



EVALUATION OF A QUESTIONNAIRE CONCERNING WORD PROBLEMS CREATING

EVA MOKRÁŇOVÁ

ABSTRACT. *In Mathematics Education seminar we conducted a research probe mapping the ability of future mathematics teachers to create their own word problems in the relevant context. The article offers the evaluation of the questionnaire, which was consequently given to the students - future teachers of mathematics.*

KEY WORDS: *work problems, mixture, research probe, questionnaire evaluation*

CLASSIFICATION: *F90*

Received 21 April 2014; received in revised form 7 May 2014; accepted 12 May 2014

Introduction

We often hear the opinion that the connection of the real world and the mathematics teaching is important and necessary. This connection is often superficial in the classrooms. From our point of view it is caused by the following reasons:

- Math teachers don't have enough materials, textbooks and collections of mathematical tasks (mathematical tasks may be simple equations, word problems, or measurement activities) that support the inclusion of situations from everyday life into mathematics teaching.
- Teachers are not able to integrate the problems of everyday life to mathematics teaching.
- Students' knowledge is not sufficient for everyday life complex problem solving.
- Many tasks are referred to as "pseudo-realistic". Often neither context nor the data used are real [3].
- The task context is not interesting for students.
- Real-world mathematical tasks usually cannot be directly applied into teaching; they have to be modified due to the pedagogical and practical reasons.

We realize that there might be more reasons than we have mentioned. For this reason, we believe it is important that future mathematics teachers are not only able to solve problems with real context, but also to create them. They should be prepared for this task during their university studies.

The research problem

In the Didactics of Mathematics seminar, we mapped the ability of the second year Master's students of Mathematics Education to individually create word problems with real context.

In 2010, we carried out the first research probe concerning the creation of word problems on the uniform linear movement with a realistic context. The results were presented on Zilina Didactic Conference with international participation didZA [2].

The second research probe was carried out in 2012 on eight students. The aim of the seminar was to summarize the methodology of word problems, to show to students the aspects of the formation of word problems with real context and subsequent independent work of students. The students' task was to create four work word problems and four word problems about mixtures from everyday life.

From created tasks we composed two databases. The first database contains 32 work word problems and the second database 32 word problems on mixtures. At the next seminar, each student addressed four work word problems and four problems on mixtures selected from these databases so that no student got his own task. For each task students received a questionnaire for the task assessment. The seminar was attended only by seven students so there were only 28 questionnaires returned.

The questionnaire includes questions from three different areas:

A. The task's context

B. Intelligibility

C. Numerical data

Evaluation of the questionnaires:

A. The task's context

1. What is the context of word problems?

As we have already mentioned, many word problems in textbooks and in task collections are "pseudo - real". For this reason, in the first question we examined what context were the tasks created by students associated with. In the second question we wanted to find out if the created tasks come from everyday life.

