Co-funded by the
Erasmus+ Programme
of the European Union

KA2 – Cooperation for Innovation and Exchange of Good Practices
KA201 - Strategic Partnership for school education

Project title: Theatre in Mathematics
Project Acronym: **TIM**
Project Number: 2018-1-IT02-KA201-048139

TIM – Theatre in Mathematics
Toolkit: activities and exercises

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Disclaimer

This project has been funded with support from the European Commission. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

1. INTRODUCTION

The TIM Methodology originates from a three years-long collaboration of an international team of drama, math teaching, education and wellbeing professionals from Italy, Norway, Portugal and Greece. During the TIM – Theatre in Mathematics Project, the team worked together to reflect, exchange good practices and create a new methodology to teach mathematics using drama in the classroom, that has then been tested and implemented in schools in the four partners' countries, with the support of teachers and educators.

The TIM – Theatre in Mathematics Project gave birth to three methodological tools that provide trainers and teachers studying or using the TIM methodology (or who received the TIM training) with a series of guidelines necessary to implement the TIM Methodology in the classroom:

- **The TIM Methodology Manual**
- **The TIM Toolkit: activities and exercises**
- **The Assessment and Evaluation Toolkit for teachers**

The **TIM Toolkit: activities and exercises**, has been created as a tool for teachers and trainers to refer to while planning a lesson following the TIM Methodology.
It is divided three sections:

- Group building and theatre literacy exercises
- Mathemart activities
- Process Drama activities

In the first section exercises to build the group of the participants and to give them a common theatrical background are presented.
In the second section all the Mathemart activities are presented divided according to the mathematical topic (arithmetic, geometry, algebra)
In the third section Process Drama preparatory activities are presented and a full Process Drama session is described.

2. GROUP BUILDING AND THEATRE LITERACY EXERCISES

2.1. THE BALL – NAMES

Objectives: Work on the coordination of voice, movement and thought. Train concentration. Reflect on concentration and the fear of mistakes. Team building and achieving a goal as a team. Preparation for 'The ball - colours'. Preparation for 'The ball - numbers'.

Life skills: effective communication, interpersonal relationships, coping with emotions, self-awareness

Description: The group stands in a circle. The activity consists in having an input being passed across the circle by the participants, as if a ball was being thrown. Participant A (the facilitator) starts, and "throws" the input to participant B. Before throwing, eye contact must be established, so that B understands he/she has been chosen as the recipient. Then, A throws the imaginary ball by clapping hands horizontally in B's direction: the top hand quickly slides on the bottom hand's palm, aiming at B. While throwing the ball, A says his/her own name (not B's name!). After that, B quickly makes eye contact with someone else, and in the same way, sends him/her the ball saying his/her own name.

Observations: the enjoyment of the activity strongly depends on the rhythm and the energy conveyed through the voice, the "impulse" and the clapping, as well as through movement and speed. This activity can improve the level of energy and concentration of the group at any given moment.

As the ability of the group increases, the facilitator can challenge the participants by encouraging them to move the "ball" faster and faster.

2.2. THE BALL – COLOURS

Objectives: Work on the coordination of voice, movement and thought. Train concentration. Reflect on concentration and the fear of mistakes. Team building and achieving a goal as a team. Preparation for 'The ball - numbers'.

Life skills: effective communication, interpersonal relationships, coping with emotions, self-awareness

Description: Just like 'The ball - name', the group stands in a circle. The activity consists in having an impulse being thrown across the circle by the participants, as if a ball was being passed. Participant A (the facilitator) starts, and throws an

impulse to participant B. Before throwing, eye contact must be established, so that B understands she/he has been chosen as the recipient. Then, A throws the imaginary ball by clapping hands horizontally in the direction of B: the top hand quickly slides on the bottom hand's palm, aiming at B.

While throwing the ball, A says RED (imagining that that is the colour of the ball). Then B quickly makes eye contact with someone else and, in the same way, sends him/her the ball saying RED.

Variations: As the RED BALL is being thrown across the circle, the facilitator can introduce the BLUE BALL (only him/her can introduce a new ball), so to have multiple balls being thrown in the circle at the same time. If the introduction of the second ball succeeds, a GREEN BALL can be added too, and so on. The rule for the participants is: << The color I get is the color I throw>>

Observations: This variation requires a great level of concentration and non-verbal communication. It might happen that some of the balls disappear and the game needs to be stopped and restarted. If the group does not succeed in keeping all the balls up, the facilitator can encourage the participants to discuss and find common strategies to make it work. Generally, all groups need to try the activity multiple times and in different moments in order to make it work. This usually leads to improvements, which can positively affect the sense of empowerment and self-confidence of the group.

2.3. JAPANESE GREETING

Objectives: opening and/or closing ritual, listening, working in group, concentration

Life skills: self awareness, effective communication

Description: the group stands in a circle. The facilitator helps participants to focus and find concentration by bringing the attention to the posture, which should be relaxed and neutral. Gazing ahead, they should also try to use their peripheral vision to glimpse what is on their sides.

Once the group is focused, the person who conducts the activity (the facilitator or a participant) starts by making a wide, fast, energetic gesture bringing one arm and hand ahead toward the center of the circle, and saying a loud, energetic "Ha!". At the same time, this person takes one step forward with the same side leg. The movement is controlled, and the arm and hand are both stretched forward.

As soon as the conductor starts the movement, the whole group has to perform the same gesture at the same time and speed, so as to produce the sound and the movement in unison. If everyone is focusing, the group's reaction will be immediate. After the movement has been performed, the whole group simultaneously goes back to a neutral posture, ready to perform a new "greeting".

Duration: from 5 to 25 minutes (including all possible variations)

Variations: The challenge can be increased by

Having the participants start the activity with their eyes closed and thus be even more perceptive.

Having the participants start the activity facing outwards and performing the movement toward the centre of the circle, by rotating by 180°. In this way, they are not able to see each other when the conductor starts moving.

Not declaring who is conducting the activity: whoever wants to do it starts, and the group will follow her/him. This variation implies a deeper experience of the peripheral vision.

Observations: To engage the group and make the activity effective, the facilitator can invite the participants to perform all movements in a sharp, clean way, including going back to neutral position.

The Japanese greeting is a simple activity but quite effective to help the group become focused and strengthen the sense of belonging to the group.

Because of its ritualistic nature, it can be used both to open and close a session (entering and exiting the extra-ordinary place/time of drama).

2.4. THROWING STICKS

Objectives: Presence, stability, coordination, concentration, ability to focus and to react to an external stimulus, open view

Life skills: self awareness, coping with stress, effective communication

Materials: wooden sticks (length of the sticks: from 1 to 1,50 meters)

Description: The group stands in a circle, with participants at 1m distance from one another.

The facilitator stands at the centre of the circle holding the stick at the middle of its length, vertically, in front of his/her chest. The facilitator throws the stick to a

participant. The participant catches the stick and throws it back to the facilitator by using only one hand. The facilitator throws the stick to the next participant in the circle. The facilitator takes some time after the first throws, to focus on body engagement and explains the following:

Use of the body: the throw of the stick is accompanied by an impetus that starts from the feet. The body is rooted on the ground, one foot forward and both legs slightly bent, to be more stable. While throwing, the arm and legs stretch slightly upward and forward to accompany the stick so that it performs a parabola before getting to the recipient. During the throw, the stick must not rotate in the air, but keep the same vertical position. Before throwing the stick, eye contact is made, to make sure the recipient understands that it is their turn.

Throwing, catching and rethrowing is repeated until participants acquire readiness in receiving and throwing, without making the stick fall to the ground.

Variation 1: The facilitator throws the stick randomly, without following the order of the participants in the circle.

Variation 2: The facilitator asks participants to take his/her place at the center of the circle.

Variation 3: With two sticks: two participants (or facilitator + one participant) stand in the center of the circle. Simultaneously, they both throw one stick to another participant. Then they switch places and have to catch the stick thrown back by their mutual recipients. (for example: A and B are in the center of the circle. C and D are two participants in the circle. A throws to C, B throws to D, then C throws back to B and D throws back to A).

Variation 4: Training in pairs. To reach a good level of practice, you can first do a two-person workout: participants are arranged in pairs, in two rows. At the conductor's signal, one row throws the sticks, the other one catches and throws it back. Subsequently, the pairs will use two sticks that will be launched simultaneously. Participants always throw with the same hand and catch with the other one.

Variation 5: The group participants throw and catch a stick around while walking in the room as in 'The raft'.

Duration: from 20 to 40 minutes.

Observations: The exercise offers the opportunity to reflect on trust, care and attention toward the other, as weel as on complicity. It works well as body and mind warm-up and as a way of working on the presence of the body on the scene.

