Math reading comprehension pdf

Over the past decades, mathematics from problem solving has gained much attention from both researchers and educational athletes (Campbell, 1992; Hegarty et al., 1995; Hajer, 1996; Depaepe et al., 2010; Hickendorff, 2011, 2013; Moreno et al., 2011; Boonen et al., 2013; Swanson et al., 2013). Word problems refer to mathematical exercises that present relevant information about a problem in the form of text, rather than as mathematical symbols (Rasmussen and King, 2000; Timmermans et al., 2007). Therefore, the effective resolution of a problem from mathematics is assumed not only depending on the student's ability to perform the necessary mathematical manipulations, but also on the extent to which they can understand the exact text of the word problem (Lewis and Mayer, 1987; Hegarty et al., 1995; Van der Schoot et al., 2009; Jitendra and Star, 2012). Both of these aspects are relevant in a way that develops a deeper understanding of the text of the word problem that serves as an important step before accurate mathematical calculations can be performed. Therefore, an important challenge for word problem solveer is to get a full understanding of the problem reports (Lee et al., 2009; Thevenot, 2010; Boonen et al., 2013). Two individual skills are involved in this matter. First, an important factor contributing to a deeper understanding of the text of word problems is the ability to build a rich and coherent spiritual representation containing all (inter-relationship) factors related to the solution derived from the text base of the word problem (De Corte et al. , 1985; Hegarty et al., 1995; Pape, 2003). That is, from problem solving must use a problem model strategy in which they translate the problem statement into a meedic spiritual representation of the problem situation hidden in the text (Pape, 2003; Van der Schoot et al., 2009). This spiritual representation then allows them to plan solutions and perform the necessary mathematical activities. Although those who solve problems from success seem to use such a problem modeling strategy by relying solely on their mental representation skills, those who solve the problem less successfully often adopt an impulsive, superficial direct campaign strategy in which they focus only on selecting the numbers presented , thus, formed the basis for their mathematical calculations (Verschaffel et al., 1992; Hegarty et al., 1995). The second most important individual skill in solving problems from research evidence-proof success is the influence of students' ability to read comprehend (Pape, 2003; Van der Schoot et al., 2009; Boonen et al., 2013). It has been suggested that reading comprehendability is particularly useful in dealing with systary-language problem characteristics such as the order of known elements in the text of word problems, the extent to which systary relationships between certain and unknown amounts of problems are made and the relate of information in the text of the word issue (De Corte et al., 1985, 1990; Verschaffel et al., 1992; Marzocchi et al., 2002). Moreover, reading comprehending skills seem more important in overcoming such text complexity than being able to use one's mental representation skills (De Corte et al., 1985, 1990). This may explain why the use of a problem model strategy is insufficient in any case. That is, word issues that contain complex syntic features require both accurate mental representation skills and reading comprehensing skills, while for word issues with lower syntic-language complexity, well-developed mental representation skills may be sufficient. These findings suggest that, in order to teach students how to effectively solve problems from mathematics, mental representation skills and reading comprehending skills should both be part of the math education program. In particular, pay attention to the styly-linguistic characteristics of relevant word issues to help students successfully improve their word problem solving, as word problems become more synisticly complex as students progress in their educational careers , for example, when they make the transition to secondary education. Word problems offered in high school subjects such as photoology, physics, and biology, include more verbal information and often contain more complex synate-language text features (Silver and Cai, 1996; Helwig et al., 1999). The Netherlands, like many other countries, currently places great focus on word problem-solving teaching in contemporary mathematics education (Ruijssenaars et al., 2004; Elia et al., 2009). The teaching of mathematics in the Netherlands takes place against the backdrop of a specific teaching method, called Practical Mathematics Education (RME, Van den Heuvel-Panhuizen, 2003), where the process of solving problems from mathematics plays an important role (Van den Boer, 2003; Barnes, 2005; Prenger, 2005; Van den Heuvel-Panhuizen, 2005; Hickendorff, 2011). RME's educational practice survey studies show that teaching mental representation skills receives a lot of attention in word problem solving guidelines (Van den Heuvel-Panhuizen, 2003; Van Dijk with his partner, 