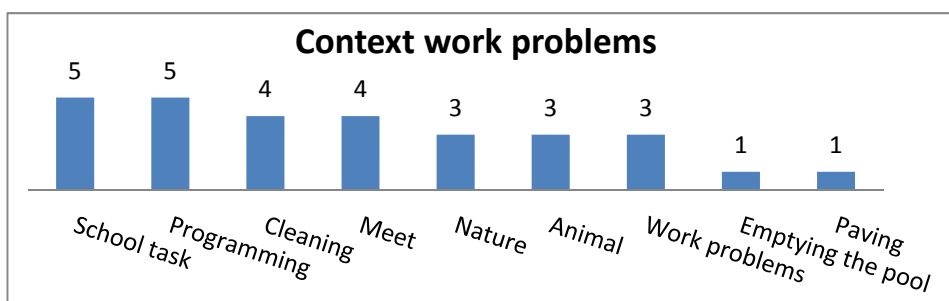


Figure 1

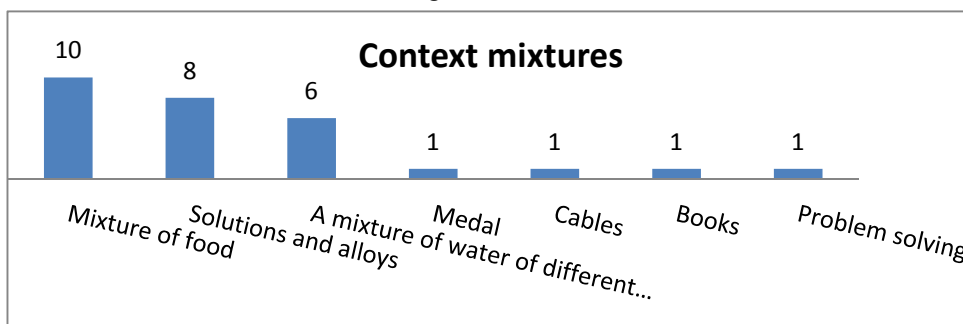


Figure 2

2. The word task has:
- Context from real life
 - Abstract nature

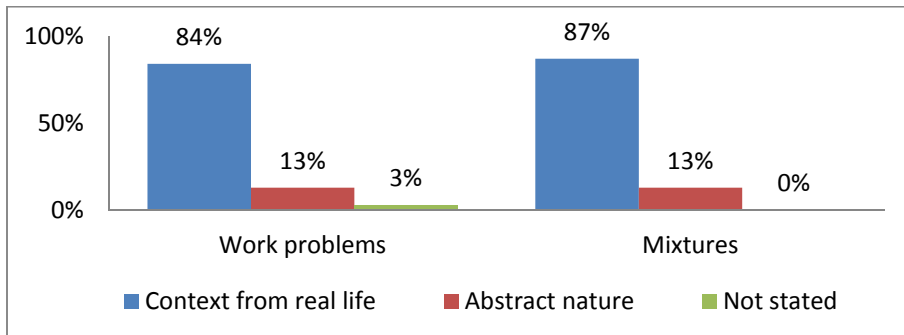


Figure 3

In spite of the fact that the students' task was to create word problems with real context, 13 % of word problems in both databases has abstract character.

B. Intelligibility

3. Assignment of the word task is:
- Understandable
 - Partially understandable
 - Rather unclear
 - Partially unintelligible
 - Unintelligible

We often see that tasks are unintelligible and unclearly formulated for students. Therefore, we think that creators of word problems should have the created word problems solved by at least one student in order to eliminate possible errors in the formulation.

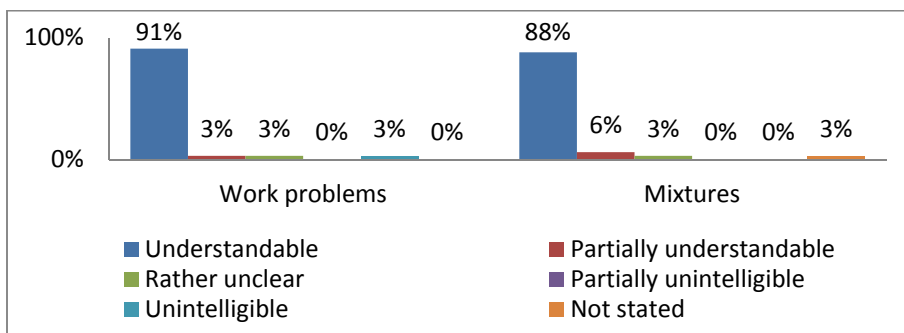


Figure 4

Students who considered the tasks to be partially unintelligible or unclear could reformulate them to be understandable. Despite this, students reported that 3 % of the tasks seemed unintelligible; none of them had reformulated them.

4. The number of sentences in word problems.

Students generally prefer to solve tasks with briefly and clearly specified task's conditions and questions. In lengthy texts students lose the meaning and do not know what to solve.

