

# The role of knowledge sharing self-efficacy in sharing Open Educational Resources

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# The role of knowledge sharing self-efficacy in sharing Open Educational Resources

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**Abstract**

In the current paper we report on a study regarding teachers' sharing behavior regarding their Open Educational Resources (OER) in the Netherlands. Little is known about how many teachers actually share their learning materials and, therefore, an attempt was made to estimate the number of Dutch teachers and the types of OER they share. Second, we tried to find out whether knowledge sharing self-efficacy facilitated, and evaluation apprehension and trust inhibited teachers to share OER in two different contexts of sharing behavior; sharing with colleagues at their school (interpersonal sharing) and sharing with the public through Internet (Internet sharing). A survey among 1,568 teachers from primary to higher education was undertaken to test the relative importance of knowledge sharing self-efficacy, evaluation apprehension and trust in determining Dutch teachers' intention to share. The results showed that a large proportion of the Dutch teachers shared their OER, but that this sharing was limited to learning materials with low complexity (e.g., texts or images). Moreover, sharing occurred twice as much interpersonally than via websites. Our hypothesis that evaluation apprehension is significantly related to sharing behavior as well as the intention to share was not confirmed. Self-efficacy to share knowledge did, however, explain some of the differences in sharing behavior and in the intention to share of Dutch teachers, although the variables under study accounted only for a small amount of variance. Our findings should thus be replicated in further studies and other variables should be considered that could effectively predict OER sharing behavior of teachers.

Keywords: OER, evaluation apprehension, knowledge sharing, teachers, self-efficacy

## 1. Introduction

The advent of the Internet has greatly influenced the way people communicate and share knowledge and information. Knowledge sharing amongst professionals used to be limited to individual exchanges or sharing through formal meetings such as conferences or during training sessions. Nowadays, the Internet hosts a plethora of community websites enabling online knowledge sharing among professionals, such as teachers and academics. Teachers may obviously make use of Internet-based knowledge repositories available to the general public (e.g., Wikipedia, Dictionary.com) as a source for a variety of topics to develop their learning materials. However, for the specific purpose of teaching, teachers might often be especially interested in materials that already incorporate content with a specific didactical or pedagogical approach. We refer to these materials as digital learning materials (DLMs). Generally, DLMs cannot be found on these before mentioned knowledge repositories, but rather on dedicated educational repositories provided by educational institutions (e.g., MIT in the USA, Delft University in the Netherlands, and the UK Open University) as well as by initiatives such as the Wikiwijs program. The Wikiwijs program was launched early 2009 by the Dutch ministry of Education, Culture and Science to encourage respectively using, creating, and sharing DLMs by teachers in every sector of education (Plasterk, 2009).

In so far that these DLMs are made available through educational repositories their use may be constrained. The degree to which DLMs use is constrained defines their openness (Peter & Deimann, 2013), that is, the degree to which they may be reused, revised, remixed, and redistributed (Wiley, 2009). DLMs that have some degree of openness are commonly referred to as open educational resources (OER). In order to regulate the degree of openness of OER the Creative Common license model could be used as it offers variety of license

options for OER and other kinds of digital resources. Depending on these options, the license may be anything between classical copyrights and the public domain.

Because OER have become a phenomenon, they got an own definition. According to an UNESCO OER online forum, OER can be defined as "...materials used to support education that may be freely accessed, reused, modified and shared by anyone" (Downes, 2013). OER may include full courses, course materials, modules, textbooks, videos, tests, software, and any other tools, materials or techniques used to support access to different kinds of knowledge. The complexity of the OER may vary from very simple (e.g., a single video clip or a single illustration) to rather complex (e.g., comprising a series of lessons).

Until now, little is known about the number of teachers that actually share their OER and the types of OER they share. Based on experiences with the Wikiwijs initiative, in which the authors of this paper are involved, it seemed that only a limited number of Dutch teachers actually share OER. In order to confirm this observation, we attempted to estimate the number of teachers that share OER in the Netherlands and the amount and types of OER they actually share. We, moreover, attempted to gain insights into why teachers refrain from sharing OER. In this respect, we considered two different contexts of sharing behavior: sharing with colleagues at their school (interpersonal sharing) and sharing with the public through Internet (Internet sharing).

In order for OER to become successful in education, we believe a sufficient amount of OER needs to be available and thus a sufficiently large community needs to be mobilized to share DLMS. OER should be available for different school types and on all possible subjects. Unfortunately, some scholars posit that practitioners have not deposited their OER in the quantity that would achieve critical mass for uptake (Davis et al., 2010). Sharing OER holds that no financial compensation is provided for the knowledge that is added to a repository. Stimulation of teachers to share their OER must thus be achieved by other means. Until now,

little is known about what motivates teachers to share OER and thus further research into what stimulates or hinders teachers to share OER seems warranted.

### **1.1 Research on knowledge sharing**

Research on knowledge sharing has some different traditions and is initiated from different disciplines, which led to the fact that researchers did not reach agreement on a definition of knowledge sharing (Wang & Noe, 2010), as well as to the use of very different models and theories. As a consequence similar constructs are often operationalized in very different ways such that the results from research are often hard to compare. From a social psychology perspective, for instance, much research has been carried out on the effects of dispositional variables such as motivation, attitude or self-efficacy and their direct and indirect relation with knowledge sharing behavior of the individual (see for instance Liao, To, & Hsu, 2013; Hew & Hara, 2007; Cheng 2011), with the purpose to explain and get more insights in human behavior. This line of research assumes that human behavior is a composition of many factors that interact with each other, the social context and the behavior itself.

