience	<1	155	21.9
	1–3	232	32.7
	4–5	103	14.5

(*continued on next page*)

Table A.1 (*continued*)

Measures	Items	Frequency	Percent
	6–10	147	20.7
	>10	72	10.2
School type	Teaching site in village	56	7.9
	Primary school in village	139	19.6
	Primary school in town	204	28.8
	Secondary school in town	148	20.9
	Nine-year School in town	162	22.8

Table A.2
Convergent validity and internal reliability.

Constructs	Parameters of significant test		Composite Reliability (CR)	Average of Variance Extracted (AVE)	Cronbach's α
	Factor Loading	Measurement Error			
INT			0.824	0.541	0.822
INT1	0.781***	0.021			
INT2	0.678***	0.025			
INT3	0.705***	0.024			
INT4	0.772***	0.021			
EXT			0.792	0.559	0.791
EXT1	0.703***	0.026			
EXT2	0.791***	0.025			
EXT3	0.747***	0.025			
SE			0.863	0.677	0.861
SE1	0.806***	0.018			
SE2	0.893***	0.016			
SE3	0.765***	0.020			
ATT			0.863	0.678	0.861
AT1	0.773***	0.019			
AT2	0.843***	0.017			
AT3	0.852***	0.017			
SC			0.878	0.645	0.876
SC1	0.778***	0.018			
SC2	0.884***	0.013			
SC3	0.808***	0.017			
SC4	0.734***	0.020			
WP			0.788	0.561	0.769
WP1	0.649***	0.029			
WP2	0.919***	0.028			
WP3	0.645***	0.029			
SIIS			0.854	0.661	0.852
SIIS1	0.833***	0.018			
SIIS2	0.775***	0.020			
SIIS3	0.829***	0.018			
SIOS			0.886	0.722	0.885
SIOS1	0.878***	0.014			
SIOS2	0.827***	0.016			
SIOS3	0.843***	0.015			
SBIS			0.803	0.577	0.801
SBIS1	0.790***	0.024			
SBIS2	0.717***	0.025			
SBIS3	0.769***	0.024			
SBOS			0.911	0.674	0.909
SBOS1	0.775***	0.017			
SBOS2	0.740***	0.019			
SBOS3	0.884***	0.011			
SBOS4	0.819***	0.014			
SBOS5	0.877***	0.011			

***$p < 0.001$.

Table A.3
Path coefficients for within and outside school.

Paths	Path coefficients for within school	Results for within school	Path coefficients for outside school	Results for outside school
INT → SE	0.587***	Yes	0.583***	Yes
INT → ATT	0.790***	Yes	0.787***	Yes
INT → SI	0.078	No	0.216**	Yes
INT → SB	0.274**	Yes	0.318***	Yes
EXT → SE	0.029	No	0.030	No

(*continued on next page*)

Table A.3 (*continued*)

Paths	Path coefficients for within school	Results for within school	Path coefficients for outside school	Results for outside school
EXT → ATT	−0.172***	Yes	−0.172***	Yes
EXT → SI	−0.022	No	−0.038	No
EXT → SB	−0.104*	Yes	−0.092*	Yes
SE → SI	0.433***	Yes	0.543***	Yes
SE → SB	0.325***	Yes	0.215***	Yes
ATT → SI	0.382***	Yes	0.047	No
ATT → SB	−0.148	No	−0.208**	Yes
SI → SB	0.073	No	0.118*	Yes
SC → SB	0.122	No	0.139*	Yes
WP → SB	0.028	No	0.017	No

Note: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table A.4
Bias-corrected bootstrapped confident intervals of the indirect effects.