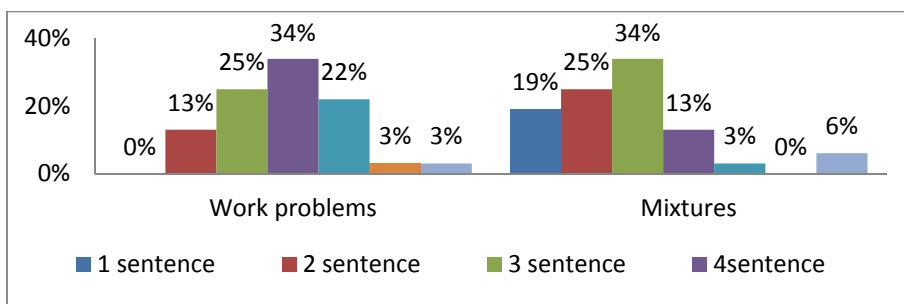


Figure 5

5. The number of questions in word problems.

The research that we have carried out on a sample of 9th grade students shows that if the task has more questions, students often respond only to the first one and forget to solve the second one.

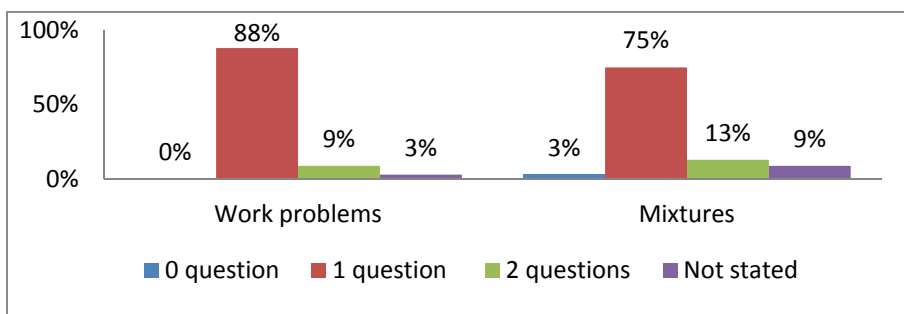


Figure 6

6. Task is given:

- a) By imperative
- b) By question

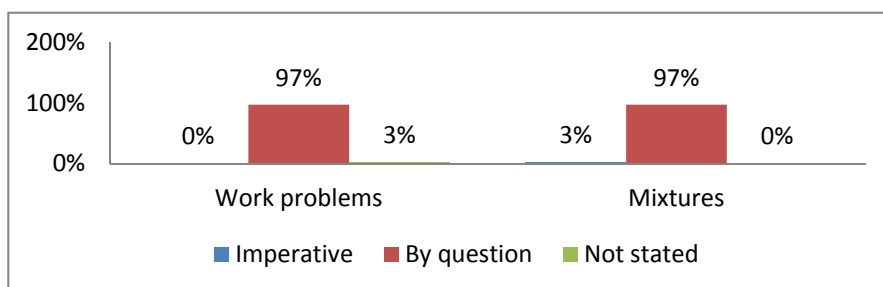


Figure 7

C. Numerical data

7. Numerical data in the assignment of word problem are real:

- a) Yes
- b) No
- c) I do not know

In this question we examined whether the data used in the assignment are real, because the created context is often real, but the data are not.

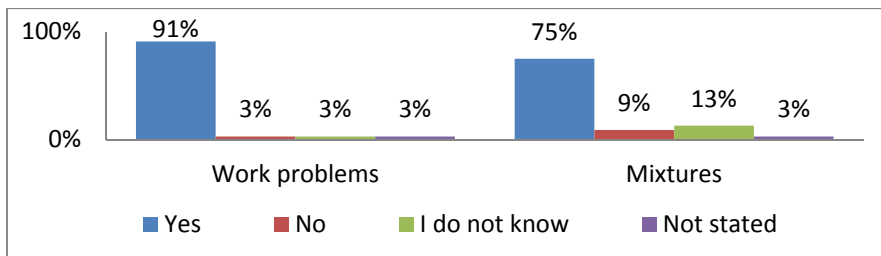


Figure 8

8. The number of numerical data in word problem leading to numerical result is:

- a) Sufficient
- b) Insufficient
- c) Word problem includes extra data.