Apart from the psychological perspective, knowledge sharing has also been researched from the perspective of game theory (Axelrot, 1984). Game theory “can be defined as the study of mathematical models of conflict and cooperation between intelligent, rational decision-makers” (Ho, Hsu & Lin, 2011, p. 54). Game theory has been used for predicting knowledge sharing behavior within organizations as well as predicting Internet knowledge sharing behavior, assuming that knowledge sharing can be seen as a play with gains and losses at both sides and that the outcome of the game can be predicted by mathematical laws. This article however builds the social psychological tradition in search of interacting variables underlying human behavior.

Research on knowledge sharing in general has identified several factors that determine an individual's motivation to share knowledge in absence of any financial reward (e.g., reputation and altruism) (Ho, Hsu & Lin, 2011). Moreover, studies on crowd sourced encyclopedia such as Wikipedia, also provide useful empirical evidence with respect to the determinants of knowledge sharing behavior. Sharing knowledge (either or not in the form of OER) may, however, also come at some cost. Based on a review of the literature on individual knowledge sharing, we focused on a specific cost related to knowledge sharing: evaluation apprehension. Evaluation apprehension, or the fear of being critiqued by others, has thus far received little attention in knowledge sharing literature (Wang & Noe, 2010; Bordia, Irmer, & Abusah, 2007) and has to our knowledge never been studied in the context of OER. The current study attempts to find out to what extent OER are being shared interpersonally in schools and via the Internet in the Netherlands and whether evaluation apprehension hinders teachers from sharing OER online.

## **1.2 Who shares knowledge online?**

To get a clear view of the extent to which people share knowledge on the Internet in general, several contribution systems (i.e., websites or communities that enable knowledge sharing) are discussed briefly. A first type of contribution system is the open source movement. Open source software is usually shared by several individuals who collectively develop and assemble several pieces of source code. The development of open source software can thus be considered as a form of online knowledge sharing. According to Lerner & Tirole (2002), about 2.1 million US citizens had a job in computer science at the end of past millennium. The same authors note that of the potential 2.1 million contributors to the open source community, about 13,000 people (or 0.62%) actually contributed some code to a specific project. Moreover, only 4% of the 13,000 programmers made more than five contributions. This is in line with the findings on the success of open source software such as

Unix and Linux (Weber, 2004). Weber stated that an important factor of success is the possibility that an individual or small group can have the lead voluntarily and generate something useful. Furthermore, open source processes seem to be more effective when the people involved can judge the viability of the evolving product with relative ease. As such they may have the feeling that contributions will actually generate a joint good, which might lead to intrinsically motivated contributors, which are learning personally valuable knowledge by doing and having a positive ethical attitude towards the process (Weber, 2004).

Although participation in the joint development of open source software is a good example of online knowledge sharing, contributing to an online knowledge database, such as an encyclopedia (e.g., Wikipedia) probably better resembles the topic of this study, because teachers who share OER generally do not develop programs together. Wikipedia itself mentions that it keeps good track of all its users and contributors on their own website. At the moment, Wikipedia states that it has more than sixteen million named accounts (Wikipedia, 2013a). Their statistics differentiate between active and passive users. Active users are defined as “users who have performed an action in the last 30 days” (Wikipedia, 2013b), actions being adding or editing information. About 0.87 % of the registered Wikipedians are considered active users. According to a recent study among 176,192 Wikipedia users, 30.67% contributed to the encyclopedia, but only 7.42 % did this regularly (Glott, Schmidt, & Ghosh, 2010). This 7.42 % can be subdivided into authors, editors and administrators. Although editors’ and administrators’ contributions were obviously important, they rarely provided any new content, but rather reviewed existing content. When excluding administrators and editors from this sub sample, an even lower percentage of actual sharers was obtained (5.33% of 176,192 users).

Based on the relatively low number of contributors to open source initiatives and Wikipedia-like initiatives, we expected that relatively few teachers participate in online OER

sharing initiatives. To our knowledge, there are no exact figures on how many OER are shared by teachers, or on how many teachers actually share OER, although we have observed by monitoring that -besides increases in the use of OER over recent years- there has recently also been a substantial increase in the number of teachers in the Netherlands who develop OER. A first aim of this study is to estimate the amount of teachers in The Netherlands who share OER on the Internet.

### **1.3 Knowledge sharing from a social exchange perspective**

Besides increasing our knowledge about how many teachers share OER and how many OER are being shared, we would also like to gain insight into factors that hinder or stimulate sharing of OER. Wang and Noe (2010) state in their review article on knowledge sharing that “Perceived benefits/costs have been one of the most studied antecedents of knowledge sharing” (p. 121). Benefits and costs are two of the central variables in social exchange theory (Homans, 1958), which has been the framework for most of the research on knowledge sharing according to Wang and Noe’s review article. Social exchange theory forms the basis for our study and therefore we briefly introduce its main concepts.