Variation 3 also implies a good level of problem-solving abilities in order to understand how quick to be, both as a sender and as a recipient.

2.5. THE RAFT

Objectives: Body awareness, space awareness, moving in the space as an individual within the group.

Life skills: self-awareness, effective relationships, coping with emotions

Description: The facilitator delineates a space on the floor (with paper tape or other material) which is referred to as a "raft". The participants walk within the perimeter of the raft trying to remain evenly distributed within the space (if we don't keep the raft in balance it might capsize!). While walking, arms and hands are resting at the sides of the body in a relaxed manner, and participants look ahead (not at the ground). The facilitator can guide the participants verbally with a stop and go or with a percussion instrument or piece of music: when the music is playing they walk, when it stops they remain still.

Duration: A minimum of 5 minutes to a maximum of 15.

Observations:

This activity can be used to start working on body awareness, which will be useful for the following activities. For example, it trains the ability to not bump into each other while moving in the space, or to avoid walking in circles, or to freeze the body completely when stopping. Developing body awareness ensures a better aesthetic quality of the activity, which determines the pleasure - and therefore the engagement - of the participants.

Despite seeming simple, this activity can be quite complex, as it requires participants to handle multiple tasks simultaneously. Therefore, directions need to be introduced gradually, giving the participants time to familiarize with the different tasks (e.g. : 1. walk in the space in the direction you prefer, 2. try not to walk in a circle, 3. try to spread out evenly, 4. try to look ahead, 5. now, when I say "stop" we all stop, etc.).

Variations: the facilitator can ask participants to change speed or way of walking.

At the "stop" signal, the facilitator can ask to form groups of 2, 3 or 4 made of people who are in physical contact with each other (the conductor can also say

what part of the body is the point of contact). At the facilitator's signal (or at the start of the music) the subgroups formed start walking again in the space without losing contact.

At the "stop" signals, the facilitator can ask participants to make statues with their bodies representing objects, people, animals, abstract concepts, etc..

2.6. THE MIRROR

Objectives: Training the ability to observe others and observe details. Practice cooperation and a deeper contact with others.

Life skills: self-awareness, effective relationships, coping with emotions, empathy

Description: The exercise is carried out in pairs. Each pair decides who is A (the person who leads the movement) and who is B (his/her reflection in the mirror). Participants stand or sit one in front of the other. When all the pairs in the room are ready and quiet, the activity starts: A begins to move parts of his/her body slowly. B follows her/him by copying the movements accurately. As the exercise progresses, A can explore more complex movements. After a given time, the facilitator asks the pairs to trade roles and start again.

Duration: 10 to 15 minutes approximately.

Observations: The exercise should be carried out slowly: the participants' aim is to make it impossible for an external observer to establish who is A and who is B in the pair. To achieve this result, the facilitator can stress that the focus of the activity is cooperation between the two participants. A way to bring attention to this, is to ask the participants "what is the strategy you found?". Answers that might come out are "making simple movements", "make sure I make movements the other can see", "observing the other", etc.

The facilitator may ask the participants to look in the other participant's eyes for the whole duration of the exercise. This is an excellent way of training peripheral vision, perception and concentration. However, it is important to make sure that participants are comfortable with this, as deep eye contact involves a high level of intimacy (e.g. asking this to teenagers, if not previously trained, might compromise the success of the activity).

This activity requires a level of complicity that might generate embarrassment, inducing participants to giggle or talk while accomplishing the task. Addressing

the issue by making them notice the difficulty of the activity and reflecting on how we handle embarrassment can be a way to undertake the challenge with self awareness.

2.7. THE BLIND GUIDE

Objectives: develop trust in the group, build the perception of a safe environment

Life skills: self awareness, empathy, effective communication, interpersonal relationships

Didactic materials:

Description: the participants stand in the space in pairs. Each pair decides who is A (the person who leads, with open eyes) and who is B (the person who follows with closed eyes). A and B face each other. B places the palm of his/her hand on A's palm. B closes eyes. A and B take a few breaths together. When the the facilitator starts the music, the pairs start moving in the space: A leads B in the space walking backward, with the idea of accompanying B across the space to explore it. B follows A's lead with his/her eyes closed and holding his/her partner's hand.

When the conductor lowers the music volume, A gently ends the walking and stops at his/her chosen spot. B opens his/her eyes. A and B switch roles without talking. The music is started again.

At the end of the second round, each pair takes a few moments to discuss the experience: they both tell each other what they felt while leading and while being led.

Duration: 15 to 20 minutes

Observations:

During the activity the facilitator observes the group and makes sure that all leaders are taking good care of their partners and that nobody gets hurt.

This activity can create intimacy and involve the themes of trust and reliability. This must be kept into consideration: all distress should be listened to and participants should not be forced to take part.

The activity works on non-verbal communication and empathy abilities: while explaining the activity it is important to encourage the participants who lead to observe their companion: what does his/her body communicate to me? Does he/she feel comfortable? If he/she is reluctant to move, how can I make her/him feel at ease? What is the best pace to keep for my companion to feel safe?

B's hand should not cling to A's, but only slightly touch it. This allows A to immediately perceive changes in what B's body is communicating.

The intimacy involved in the activity might lead to embarrassment and cause some giggling or chatting during the activity. It is important to encourage participants to observe any light discomfort, and try to engage in the activity quietly, by focusing on the idea of the sensory journey and the care for the other.

Variations: after a first experience where pairs use the palms of their hands to be in contact, variations can be explored (e.g. only touching with a finger tip, or leading the companion around the room by simply making a sound that he/she follows).

2.8. MOVEMENTS AND SOUNDS

Objectives: activate creativity and body expression, explore the use of body and voice together

Life skills: creative thinking, effective communication, coping with emotions, self-awareness.

Didactic materials:

Description: The participants stand in a circle. One participant makes a movement accompanied by a sound. The sound should involve the vocal cords as well as the mouth (i.e. finger snaps or lips smacking are not suitable). As soon as the first person completes the action, all the other participants replicate the movement and the sound as accurately as possible. Then, the person standing next to the first makes another movement+sound and all participants replicate that too. The activity goes on until all participants have performed their movement+sound.

Duration: Approximately 10 minutes.

Variation: a variation that emphasizes the performative aspect can be done as follows: participants are standing in two lines. Each participant stands behind

another one. One line faces the other, so that the two participants at the front of each line (participant A and participant B) face each other. Participant A makes a movement with a sound. Participant B responds with his/her own movement and sound. As soon as the action is completed, both A and B walk to the end of their line, behind everyone else. Now there are two new participants at the head of the two lines, facing each other. Just like A and B did, they perform their own movements+sounds (one in response to the other). Then they walk to the end of their line too. The activity goes on until all participants have performed their movement+sound.

Observations: the movement should be made as neatly as possible (in order to allow the other participants to try to replicate it accurately). Pace and the level of energy are very important in this activity: the movements/sounds should be sharp and energetic, and a good pace in the sequence should be kept constantly (participants should not be urged, but moments of silence should be avoided as well).

"Movements and sounds" can be a suitable preparatory activity for the "Rhythmic machine".

2.9. RHYTHMIC MACHINES

Objectives: train body, rhythm, sound and cooperation, explore a given topic

Life skills: self awareness, coping with emotions, creative thinking

Description: The group is divided into subgroups of 4-5 people. Each group builds a rhythmic machine inspired by a keyword or topic given by the facilitator.

Here is how to build the machine The construction of the machine has different phases: brainstorming, rehearsals, finalization. During the brainstorming the participants choose which movement and sound they want to make and how to link them with the others. During the rehearsals the participants enter the stage one by one and start to make their rhythmic movement and sound, which they must repeat until the entire machine stops. The machine is performed repeatedly by the participants until they find a common rhythm and they feel comfortable in it.

Then, the machines are shown to the rest of the group. The facilitator divides the space in two parts: the audience and the stage. The first participants to present the machine enter the stage one by one until they are all in and run the machine until the facilitator stops it.

Duration: At least 30 minutes, depending on the number of subgroups

Variations: In order to train the execution of a movement and a sound connected with others in a group, the rhythmic machine can also be improvised. In this case, up to 10 participants enter the stage one by one and improvise a movement and a sound in relation to the ones already on the scene.

During the improvisation the facilitator can ask the participants to animate the machine with a particular mood, emotion, or accent (e.g. tired, hungry, or Russian) in order to make the activity funnier.

Observations: in order to make the machine work properly it is very important that the facilitator helps the participants keep the pace of their movements and sounds.