Mediation path	B	SE	95% CI for indirect effect	
(IV → MV→ DV)			Lower limit	Upper limit
Within school				
INT → SI	0.691	0.148	0.470	1.065
Specific 1: INT → SE → SI	0.315	0.065	0.216	0.475
Specific 2: INT → ATT → SI	0.375	0.128	0.163	0.673
EXT → SI	−0.049	0.043	−0.148	0.022
Specific 1: EXT → SE → SI	0.011	0.024	−0.037	0.057
Specific 2: EXT → ATT → SI	−0.060	0.027	−0.131	−0.018
Outside school				
INT → SI	0.553	0.157	0.287	0.853
Specific 1: INT → SE → SI	0.496	0.093	0.350	0.721
Specific 2: INT → ATT → SI	0.057	0.166	−0.362	0.260
EXT → SE →SI	0.010	0.044	−0.089	0.087
Specific 1: EXT → SE → SI	0.019	0.037	−0.057	0.088
Specific 2: EXT → ATT → SI	−0.009	0.027	−0.051	0.047

Note. B indicates the strength of the indirect effect.

Appendix B. The remaining items for each variable

INT
1. Because this represents a meaningful choice to me.
2. Because this is an important goal to me.
3. Because I enjoy doing it.
4. Because it's fun.

EXT
1. Because that's something others (principals, colleagues, etc.) want me to do.
2. Because others (principals, colleagues, etc.) oblige me to do so.
3. Because that's what others (principals, colleagues, etc.) expect me to do.

SE
1. It's easy for me to share digital educational resources.
2. I have enough skills to share digital educational resources.
3. I can help others if they have digital educational resources sharing-related questions.

ATT
1. If I share my digital educational resources, I feel enjoyable.
2. If I share my digital educational resources, I feel valuable.
3. If I share my digital educational resources, I feel beneficial.

SC
1. In our school, there are sufficient supports for sharing digital educational resources.
2. In our school, teachers share conceptions and ideas about their educational vision.
3. In our school, teachers share knowledge about developments in education.
4. In our school, teachers share knowledge and experiences about changes they implemented in their lesson practices.

WP
1. Do you have to work very fast?
2. Do you have too much work to do?
3. Do you need to work extra hard to get your work done?

SIIS
1. How biggest is the chance for you to share digital educational resources in school
2. Do you plan to share digital educational resources in school?
3. Do you intend to share digital educational resources in school?

(*continued on next page*)

(*continued*)

SIOS
1. How biggest is the chance for you to share digital educational resources outside school
2. Do you plan to share digital educational resources outside school?
3. Do you intend to share digital educational resources outside school?
SBIS
1. Digital text
2. Micro lecture/micro video
3. Subject software and tools
SBOS
1. Electronic lesson plans
2. Exercises
3. Digital text
4. Micro lecture/micro video
5. Subject software and tools

References

Admiraal, W., Lockhorst, D., Smit, B., & Weijers, S. (2013). The integrative model of behavior prediction to explain technology use in post-Graduate teacher education programs in the Netherlands. *International Journal of Higher Education, 2*(4), 172–178. https://doi.org/10.5430/ijhe.v2n4p172

Admiraal, W., Louws, M., Lockhorst, D., Paas, T., Buynsters, M., Cviko, A., & Kester, L. (2017). Teachers in school-based technology innovations: A typology of their beliefs on teaching and technology. *Computers & Education, 114*, 57–68. https://doi.org/10.1016/j.compedu.2017.06.013

Ahmed, Y. A., Ahmad, M. N., Ahmad, N., & Zakaria, N. H. (2019). Social media for knowledge-sharing: A systematic literature review. *Telematics and Informatics, 37*, 72–112. https://doi.org/10.1016/j.tele.2018.01.015

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Akosile, A., & Olatokun, W. (2020). Factors influencing knowledge sharing among academics in Bowen University, Nigeria. *Journal of Librarianship and Information Science, 52*(2), 410–427. https://doi.org/10.1177/0961000618820926

Al-Huneini, H., Walker, S. A., & Badger, R. (2020). Introducing tablet computers to a rural primary school: An Activity Theory case study. *Computers & Education, 143*, 103648. https://doi.org/10.1016/j.compedu.2019.103648

Al-Kurdi, O., El-Haddadeh, R., & Eldabi, T. (2018). Knowledge sharing in higher education institutions: A systematic review. *Journal of Enterprise Information Management, 31*(2), 226–246. https://doi.org/10.1108/JEIM-09-2017-0129