2003; Elia et al., 2009). However, reading comprehending skills allow students to become sensitive to syringe complexity in a matter of words that seem to be less trained and less clear in RME teaching practice, although importance has been demonstrated in previous studies (e.g. : De Corte et al., 1985, 1990; Hegarty et al., 1992). This is probably because teachers may underestimate or are not aware of the importance of reading comprehending skills to solve word problems (Hajer, 1996; Van Eerde, 2009). Therefore, the current approach to problem-solving teaching seems to emphasize the development of mentally representative skills, but seems to pay less the role of reading comprehending skills. In this way, the word problem-solving taught in the RME curriculum does not seem to match what is currently known from research on factors related to problem solving from efficiency. Based on the above analysis of the RME curriculum it seems legitimate to assume that students attending such a curriculum can be a disadvantage when the synthe language characteristics of a word problem must be taken into account. That is, students from an RME curriculum are likely to have difficulty solving problems from mathematics with high synistic-language complexity. To test this assumption, we compared students' performance on issues from obtained while following the RME curriculum with their performances in a mission to solve problems from independents. First, we classify students as problem solveers from success or less successful with the help of a math test as part of the RME curriculum, viz., CITO math test. This test can be considered a method-specific (i.e. RME-specific) math test for student word problem-solving performance, as it is built on the teaching method currently used to solve word problems. Therefore, this test reflects the skills that students learn in RME classrooms, to solve word problems (Doorman et al., 2007; Hickendorff, 2011). Secondly, we tested students' performance in an independent word problem-solving test, which has one of two word problems that they can solve by using only their mental representation skills, or word problems that require them to also rely on their reading comprehending skills to handle systical-language complexities in the word problems. This procedure provides an advantage over previous studies of, among others, Hegarty et al. (1995), Pape (2003), and Van der Schoot et al. (2009), which often used the study's primary dependency variable (i.e., successful problem solving) as a measure of outcome as well as a means to classify students as problem solvers from success and little success. On the other side, the classification used in the current study is based on an external measure, well established in terms of problem solving from mathematics, independent of the main dependent variable of the study (i.e. solving the problem from success). This allows us to compare groups more meaningfully. As mentioned earlier, an important aspect of distinguishing success from problem solving is less success regarding their ability to build an accurate spiritual representation of problem writing. Previous studies have shown that asking students to address comparative issues, especially inconsistent comparison issues (see Example 1), is an appropriate method of investigating whether they effectively build a representative correct god of problem statement (e.g. Pape, 2003; Van der Schoot et al., 2009). [Example 1 - inappropriate problem] At the grocery store, a bottle of olive oil costs 7 euros. That's 2 euros more at the supermarket. If you need to buy seven bottles of olive oil, how much will it cost at the supermarket? [Example 2 – consistent word problem] At the grocery store, a bottle of olive oil costs 7 euros. At the supermarket, a bottle of olive oil costs 2 euros more than at the grocery store. If you need to buy 7 bottles of olive oil, how much will you pay at the supermarket? In inconsistent word issues such as the one presented in Example 1, the translation process requires determining the subjective reference 'i.e.,' which is an index of the relationship between the value of the first variable ('the price of a bottle of olive oil at the grocery store') to the second ('the price of a bottle of olive oil at the supermarket'). This identification is necessary to become aware of the fact that, in an inappropriate comparison issue, the term 'more' refers to a subtraction activity rather than an additional activity. So inconsistent word issues create greater cognitive complexity than consistent word issues (see Example 2), which requires students to ignore the well-established link between gain and plus, and less with reduction and subtraction (Schumacher and Fuchs, 2012). Experimental evidence ate this explanation by suggesting that people who solved the word problem created more inconsistent errors (reversals) than consistent word problems (i.e. consistent effects, Lewis and Mayer, 1987; Pape, 2003; Van der Schoot et al., 2009). Especially those students who do not build an accurate spiritual representation of problem statements, and therefore immediately begin to