In essence, social exchange theory (Homans, 1958) posits that the benefits and the costs as a consequence of engaging in a specific behavior are important determinants of that behavior. Benefits need to be distinguished from - monetary or non-monetary - rewards or incentives. Contrary to rewards or incentives, benefits must rather be viewed as social incentives such as appreciation, reputation or even altruism (Weber, 2004). Trust, a third key variable in the social exchange model, is supposed to moderate the relationship of benefits and costs with the actual behavior. In other words, the impact of costs and benefits is most likely to be influenced by the trust involved in the exchange relationship (Rusman, van Bruggen, Sloep, & Koper, 2010).

For the remainder of this review, we will focus on two of the three core concepts of social exchange theory: costs and trust. We focus on costs and trust because a previous study has already focused on several possible benefits of sharing OER (Van Acker, van Buuren, Kreijns, & Vermeulen, 2013). The literature reviewed will not be limited to online knowledge sharing, since theoretical as well as empirical insights from other forms of knowledge sharing behavior might be relevant as well for this research. It must be noted however, that the effects of benefits and costs may depend on the context in which knowledge is shared (i.e., online or face-to-face; Bordia, Irmer, & Abusah, 2006), although research comparing different contexts was limited (Wang & Noe, 2010). For this reason we also tried to find out whether determinants of sharing OER differ between an online and an interpersonal (or school-based) setting.

#### **1.4 Motivations to freely share knowledge**

Although several scholars have identified the impact knowledge sharing could have on a contributor's reputation as a key determinant of knowledge sharing, empirical studies have provided limited support for this hypothesis. Some evidence seems to contradict this conjecture. For example, Anthony, Smith, & Williamson (2009) found that in the context of Wikipedia, a major proportion of the contributions are indeed provided by a limited number of registered users, which, according to the authors, is consistent with the idea that they are motivated by reputation. This would be in line with the findings from the success of the open source process (Weber, 2004). Surprisingly, however, a large number of Wikipedia contributions are provided by anonymous sources. Moreover, it was found that these anonymous contributions generally have a higher quality than those from registered users.

In a previous study on determinants of sharing OER, Van Acker et al. (2013) found that reputation had only a limited impact on a teacher's intention to share OER. Altruism and the perceived added value of the contribution seemed to provide a better explanation for

teachers' intention to share OER. Nonetheless the determinants being studied explained only a part of the variance in sharing OER and thus other factors should be sought that jointly determine teachers' sharing behavior.

### **1.5 Evaluation apprehension as a cost of knowledge sharing**

Sharing information, either online or on the work floor may involve some costs for the individual. One of these costs may be the fear of being evaluated negatively by others.

Evaluation apprehension can thus be defined as a person's concern that he or she may be evaluated in a negative fashion (Rosenberg, 1969). Evaluation apprehension may occur in different situations, for example when giving a speech, taking a test or when collaborating with colleagues. This fear of criticism may be evoked in such situations out of fear for negative outcomes or fear to create a negative impression among others (Leary, Barnes, Griebel, Mason, & McCormack, 1987). Previous research has shown that evaluation apprehension negatively impacted consultant's knowledge sharing intentions (Bordia, Irmer, & Abusah, 2006). This was explained by the fact that shared knowledge is reviewed and assessed by the target audience. In the case of OER, teachers exhibit their knowledge and didactical skills by sharing DLMS either online or in school with other teachers and might thus fear being exposed to the criticism of colleagues. We therefore surmise that the fear of being criticized is an important inhibitor of knowledge sharing.

In knowledge sharing studies within virtual communities of practice, several authors have examined the role of fear of losing face (Ardichvili, Page, & Wentling, 2003; Ardichvili, Maurer, Li, Wentling, & Stuedmann, 2006; Usore, Sharatt, Tsui, & Shekhar, 2007), which could be considered a similar construct to evaluation apprehension. According to these authors, people who experience fear of losing face in the context of knowledge sharing are afraid that the information they provide might be inaccurate or that their contribution might be unimportant. Part of this concept thus shows an important overlap with evaluation

apprehension. However we believe it is necessary to consider both aspects as two distinct dimensions. Thus being afraid of sharing inaccurate information can be equaled to evaluation apprehension, because the consequence of sharing inaccurate information might lead to criticism. In our view, this expectation about the importance of one's contribution can be labeled as - a lack of - knowledge sharing self-efficacy.

Self-efficacy is a person's evaluation of one's own capabilities with respect to some intended behavior (Bandura, 1991). A person with a high self-efficacy is more likely to perform a specific behavior because he or she believes it is within his or her capabilities to do so (Schunck, 1990). Knowledge sharing self-efficacy, more specifically refers to the belief a person has in being able to effectively share information. In order to have such a belief, a person needs to be convinced to possess actual knowledge worth sharing, and have the necessary skills to provide such information. With respect to OER, this implies that one should be convinced to have sufficient content-related knowledge and didactical skills, as well as the necessary ICT skills to capture the knowledge in a digital learning object.