Al-Kurdi, O., El-Haddadeh, R., & Eldabi, T. (2020). The role of organisational climate in managing knowledge sharing among academics in higher education. *International Journal of Information Management, 50*, 217–227. https://doi.org/10.1016/j.ijinfomgt.2019.05.018

Arpaci, I., & Baloğlu, M. (2016). The impact of cultural collectivism on knowledge sharing among information technology majoring undergraduates. *Computers in Human Behavior, 56*, 65–71. https://doi.org/10.1016/j.chb.2015.11.031

Artuso, A. R., & Graf, S. T. (2020). Science and math courses in a Danish digital learning platform: What makes them more or less popular? *IARTEM e-journal, 12*(1), 1–35. https://doi.org/10.21344/iartem.v12i1.726

Baas, M., Admiraal, W., & van den Berg, E. (2019). Teachers' adoption of open educational resources in higher education. *Journal of Interactive Media in Education, 2019*(1), 1–11. https://doi.org/10.5334/jime.510

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Baron, G. L., & Zablot, S. (2015). Research on educational media and resources in the field of French vocational education. The case of automobile maintenance. *IARTEM e-journal, 7*(3), 25–44.

Bock, G. W., & Kim, Y. G. (2002). Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing. *Information Resources Management Journal, 15*(2), 14–21. https://doi.org/10.4018/irmj.2002040102

Bock, G. W., Zmud, R. W., Kim, Y. G., & Lee, J. N. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social–psychological forces, and organizational climate. *MIS Quarterly, 29*(1), 87–111. https://doi.org/10.2307/25148669

Bruillard, É. (2017). MOOCs as contemporary forms of books: New educational services between control and conversation. *IARTEM e-Journal, 9*(1), 142–164.

Carmines, E., & McIver, J. (1981). Analyzing models with unobserved variables: Analysis of covariance structures. In G. Bohmstedt, & E. Borgatta (Eds.), *Social measurement: Current issues* (pp. 65–115). California: Sage.

Charband, Y., & Navimipour, N. J. (2016). Online knowledge sharing mechanisms: A systematic review of the state of the art literature and recommendations for future research. *Information Systems Frontiers, 18*(6), 1131–1151. https://doi.org/10.1007/s10796-017-9799-2

Chen, C. C. (2011). Factors affecting high school teachers' knowledge-sharing behaviors. *Social Behavior and Personality, 39*(7), 993–1008. https://doi.org/10.2224/sbp.2011.39.7.993

Chen, I. Y. L., Chen, N. S., & Kinshuk. (2009). Examining the factors influencing participants' knowledge sharing behavior in virtual learning communities. *Journal of Educational Technology & Society, 12*(1), 134–148.

Cockrell, R. C., & Stone, D. N. (2010). Industry culture influences pseudo-knowledge sharing: A multiple mediation analysis. *Journal of Knowledge Management, 14*(6), 841–857. https://doi.org/10.1108/13673271011084899

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology, 95*(5), 834–848. https://doi.org/10.1037/a0019364

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

de Souza, E. L., & Dias Garcia, N. M. (2019). The textbook for countryside schools: teacher's perceptions and practices of students in the initial years of basic education. In E. Bruillard, A. Anichini, & G. L. Baron (Eds.), *Changing media–changing schools?. IARTEM 2017 14th international conference on research on textbooks and educational media* (pp. 102–106). Lisbon: IARTEM.

Evers, A. T., van der Heijden, B. I. J. M., Kreijns, K., & Vermeulen, M. (2016). Job demands, job resources, and flexible competence: The mediating role of teachers' professional development at work. *Journal of Career Development, 43*(3), 227–243. https://doi.org/10.1177/0894845315597473

Fathali, S., & Okada, T. (2018). Technology acceptance model in technology-enhanced ocll contexts: A self-determination theory approach. *Australasian Journal of Educational Technology, 34*(4), 138–154. https://doi.org/10.14742/ajet.3629

Fei, X. (1992). *From the soil: The foundations of Chinese society*. Berkeley, CA: University of California Press.