calculate with certain numbers and relational terms, seem less successful on issues from inappropriate (Hegarty et al., 1995). In the current study, we expect to be unsuccessful as well as many successful problem solve solves to experience difficulties with solving comparison problems from the right. However, we have assumed that people who solve problems from success in the RME curriculum will have less difficulty solving inconsistent comparison issues precisely due to their re dependence on mental representation skills (available in the problem solving guidelines from within the RME) , than those who solve less successful problems, those who use a more superficial problem-solving method (Verschaffel et al., 1992; Van der Schoot et al., 2009). It is important to note that this only keeps fit and inconsistent comparison of problems with a low sylyous complexity; that is, the issues only exploit the student's ability to build an accurate spiritual representation. If the systling complexity of comparison issues increases, we hope that even students classified as problem solves from success (according to our classification based on RME guidelines) may have difficulty with accurately resolving inconsistent comparison issues. In this case, solving a word problem requires students to use both mental representation skills and reading comprehensible skills, while word problem solving guidelines in RME (perhaps) have provided students with only significant training in the first of these two skills. A relatively studied and accepted way to increase the systual complexity of (inappropriately) comparing problems is to manipulate the terminology of relationships (Lewis and Mayer, 1987; Van der Schoot et al., 2009). According to the principle of marking from King (Clark, 1969), the processing of relational terms is marked (such as 'less' in the left word pair meaning 'less', 'narrow' in 'narrow' or 'short' in 'high-short') than unmarked relational terms (e.g., more, wider, higher). In line with this, research has shown that students find it easier to convert unmarked relationship terms 'more' into a minus activity than the term 'less' marked relationship into an additional activity (Clark, 1969; Lewis and Mayer, 1987; Kintsch, 1998; Pape, 2003; Van der Schoot et al., 2009). In the current study, we therefore refer to word issues that contain a marked relational term ('more than') as more complex word issues of syringes, while word problems with an unmarked relationship term ('less') are called issues from less styling (see Examples 3 and 4 for example examples of word issues marked and not marked accordingly). More importantly, the difficulties experienced with solving problems from inappropriate marking lie in the fact that these problems draw on the use of students' mental representation skills as well as on their reading comprehending skills. Accordingly, the influence of reading comprehending skills on problem solving can only be studied for students who represent the question correctly, i.c. the group of problem solve solves succeeds in our research. So while the group of problem solveers from our success may be based on their mental representation skills, insufficient attention to reading comprehensing skills in RME's educational practice is likely to make it difficult for them to correctly solve (synative complexities) marked problems from inappropriate. [Example 3 – word marking problem] At the grocery store, a bottle of olive oil costs 7 euros. At the supermarket, a bottle of olive oil costs 2 euros less than at the grocery store. If you need to buy seven bottles of olive oil, how much will you pay at the supermarket? [Example 4 – unmarked word problem] At the grocery store, a bottle of olive oil costs 7 euros. That's 2 euros less than at the supermarket. If you need to buy seven bottles of olive oil, how much will it cost at the supermarket? According to some researchers, the extent to which problem solveers from success may be able to overcome difficulties with correctly solving problems from inappropriately marked is related to their reading comprehending skills (e.g., Lee et al., 2004; Van., 2009). Translate a relationship term marked as 'less' into an additional activity found to be closely related to the general measure of reading comprehend (Lee et al., 2004; Van der Schoot et al., 2009). This suggests that reading comprehensing skills, along with mental representation skills, may be necessary to deal with complex syntic word problems. Therefore, current research also take into account students' overall reading comprehensibility. In summary, the current study aims to test the following hypothesis: 1. We hypothesized that, due to the difficulties in building a coherent spiritual representation of word problems, those who solve the problem from less successful in the RME curriculum will make more mistakes on both unmarked and inappropriate word problems compared to unmarked and consistent word issues. 2. We hypothesized that, due to insufficient attention to reading comprehension skills in word problem-solving teaching, those who solve problems from success in the RME curriculum will have difficulty solving problems from systical complexity, marked as inappropriate , but does not solve problems from less complicated, unmarked, inconsistent. 