2.10. IMAGE THEATRE

Objectives: train non verbal communication, train observation, explore a given topic

Life skills: self-awareness, creative thinking, effective communication

Didactic materials:

Description: the participants stand in a circle, facing outward. The facilitator says a word and immediately counts to three. On 'three' all participants turn around and, now facing each other, each "creates a statue" with his/her body representing the first thing that came to their mind when they heard the word. Everybody stays still for a few moments. The facilitator can invite the participants to move their eyes - and only the eyes - to look at the other statues in the circle.

The activity can be repeated with many different words.

Duration: 5 to 10 minutes

Observations: If they want, participants can wait to hear the word with their eyes closed, as this helps imagination to flow.

This activity can be simply used to activate creativity but it also allows the introduction and exploration of a theme in a non-verbal way: the statues being created impulsively can be a truthful representation of the participants' ideas and feelings. For this reason, it is helpful to start the activity by using simple words, related to concrete concepts, that usually don't imply emotional involvement (e.g.

summer, sport, TV). Only after, when they have become familiar with the activity, the facilitator can use words that they want to explore (e.g. studying, learning, school, mathematics, friendship, etc.). At the end of the activity, the group can reflect on the representations that were made (i.e. How was the word "Math"/"school"/"learning" represented in the statues? What does this say about us?).

By involving all participants at the same time, this activity helps familiarize with performing without the pressure of an audience (all participants perform their statues at the same time).

To train expressiveness, the facilitator can encourage participants to focus on expressing an idea with a statue instead of a movement. What is the posture that better captures and communicates that idea, to me?

2.11. TABLEAUX VIVANT (STILL IMAGE)

Objectives: train non verbal communication, train observation, explore a given topic

Life skills: self-awareness, effective relationships, creative thinking, coping with emotions.

Description: Participants stand on one side of the room, as spectators. On the other side is the space of the scene. One of the participants goes into that space and creates a statue with his/her body, holding any posture he/she wishes.

The rest of the group observes. One by one, more participants are invited to join the first one, adding new shapes that interact with the ones already there, completing the meaning of the scene that is being built. In this way, they are forming a Tableau vivant (a still image) where everyone gives a piece of significance to one picture.

Duration: Approximately 20 to 25 minutes.

Observations: The facilitator can decide to limit the number of people that will form the Tableau, by establishing it at the beginning or by stopping the creation process. To get the participants acquainted with the activity, the first Tableau can be composed by only a few participants.

Variations: The participants who are not creating the Tableau can observe and be asked to give a title to the still image or derive a story from it.

To start introducing the use of the voice, the facilitator can ask the participants in the scene to say a word/sentence/make a sound related to the character/piece of image they are performing, which is going to be "activated" by the conductor's touch.

The 'Image Theatre' activity can be used to prepare the group for this 'Tableaux vivants'.

2.12. STATUES ON THE WALL (BAS-RELIEF)

Objectives: train non verbal communication, train observation, explore a given topic

Life skills: self-awareness, effective relationships, creative thinking, coping with emotions

Description: This exercise is a variation of 'Tableaux vivants'. Participants stand on one side of the room, as spectators. On the other side there is an empty wall. One of the participants positions her/himself against the wall and creates a statue with her/his body (by being against the wall it will resemble a bas-relief). One by one, more participants are invited to quickly join the first one and create new statues that will complete the scene. They must find a contact point with another statue.

Duration: Approximately 20 to 25 minutes.

Observations: This exercise can involve physical contact among the participants.

Variations: The facilitator (or one of the participants) can say a word to inspire the first shape. Also, after being in the bas-relief for a while, participants can decide to come out of it and go back to the audience, in order to be able to observe the action from outside, thus allowing the scene to change and to create new meanings as new statues add on.

2.13. IMAGINARY OBJECT

Objectives: To stimulate creativity, familiarise with a creative process.

Life skills: creative thinking, coping with emotions, effective communication

Description: The group stands/sits in a circle. The facilitator gives an object (any object) to one of the participants and asks her/him to show the group how to use that object as if it were something else (for example, a roll of tape can be used as a magnifying glass, a dish, a clock, etc.). The participant who holds the object cannot talk, but he/she can make sounds to help the group understand what the imaginary object is.

Once the action is completed, the object is passed on to the next participant, who will transform the object into a different imaginary object. The same imaginary object can only be proposed once, and participants cannot mime the action of using the object with its ordinary function (i.e. using a book as a book). The game continues until everyone has created an imaginary object with the same one.

Duration: Approximately 15 minutes.

Observations: This activity offers a great opportunity to reflect on creativity and the emotions that contrast or promote it. The first round of 'Imaginary object' will involve the participants in a rather simple task which triggers the creative use of the object (which might be partly predictable). This will allow the group to familiarize with the activity and warm up creative thinking. If the same object is used in a second round, the group might start to experience the next level of the creative process: ideas on how to transform the object take some time to come. If a participant is stuck and is stressing about finding an idea, encourage her/him to look at the object more carefully, moving it in his/her hands, being optimistic about the fact that an idea will eventually come, because stress and anxiety can inhibit the creative process. Despite the difficulties, this round (and a third one if you are going to do it) will allow the most exciting and brilliant idea to appear, and this will bring a high level of energy and enjoyment to the group.

This activity also offers an opportunity to work with patience and mutual support within the group. Participants should be able to create a supportive atmosphere promoting the creative process for everyone.

In order to use this activity as a preparation for 'A stick story', a stick can be used as object to transform.

Variation: After as many rounds as the group wants to perform, the object is left at the center of the circle. Whoever has a new idea about what imaginary object it can be transformed into goes into the circle and mimes it.

2.14. STORIES WITH IMAGINARY OBJECTS

Objectives: To stimulate creativity, develop the ability to invent, familiarize with creative work with objects, inventing short stories.

Life skills: self-awareness, creative thinking, problem solving, coping with stress

Didactic materials: Various objects.

Description: Objects are distributed around the room.

Participants walk around the room and try the "'Imaginary object' activity with multiple objects (they walk, stop next to an object, transform it, put it back where it was, keep walking to reach the next object).

When all participants seem to have tried all the objects (maybe multiple times and with different uses), the facilitator asks them to choose one object and engage in a creative process with that one by: transforming it into three different creative objects; deepening the exploration; perfectioning the quality of movements; creating a sequences of actions with the three imaginary objects.

The participants are given some time for this exploration. Then, the facilitator asks them to create a short story that includes the actions of their sequence. They are going to show this story to the group. The participants are given some time to prepare. Then, the setting for the performance is prepared (the group decides how to spread in the space) and the short stories are performed.

Duration: Approximately 15 to 20 minutes.

Observations: To familiarize with this activity, the group can first engage in the activity 'Imaginary object'.

2.15. IMPROSTOP

Objectives: improvisization, cooperative problem solving

Life skills: creative thinking, problem solving, effective communication, interpersonal relationships, self-awareness

Didactic materials:

Description: Participants stand in a circle. One of them (participant A) goes into the circle, and assumes a posture of his/her choice. The group observes the "statue" in the center of the circle as if it were a freeze-frame from a situation,

and imagines what that situation could be. Another participant (participant B - whoever feels ready to do it) goes into the circle and immediately starts to improvise on the situation he/she imagined, giving A a hint of what the situation is. A immediately starts to play along.

(E.g. A is standing still, slightly bent toward the floor, staring at the ground. B enters the scene, places hands on his/her hips, looks at the same spot on the ground and says "This ants' nest sure is impressive!". A, who now has elements about B's interpretation on the situation, starts improvising along.)

At a certain point, the facilitator gives a signal to freeze the scene (by saying "stop" or by clapping hands). Both A and B freeze in whichever position they are in that moment. A exits the scene; B holds position. The group observes B's "statue" as if it were a freeze-frame from a different situation, and imagines what that situation could be. Participant C enters the circle and starts improvising on the new situation with B. When the freeze signal is given again, B exits the scene, C stays in, and someone new enters.

Duration: from 15 to 30 minutes, depending on the group

Observations: Some important improvisation rules should be applied for the success of the activity (they can be slowly introduced as the game goes on, when the situation makes it necessary):

AGREE: anything that is proposed during an improvisation should be accepted by the participants. If B says "Look at this ants' nest!" and A says "There is no ants' nest" the improvisation cannot evolve, and it becomes frustrating. Encourage participants to say "Yes" or "Yes, and.." if they want to introduce a new element.

PERFORM ACTIONS: During improvisations participants often tend to talk rather than perform, thus causing a lack of action in the scene. For an improvisation to be interesting, it is important to include actions in the scene.

DO NOT STOP: participants cannot leave the scene until the freeze signal is given. This means that the action needs to be carried on at any cost, with new ideas constantly brought to the scene.