Fernet, C., Senécal, C., Guay, F., Marsh, H., & Dowson, M. (2008). The work tasks motivation scale for teachers (WTMST). *Journal of Career Assessment, 16*(2), 256–279. https://doi.org/10.1177/1069072707305764

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. New York, NY: Psychology Press. https://doi.org/10.4324/9780203838020

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://www.jstor.org/stable/3151312.

Gao, M., & Sun, Z. (2019). Analysis of the demand for teaching design of rural teachers in the WeChat group. In *Proceedings of the 2019 2nd international conference on data science and information technology* (pp. 19–24). https://doi.org/10.1145/3352411.3352415. Seoul, Republic of Korea.

Guan, T., Wang, L., Jin, J., & Song, X. (2018). Knowledge contribution behavior in online Q&A communities: An empirical investigation. *Computers in Human Behavior, 81*, 137–147. https://doi.org/10.1016/j.chb.2017.12.023

Guan, X. H., Xie, L., & Huan, T. C. (2018). Customer knowledge sharing, creativity and value co-creation. *International Journal of Contemporary Hospitality Management, 30*(2), 961–979. https://doi.org/10.1108/IJCHM-09-2016-0539

Hagger, M. S., Chatzisarantis, N. L., & Harris, J. (2006). From psychological need satisfaction to intentional behavior: Testing a motivational sequence in two behavioral contexts. *Personality and Social Psychology Bulletin, 32*(2), 131–148. https://doi.org/10.1177/0146167205279905

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hansen, T. I., & Gissel, S. T. (2017). Quality of learning materials. *IARTEM e-Journal, 9*(1), 122–141.

Hew, K. F., & Hara, N. (2007). Empirical study of motivators and barriers of teacher online knowledge sharing. *Educational Technology Research & Development, 55*(6), 573–595. https://doi.org/10.1007/s11423-007-9049-2

Hislop, D. (2009). *Knowledge management in organizations*. New York, NY: Oxford University Press.

Hood, N. (2017). Conceptualising online knowledge sharing: What teachers' perceptions can tell us. *Technology, Pedagogy and Education, 26*(5), 573–585. https://doi.org/10.1080/1475939X.2017.1348980

Hood, N. (2018). Personalising and localising knowledge: How teachers reconstruct resources and knowledge shared online in their teaching practice. *Technology, Pedagogy and Education, 27*(5), 589–605. https://doi.org/10.1080/1475939X.2018.1535448

Hou, H. T., Chang, K. E., & Sung, Y. T. (2010). What kinds of knowledge do teachers share on blogs? A quantitative content analysis of teachers' knowledge sharing on blogs. *British Journal of Educational Technology, 41*(6), 963–967. https://doi.org/10.1111/j.1467-8535.2009.01040.x

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.

Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Thousand Oaks, CA: Sage.

Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education, 67*, 37–45. https://doi.org/10.1016/j.tate.2017.05.016

Jansen in de Wal, J., van den Beemt, A., Martens, R. L., & den Brok, P. J. (2020). The relationship between job demands, job resources and teachers' professional learning: Is it explained by self-determination theory? *Studies in Continuing Education, 42*(1), 17–39. https://doi.org/10.1080/0158037X.2018.1520697

Jiang, Y., & Chen, C. C. (2018). Integrating knowledge activities for team innovation: Effects of transformational leadership. *Journal of Management, 44*(5), 1819–1847. https://doi.org/10.1177/0149206316628641

Jolaee, A., Nor, K. M., Khani, N., & Yusoff, R. M. (2014). Factors affecting knowledge sharing intention among academic staff. *International Journal of Educational Management, 28*(4), 413–431. https://doi.org/10.1108/IJEM-03-2013-0041

Joo, Y. J., Lim, K. Y., & Kim, N. H. (2016). The effects of secondary teachers' technostress on the intention to use technology in South Korea. *Computers & Education, 95*, 114–122. https://doi.org/10.1016/j.compedu.2015.12.004

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly, 23*(2), 183–213. https://doi.org/10.2307/249751

Khan, I. U., Hameed, Z., Yu, Y., Islam, T., Sheikh, Z., & Khan, S. U. (2018). Predicting the acceptance of MOOCs in a developing country: Application of task-technology fit model, social motivation, and self-determination theory. *Telematics and Informatics, 35*(4), 964–978. https://doi.org/10.1016/j.tele.2017.09.009

Klaeijsen, A., Vermeulen, M., & Martens, R. (2018). Teachers' innovative behaviour: The importance of basic psychological need satisfaction, intrinsic motivation, and occupational self-efficacy. *Scandinavian Journal of Educational Research, 62*(5), 769–782. https://doi.org/10.1080/00313831.2017.1306803

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.