A study on online and offline knowledge sharing pointed out that knowledge sharing self-efficacy is an important predictor of knowledge sharing behavior, especially in an online context (Bordia, Irmer, & Abusah, 2006; Liao, To, & Hsu, 2013). There is also indirect evidence that a lack of knowledge sharing self-efficacy may inhibit knowledge sharing. For example, Hew and Hara (2007) report a qualitative study involving three online communities and conclude that lack of time and unfamiliarity with the subject are two of the most important reasons why people refrain from sharing knowledge. Kankanhalli, Tan and Wei (2005) report similar findings from a quantitative study on online knowledge sharing. Similarly, in an attempt to find out why Wikipedia users do not have the intention to contribute to the online encyclopedia, Schmidt, Glott and Gosh (2010) found that the main reason for non-contribution is that one believes to lack the necessary information to

contribute. Based on these findings we might thus conclude that when people believe they are unfamiliar with a subject, or have insufficiently important knowledge to share, they might refrain from sharing knowledge.

Our expectations regarding the impact of knowledge sharing self-efficacy (KSSE) and evaluation apprehension can be summarized in the following hypotheses:

Hypothesis 1a: evaluation apprehension is negatively related to sharing OER

Hypothesis 1b: knowledge sharing self-efficacy is positively related to sharing OER

### **1.6 Trust and knowledge sharing**

According to social exchange theory, not only benefits and costs, but also trust plays an important role in exchange processes between people. Wang and Noe (2010) state that the importance of trust has thus far received little attention in the knowledge-sharing literature. In this study we therefore focus on two aspects of trust, which are closely related to knowledge sharing self-efficacy and evaluation apprehension, namely competence-based trust and benevolence-based trust.

Trust can be defined as “an individual’s belief or a common belief among a group of individuals that another individual or group makes good-faith efforts to behave in accordance with any commitments both explicit or implicit, is honest in whatever negotiations preceded such commitments, and does not take excessive advantage of another even when the opportunity is available” (Cummings & Bromiley, 1996, p. 303). Trust seems to be a supportive factor in situations that require interactions between people, such as in professional organizations. Research suggests that trust in colleagues promotes knowledge exchange within organizations (Grootaert & van Bastelaer, 2002). More specifically, individuals who trust the people they interact with are “more likely to disclose more accurate, relevant, and complete data about problems” (Tschannen-Moran & Hoy, 2000, p. 581). In this study we build on these latter findings that trust increases the probability of disclosing accurate

information. As argued, OER can be considered as a complex type of information that is probably more likely to be shared when trust is high. We refine this conjecture by stating that a specific type of trust, namely competence-based trust is responsible for this. Competence-based trust refers to the beliefs people have that the people they are sharing information with are knowledgeable about the subject. This kind of competence-based trust also corresponds to one of Webers (2004) success factors in the process of open source. Consequently teachers who do not hold such beliefs might refrain from sharing knowledge, as it may seem unlikely that the knowledge will actually be useful to others. On the other hand, if teachers believe that other teachers they share OER with lack the necessary competencies regarding the subject, this might lead them to think that the relationship will not be reciprocal, in other words: sharing OER will not necessarily lead to other teachers sharing OER on a similar subject. Our expectations lead to the following hypothesis:

Hypothesis 2a: competence-based trust is positively related to sharing OER

In previous work (Mayer et al., 1995; Jones & George, 1998; Dirks & Ferrin, 2001; Chiu et al., 2006) it was found that trust is an important factor in cooperation as well as in knowledge sharing. Mayer et al. (1995) define trust as the “willingness of a party to be vulnerable.” In line with Mayer et al.’s view of trust as a vulnerability issue, we conjecture that trust plays a key role in people’s willingness to share OER. More specifically, we believe that a specific type of trust, namely benevolence-based trust, is positively related with knowledge sharing behavior. Benevolence based trust refers to the expectations people have that others will not harm them intentionally. In the case of sharing OER, such an intentional harm could occur when colleagues criticize the shared materials of a teacher. Another example is that a teacher’s OER are used without mentioning the original author. Teachers with a strong benevolence based trust expect such harm is unlikely to happen to them, and are therefore probably more likely to share OER. This results in the following hypothesis:

Hypothesis 2b: benevolence-based trust is positively related to sharing OER

### **1.7 The context of knowledge sharing**

The literature on knowledge sharing has identified two knowledge management strategies, namely codification and personalization of knowledge (Hansen, Nohria, & Tierny, 1999). Whereas personalization strategies focus on facilitating knowledge sharing between persons directly, codification strategies stimulate the permanent identification, codification and storage of the information (Gray, 2001). The distinction between personal knowledge sharing and sharing through a database was made in the study of Bordia, Irmer, and Abusah (2006) and showed that employees are more willing to share knowledge interpersonally than through a database.

With OER, the distinction between interpersonal and database sharing may seem less clear. Identification and codification of knowledge has already taken place, regardless of whether sharing happens between two teachers or by means of a database. The main difference lies in the permanent storage of the OER, which does not occur with interpersonal sharing as opposed to Internet-based sharing. With respect to OER, database driven sharing most often implies sharing information not only with one's colleagues, but with the entire world. As opposed to Internet-based sharing, interpersonal sharing allows the establishment of reciprocity and trust in the knowledge exchange process, which is important for an effective exchange (Gray, 2001). We therefore believe that teachers have a stronger intention to engage in interpersonal exchange of OER than in Internet-based sharing of OER (Wang & Noe, 2010). We also believe that trust is higher in the interpersonal context. For this study, we define Internet-based sharing as sharing of OER through a database on an internal (e.g., an Intranet or an electronic learning environment) or external (e.g., a website on the Internet) location. Interpersonal sharing is defined as sharing between two or more teachers without explicitly enabling permanent access to the content by other teachers. The latter type of

sharing could thus take place at school (e.g., exchanging files via a USB stick), but also via e-mail, a protected electronic learning environment, limited and interpersonal sharing of an URL (which is for instance possible with the Wikiwijs platform) or a protected website which can be accessed only by a limited number of people, which are chosen by the teacher.