3. We hypothesized that, as a result of the alleged relationship between reading comprehension and the ability to overcome the systical language complexity of a word problem, a positive relationship for successful problem solvers exists between reading comprehension and the number of word problems correctly solved inappropriately. Documentation and methods Of selecting participant data from 80 sixth graders of the Netherlands (42 boys, 38 girls) from eight primary schools in the Netherlands were collected. These students had an average age of 11.72 years ($SD = 0.40$). They were divided into two groups (by the average division method) on the basis of their scores in the Math CITO (Educational Measurement Institute) test (2008). This selection procedure resulted in a group of problem solves from less success ($N=41$) and a group of problem solving from success ($N=39$). The CITO Math Test is a nationwide standardized test that reflects how to solve problems from being guided in Practical Mathematics Education. The test contains factors such as mental angology (addition, subtraction, by-and-divide), complex applications (issues related to multiple activities) and measurement and photometer (knowledge of measurement situations), all provided as problems from mathematics. The internal consistency of this test is high (Cronbach's $\alpha = 0.95$, Janssen et al., 2010). Parents have provided written consent based on printed information about the purpose of the study. This study was carried out in accordance with the ethical procedures of Vrije Universiteit Amsterdam. Instruments and processes Two measuring instruments used in The study was administered to students by three independent research assistants trained in a session of about 45 minutes. Inconsistent Tasks Inconsistent tasks contain eight two-step comparison issues (see Appendix in Additional Documentation) selected from Hegarty et al. study (1992) and translated into Dutch. The first sentence of each comparison issue is a transfer statement that expresses the value of the first variable, namely the price of a product at a well-known Dutch store or supermarket (e.g. At Aldi a bottle of wine costs 4 euros). The second sentence contains a relationship statement, which shows the value of the second variable (i.e. the price of this product at another store or supermarket) in relation to the first time (e.g. At Boni, a bottle of wine costs 3 euros more than at Aldi). In the third sentence, the problem solveer is asked to find a multiple of the value of the second variable (e.g. If you need to buy three bottles of wine, how much will you pay at Boni?). The answers to these comparative problems always involve calculating the value of the second variable (e.g. $4 + 3 = 7$), and then by following this solution by the number given in the third sentence (e.g. 7 times $3 = 21$). Eight comparison issues have been separated from four different types of issues (see Appendix in additional documentation) by passing two factors in the following topic: Consistency (consistency versus inappropriateness) and Markedness (unmarked vs. markers). Consistency refers to whether the term relationship in the second sentence is consistent or inconsistent with the required angology activity. A consistent sentence that clearly expresses the value of the second variable (e.g. At Boni, a bottle of wine costs 3 euros [more/less] than at Aldi) introduced in the previous sentence (e.g. At Aldi, a bottle of wine costs 4 euros). An inconsistent sentence relates to the value of the second variable with the first variable using an official reference (e.g. It is 3 euros [more/less] than at Aldi). Therefore, the term relational in a matter of consistent comparison primed the appropriate aoary activity ('more' when the necessary activities are additional, and 'less' when the activity requires subtraction). The term relational in an inconsistent comparison issue primed inappropriate aoary activities ('more' when activities require subtraction, and 'less' when the required activity is additional). Markedness refers to whether the term relationship is a tick (i.e., less) or an unmarked member (i.e., more) of the antonym pair 'more-less.' As mentioned earlier, markedness has been used to manipulate the synology of relational terms. The term marked relationship (i.e. smaller) is more synative than the unmarked relationship term (i.e. more). Therefore, the problems of marked and unmarked words are considered more complex in terms of symism synate problems are less complicated accordingly. The stimuli are arranged into four sets of materials. Each participant is presented with eight word issues, two from each word issue type. The order in which word issues were presented in each set was pseudorandomized. Each set is presented to 20 participants. On the set and among the participants, each word problem occurs equally frequently in unmarked/consistent, marked/consistent, unmarked/inconsistent and marked/inconsistent versions to ensure