Kreijns, K., van Acker, F., Vermeulen, M., & van Buuren, H. (2013). What stimulates teachers to integrate ICT in their pedagogical practices? The use of digital learning materials in education. *Computers in Human Behavior, 29*(1), 217–225. https://doi.org/10.1016/j.chb.2012.08.008

Kreijns, K., Vermeulen, M., Kirschner, P. A., van Buuren, H., & van Acker, F. (2013). Adopting the integrative model of behaviour prediction to explain teachers' willingness to use ICT: A perspective for research on teachers' ICT usage in pedagogical practices. *Technology, Pedagogy and Education, 22*(1), 55–71. https://doi.org/10.1080/1475939X.2012.754371

Kreijns, K., Vermeulen, M., van Acker, F., & van Buuren, H. (2014). Predicting teachers' use of digital learning materials: Combining self-determination theory and the integrative model of behaviour prediction. *European Journal of Teacher Education, 37*(4), 465–478. https://doi.org/10.1080/02619768.2014.882308

Kuo, F. Y., & Young, M. L. (2008). Predicting knowledge sharing practices through intention: A test of competing models. *Computers in Human Behavior, 24*(6), 2697–2722. https://doi.org/10.1016/j.chb.2008.03.015

Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education, 19*(2), 149–170. https://doi.org/10.1016/S0742-051X(02)00101-4

Lai, H. M., & Chen, T. T. (2014). Knowledge sharing in interest online communities: A comparison of posters and lurkers. *Computers in Human Behavior, 35*, 295–306. https://doi.org/10.1016/j.chb.2014.02.004

Lee, J. C., Shiue, Y. C., & Chen, C. Y. (2016). Examining the impacts of organizational culture and top management support of knowledge sharing on the success of software process improvement. *Computers in Human Behavior, 54*, 462–474. https://doi.org/10.1016/j.chb.2015.08.030

Leonard, N. H., Beauvais, L. L., & Scholl, R. W. (1999). Work motivation: The incorporation of self-concept- based processes. *Human Relations, 52*(8), 969–998. https://doi.org/10.1177/001872679905200801

Li, Y., Long, H., & Liu, Y. (2015). Spatio-temporal pattern of China's rural development: A rurality index perspective. *Journal of Rural Studies, 38*, 12–26. https://doi.org/10.1016/j.jrurstud.2015.01.004

Liou, Y. H., & Canrinus, E. T. (2020). A capital framework for professional learning and practice. *International Journal of Educational Research, 100*, 101527. https://doi.org/10.1016/j.ijer.2019.101527

Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

Nikou, S. A., & Economides, A. A. (2017). Mobile-based assessment: Integrating acceptance and motivational factors into a combined model of Self-Determination Theory and Technology Acceptance. *Computers in Human Behavior, 68*, 83–95. https://doi.org/10.1016/j.chb.2016.11.020

Norulkamar, U., & Hatamleh, A. (2014). A review of knowledge sharing barriers among academic staff- A Malaysian perspective. *Sains Humanika, 2*(2), 87–91.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Oddone, K., Hughes, H., & Lupton, M. (2019). Teachers as connected professionals: A model to support professional learning through personal learning networks. *International Review of Research in Open and Distance Learning, 20*(3). https://doi.org/10.19173/irrodl.v20i4.4082

OECD. (2020). *TALIS 2018 results (volume II): Teachers and school Leaders as valued professionals, TALIS*. Paris: OECD Publishing. https://doi.org/10.1787/19cf08df-en