DO NOT OVERTHINK: when looking at the "statue" and imagining the situation, participants should be encouraged to not overthink and just "have a go". The idea for the new scene might as well arrive once in the scene. When the group has become acquainted with the activity, the facilitator can even set a time limit (ex. 5 seconds) to make a new scene start.

Participants might tend to interpret the posture of the "statue" as a scene from sport or dancing. To make the activity more interesting and challenging, the facilitator can ban this kind of themes.

If the scene includes objects, the facilitator can encourage participants to engage physically so that the audience gets to "see" the objects, even if they are just being mimed.

If the scene is interesting, participants will all become engaged: the accuracy of the movements, a high tone of the voice, being immersed and believing in the situation, these are all elements that contribute to the aesthetic quality of the scenes, thus making them pleasant and interesting to watch.

3. MATHEMART ACTIVITIES

3.1. THE BALL - NUMBERS

Math topics: Counting

Objectives: Work on the coordination of voice, movement and thought. Train concentration. Reflect on concentration and the fear of mistakes. Team building and achieving a goal as a team. Playing with numbers

Life skills: effective communication, interpersonal relationships, coping with emotions, self-awareness

Propaedeutic activity: 'The ball - names' and 'The ball - colours'.

Description: Same as 'The ball - names'.

While throwing the imaginary ball, the participants count from 1 to 10 and then backwards from 10 to 1. Every time they say the wrong number, the counting starts over (from number 1). The game ends when the participants are able to count from 1 to 10 and back again without making mistakes.

Duration: Minimum 10 minutes

Variations:

a) Numbers 5 and 10 are replaced by the thrower's name. Then, numbers 3 and 7 are replaced by the name of a fruit (e.g: one, two, apple, four, Anne, six, strawberry, eight, nine, Miriam, nine, eight, lemon, …)

b) Multiples of 2 are replaced by the word "apple". Multiples of 3 are replaced by the word "pie". Multiples of 3 AND 2 are replaced by the word "apple pie", and the game continues up to the target number (e.g. up to 20 or 30).

c) Instead of counting in multiples of 1, the group can use different counting patterns (e.g. the 2-times or 3-times table, etc.)

All of these variations can be combined to make the game even more complicated as the group acquires skill. The complexity level can be raised gradually for a positive experience.

3.2. TIMES TABLES COUNTING

Math topics: Counting, times tables.

Objectives: Training participants to count time tables.

Life skills: Problem Solving, Coping with stress, Creative Thinking, Effective Relationships

Description: The group stands in a circle. The times table to be used is established (the example below uses the 3-times table). Participants "march" on the spot on a shared rhythm.

The facilitator starts the game by saying "One" to the marching beat. Following the rhythm, one by one, each participant says the numbers in sequence (from 1 to the number of participants) until the counting has completed a full circle and got back to number 1 (the facilitator).

Then the group starts again. This time, only the facilitator and the last participant will say the number aloud. All the other participants will only count mentally. The facilitator must check that the last number is correct.

Then the group starts again, but this time there will be more people saying their number aloud on their turn: for example, number 1 (the facilitator), and all multiples of 3.

All the other numbers will not be said aloud. If someone makes a mistake, the group starts over.

If the group is small, the game could continue for multiple rounds up to the required number (e.g.: 30), in order to be counting for a longer time.

Duration: A minimum of 10 minutes depending on the variations.

Variations: If the group is comfortable with the mechanism, the game can be continued beyond the multiplier by 10 and can be stopped when a participant makes a mistake.

3.3. THE RAFT - NUMBERS

Math topics: prime factors, times tables

Objectives: Training participants to break down numbers into prime factors, to count time tables

Life skills: Problem Solving, Coping with stress, Effective Relationships

Propaedeutic activity: 'The raft'

Description: The participants walk within the perimeter of the raft trying to remain evenly distributed around the space. Participants are assigned a number from 1 to N which will be theirs for the duration of the activity.

The raft game continues this way: the facilitator asks participants to walk in the space and stop or go when requested. At the "stop" signal, the facilitator calls a rule: *"Only numbers [CHARACTERISTIC OF THE NUMBER] transform into [OBJECT TO BE REPRESENTED WITH A STATUE]"* . **E.g:** «Only multiples of 3 transform into a cat»; «Only numbers that can be divided by 2 and 3 transform into a coffee maker»; "Only prime numbers transform into a tree"; etc.

Duration: A minimum of 10 minutes depending on the variations.

3.4. THE RAFT - PRIME FACTORS

Math topics: Divisors, prime factors

Objectives: Training participants to break down numbers into prime factors.

Life skills: Problem Solving, Coping with stress, Effective Relationships

Propaedeutic activity: 'The raft', 'The raft-numbers'

Description: The participants walk within the perimeter of the raft trying to remain evenly distributed around the space. Participants are assigned a number from 1 to N which will be theirs for the duration of the activity.

The raft game continues this way: the facilitator asks participants to walk in the space and stop or go when requested. At the "stop" signal, the facilitator calls a rule: *"Only DIVISORS of number [NUMBER] transform into [OBJECT TO BE REPRESENTED WITH A STATUE]"*

Duration: A minimum of 10 minutes depending on the variations.

3.5. ADDITION

Math topics Addition, the four operations.

Objectives: Understanding the mechanics of addition.

Life skills: Problem Solving, Effective Relationships, Creative Thinking

Propaedeutic activity: 'The raft', any activity that introduces physical contact among participants

Materials: Music

Description: The participants walk within the perimeter of the raft trying to remain evenly distributed around the space. Participants are assigned a number from 1 to N which will be theirs for the duration of the activity.

The raft game continues this way: the facilitator asks participants to walk in the space and stop and go when requested (either with a "stop" voice signal, or on the interruption of the music). When the group has started walking, the facilitator explains that at the "stop" signal, they will have to stop and, as quick as possible, form groups of 2, 3 or 4 people in physical contact with each other (the facilitator can specify with which part of the body). When the music starts or the "go" signal is sent, the subgroups move around the space without losing contact. At the next "stop" signal, the facilitator asks the subgroups to merge and create larger groups (e.g. *groups of N people)*, letting participants decide which groups will need to be merged in order to reach the N number required by the facilitator.

E.g: If the group is made of 24 participants, at the first "stop" there might be 8 subgroups of 2, 2, 3, 3, 3, 3, 4 and 4 people.

At the first "go" signal, the subgroups move in the space and at the second "stop", the facilitator asks to form groups of 12 people. At this point the participants can decide to merge four groups o 3, or two groups of 3 together with one group of 2 and one group of 4, and so on.

If the number of participants is not high enough to reach the result, objects of the room can be included in the game instead of people. **E.g.** 4 sub-groups (of 2, 2, 3, 4) are left out and they cannot reach number 12. To be able to do it, they can take and use a chair. In order to support this kind of solution the facilitator can disseminate object all around the space.

After making sure that the result of the addition is correct, the participants start walking alone on the raft again, ready for a new round.

Duration: Approximately 30 minutes.

Variations: When participants have familiarized with the activity, they can be asked to form subgroups without communicating with each other.

Participants can be asked to form subgroups without being in physical contact with each other.

3.6. SUBTRACTION

Math topics: Subtraction, the four operations.

Objectives: Understanding the mechanics of subtraction.

Life Skills: Effective Relationship, Effective communication, Decision Making, Creative Thinking

Didactic materials: Music.

Description:

The group is divided into subgroups. Each subgroup demonstrates an operation.

E.g. Let's take the operation 7-3 as an example.

The facilitator creates a group of 10 participants. One subgroup of 7 is the minuend of the subtraction, subgroup of 3 is the subtrahend.

First, the minuend group goes into the space and creates a static scene. The participants can be touching each other or not.

Then, music starts and one by one the components of the subtrahend enter the space. They dance or walk in their preferred way following the music, and go to touch one participant of the minuend group. The person touched begins to imitate the dance / walk of the person who touched her/him and following her/him, the two exit the space.

At the end 4 people remain in the space: this is the result of the operation.

Duration: Approximately 30 minutes.

Variations: If the subtrahend group is bigger than the minuend group, participants are told about relative numbers.

Observations: In order to let the participants focus on the mathematical part of the activity, they should be comfortable with performing in front of the others and with having physical contact.

3.7. MULTIPLICATION

Math topics: Multiplication, the four operations.

Objectives: Understanding the mechanics of multiplication.

Life Skills: Effective Relationships, Creative Thinking, Problem solving

Didactic materials: Music.