a full combination of conditions and documentation. On word issues, we control for the difficulty of the necessary calculations, and for the number of letters in the name of variables (i.e., stores) and products. To ensure that the implementation of the necessary aology activities will not be a decisive factor in the student's problem-solving performance, the activities were selected on the basis of the following rules: (1) the answer to the first step of operation under 10; (2) the final answer is between 14 and 40; (3) none of the first steps or final answers contain a fraction of a negative number or number; (4) no number value occurs twice in the same issue; and (5) no (possible) answer is 1. The number values used in the consistent and inconsistent issues of each type of word problem have been combined for great length (see Van der Schoot et al., 2009). For the analysis, we looked at student accuracy (i.e. the number of correct answers) per four-word problem type: (1) unmarked/consistent; (2) marking/consistency; (3) unmarked/inappropriate; and (4) marking/inconsistent. The internal consistency of this measure in the current study is high (Cronbach's $\alpha = 0.90$). The (Grade 6 version of) standardized CITO (Educational Measurement Institute) Reading Comprehending Test (2010) of the Dutch National Institute of Educational Measurement was used to assess children's reading comprehensiation. This test is part of the Dutch standard CITO student monitoring system and is designed to determine the overall level of reading comprehending in primary school children. This test consists of two modules, each involving one text and 25 multiple choice questions. Questions related to words, sentences or text levels, and exploit both the text base and representative situations that the reader builds from the text (Kintsch, 1998). In this test, children's reading comprehending levels were expressed by reading proficiency scores, which, in this study, ranged from 15 to 95 ($M = 40.51$, $SD = 13.94$). The internal consistency of this test is high with an alpha of Cronbach's of 0.89 (Weekers et al., 2011). Data Analysis 2 × 2 2 × 2 (ANOVA) Ertho Edation Analysis (ANOVA) is performed with consistency (consistency vs. in consistency) and Clarity (unmarked vs. markers) as factors in the subject and Group (less successful than problem solving from success) are factors topics. topics. tests are performed using paired sample t tests. The part eta median (θp2) is calculated as an effect size measure (Pierce et al., 2004). According to Pierce et al. (2004), values of 0.02, 0.13 and 0.26 represent small, medium, and large effect sizes respectively. In the current study, the role of reading comprehending in the four types of word problems was examined by calculating the product-moment correlation (Pearson's r) between reading comprehending and score differences between the types of issues from inconsistent and consistently marked, and the correlation between reading comprehending and score differences between the types of problems from inappropriate and appropriate marking. These score differences reflect differences in performance between the types of issues from consistent and inconsistent, and can be taken as a measure of the extent to which students can build a mental representation of the problem situation described. The lower the spread score, the less conflicted the problem solveer. The first correlations are calculated for problem solving from little success and success to each other, and then, to test the third hypothesis, for each of these groups separately. Our approach deviates from, but provides a more important advantage, research by Van der Schoot et al. (2009), who added reading comprehended as a covariate in ANOVA repetitive measures. That is, the results obtained by Van der Schoot et al. (2009) can only provide limited insight into the exact locus of the covariate effect, since it is not known which group (who solves the problem from little success or success) or in which this type of word problem (consistently unmarked/marked or inappropriately unmarked/marked) reading comprehend plays a role. Moreover, it indicates that the ancova repetitive measures do not change the main impact of repetitive measures compared to evaluating the main effects through a simple repeat measure ANOVA (see Thomas et al., 2009). So the approach used in the current study allows us to get more specific insight into the exact role of reading comprehending in solving word problems. In all analysis an alpha of 0.05 was used to check the importance of results. Results The overall means (M) and standard deviation (SD) for key factors in this study, as well as the relationship between their vehicles, are shown in Table 1. It can be seen that there is a significant primary impact of Consistency [$F(1.78) = 23.84$, $p = 0.00$, θp2 = 0.23], which indicates that consistent word problems have been more accurately completed than inconsistent word problems (i.e. consistency effects). There is no significant major effect of Markedness [$F(1.78) = 2.64$, $p = 0.11$], suggesting that overall there are not many errors made on