

Lesson Plan: The BUS

Information

School: ZŠ a MŠ Ostrava-Zábřeh, Kosmonautů 15, příspěvková organizace

Students: Michaela Janáčková, Lucie Kobzová, Klára Šmírová, Michaela Škrabálková, Nikol Bystroňová, Karolína Hosová, Michaela Hladká

Subject: Maths (elementary school, grade 2 - 3)

Goals (targets, results):

To develop critical and logical thinking

To practice additions and subtractions (1 - 100)

To promote creativity, imagination and abstract thinking

To introduce Mr. Hejny's teaching method - procedure called "bus"

To introduce Mr. Hejny's teaching method - procedure called "digital numbers"

Means:

the online version of the presentation <http://www.slideshare.net/alengaholas/math-lesson-the-bus>, video for teachers to get the idea of the procedures <https://youtu.be/A3mqplpFg24>, crayons, paper, pencils, plastic bottle tops, cards with the names of bus stops, a box representing the bus, a bus or a picture of it, a steering wheel, a data projector

Description

Begin:

1° activity: Students introduce themselves, the project ideas and topic of the lesson 5'

Students mentioned that both activities are based on Mr. Hejny's Math methodology. His methodology is becoming the trend in the Czech Republic because it is based on logical thinking continual development and is engaging for all types of pupils. It is taught in one third of Czech elementary classes.



2° activity: CLIL part of the lesson

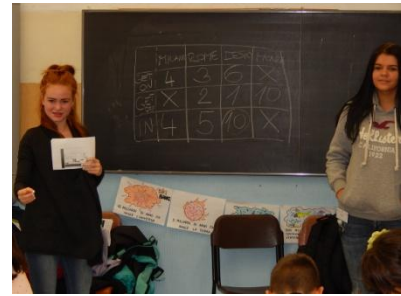
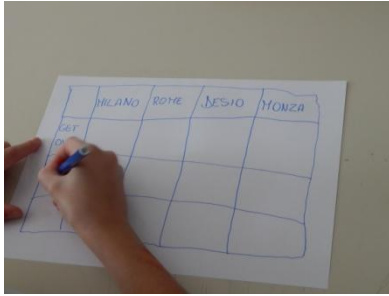
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In the beginning of the activity, the Czech students introduced the bus driver and taught two important words “get on” and “get off”. The narrator (Michaela J.) said these words and girls hopped towards the class or backwards. Next, we showed a slide from our presentation with some Italian words important for this lesson translated in English and Czech languages. Czech students were ashamed to use the Italian words but they could hear them and understand during the lesson when the translators were helping from time to time to get over language problems.

3° activity: Motivation part “Hop on the bus” role-play

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One student placed cards with 4 Italian cities (Milano, Desio, Roma, Monza) on desks. They represented bus stops. One student pretended to be a bus driver (Klara); she used a cap with the label “bus driver”, a driving wheel and a box with a bus picture on it. Other Czech students chose where they wanted to wait for the bus. (It is important to realize that nobody gets off on the first stop because the bus is coming from a garage obviously with no passengers on. This conclusion a teacher does not tell the pupils, they should make it for themselves. On the other hand, it is good to say that the bus driver is not a passenger in advance. If necessary, add that the bus is ALWAYS coming with no passengers on to the first stop.) The bus driver came to the first stop and announced its name (Milano). Then the bus driver asked who wanted to get on. Four Czech students hopped on (Michaela H., Nikol, Lucy, Karolina) and travelled on the bus to the next stop. The bus driver stopped on the second stop (Desio) and asked who wanted to get off. Two girls (Michaela H., Karolina) got off. Next the bus driver asked who wanted to get on. One girl (Michaela Š) hopped on. The bus went to the third stop (Monza). There were two Czech students waiting but only one of them wanted to get on. Nobody went off. They travelled to the last stop (Rome). The bus driver got to the last stop and asked passengers to get off. (On the last stop nobody is allowed to get on, people can only get off.) Then we asked Italian pupils how many passengers were on the bus when it came to the last stop. The Italian pupils were not told what they would be asked in the end of this activity. The only information was to watch carefully the role-play. It took a little time for pupils to recall everything and come with the correct answer. Then Italian and Czech pupils described together what was happening on each stop. Finally, the narrator showed the slide with the empty chart, asked pupils to draw it and asked the following questions: “How many girls got on in Milano? How many people were in the bus? How many girls got off in Desio? How many girls got on in Desio? How many people were in the bus? How many people got off at the third stop? How many girls got on in Monza? How many people were in the bus? How many people got off in Rome? How many people got on? Why? How many people were in the bus after the last stop? How many people were in the bus when it came to Milano? Why?” Then pupils checked their answers it, next slide in the presentation. Michaela explained why there were no passengers before the first stop in Milano and after the last stop in Rome. Czech students replayed the whole role-play; Italian pupils were telling them what to do. You can also ask who travelled from Milano to Rome (Lucy, Nikol), who travelled from Milano to Desio (Michaela H., Karolina), who travelled from Desio to Milano (Michaela Š.), who travelled from Monza to Milano (Michaela J.).