Description: The group is divided into subgroups. Each subgroup will represent the multiplicand. **E.g.** In the operation 4x5. 4 is the multiplicand and 5 is the multiplier. The group is divided into 5 subgroups of 4 participants. The space is empty and the facilitator starts the music. The first group's participants enter one by one by waling in a peculiar way. All imitate the first person's style of walk. When the music stops, the group of 4 creates a tableau/still image made of 4 statues in physical contact with each other.

The remaining 4 groups enter, one after the other, imitating the walk of their first member, and create a tableau/still image.

At the end of the activity, there will be 5 tableau/still images made of 4 people each. By counting the number of people in the space, the participants can see the result of the multiplication.

Duration: Approximately 20 minutes.

Observations: In order to let the participants focus on the mathematical part of the activity, they should be comfortable with performing in front of others and with having physical contact.

3.8. DIVISIONS

Math topics: Division, remainders, numbers.

Objectives: Explaining division and remainders.

Life Skills: Effective Relationships, Creative Thinking, Problem Solving

Propaedeutic activity: 'The raft', any activity that introduces physical contact among participants

Description: The participants walk within the perimeter of the raft trying to remain evenly distributed around the space.

The raft game continues this way: the facilitator asks participants to walk in the space and stop or go when requested (music or a percussion instrument can be used).

When the music stops the participants have to make contact with each other and form one large group. This can be repeated until the group is fully focused.

Then, after a "stop", the facilitator asks participants to divide in N equal subgroups. Each subgroup of participants must improvise and build an animal by using their bodies. They can make sounds too.

The number of participants is the dividend and N is the divisor. If the number of participants is not exactly divisible by N, some participants might be left out as an incomplete subgroup. This is the remainder of the division. Since they are just a part of a subgroup, they will build just a part of that animal.

Now we have N subgroups and another small group. These groups have 5 minutes to rehearse how to bring their animals on stage: how it moves, how it behaves (eating, sleeping, …) and which sounds it makes.

Then, each subgroup performs its animal in front of the others.

Duration: Approximately 30 minutes.

Variations: The participants can be asked to represent objects or abstract concepts, instead of animals. Depending on the skill level of the group, this variation can be more challenging when it comes to represent abstract concepts.

Observations: A previous engagement in group improvisation activities is necessary for this activity to be enjoyed.

3.9. FRACTIONS

Math topics: Fractions.

Objectives: Training participants to recognise simple fractions.

Life Skills: Effective Relationships, Creative Thinking, Problem Solving

Description:The participants walk within the perimeter of the raft trying to remain evenly distributed around the space.

The raft game continues this way: the facilitator asks participants to walk in the space and stop or go when requested (music or a percussion instrument can be used).

When the group stops, the participants have to make contact with each other and form one large group. This can be repeated until the group is fully focused.

Then, after a "stop" signal, the facilitator asks participants to divide in N equal subgroups. The participants in each subgroup must hold physical contact. When the facilitator says "go", they start walking without losing contact. At the next "stop", the facilitator asks a fraction of the participants to transform in an object/animal/abstract concept. These transformations are improvised. Participants can be asked to do it without talking. At the following "start" signal, they move without losing their transformations.

E.g. Subgroups of 6 are formed. The participants are asked to transform as follows:

2 / 3 transform into a chicken (4 out of 6)

1 / 6 transform into a chair

2 / 12 transform into a sandwich (1 out of 6)

Duration: A minimum of 15 minutes.

3.10. CALCULATING IN YOUR HEAD: THE OLD-WESTERN DUEL

Math topics: Calculating in your head, operations, times tables.

Objectives: Learning how to calculate in your head in a playful way.

Life Skills: Problem Solving, Creative Thinking, Coping with emotions

Pre-requisites: Knowing the 4 operations.

Description: The facilitator introduces the setting: we are in a Western movie. A duel is about to take place. The part of the room dedicated to this is shown. Two participants are actively involved in the duel, whereas the others act as spectators.

The two participants start by standing back to back like in a gunfight. The facilitator gives the "start" signal and the duellers take three steps in opposite directions. After the third step, the facilitator says an operation aloud. The duellers calculate it mentally and, as soon as they have the answer, they can turn, say the result and shoot the other dueller (miming the typical gesture of a Western movie character). The first to shoot with the correct answer wins, the other dies in a very tragic and theatrical way. Now a new dueller can enter the scene to challenge the winner.

Duration: Approximately 30 minutes.

Variations: In order to decrease the level of competition, both duellers can be replaced after each round.

Observations: It is important to maintain a playful climate throughout the activity,in order to prevent the competition from scaring those who feel weaker at calculating. One way of doing this, is to emphasize the theatrical part of the walk, the posture and the dramatic death of the duellers.

3.11. GREATEST COMMON DIVISOR

Math topics: Greatest common divisor, prime factors.

Objectives: Understanding the mechanics of greatest common divisor.

Life Skills: Effective Relationships, Creative Thinking, Effective communication

Description: The group is divided into subgroups of 3 or 4 people. Each subgroup has to represent a holiday by using the theatrical language they prefer.

The rules are:

Every participant must express 5 desires for the holiday they are going to represent;

The subgroup represents a holiday that includes only the desires that all its participants share;

After sharing the desires, each subgroup has 10 minutes to rehearse how to represent the holiday;

Then, each holiday is shown to the others.

Duration: Approximately 30 minutes.

Observations: The desires expressed are related to the type of holiday they are going to represent or related to the activities they are going to do during it. E.g. at the beach, relaxing, biking, abroad, reading a lot, or biking in the mountains.

Keeping only the common desires is a metaphor of keeping the common prime factors during the greatest common divisor process.

3.12. LEAST COMMON MULTIPLE

Math topics: Least common multiple, prime factors.

Objectives: Understanding the mechanics of least common multiple.

Life Skills: Effective Relationships, Creative Thinking, Effective communication

Description: The activity follows the same pattern of the 'Greatest Common Divisor'. The difference stands in the fact that every participant expresses only 1 or 2 desires and the holiday represented must include all desires expressed.

Duration - Approximately 30 minutes.

Observations: Keeping all the desires is a metaphor of keeping all the prime factors during the least common multiple process.

3.13. FLAT GEOMETRY: A STICK STORY

Math topics: plane geometry

Objectives: Introducing elements of plane geometry.

Life Skills: Effective Relationships, Creative Thinking, Decision Making.

Didactic materials: A 100 - 150 cm stick for each participant.

Description: The group warms up by playing the 'Imaginary object' activity using a stick. After 10 minutes of this, the group is divided into subgroups of 4-5 participants.

Each subgroup invents and stages a story where participants use the sticks as if they were something else.

The story must include three moments in which the characters freeze and the story stops, and by looking at the position of the sticks on stage, the audience must detect geometrical forms (parallel lines, acute angle, a dot, a segment, etc.).

It is recommended that each story is shown twice. The first time the audience doesn't say aloud which geometrical forms they are able to see. During the second replica the pauses are longer and the facilitator and the audience can discuss the geometrical elements that are visible on stage.

Variations: If staging a story is too difficult for the group, they can be asked to stage only 3 different still images representing the core moments of a story. The link between the three moments is made apparent by one (or more) narrator. In the still images the audience should be able to see the geometrical elements.

The activity 'Imaginary object' and 'Stories with imaginary object' can be used to prepare the group for this activity.

3.14. PERIMETER AND AREA

Math topics: Plane forms, perimeters and areas.

Didactic materials: Masking tape.

Life Skills: Creative Thinking, Problem solving

Description: The facilitator traces geometric shapes on the ground by using some masking tape or chalk. The sides of the shapes must be long enough to allow the participants to walk along them (2-3 meters each). The number of sides must be equal or higher than half the number of participants. **E.g.** For 26 participants we need at least 13 sides (3 triangles and 1 square).

The group is divided into two subgroups: audience and actors. The activity starts with each actor moving along the sides/lengths of the shapes. While the participants are moving, the facilitator asks them to transform into things according to their position on the shape.

E.g:

<< Those on a height turn into a train>>

<< Those on a base turn into … >>

<< Those on a hypotenuse turn into… >>

Sometimes the facilitator calls out a stop, and the participants must stand still. Then, the facilitator and the audience determine whether the performed walk is appropriate for the line on which the participant is standing.

Variations: In order to address the topic of perimeters and areas, it is possible to ask the participants to walk along the parts needed to calculate perimeter and area. **E.g.** To calculate the area of a triangle, the participant will walk along the base and then along the height.

In order to incorporate more theatre into the activity, it is possible to give the participants a context in which to perform (an era, a cinematographic or theatrical style, a situation, etc.).

In this case, it is important to give the participant some time for rehearsing before showing their walk to the audience.

Duration: A minimum of 45 minutes.