the marker than on unmarked word issues. The main effect of the Group is also insignificant = 1.15, $p = 0.29$)], indicates that those who solved the problem successfully overall did not show higher problem solving performance less successful problem solveer. GROUP 1. Generally means, standard deviation and correlation of key variables. Regarding the interaction effect between Consistency and Clarity, the analysis showed a significant interaction [$F(1.78) = 7.64$, $p = 0.01$, θp2 = 0.09] showing that overall consistency effects were present for marked word issues but were absent for unmarked word issues. Of more interest, in light of our hypothesis, is that, as expected, × different interactive markedness for problem solveers from less success and success. This is evidenced by a significant three-dimensional interaction between Consistency, Clarity, and Group [$F(1.78) = 4.32$, $p = 0.03$, θp2 = 0.05]. In Figure 1, word problem-solving performance is presented as a consistent (consistent versus inappropriate) function and markedness (marked versus unmarked) for less successful problem solveers (Figure 1A), and for successful problem solveers (Figure 1B), respectively. FIGURE 1. Performance across four types of word problems for less success (A) and problem solving success (B). As shown in Figure 1A, the main effect of Consistency [$F(1.38) = 8.16$, $p = 0.01$, θp2 = 0.18] indicates that problem solveers from less successful show consistent performance. With insignificant consistency × Interaction markedness [$F(1.38) = 0.25$, $p = 0.62$], a consistent effect was present for both marked and unmarked word issues. No significant major effects of Markedness were found [$F(1.38) = 0.12$, $p = 0.74$]. Therefore, problem solveers from less successful implementation are significantly lower on both types of unmarked and inconsistent word problems, compared to the types of problems from unmarked and marked consistently [$t(38) = 1.86$, $p = 0.04$; $t(38) = 2.57$, $p = 0.01$ respectively]. As can be seen in Figure 1B, the group of successful problem solve solveeres is like those who solve less successful problems where there is the main effect of Consistency [$F(1.40) = 16.29$, $p = 0.00$, θp2 = 0.29], but there is no significant major effect of Markedness [$F(1.40) = 0.27$, $p = 0.61$]. However, in contrast to the group of unsuccessful problem solveers, consistent efficiency in the group of successful problem solveers was present to mark but absent for issues from unmarked [Consistency × Interaction marker: $F(1.40) = 17.44$, $p = 0.00$, θp2 = 0.30]. This indicates that the problem solveer from successfully performing is significantly lower on the inconsistent marker than the appropriate marker from the problem [$t(40) = 5.07$, $p = 0.00$], while the performance on the unmarked match and unsymed inconsistent type of problem does not significantly differ [$t(40) = 1.52$, $p = 0.13$]. In summary, these findings suggest that those who solve problems from less successful have demonstrated consistent effect on both systiest-simple language (i.e., unmarked) and complex (i.e., markers) from the problem, while problem solving from success only proves consistently effective when writing problems from complex containers features (i.e., markers). On the role of reading comprehending skills in problem solving from the following findings have been obtained. Overall, there is a significant correlation between reading comprehensible scores and mathematics obtained from the curriculum-specific RME test ($r =0.59$, $p=0.00$). This suggests that students with higher reading comprehensing scores also showed higher scores on the RME math test. To get more detailed insight into the role of reading comprehending skills in solving marked and unmarked word problems, reading comprehen comprehensing scores that are correlation with distinct (inconsistent - consistent) scores are counted for the types of word problems that are marked and unmarked. The results showed that reading comprehendability was significantly correlationd with spread scores for unmarked word problems ($r = 0.19$, $p = 0.04$) and had a significant correlation with the difference for marked word problems ($r = 0.17$, $p = 0.06$). This suggests that overall reading comprehendability is associated with solving both marked and unmarked word problems. When looking at successful problem solveer and less successful separately, the results showed, similar to the overall findings, that reading comprehensible was significantly correlation with scores on the RME-specific math test for both success ($r=0.48$, $p=0.00$) and less successful problem solving ($r=0.64$, $p = 0.00$). Therefore, to solve the problem successfully and less successfully the ability to read comprehend higher was associated with higher RME math scores. Furthermore, problem solve solves from success ($M = 46.42$, $SD = 2.66$) scored significantly higher on the standardized reading comprehending test than those who solved the problem from less success ($M = 35.02$, $SD = 1.27$) [$t(53.32) = 3.87$, $p = 0.00$]. More specific analyses focusing on the hypothetical relationship between reading