Hypothesis 3: OER sharing intention is stronger and actual sharing is more frequent in an interpersonal setting than in an Internet-based setting

Hypothesis 4: Trust regarding sharing OER is higher in an interpersonal setting than in an Internet-based setting

## **2. Method**

### **2.1 Sample and Procedure**

INSERT TABLE 1 ABOUT HERE

Teachers from primary, secondary and higher education were contacted through an online panel to participate in our study ( $N = 1,568$ ). The distribution of the sample with respect to education type, age and gender is shown in Table 1. Based on statistics from 2009 (CBS, 2009), we found that the distribution on the abovementioned variables did not deviate more than 2% from the Dutch teacher population.

### **2.2 Measures**

The dependent variable sharing OER was measured using six items that could be rated on a six-point response scale ranging from never to every day. The items measured with what frequency teachers had shared several types of OER in the previous year. For Internet-based sharing, items started with “I have shared digital learning materials via the Internet in the past year in the form of...” followed by one of six types of OER: tests, own texts (with illustrations), other's texts (with illustrations) I've adapted, images or illustrations (without text), presentations, own audio or video fragments. The question was then repeated for

materials shared interpersonally (“I have shared digital learning materials at school in the past year in the form of...”). Cronbach’s alpha for this scale was .92 for Internet-based sharing and .88 for school based sharing.

To measure the dependent variable intention to share OER, two questions were asked regarding the intention to share either via the Internet or online. An example was: “I actually plan to share OER via the Internet in the coming year”. Cronbach’s alpha was .92. Again, these questions were repeated for interpersonal sharing, with alpha for this scale being .94.

The independent variables knowledge sharing self-efficacy, benevolence-based trust and competence based trust were adapted to the context of sharing OER from existing measures. Knowledge sharing self-efficacy was measured using the three items from the scale developed by Lin, Hung, & Chen (2009) and a Cronbach’s alpha of .94 was obtained. Both trust measures were taken from McKnight, Choudhury, and Kacmar (2002). The benevolence-based trust measure consisted of three items with alpha being .84 for the Internet-based version and .91 for the school-based version. Four items were used to measure competence-based trust. The scale was found to be reliable both in the Internet-based version ( $\alpha = .90$ ) and the school-based version ( $\alpha = .93$ ). Finally, to measure evaluation apprehension we developed a scale consisting of six items. The resulting alpha for the scale was .87. All items and scales can be found in Appendix I.

### **3. Results**

#### **3.1 Descriptive statistics regarding sharing behavior**

Out of the 1,568 teachers who took part in the survey, 882 (56.25%) indicated that they had shared OER in the past year, either via the Internet or interpersonally. In Table 2 the frequency with which teachers share several types of learning materials can be observed. The frequencies are displayed for interpersonal sharing as well as via the Internet and are based on

the answers of the 882 teachers who indicated that they had shared OER in the past year. It can be observed that over half of the teachers never shared the types of OER that were studied, while only 25% of the teachers indicate they never shared OER interpersonally. Differences between the distributions of frequencies of school-based and Internet-based sharing were tested with several Wilcoxon tests and were adjusted for multiple comparisons (i.e., differences were deemed significant when  $p < .01$ ). Results of the analyses showed that interpersonal sharing frequency was higher for all types of OER hereby confirming Hypothesis 3.

INSERT TABLE 2 ABOUT HERE

Next, descriptive statistics are presented for the instruments used in our study (Table 3). To test hypotheses 3 and 4, differences in benevolence-based trust, competence-based trust, sharing intention and actual sharing between the Internet-based context interpersonal sharing were tested using paired samples t-tests. All pairs differed significantly. Cohen's  $d$  was used to evaluate the magnitude of the difference. The largest difference (expressed as Cohen's  $d$ ) was found for sharing intention ( $d = .92$ ), followed by actual sharing ( $d = .74$ ), benevolence-based trust ( $d = .67$ ) and finally competence-based trust ( $d = .42$ ). Correlations between the different variables were computed separately for Internet-based sharing and interpersonal sharing.

INSERT TABLE 3 ABOUT HERE

### **3.2 Determinants of OER sharing**

In order to test hypotheses 1 and 2, four separate sets of regression analyses were run. The first set of two analyses tests the hypothesis that KSSE, knowledge apprehension and trust (competence as well as benevolence-based trust) influence actual sharing behavior. A large

proportion (25% to 50%) of teachers do not actually share OER, and thus a second set of analyses was run based on the reported intention to share OER. Within each set, analyses for Internet-based sharing and interpersonal sharing were run separately. Hierarchical regression analyses were performed with: in a first step, the control variables (gender and age) and in the second step, the independent variables. Based on Cook's distance, none of the participants were considered as influential cases. All other assumptions for the analysis were met.