Park, J., & Gabbard, J. L. (2018). Factors that affect scientists' knowledge sharing behavior in health and life sciences research communities: Differences between explicit and implicit knowledge. *Computers in Human Behavior, 78*, 326–335. https://doi.org/10.1016/j.chb.2017.09.017

Peng, W. J., McNess, E., Thomas, S., Wu, X. R., Zhang, C., Li, J. Z., et al. (2014). Emerging perceptions of teacher quality and teacher development in China. *International Journal of Educational Development, 34*, 77–89. https://doi.org/10.1016/j.ijedudev.2013.04.005

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891. https://doi.org/10.3758/BRM.40.3.879

Qiao, X. (2018). "Internet Plus" integration in rural education in China. In H. A Spires (Ed.) (1st ed.,*Information science reference- IGI globalDigital transformation and innovation in Chinese education* (pp. 289–306). https://doi.org/10.4018/978-1-5225-2924-8.ch016

Runhaar, P., & Sanders, K. (2016). Promoting teachers' knowledge sharing. The fostering roles of occupational self-efficacy and Human Resources Management. *Educational Management Administration & Leadership, 44*(5), 794–813. https://doi.org/10.1177/1741143214564773

Ryu, S., Ho, S. H., & Han, I. (2003). Knowledge sharing behavior of physicians in hospitals. *Expert Systems with Applications, 25*(1), 113–122. https://doi.org/10.1016/S0957-4174(03)00011-3

Safa, N. S., & Von Solms, R. (2016). An information security knowledge sharing model in organizations. *Computers in Human Behavior, 57*, 442–451. https://doi.org/10.1016/j.chb.2015.12.037

Santana Bonilla, P. J., & Rodríguez Rodríguez, J. (2019). Does the use of educational digital resources at school provide potentially new methodologies of teaching and learning? In E. Bruillard, A. Anichini, & G. L. Baron (Eds.), *Changing media–changing schools?. IARTEM 2017 14th international conference on research on textbooks and educational media* (pp. 10–15). Lisbon: IARTEM.

Schenke, W., Sligte, H. W., Admiraal, W., Buisman, M., Emmelot, Y., Meirink, J. A., & Smit, B. H. J. (2015). *Scan school als professionele leergemeenschap [Scan school as a professional learning community]*. Amsterdam, The Netherlands: Kohnstamm Instituut.

Scherer, R., Siddiq, F., & Tondeur, J. (2020). All the same or different? Revisiting measures of teachers' technology acceptance. *Computers & Education, 143*, 103656. https://doi.org/10.1016/j.compedu.2019.103656

Schulte, B. (2015). (Dis) empowering technologies: ICT for education (ICT4E) in China, past and present. *Chinese Journal of Communication, 8*(1), 59–77. https://doi.org/10.1080/17544750.2014.990909

Schuwer, R., & Janssen, B. (2018). Adoption of sharing and reuse of open resources by educators in higher education institutions in The Netherlands: A qualitative research of practices, motives, and conditions. *International Review of Research in Open and Distance Learning, 19*(3), 151–171. https://doi.org/10.19173/irrodl.v19i3.3390

Sedighi, M., Lukosch, S., Brazier, F., Hamedi, M., & van Beers, C. (2018). Multi-level knowledge sharing: The role of perceived benefits in different visibility levels of knowledge exchange. *Journal of Knowledge Management, 22*(6), 1264–1287. https://doi.org/10.1108/JKM-09-2016-0398

Singh, S. K. (2019). Territoriality, task performance, and workplace deviance: Empirical evidence on role of knowledge hiding. *Journal of Business Research, 97*, 10–19. https://doi.org/10.1016/j.jbusres.2018.12.034

Taylor, W. A., & Wright, G. H. (2004). Organizational readiness for successful knowledge sharing: Challenges for public sector managers. *Information Resources Management Journal, 17*(2), 22–37. https://doi.org/10.4018/irmj.2004040102

Teo, T., & van Schaik, P. (2012). Understanding the intention to use technology by preservice teachers: An empirical test of competing theoretical models. *International Journal of Human-Computer Interaction, 28*(3), 178–188. https://doi.org/10.1080/10447318.2011.581892