comprehension skills and solving inappropriate word problems are marked to show the following detection pattern. In line with our expectations, the results of correlation analyses between reading comprehensible and differentiated scores for marked and unmarked word issues show that only in the group of problem solvers from successful score differences to the type of problem marked is significantly related to reading comprehending (r=-0.40 , p = 0.01). More importantly, reading comprehendation does not match the problem solveer's distinct score from success to unmarked word issues (r=-0.27, p=0.10). Furthermore, in the group of problem solveers from less successful, reading comprehendation also does not match the difference scores calculated for either unmarked (r=-0.04, p=0.76) or marked word issues (r=-0.04, p=0.83). Therefore, only in the group of problem solves from success, higher reading comprehensing scores are associated with smaller spreads. That is, security vulnerabilities for consistent effects on word issues are marked lower students have a higher ability to read comprehend. This suggests that students with a higher reading comprehensible ability seem to be less primed to an inappropriate angology activity (i.e., being directed towards an activity subtract by 'less' while supplementation is needed) in solving inappropriate word marking issues. Discussion This study was driven by the observation that modern RME primarily teaches students to use their mental representation skills, and focuses much less on the use of reading comprehension skills, to solve problems from mathematics. In this context, we set out to investigate the assumption that students from an RME curriculum experience the difficulty of having to solve problems from mathematics to systical-language complexity. Therefore, we have designed a study in which we not only manipulate the extent to which mental representation skills are required, but also change the synative complexity of word problems using a tick (i.e., high synative complexity) or unmarked (i.e. , complex synology low) terminology relationship in word problem text. Furthermore, we classify students as those who solve problems from success and are less successful on the basis of their performance in an independent and well-established math test dedicated to RME. Using this classification process, it is hypothesized that those who solve problems from less successful will have difficulty with correctly solving inappropriate word problems regardless of their systical complexity (Hypothesis 1). This hypothesis has been confirmed by our analyses, suggesting that those who solve the problem from less successful perform poorly on both issues from being marked and not marked inappropriately. Solving the problem from success, on the other, was able to effectively solve the problem from inconsistent low syn syceficiency. Therefore, these findings suggest that RME-based classifications in successful and less successful problem solving are also reflected in our experimental problem-solving tasks. However, in terms of complex systical problems even those who solved the problem successfully struggled, as indicated by the large number of errors they made on the problems from the inconsistent word marked (Hypothesis 2). More specifically, problem solveers from successfully finding it harder to translate a marked relationship term ('less') into an additional activity, than to translate an unmarked relationship term ('more') into a minus activity. These findings again support previous observations that the (subtle) linguistic systling elements of a word problem, more specifically the term relationship marked, affect the word problem solving success (Clark, 1969; Lewis and Mayer, 1987; Kintsch, 1998; Pape, 2003; Van der Schoot et al., 2009). Moreover, they are consistent with the ongoing experimental work of reporting dealing with marked, suggested terms that are due to synable representation of negativity of pairs of contradictory words (e.g. more than less) such as 'less' fixed and more complex, and therefore less likely to be reversed, than anoms such as 'more than' (e.g., Lewis and Mayer, 1987; to explain in detail the basic mechanism, see, for example Clark, 1969). For example, previous studies have shown that students are less likely to recall correctly marked terms in memory tasks (Clark and Card, 1969), which have slower naming responses to terms marked in naming tasks (Schriefers, 1990), which have slower resolution times for problems with admons marked in reasoned matters (French, 1979), and, the findings replicated in this study, have problems reversing a marked inappropriate word problem (e.g., Pape, 2003; Van der Schoot et al., 2009). More importantly, our results reveal interesting situations where students are classified as problem solveers from success in an unsuccessful RME curriculum in solving problems from complex (inappropriate) synology. The fact that successful problem solve solves have been able to solve problems from inconsistent with lower synative complexity suggests that this poor performance on issues from syntic complexity is not due to