### **3.2.1 Determinants of actual sharing**

Two regression analyses predicting actual Internet-based sharing (Table 4) and interpersonal sharing (Table 5) were performed separately. The four predictors of Internet-based sharing accounted for a small, but significant proportion of variance ( $R^2 = .08$ ;  $F(4, 786) = 11.35, p < .001$ ). Table 4 further shows that only knowledge sharing self-efficacy was a significant predictor in this model. Concerning interpersonal sharing, the model showed a slightly better fit, with the four predictors explaining 11.70% of the variance in school-based sharing ( $F(4, 786) = 21.13, p < .001$ ). Again, of all four predictors, only knowledge sharing self-efficacy was significant (see Table 5).

INSERT TABLES 4 AND 5 ABOUT HERE

### **3.2.2 Determinants of sharing Intention**

Then, two regression analyses were performed, now predicting actual Internet-based sharing intention (Table 6) and interpersonal sharing intention (Table 7) rather than actual sharing. The four predictors of Internet-based sharing intention accounted for a 13.10% of variance ( $F(4, 786) = 29.70, p < .001$ ). Table 6 furthermore shows that only knowledge sharing self-efficacy was a significant predictor in this model. Concerning interpersonal sharing intention, the model explained 17.90% of the variance in school-based sharing ( $F(4,$

786) = 42.91,  $p < .001$ ). Here, knowledge sharing self-efficacy and benevolence-based trust were significant predictors, as can be observed in Table 7.

INSERT TABLES 6 AND 7 ABOUT HERE

## **4. Discussion**

### **4.1 Descriptive statistics regarding sharing OER**

Our study showed that more than half of the teachers in the sample have shared OER in the past year either on the Internet or among colleagues in school. When we consider the averaged percentage of teachers sharing different type of OER by Internet we notice that the results is similar to what has been found for Wikipedia where 30.67% of the active users contribute (Glott, Schmidt, & Ghosh, 2010). When we take into account the frequency of sharing, we notice that frequent sharing is limited to a relatively small percentage of teachers. Less than 10% shares regularly on the Internet (i.e., several times a month or more) online while less than 20% shares regularly interpersonally. This seems also in accordance with studies on Wikipedia as well as open source software initiatives for which the investigators found that only few of a substantial number of users contribute regularly (Glott, Schmidt, & Ghosh, 2010; Lerner & Tirole, 2002; Weber, 2004).

The results also showed that interpersonal sharing frequency was higher for all types of OER. For each type of OER, over 50% of the participants in our study had indicated that they have never shared this type of OER online. For school-based sharing, this percentage was much lower. Audio or video fragments seem to be shared infrequently by teachers interpersonally, however, all types of OER under study have been shared interpersonally by over 70% of the teachers at least once. Teachers thus seem to share a variety of learning materials, although they seem to do this more often interpersonally than through websites that were developed to share OER with a larger population of teachers. While sharing OER

interpersonally is an important form of knowledge sharing and should thus be encouraged, a large part of the OER developed by teachers is likely to be used by only a small portion of possible users. Moreover, our analysis also showed that not only sharing behavior itself but also teacher's intention to share OER, is stronger regarding school-based sharing than Internet-based sharing. These two findings confirm our third hypothesis that sharing is more frequent - and sharing intention is stronger - in an interpersonal context than in a Web-based context. Our findings suggest that teachers hardly seem reluctant to share, they merely seem to refrain from sharing on the Web.

#### **4.2 Determinants of knowledge sharing**

We conjectured that evaluation apprehension and trust would be related to actual sharing as well as sharing intention. In addition we conjectured that knowledge sharing self-efficacy would be an important predictor of sharing and sharing intention. Regarding actual sharing, we found no evidence for the relationship between evaluation apprehension and sharing neither via the Internet nor interpersonally. Knowledge sharing self-efficacy did however explain some of the differences in sharing as well as sharing intention of teachers. Teachers with more knowledge sharing self-efficacy shared more via the Internet as well as interpersonally. Regarding sharing intention, our results were similar: knowledge sharing self-efficacy was positively related to intention to share via the Internet or interpersonally.

Our results suggest that evaluation apprehension does not play an important role in determining whether teachers are willing to share or actually share OER. This is in contrast with previous studies that found negative relationships between evaluation apprehension and knowledge sharing (e.g., Bordia, Irmer, & Abusah, 2006). An important difference between our study and previous work is the research population that was surveyed and the context wherein they operate. Previous studies were usually based on employees from for-profit organizations. Knowledge is an important asset in most organizations and it can be used to the

advantage of the employee. Sharing faulty knowledge, however, may lead to negative outcomes for an employee. Teachers might differ from such populations as they might experience less impact from sharing incomplete or incorrect knowledge. Moreover, the knowledge itself in OER usually comes from reliable sources such as textbooks. The value that is added by a teacher is probably more related to the didactical approach that is used by the teacher or the presentation of the content (e.g., through a slideshow, a video or an illustrated text). The evaluation of these aspects of OER may be more subjective and therefore teachers might not pay much attention to colleagues' criticism regarding form or didactics.

Although evaluation apprehension played not the role we expected in predicting teachers' sharing behavior regarding OER, a related construct, knowledge sharing self-efficacy, did predict to some extent how often teachers share as well as their sharing intention. Our results thus suggest that teachers will share – or have the intention to share – when they are able to make a valuable contribution for other teachers in the OER community. It thus seems that not the fear of being criticized, but rather the idea of having something valuable to share is important. This finding underlines the importance of making the distinction between knowledge sharing self-efficacy and evaluation apprehension in the construct of fear of losing face as defined by Ardichvilli et al. (2003, 2006).