3.15. SOLID GEOMETRY

Math topics: solid geometry

Objectives: Understanding the spatial concept of three-dimensional shapes.

Life Skills: Effective Relationships, Creative Thinking, Problem solving

Didactic materials: A pair of white gloves for each participant, music.

Description: The facilitator divides the group into subgroups. The task for each subgroup is to build a solid in the room. The solid is represented in the space by showing its vertices with the participants' gloved hands closed in fists.

After deciding which solid they want to represent and how to build it, each group has to prepare the theatrical part. They choose a soundtrack, a way to move accordingly, and a context (an era, a cinematographic or theatrical genre, a situation, etc.). Then, they rehearse it before showing it to the others.

During the performance, the actors enter the stage one at a time with a special walk or dance that suits the soundtrack and the context chosen. At the end of the performance the audience has to guess which solid is represented.

Duration: A minimum of 45 minutes.

Variations: If the group has got good theatrical abilities, the construction of the solid can be done through the development of a story ending with a still image representing the solid. It needs to be a visual story, hence they can incorporate music, but no speaking.

3.16. REPRESENTING MONOMIALS AND POLYNOMIALS

Math topics: Literal calculation, monomials, polynomials.

Objectives: Understanding representations of monomials and polynomials.

Life Skills: Effective Relationships, Creative Thinking, Decision Making

Didactic materials: A4 paper sheets, large-tipped felt pens, two tunics of different colours, music.

Description: The facilitator asks the participants to transform into monomials and perform a parade or a fashion show.

The rules on how to transform into a monomial are shared at the beginning of the activity and are the following:

One person can be a letter or a number;

The letters (x and y, a and b) are represented by the colours of the tunics. Its coefficient is written on a A4 sheet of paper and held up by the letter/participant with her/his hands;

The exponent (from 2 to 5) is represented by the left hand raised;

The sign (+ or -) is represented by the position of the participant. If he/she is facing the audience he/she is a positive number, if he/she faces the opposite direction, he/she is a negative number.

Each participant chooses which monomial he/she want to be and if to work alone (one letter, e.g. 3x^2) or with a groupmate (two letters, e.g. 3x^2y^4) and prepares him/herself for the parade/fashion show.

When the participants are ready the facilitator prepares the setting, chooses the music and the position of the stage. Then, half the group makes the parade/fashion show and the other half is the audience. After that, the two groups swap roles.

In this activity, the role of the facilitator as a presenter of the parade/fashion show is very important to create the right atmosphere of amusement, both for the performers and for the audience.

Variations: With the same structure, it is possible to represent simple polynomials.

3.17. OPERATIONS BETWEEN MONOMIALS

Math topics: Literal calculation, monomials, polynomials, operations between monomials

Objectives: Understanding the representation of monomials and polynomials, make simple calculations with polynomials

Life Skills: Effective Relationships, Creative Thinking, Decision Making

Didactic materials: A4 paper sheets, large-tipped felt pens, two tunics of different colours, music.

Description: Monomials are represented with the same rules of the activity 'Representing monomials and polynomials'.

The facilitator divides the group into subgroups of 3 to 5 people.

An operation is assigned by the facilitator or each group decides which operation they want to represent. After that, the participants determine what mathematical steps are needed to represent the operation chosen.

Then, each subgroup decides how to stage the operation, by defining a context (an era, a cinematographic or theatrical genre, a situation, etc.) and a soundtrack. According to the style chosen, they also choose the intermediate steps that will bring to the solution and rehearse them (how would monomial characters move in a Western movie? And if we were samurais?).

At the end, every subgroup shows their operations to the others.

Duration: A minimum of 1 hour.

Variations: The same structure can be used to represent products between monomials or polynomial identities.

3.18. EQUATIONS

Math topics: Literal calculation, monomials, polynomials, operations between monomials and polynomials, equations.

Objectives: Understanding the solution of first order equations.

Life Skills: Effective Relationships, Creative Thinking, Decision Making

Prerequisites: Knowing operations between monomials.

Didactic materials: A4 paper sheets, large-tipped felt pens, two tunics of different colours, music.

Description: The facilitator divides the group in subgroups with a variable number of participants according to the first order equation they want to represent. It is recommended to include an equation with at least two monomials and two numbers (E.g. 2X+7 = -3X +2).

In each subgroup participants decide which equation they want to solve and how to represent monomials and polynomials with the rules described in the activity 'Representing monomials and polynomials'. A new symbol is introduced: the equals. It can be represented by a participant bending his/her elbows horizontally and positioning his/her hands one above the other, palms down, at chest level (or by writing it on a sheet of paper the symbol " = ").

Now, the group writes how to solve the equation on a sheet of paper. Then, the group works on the theatrical process by choosing a soundtrack, decide how the actors move and a set a context (an era, a cinematographic or theatrical style, a situation, etc.).

The process of solving the "human equation" is then rehearsed, before showing it to the other subgroups.

Some points of attention are necessary for a good result:

All the operations must be done separately and with no overlaps, so that the audience can understand what is happening;

The equals character is a sort of conductor who checks that everything is working correctly and directs the othes;

The solving of the equation should be shown twice: the first one as a theatre show (with no interruptions), the second one with interruptions, so that the audience can check that every operation is mathematically correct;

By giving importance to the setting, the soundtrack, and the way the actors move, we are giving the activity a good theatrical quality and therefore, it becomes more enjoyable for the audience;

It is not important that the staging of the equation is mathematically perfect. If errors are made, they can be the starting point of a discussion within the audience.

It is very important that the actors feel comfortable and enjoy the theatrical part of the activity. In this way they can fully commit to the interpretation of their characters.

Variations: It is also possible to use the same format to work on expressions. There will only be numbers and no letters and there will be no equals sign, but the theatrical framework can be the same.

3.19. EXPRESSING DEFINITIONS AND THEOREMS

Math topics: Understand the importance of the mathematical language

Objectives: Improving the ability to express a definition, theorem, etc.

Lifeskills: Creativity, Effective relationships, Decision making

Didactic materials: A 2m x 2m black cloth.

Description: The context is an international conference to be broadcast worldwide because a new mathematical discovery is going to be presented.

The group is divided into pairs and each pair will present their mathematical discovery. This can be a theorem, a definition, or a mathematical concept taken from the school curricula.

In order to present the discovery, participants A and B have different roles within the pair. A is sitting on a chair with his/her hands hidden behind his/her back and he/she can speak. B is kneeling behind A, hiding his/her head and passing his/her arms under the under A's arms. From the audience's point of view, B's arms look like A's arms (in order for it to be more effective, it is possible to cover A's chest with a big cloth). What B can do is move his/her arms consonant with what A is saying.

Each pair is given time for rehearsing their presentation and understanding how to coordinate A's talk with B's movements.

Then, each pair presents their discovery to the rest of the group. This is introduced by the facilitator in the role of the presenter. The presenter's role is very important, as they have to introduce each presentation with a lot of emphasis on the fact that this is an international conference, it is broadcast worldwide and is going to change the history of mathematics.

Duration: at least 1 hour, depending on the number of pairs

Variations: In order to help A and B, the presenter can intervene during the presentation by dialoguing with them, asking questions, underlining what a remarkable discovery they made, and so on.

If you are working with groups of three, a possible variation is to have the third person translating what A is saying. In this case, A is speaking an invented language (gramelot) that sounds like a real and known language (e.g. English, German, Chinese, etc.)

Observations: The role of the facilitator as presenter is very important in this case. Making the situation theatrical will foster the audience's and performers' enjoyment.

3.20. SEXAGESIMAL SYSTEM

Math topics: angles (degrees, minutes, seconds), the clock (hours, minutes, seconds)

Objectives: Understanding the sexagesimal measurements

Life Skills: Effective Relationships, Creative Thinking, Critical Thinking, Effective communication, Decision Making

Didactic materials:

Description: The facilitator divides the participants into groups of three.

The members of the groups respectively represent seconds, minutes, and hours.

The facilitator asks participants to develop a performance based on rhythm, movements and sound as described in the activity "The rhythm machine'. Unlike the rhythm machine though, the three participants (A, B and C) are not positioned in a row. They can freely decide their position in the space. The main point (the sexagesimal system metaphor), is that B can do his/her action only after A's x actions, and C can do his/her action only after B's x actions. So, the performance is made of actions carried out according to a very precise sequence, like the hands of a clock. It is important that the facilitator explains the interdependence between A, B and C and that we are using only a metaphor of the clock. Since they cannot follow real timing, a reduced number of cycles must be used.

In order to prepare the clock/machine, A, B and C have to decide what topic they want to address and a title. Each performance must respect three steps: a clear beginning, the main action, the exit moment.