4° activity: procedure “The Bus”

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Now we were ready to do the procedure by Mr. Hejny’s methodology. The bus driver was carrying a box with the picture of a bus and doing the same actions as previously. But the order of the bus stops was changed. At each bus stop, one girl was waiting. They had a bag with plastic bottle tops. First the bus came to Milano. Four people (plastic bottle tops) got on. Lucy who was waiting at the stop took one bottle top and dropped it in the box from a height. Then she dropped the second top. Pupils were asked to watch, remember and NOT to count at LOUD. Then she dropped the third top and the last top. (It is important to do it properly. One hand, always the same one, takes a top. The arm with the top is raised high so that everybody can see it. No words are said, no comments. Then the arm goes down slowly. The top is dropped from above in the box which the driver is holding. The top makes a noise. If the class is really quiet, it is audible. The class always gets very quiet during this procedure. The children usually get it without being told that they must be absolutely quiet. Do not tell them to write the numbers of the tops. When the task is easy or the child has a good memory they do not feel the need to do it. As this procedure gets more and more complicated during the school years, the children sooner or later feel the need to develop a system of keeping a record about the actions. Later there are not just people getting on and off, the passengers are distinguished as girls and boys, adults and children, even pets are added.) Next stop was in Rome where two passengers got off. The bus driver took one bottle top from the box, raised the arm with the top high so that everybody could see it. Then the top was dropped even thrown on the floor. Then the second top was dropped on the floor. Everyone could hear the noise and knew that two people got off. No one was speaking. (Teachers can use the plastic bottle tops because they make a good noise, they do not break and there are easy to get. Some teachers use wooden sticks which are used in popsicles or by doctors.) After this Karolina who was standing at the second bus stop threw two bottle tops from above in the box, one by one as it was described above. Then the bus went to Desio where one passenger from the box got off, was thrown on the floor by the bus driver. Six bottles tops were thrown one by one in the box by Michaela H, who decide that six people want to travel to Monza. Now, nobody could see in the box and the crucial question of this procedure came: “How many people are in the bus?” Italian children started answering. Some guessing, then they started counting what was happening during the role-play. Finally, the bus driver took the tops one by one out of the box and threw them on the floor. There were ten tops. It is possible to replay this role-play or just describe what happened on each stop before you fill the information in the chart. (It is not necessary to fill a chart for a role-play but we had only one lesson to introduce this procedure). Then we asked the Italian pupils to take over and do the role-play.

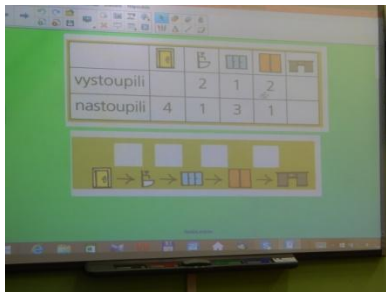




5° activity: word task for the procedure “The Bus”

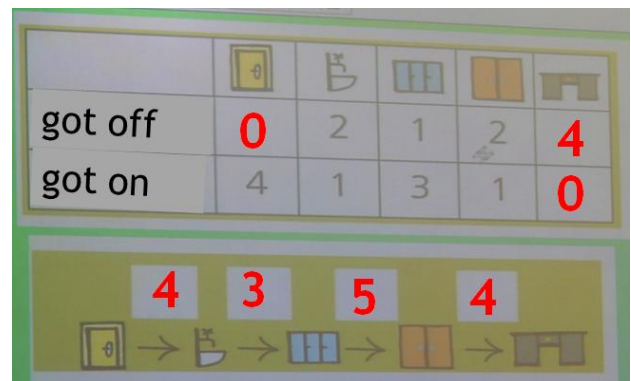
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The procedure described above can be done with or without the word task. In one of the photos above you can see some of the visuals used by Czech teachers for this procedure. Below you can see a picture from the textbook, “vystoupili” means got off, “nastoupili” means got on. There are also pictograms for different placements of the bus stops: at the door, at the wash-basin, at the windows, at the cupboard, at the teacher’s desk etc. under the task. In the square above the arrow is necessary to fill how many passengers were on the bus at that moment. The task is easy to make more difficult by giving less information. We did not do this activity with the Italian pupils because it took too long to do the previous activities due to their low knowledge of English but we did it with the Czech pupils during our rehearsal in Math lesson with class 3. A on 14 October 2015 in Ostrava. It is helpful to use visual means such as plastic bottle tops as you can see in the photographs below. In the pictures, pupils are working in little groups, the paper which they are holding contains the work tasks and they use the bottle tops to model the task without walking. The word tasks have quite often more than one answer and children are asked not only to find them all but also to explain why there are no other possibilities. Of course, some children are not able to solve the more difficult tasks. They do what is appropriate for their level and use visuals or the role-play. Many tasks are developed by the pupils.