There was only limited support for the role of trust in predicting teachers' OER sharing behavior. Trust was solely related to sharing intention and not to behavior itself. Moreover, depending on the context, two different types of trust predicted sharing intention. It seems that benevolence-based trust is important when teachers consider sharing with their colleagues interpersonally. The expectation that other teachers would act in their best interest and would provide help when needed is more important than competence based trust for school-based sharing. As for Internet-based sharing, the fact that teachers expect that the users of their shared OER are knowledgeable and provide a reliable source of information seems

more important than benevolence-based trust. Teachers may find Internet based sharing more anonymous and therefore benevolence may be a less important factor. Competence-based trust might be related to teachers' expectations regarding reciprocity. When teachers' expectations about the competence of the online OER community are low, they may also have low expectations about what is in it for them when they share. This explanation is however in contrast with a previous study that showed that reciprocity is not related to sharing OER (Van Acker et al., 2013).

Finally, we argued that the context in which sharing takes place determines the extent to which OER is shared as well as trust with respect to sharing. In the first part of the discussion we already mentioned that more sharing takes place interpersonally than on the Internet. We found similar results for sharing intention and for trust. Sharing intention was much higher for school-based sharing than it was for Internet based sharing. Differences in trust were smaller than for sharing intention, but the tendencies for differences in school-based sharing and Internet-based sharing were similar. Both benevolence-based trust and competence-based trust were higher for interpersonal sharing than for Internet-based sharing as well as the intention to share. As Internet-based sharing intention is related to competence-based trust, the latter may be a factor to consider when trying to increase sharing, provided that sharing intention is a good proxy for actual sharing. Results from our correlation analysis suggest that this is not particularly the case for Internet-based sharing. A fairly small correlation was found between sharing intention and actual sharing, whereas a medium correlation was found for school-based sharing. It would thus also seem that, although many teachers show a reasonably high intention to share OER, many never actually share anything.

#### **4.3 Limitations and suggestions for future studies**

Our study was based on self-report data from a general population of teachers in the Netherlands. Although the distribution of our sample with respect to relevant demographic

variables (age, gender and school type) suggests our results can be generalized to the entire population, possible cultural differences might exist between countries especially regarding evaluation apprehension, as argued by Ardichvilli et al. (2006). Therefore it might be relevant to replicate our findings in other countries.

To our knowledge we are the first to make the distinction between knowledge sharing self-efficacy and evaluation apprehension in the context of knowledge sharing. Although we used an existing scale to measure knowledge sharing self-efficacy, evaluation apprehension was measured using a scale we developed ourselves, based on previous research. The scales in our study showed good reliabilities and - based on the correlations between our scales - it can be concluded they measure distinct variables. A further validation of the scales we used might provide further insights into the relationship between evaluation apprehension and knowledge sharing.

In this study only two situations were compared, school-based sharing and Internet. However within these two situations more differentiation can be made, for example using the context of professional communities within the school and within the Internet. This could shed a different light on the factors affecting knowledge-sharing behavior because of other factors involved. The same can be said about the type of OER that was shared, no differentiations were made on characteristics of OER such as complexity, target or form. However, before future research can look into such factors, more teachers should share their materials. Thus far we do know that self-efficacy in knowledge sharing enhances actual knowledge sharing in both contexts studied in this paper.

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Table 1  
*Descriptive statistics of the sample*

Education Type	<i>n</i>	% women	<i>M</i> age in years ( <i>SD</i> )
Primary	734	83.65	41.88 (4.24)
Secondary	657	44.90	44.87 (4.52)
Higher	177	46.89	44.53 (4.45)

Table 2  
*Descriptive statistics (percentages) of frequency of sharing behavior for different types of OER*

	<b>Internet</b>					
	Never	Once or twice a year	Several times a year	Several times a month	Several times a week	Every day
Tests	65.00	16.40	12.20	5.20	1.00	0.20
Own texts (with illustrations)	57.00	19.80	14.50	6.20	1.90	0.60
Other's texts (with illustrations) adapted	62.10	16.70	13.30	5.80	1.70	0.40
Images or illustrations (without text)	57.90	15.50	15.80	6.80	3.10	0.70
Presentations	57.10	18.60	13.20	7.80	2.90	0.40
Audio or video fragments	74.90	11.00	6.30	5.80	1.70	0.30
	<b>School</b>					
	Never	Once or twice a year	Several times a year	Several times a month	Several times a week	Every day
Tests	27.40	22.70	29.80	15.40	4.10	0.60
Own texts (with illustrations)	25.10	24.30	30.50	15.00	4.20	0.80
Other's texts (with illustrations) adapted	29.70	23.40	28.10	14.40	4.00	0.40
Images or illustrations (without text)	24.30	22.00	31.50	16.70	4.90	0.50
Presentations	24.60	24.20	29.40	15.60	5.50	0.70
Audio or video fragments	54.70	15.50	16.90	8.60	4.00	0.30

Table 3

*Descriptive statistics (mean, standard deviation and inter scale correlations) for the scales involved in this study*