A, B and C enter the stage one at a time, they take their positions in the space and remain still. When everyone is on the stage and ready, the clock/machine starts working and it only stops after completing at least one complete cycle.

Duration: 1 hour

4. Process Drama Activities

4.1. Introduction

The concept 'process drama' was introduced by Brad Haseman (1991: 19), defining it as "the distinctive form of improvisation which has emerged from schools", one of the characteristics being that the improvised drama was structured to arouse an artistic response from the participants. According to Cecily O'Neill, process drama proceeds without a script, its outcome is unpredictable, it lacks a separate audience, and the experience is impossible to replicate exactly (O'Neill 1995: xiii).

In developing Theatre in Mathematics, as a new methodology, we include the genre of process drama, to which the method Teacher-in-Role (TIR) has become a major approach. TIR makes it possible for the teacher to switch between roles and influence the drama both inside and outside the fictitious event, i.e. both as teacher and in role. Bolton (1995, p. 189) underlines that it is exactly "the *mixture* of teacher/roles, including the normal teacher register, that makes for authenticity, (…) and, again, it is this ambiguity that 'disturbs into learning'".[i] To describe this mixture of roles, some drama theorists use the notion of role categories, i.e., when 'role categories' are used, it usually refers to different roles used by Teacher-in-Role (Heathcote 1984; Heggstad 2012).

In line with UNICEF, we are referring to a life-skills based education, which "makes it clear that a life skills approach will be used to teach the subject matter, meaning that participatory teaching/learning methods will be used to help learners develop not only knowledge, but also the psycho-social life skills they may need to use knowledge to inform and carry out behaviour". With the aim of changing and improving learning processes in math using drama, roles and role categories, we explore a possible link between role categories and life skills as well.

In the methodology 'Theatre in Mathematics', we have adapted the idea of *role categories* primarily for the participants and their collective role, and *role aspects* as necessary details for creating and acting in role. We have used the idea of role categories to explore if the experience of role categories, such as the sceptic, curious, democratic leader (positive authority) and mediator, can contribute to a more engaging student involvement in mathematics. The aim is to contribute to a change of the traditional pattern of teaching math in classroom communication, in which the teacher asks questions, the students answer questions from the teacher, and the teacher evaluates. In the TIM methodology we also refer to

WHO's life skills and explore if and how the role categories can work to improve life skills, and the challenges in trying to do so.

Process drama is a structured, improvised acting form where teachers and students agree to examine a fictional world together: 'It is structured so that participants take on multiple roles, not just one character throughout the drama experience. It is framed this way to allow participants to consider multiple perspectives' (Landy and Montgomery 2012: 19). In this way, process drama differs from other kinds of drama, such as basic role-plays and dramatization.

4.2. APPROACHING DRAMA WORK

Many teachers may have a wish to use more playful approaches to teaching, like drama, but are unsure and insecure how to do it. It may seem manageable to use a few exercises, but not easy applying a longer fictional work, like process drama. Of course, you may work with exercises, small plays and longer sequences which turn out not to work, or work very differently in your class than the classes you read or are told about. It is possible, even in drama, to work in a way that doesn't promote creativity, for example because you use too much control and too little trust in the class. The balance between teacher as leader and facilitator is not always easy, and in drama you often work as both. Teachers often prepare their lessons in a way that creates a clear structure for the teaching, even if the lesson was thought to be creative and engaging.

We think many teachers will feel more secure to use new teaching strategies if they have a clear structure for the drama lesson, although there might be some flexibility and space for change. We use the word dramaturgy for the way a lesson, performance or an improvised drama is structured, implemented and the way the composition and implementation opens or closes for participation and involvement. Therefore we have used a process drama with a clear structure in episodes as our example, but not as an example of how every process drama should be. It is not a general model for process drama, but nevertheless an example of how many process dramas are composed.

The structure of our process drama, The Stone Soup, has a classical, linear dramaturgy, influenced by traditional rituals. The story starts in harmony, then harmony is challenged by some threat, which has to be overcome for a new harmony and balance to be re-created. But the change between fictional work and negotiations and reflections out of role creates a mix of classical and epic dramaturgy. A more experienced drama teacher can be able to create the drama from scratch, from an idea among the students, a suggestion for a topic or an

incident to start from. The teacher can use a text as an impulse for fictional actions, which Cecily O'Neill explains as pre-text. In our example, we take the legend of Stone Soup as a pre-text, and transform it to situations the participants are asked to act within, and that creates some challenges for them. Still, there are many spaces for creating fiction; the interactions in the families, the way they show their intentions, enact attitudes and status, and react to the foreigner in a state of hunger and drought.

While there are spaces within the episodes for negotiation and creation, this story follows the legend; the foreigner manages to convince the villagers that sharing is good. The drama is not about the villagers who discover sharing is good, but how, and how convincing, their change of attitude is. Is it a real struggle, and thus a play for the students, or is it just a play for the teacher, fulfilling what the participants believe is the teacher's expectation?

The combination of classical and epical dramaturgy may also express differences in learning process, in which the classical dramaturgy refers to mediation of already constructed knowledge, and the epic dramaturgy question and reflect on traditional concepts of knowledge, and thus the two dramaturgies may complement each other. The dramaturgy may also express a more obvious constructivist learning process, where knowledge is not something mediated, but something situated and influenced by the context. The drama may even create a state of being, rather than a story with a beginning, middle and end, like in Heathcote's work with young women. Starting from an excerpt from Cinderella, focusing on the relationship to her stepsisters, what comes before and after is not of interest, but the dwelling of the relationship (Heathcote 1985, p. 48). Thus this drama is linked to situations in similar relationships between siblings, in the old Testament, other literature, and at last in their own lives. This conditional, or circular, dramaturgy, creates knowledge from the experience of combining experiences and perspectives, and not from mediating how a tradition acknowledges an attitude or viewpoint.

When presenting this, we will remind that the foundation for drama is life, and relationships through which we explore the world. We create drama in some way to explore and comment on relationships and human conditions, in a fictional frame, and in role. This can be done in many different ways, and doing this recreation of life and features of human existence (mimesis) is often very joyful and entertaining.

Here we suggest some ways to do it, i.e., creating participatory learning processes in drama. The idea of doing this in math is to help create a more participatory teaching in math, by the use of role categories (sceptic, curious, mediator and

democratic leader). The same reflective flexibility should be applied in how math is integrated, before, during and after the process drama. Math exercises and tasks may be used to strengthen the fiction, i.e., when these tasks appear to be natural to the context enacted, and they may create a distance to the fiction, in a Brechtian and epic way (dramaturgy). There is and should not be any ortodoxi in how to create drama, but there are some experiences and practice-theory for what may work in this or that circumstance.

4.3. WARMING UP, IMPROVISATION AND ROLE ASPECTS

We ask the students to sit in a circle, with a short presentation of names (the whole group), if this is a new group, or if some of the teachers are new to the group. We remind them in a short conversation about the lessons and what it contains these days. Now we are going to work on more tools to act in theatre. We will work on how to play a role, as a way of preparing for the use of drama in mathematics.

4.3.1 THE FLEET

Duration	**Materials**	**Age**	**Prerequisites**
5 minutes	Tambourine	9 - 14	None
Math - topics	**Theatre**	**Life skills**	
Communication Creative thinking	Exercise	Self awareness Creative thinking Effective communication	

Key words: Physical and mental awareness

Purpose: Warming up and attempting to establish a cheerful mood in the group. Move the group towards improvisation and later we are standing in a circle, we develop games that turn into work as people in a city/village around a lake.

Description: Reminding them of the raft from earlier exercises, and to walk within the fleet, filling the gaps, so we keep the balance of the fleet. One teacher

plays a tambourine, and when she stops, they stop moving, and we may make comments to the balance of the fleet.

4.3.2. IMAGINARY DUST

Duration	**Materials**	**Age**	**Prerequisites**
3-5 minutes	None	9- 14	None
Math - topics	**Theatre**	**Life skills**	
Communication Creative thinking	Exercise	Self awareness Creative thinking Effective communication	

Keywords – fantasy, improvisation, creativity, humour.

Purpose - warming up and attempting to establish a cheerful mood in the group. Move the group towards improvisation and later work as peoples in a city/village around a lake.

Description – A rehearsal of the imaginary: pass around the dust in a ring and it changes its form and purpose each time a new person gets it. We exercise the

skill to improvise on imaginary objects and to be able to be present in the moment.