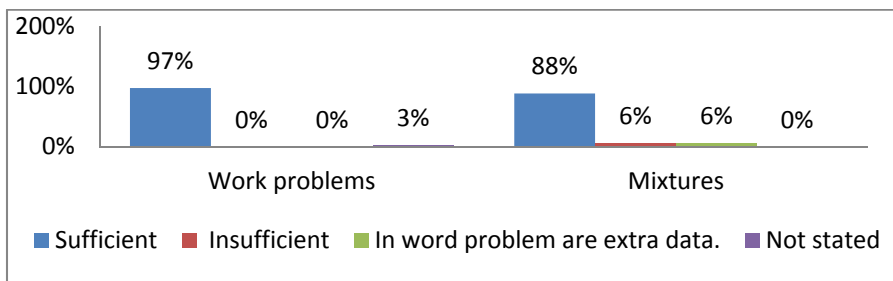


Figure 9

9. Numerical result of a word problem is:

- a) Integer
- b) Fraction
- c) Decimal number

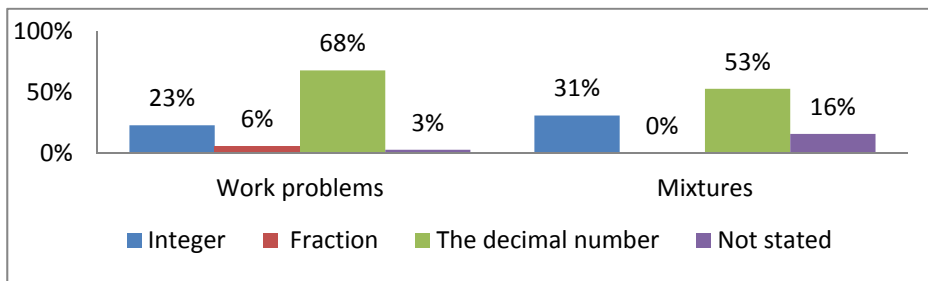


Figure 10

68% of students who have solved the work word problems stated the result in decimal form, in case of mixture tasks it was 53 %. Such result is often rounded, although students interpret results of tasks more often as a decimal number than as a fraction, as it is more precise and concise.

10. At this point we left to students the space for their comments on word problems.

"It is not a work word problem"

"I can't get the result."

"Difficult."

"The task has no logical solution; prices should be given in reverse."

"The result contradicts the conditions of the assignment."

"The result does not make sense; we do not buy" negative "quantity of goods."

"The word problem is more likely for the better students."

Conclusion

Currently, math teachers are forced to create their own materials and teaching tasks. Our effort at the seminar was to present the issue of creating work word problems and word problems about mixtures, as well as to offer a methodology of word problems creation to mathematics education students.

Despite the fact that the students identified the created problems as having a real basis in the questionnaire, many of them were "pseudo-real". The tenth section of the questionnaire shows that students often did not approach the tasks creation responsibly and were not solving the word problems they did not create.

Nevertheless, we think that within the Didactics of Mathematics it is necessary that students create their own databases with word problems that might be useful for them in their future role as teachers in schools.

References

- [1] Gainsburg, J. 2008. Real-world connections in secondary mathematics teaching. In: *Journal of Mathematics Teacher Education*, Vol. 11, 2008. P. 199-219. ISSN 1573-1820
- [2] Mokráníová, E. 2010. Tvorba slovných úloh na rovnomerný priamočiary pohyb. In: *didZA 7: Nové trendy vo vyučovaní matematiky a informatiky na základných a stredných a vysokých školách*, 2010. P. 1 – 7. ISBN 978-80-554-0216-1
- [3] Ulovec, A. 2010. REAL-LIFE TASKS – MORE REALITY, PLEASE!. In: *ACTA MATHEMATICA 13*, 2010. P. 85 - 88. ISBN 978-80-8094-773-6

Author's Address

Mgr. Eva Mokráníová

Department of Mathematics, Faculty of Natural Sciences, Constantine the Philosopher University,
Trieda A. Hlinku 1, SK - 949 74, Nitra

e-mail: eva.mokranova@ukf.sk