	<b>Internet</b>						
	<i>M</i>	<i>SD</i>	2	3	4	5	6
1. KSSE <sup>†</sup>	4.31	1.48	-0.27*	0.05	0.02	0.22*	0.33*
2. evaluation apprehension <sup>‡</sup>	2.54	1.06		-0.20*	-0.16*	-0.08	-0.13*
3. benevolence-based trust	5.12	0.95			0.73*	0.06	0.23*
4. competence-based trust	5.12	0.90				0.05	0.26*
5. sharing	1.71	0.91					0.28*
6. sharing intention	3.97	1.41					
	<b>School</b>						
	<i>M</i>	<i>SD</i>	2	3	4	5	6
1. KSSE <sup>†</sup>	4.31	1.48	-0.27*	-0.01	-0.02	0.30*	0.37*
2. evaluation apprehension <sup>‡</sup>	2.54	1.06		-0.23*	-0.18*	-0.07	-0.19*
3. benevolence-based trust	5.69	0.90			0.80*	-0.05	0.33*
4. competence-based trust	5.48	0.95				-0.01	0.29*
5. sharing	2.40	0.94					0.57*
6. sharing intention	5.06	1.34					

Note: variables marked with a <sup>†</sup> were not context dependent and thus do not differ between Internet and interpersonal sharing. Parameters marked with an \* are significant at .05 level.

Table 4

*Prediction of Internet-based sharing by age, gender, knowledge sharing self-efficacy, evaluation apprehension, benevolence-based trust and competence-based trust*

Predictor	$\Delta R^2$	B	$\beta$	t/F change	p
Step 1	.03			10.49	< .001
Gender (man)		.29	.17	4.51	< .001
Age		.00	-.02	-.42	.68
Step 2	.05			9.54	< .001
KSSE		.14	.22	5.65	< .001
Evaluation apprehension		-.01	-.01	-.24	.81
Benevolence-based trust		.00	.02	.01	.99
Competence-based trust		.04	.03	.78	.44

Table 5

*Prediction of school-based sharing by age, gender, knowledge sharing self-efficacy, evaluation apprehension, benevolence-based trust and competence-based trust*

Predictor	$\Delta R^2$	B	$\beta$	t/F change	<i>p</i>
Step 1	.05			19.36	< .001
Gender (man)		.22	.12	3.27	.001
Age		-.01	-.7	-1.72	.09
Step 2	.07			15.09	< .001
KSSE		.19	.28	7.36	< .001
Evaluation apprehension		.01	.01	.23	.91
Benevolence-based trust		-.08	-.08	-1.38	.13
Competence-based trust		.05	.06	.97	.36

Table 6

*Prediction of Internet based sharing intention by age, gender, knowledge sharing self-efficacy, evaluation apprehension, benevolence-based trust and competence-based trust*

Predictor	$\Delta R^2$	B	$\beta$	t/F change	p
Step 1	.02			6.34	.001
Gender (man)		.14	.05	1.39	.16
Age		-.01	-.05	-1.45	.15
Step 2	.12				< .001
KSSE		.23	.22	5.86	< .001
Evaluation apprehension		-.02	-.02	-.50	.62
Benevolence based trust		.10	.07	1.41	.16
Competence based trust		.29	.20	3.98	< .001

Table 7

*Prediction of School based sharing intention by age, gender, knowledge sharing self-efficacy, evaluation apprehension, benevolence-based trust and competence-based trust*

Predictor	$\Delta R^2$	B	$\beta$	t/F change	p
Step 1	.00			.19	.82
Gender (man)		-.05	-.02	-.68	.50
Age		.00	.05	1.41	.16
Step 2	.18			42.63	< .001
KSSE		.22	.27	7.23	< .001
Evaluation apprehension		-.05	-.05	-1.29	.20
Benevolence-based trust		.32	.27	4.92	< .001
Competence-based trust		.06	.05	1.00	.32

APPENDIX I: Measures used in this study

Knowledge Sharing Self Efficacy (Lin, Hung, & Chen, 2009)

I have confidence in my ability to provide digital learning materials that other teachers consider valuable

I have the expertise, experiences, and insights needed to provide digital learning materials that is valuable to other teachers

I have confidence in making adaptations to existing digital learning materials that can be valuable for other teachers

Evaluation apprehension (self-developed)

By sharing my digital learning materials with other teachers I am afraid ...

...this may expose my lack of skills

...they might think I am a poor teacher

...they might dislike the digital learning materials I have developed

...that the digital learning materials won't be useful to other teachers

...that the digital learning materials will contain errors

Trust (McKnight, Choudhury, & Kacmar, 2002)

Benevolence-based trust

I believe that the teachers I share digital learning materials with online...

...would act in my best interest

...would do their best to help me if I required help

...are interested in my well-being, not just their own

Competence-based trust

I believe that the teachers I share digital learning materials with online...

...are a competent and effective source of expertise

...perform their role of sharing digital learning materials very well

...are a capable and proficient source of expertise and knowledge

...are very knowledgeable

OER sharing behavior (self-developed)

I have shared digital learning materials via the Internet in the past year in the form of...

...tests

...texts I've written myself, including pictures or illustrations

...others' texts I have edited or adapted

...images or illustrations

...presentations

...videos or audio fragments I've developed or edited

Intention (self-developed)

I am prepared to share OER via the Internet in the coming year

I actually plan to share OER via the Internet in the coming year