deficiencies in their mental representation skills. Instead, it seems that successful problem solve solves are particularly difficult to effectively handle synling-language complexity in word problems. This suggests that students lack the reading comprehending skills needed to identify and translate a primed mathematical activity to the 'from the appropriate problem' of mathematical activity. In case of marking problems from inappropriate, this means that even successful students find it difficult to convert 'less' into an additional activity. Although it can be argued that this may be the result of relatively little attention to the development of reading comprehending skills in the context of problem solving from mathematics in RME (e.g., Elia et al., 2009), this diagnosing explanation needs to be further demonstrated in future research. Build on previous studies (e.g. Lee et al., 2004; Van der Schoot et al., 2009), another purpose of this study is to investigate whether reading comprehending skills can help (successfully) from problem solving to overcoming complex synular terminology that marks relationships in a problem from inappropriate. In line with our expectations, reading comprehension is positively related to performance on marked (but unmarked) word issues that are not suitable for groups of problem solveers from success, while for less successful groups no important relationships are found between reading comprehension and word problem solving (Hypothesis 3). These results provide evidence that reading comprehending skills generally play an important role in students' ability to correctly address complex synology problems. Moreover, our findings represent an improvement over previous work by more determine what kind of word problem and the student's ability to read comprehend can work. This study found that reading comprehending skills are particularly useful when it comes to improving performance on issues from systology complexity by people who solve problems from success (cate classified according to the RME math test). More specifically, reading comprehending skills are involved in solving problems from primarily in helping students effectively translate complex relational terms (i.e. marked) encountered in word problems that are inconsistent with correct mathematical activity (i.e. complementary). From there, it is clear that reading comprehending skills provide a valuable addition to the mental representation skills to solve word problems, and simply relying on mental representation skills is not enough to correctly solve problems from complex sytheism. This suggests that in addition to teaching students to use their mental representation skills to solve word problems, word problem-solving guidelines require adequate attention to develop and use reading comprehending skills related to identifying and dealing with sythe-language features in word problem statements. It is important to start developing such skills early in primary school, as word issues become more systically complex as students progress in their educational careers, for example when making the transition from primary to secondary (Silver and Cai , 1996; Helwig et al., 1999). Especially in teaching methods that focus on solving word problems that show the imbalance between the teaching time spent teaching mentally representative skills and reading comprehensing skills, such as in RME, it is important to make teachers aware of this inequality distribution. Encouraging them to pay more attention to reading comprehending skills and teach students how to deal with synling-language characteristicss in word problems will then provide a good starting point towards more balanced problem-solving guidelines. Moreover, it is useful to make a difference between learning to handle more subtle systy-language text features (such as a marked relational term) and dealing with more general systy text complexity (such as the relation of information in word problem text , the clarity of the relationship described, and the order of the elements known in the word problem text). These and other practical aspects of the results, such as finding the optimal balance between the number of teaching skills of strategic spiritual representation and reading comprehending skills, are still addressed in future research. Presumably, intervention programs are now effectively focused on both strategic mental representation skills and reading comprehensing skills, such as diagram-based tutorials (e.g. Jitendra et al., 2002, 2011) and the Solve it guide! (Montague et al., 2000; Krawec et al., 2013), can provide an effective starting point in pursuit of this challenge. Contributing Authors All authors are listed, have made significant, direct and intellectual contributions to the work, and approved it for publication. Conflict of Interest Statements The authors claim that the study was conducted in the event that there were no commercial or financial relationships that could be understood as potential conflicts of interest. Additional documentation For this article can be found online at:

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