Trust, T. (2017). Using cultural historical activity theory to examine how teachers seek and share knowledge in a peer-to-peer professional development network. *Australasian Journal of Educational Technology, 33*(1), 98–113. https://doi.org/10.14742/ajet.2593

Tseng, F. C., & Kuo, F. Y. (2014). A study of social participation and knowledge sharing in the teachers' online professional community of practice. *Computers & Education, 72*, 37–47. https://doi.org/10.1016/j.compedu.2013.10.005

van Acker, F., Vermeulen, M., Kreijns, K., Lutgerink, J., & van Buuren, H. (2014). The role of knowledge sharing self-efficacy in sharing Open Educational Resources. *Computers in Human Behavior, 39*, 136–144. https://doi.org/10.1016/j.chb.2014.07.006

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology, 101*(3), 671–688. https://doi.org/10.1037/a0015083

van Veldhoven, M., & Meijman, T. F. (1994). *Het meten van psychosociale arbeidsbelasting met een vragenlijst (VBBA) [The Measurement of Psychosocial Work Demands with a Questionnaire (VBBA)]*. Amsterdam: Dutch Institute of Working Conditions.

Wang, J., Tigelaar, D. E., & Admiraal, W. (2019). Connecting rural schools to quality education: Rural teachers' use of digital educational resources. *Computers in Human Behavior, 101*, 68–76. https://doi.org/10.1016/j.chb.2019.07.009

Wang, S., & Noe, R. A. (2010). Knowledge sharing: A review and directions for future research. *Human Resource Management Review, 20*(2), 115–131. https://doi.org/10.1016/j.hrmr.2009.10.001

Wang, W. T., & Hou, Y. P. (2015). Motivations of employees' knowledge sharing behaviors: A self-determination perspective. *Information and Organization, 25*(1), 1–26. https://doi.org/10.1016/j.infoandorg.2014.11.001

Wu, Z., & Qin, Y. (2019). *The report of rural education development in China: 2019*. Beijing: Beijing Normal University Publishing House.

Xie, K., Di Tosto, G., Chen, S. B., & Vongkulluksn, V. W. (2018). A systematic review of design and technology components of educational digital resources. *Computers & Education, 127*, 90–106. https://doi.org/10.1016/j.compedu.2018.08.011

Xue, S., Hu, X., Chi, X., & Zhang, J. (2019). Building an online community of practice through WeChat for teacher professional learning. *Professional Development in Education*, 1–25. https://doi.org/10.1080/19415257.2019.1647273

Yang, H. H., Zhu, S., & Macleod, J. (2018). Promoting education equity in rural and underdeveloped areas : Cases on computer-supported collaborative teaching in China. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(6), 2393–2405. https://doi.org/10.29333/ejmste/89841

Yang, J., Yu, H., & Chen, N. S. (2019). Using blended synchronous classroom approach to promote learning performance in rural area. *Computers & Education, 141*, 103619. https://doi.org/10.1016/j.compedu.2019.103619

Yang, X., Song, S., Zhao, X., & Yu, S. (2018). Understanding user behavioral patterns in open knowledge communities. *Interactive Learning Environments, 26*(1), 245–255. https://doi.org/10.1080/10494820.2017.1303518

Yang, Z., Nguyen, V. T., & Le, P. B. (2018). Knowledge sharing serves as a mediator between collaborative culture and innovation capability: An empirical research. *Journal of Business & Industrial Marketing, 33*(7), 958–969. https://doi.org/10.1108/JBIM-10-2017-0245

Zhang, S., & Liu, Q. (2019). Investigating the relationships among teachers' motivational beliefs, motivational regulation, and their learning engagement in online professional learning communities. *Computers & Education, 134*, 145–155. https://doi.org/10.1016/j.compedu.2019.02.013

Zhu, Y. Q., Chiu, H., & Holguin-Veras, E. J. I. (2018). It is more blessed to give than to receive: Examining the impact of knowledge sharing on sharers and recipients. *Journal of Knowledge Management, 22*(1), 76–91. https://doi.org/10.1108/JKM-06-2016-0218