Word task 1:

Answers for task 1:



Word task 1:

Answers for task 1 - boys:

	A	B	C	D	E
GET OFF			■ ▲		■ ▲
GET ON	■ ■	■ ▲ ▲	■ ■ ▲		
TOTAL					0
IN THE BUS		6			X

Fill in the numbers and pictograms. Find all solutions, explain why there are not more solutions.

	A	B	C	D	E
GET OFF	0	■ ■	■ ▲	* **	■ ▲
GET ON	■ ■	■ ▲ ▲	■ ■ ▲		0
TOTAL	4 + 0	2 + 4	4 + 6		0
IN THE BUS	4	6	10		X

- * a) If 0 or 1 boy gets off, then we will have more than 2 on the bus. But we need only 2 boys.
- b) If 2 boys get off, then no boy can get on.
- c) If 3 boys get off, then one boy must get on.
- d) If 4 boys get off, then two boys must get on.

Answers for task 1 - girls:

	A	B	C	D	E
GET OFF	0	■ ■	■ ▲	* **	■ ▲
GET ON	■ ■	■ ▲ ▲	■ ■ ▲		0
TOTAL	4 + 0	2 + 4	4 + 6		0
IN THE BUS	4	6	10		X

- * ** a) If 0 or 1 or 2 or 3 or 4 girls get off, then we will have more than 1 on the bus. But we need only 1 girl.
- b) If 5 girls get off, then no girl can get on.
- c) If 6 girls get off, then one girl must get on.

Answers for task 1 - girls:

ALL POSSIBLE ANSWERS: 6

Now we need to find all combination of the 3 possibilities for boys with the 2 possibilities for girls:

- 1) 2 boys get off and 5 girls get off/ 0 boy gets on and 0 girl gets on
- 2) 2 boys get off and 6 girls get off/ 0 boy gets on and 1 girl gets on
- 3) 3 boys get off and 5 girls get off/ 1 boy gets on and 0 girl gets on
- 4) 3 boys get off and 6 girls get off/ 1 boy gets on and 1 girl gets on
- 5) 4 boys get off and 5 girls get off/ 2 boys get on and 0 girl gets on
- 6) 4 boys get off and 6 girls get off/ 2 boys get on and 1 girl gets on

6° activity: Digital numbers

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Pupils need crayons. First our team checked if the Italian pupils understand the concept of a digital number and wrote some numbers on the blackboard. Next the Italian pupils were asked how many crayons they would need to write such a number. Then we asked them to pick 6 crayons and show them to us. Then they were asked figure out all digital numbers which can be written with them (0, 6, 9). Then we repeated the procedure with 5 crayons (2, 3, 5, 14, 17).



Experience

Try-out: 2015-20-10, Desio

Lesson 1: class 3 from Italian primary school IC di via Agnesi, 9 years old pupils

Lesson 2: class 2 from Italian primary school IC di via Agnesi, 8 years old pupils

Evaluation

Students:

Lucie: Teaching little children from grade 3 in Italy was sometimes really demanding, and teaching Math in English was not an easy thing to do. Nevertheless, the children were smart and many of them succeeded very well.

Karolina: Our team task was to come with a “playful” Math lesson. We chose the Mr. Hejny’s method which teaches children mathematical and logical thinking. Before departure we tried out our lesson with the Czech pupils from our school in grade 3 but they were taught with this method since grade 1 so they have somehow learnt the logic. In Italy, we went to teach children from class 2 who really loved our lesson because they even did not realize that they are learning to count and perceived it as game. In the end we gave them little gifts for their hard work.

Teachers:

Czech teacher: It was great to watch our pupils’ hard effort during preparing for our Math lesson, learning about the new Mr. Hejny’s methodology. I also had to contact my elementary colleague and ask her to help and choose some suitable activities. I went to a few lectures on this method to understand it. Then we organized a lesson where our pupils from class 3. A showed our team and other pupils from grade 9 what they do in their Math lessons. The feedback from this lesson was amazing. The little children enjoyed showing the “big” ones how to solve their tasks. The “big” pupils appreciated the logical thinking of the little ones and admitted that they had difficulties with the Math tasks and that they should start to learn harder to keep up. Next a lot of explanation, research and preparation followed in our team and we were ready to teach our Math lesson. The first audience, of course, was class 3. A and this time we met in their English lesson as we were teaching in English. The children appreciated our effort and wrote us positive comments. Teaching in Italy was different because this time the children met with our activities for the first time in their lives and we needed to keep English explanations very simple. The Italian pupils were trying hard, and their lessons lasted longer than in our country. I believe that both Czech and Italian pupils enjoyed the activities. The Czech pupils divided the tasks evenly and were not afraid to take their part of responsibility for a specific task. The team cooperation was going well during all phases of this lesson preparation. I appreciate the help and cooperation of other Czech teacher who participated on the preparations for the lesson.

Pupils: We do not have their written responses but you can see in our videos that they were engaged in the activities and they looked happy.