4.3.3. PRESENTS

Duration 5 min	**Materials** None	**Age** 9 - 14	**Prerequisites** None or game nr. 1
Math - topics Communication Problem Solving Creative thinking	**Theatre** Dramatic playing mode	**Life skills** Creative Thinking, Effective communication	

Keywords - improvisation, acceptance, spontaneity, fantasy.

Purpose - Give and receive presents to show how an item can be used in different ways. Working on imagination in the moment and making up as we go. Work in pairs.

Description – two students stand in front of each other, one puts up an imaginary gift big / small, heavy/ light etc. and gives it to the other person. The receiver says thank you and opens the gift. Try not to decide what it is until you open it. The receiver does something with the gift that helps the giver understand what it is. This could also be done in a circle, sharing silent work together, rehearsing and miming.

4.3.4. SELLING AN OBJECT

Duration	**Materials**	**Age**	**Prerequisites**
5 - 8 minutes	one small object for every pair	9 -14	None or nr. 1 and 2.
Math - topics	**Theatre**	**Life skills**	
Communication Argumentation and reasoning Creative thinking	Dramatic playing mode	Creative Thinking, Effective communication, Effective Relationship	

Keywords - partner work, objects, improvisation, spontaneity, acceptance.

Purpose – create a positive climate among participants and move the group towards improvisation and later work as peoples in a city/village around a lake.

Description – work in pairs, A and B. A: take an object and sell it to B, either as the same object or transform it to something else, a fantasy object that you are going to sell. Arrange the improvisation with an arrival, as someone selling goods in a market. A is a seller, B is a buyer. A wants to sell something to B, and to convince B to buy it. The object can change to be something else when they have tried one or two times. They change roles after one round. What kind of strategies do you use, can you change tactics? The facilitator might want to give an example first.

4.3.5. TELL ME ABOUT A PICTURE

Duration	**Materials**	**A**	**Prerequisites**
10 minutes	Art Pictures or pictures related to local environment	9 - 14	None
Math - topics	**Theatre**	**Life skills**	
Communication	Exercise	Effective communication, Creative thinking, Critical Thinking	

Creative thinking Problem Solving			

Keywords - observe, denote, connote, describe, interprete.

Purpose - This exercise can be used in different phases, but especially in an early stage, as in this work, to create a playful and motivating atmosphere. This may give the participants some clues to tell a story, to stimulate their fantasy, and train their ability to mediate something they have seen or experienced. Training the ability to distinguish between what we see and how we interpret it: denotation and connotation). Training the ability to tell stories in a way that makes the listener able to imagine what one is told, and likewise to listen with attention, and train the ability to see what one is told.

Description – The exercise is based on the model: notice – describe – interpret, which promotes a nuance between describing and interpreting (denotation and connotation). The participants are divided into couples, and one from each couple – partner A - will see a picture, for example a piece of art in an artbook. (It might be any pictures from art history f. example from modernism, with bright colours and many items and people). All A's come to the leader and study a picture for a minute, trying to memorize all details (colours, lines, figures). The A's go back to their partner (B), and describe the picture and its details, holding back the interpretation. A concludes or sums up with his or her interpretation of the picture. The partner – the B's – shall try to see the picture while the A's explain it and may ask some questions during A's describing the picture. Then the B's go to the leader, they see the picture, and get a new one. They talk about it in the same way as A did. Each participant tells about two pictures.

Variation for the 9 - 11 year olds: Picture making :

To make it more understandable for the younger children a variation can be chosen;

After A explains B's about the picture, the group can make a physical interpretation of the image by using their bodies (still image):

a. A sees the picture

b. A describes to B what she saw.

c. B's are making a still image out of their understanding of the picture from the description A are making.

The A's and B's change, and the B's will see another picture, which should be described for the A's. The exercise might be changed once more, so the participants get the chance to explain twice each.

Observations

We have observed a need to differ between the two age groups, because of the degree of difficulty in keeping focus during storytelling.

4.3.6. IMPROVISATION AND ROLE WORK

Duration	**Materials**	**Age**	**Prerequisites**

10 - 15 minutes	Notes with different occupations	9 -14	Games or roleplay
Math - topics Communication Creative thinking Problem solving Change of perspective	**Theatre** Dramatic playing mode	**Life skills** Creative Thinking, Critical Thinking, Coping with emotions, Effective communication, Effective Relationship, Empathy	

Keywords - improvisation, role, status, relationship

Purpose - The process drama is based on improvisation, and not a finished script. We will train on improvising, enacting a role and having different status in role. We should be able to enact another status than the one we want to express in our daily life, and we should be able to vary the status. In play, we should reflect on how the role expresses its relationship to other roles, and how the relationship to others can be varied. We should be able to act submissive if the roles relationships indicate so.

For the 12-14 year olds, to status we add intention and attitude, and through developing these three aspects (status, intention and attitude) we build the role.

Description

A) Saying YES: impro with whole group: the whole group is spread in the room. The facilitator shouts: "Do you want to go backwards?" the crowd answers: "Yes!" and then collectively do it. Then a new task is coming from the facilitator, and the activity sustains as long as nobody comes with another offer. Anybody can now give offers on what to do. We are exploring the use of saying "yes" as an important factor in drama work for the play to happen. If you refuse what's being brought to you in a situation, the drama is stopped and the lack of acceptance towards the initiativ is stopping drama to develop.

B) Walking in the room, stopping, saying hello with different subtext: a) I am sorry, b) can I help you? c) I am hiding from someone

C) Rehearsal on status as we walk, stand with emphasis on different body parts; demonstration and impro in the big group before going into pairs. The group stands in a circle. The facilitator instructs them to put emphasis on their toes. For example, how does it feel to let your toes be big and lead you as you walk? How does it feel in the way you walk, your body, your way of walking? Does it give you a special feeling? Now try this with emphasis on: shoulders, your neck, your belly, your hips etc. After the exercise you might talk about what they experienced.

D) Situation A and B - from Augusto Boal: All the children get a note telling about an occupation. Half of the group is getting the same occupation but it's a secret which one. They try to find a way to walk around in the town as this person – is there any special way this is felt in the body of that person? After a while they start to look at each other and finding their "twin" they walk behind him or her. In the end they can reveal their occupation.

Summing up: To play a role, we should have an indication of the status, the intention and the attitude of the role in the situation of the drama, i.e.:
- What the role tries to gain in the situation
- The relationship to other roles in the situation
- The attitude to the question discussed in the situation.

If this is not clear, the drama is often reduced because we rather play ourselves than the role, or play some variation of ourselves, regardless if this suits the role or not.

Variation with age 12 - 14: Vary status in this situation: A and B meet … (the market, or somewhere else). A has recently arrived at … (decide the place), B has lived in this place for a very long time, and knows the city/village, etc. Try this impro when A has low status, B has high, when A has high status and B has low, when both have high status, and when both have low status. Is it possible to change status while acting? Discuss what happened between the two of you.

A is a headmaster - B is a student. A asks B to come to his/her office, after a while the headmaster accuses B for something, like bad behaviour, and B's status decreases. B's status becomes very low, before B struggles to argue that the accusations are unfair, and after a while A's admit that the accusations were wrong, and based on lack of knowledge of the situation. A's status decreases, and

B's becomes higher, until a complete change of the barbell between A's and B's status. Notice how and when the situation changes, and the equilibrium between A and B is changed.

4.3.7. INTENTION

Duration	**Materials**	**Age**	**Prerequisites**
5 - 10 minutes	None	9-11 and 12-14	Playing role games
Math - topics Communication Creative thinking	**Theatre** Exercise	**Life skills** Creative Thinking, Critical Thinking, Coping with emotions, Effective communication, Effective Relationship, Empathy	

Key words: listen, observe, motivation, improvisation

Purpose: be aware of how you listen to others, and how different communication influences the way you react.

Description: Name-game (two of the teachers demonstrate). The children stand in two rows, one of them with the back to the other. The one in the back says the other one's name and the purpose is to get the other to turn. Try different subtexts to see what works; when is he or she motivated to turn around?

The activity is repeated, but instead of asking for the name, the children "calling" asks for something like, for instance "give me a glass of water" enacting three different ways of saying the request. How can I achieve my aim by using different tactics?

4.3.8. ATTITUDES

Duration	**Materials**	**Age**	**Prerequisites**
5 -7 minutes	None	9-11 and 12-14	none
Math - topics Communication Argumentation and reasoning Creative thinking Problem solving	**Theatre** Improvisation Exercise	**Life skills** Effective communication, Creative thinking, Critical Thinking	

Keywords: imagination, communication, rhetoric skills

Purpose: try out different approaches to how you can communicate your task in different statuses. What happens with me, the other and the situation?

Description: The street seller A tries to sell something to B.

Sell the cup as a cup, or as something transformed from the cup. A has to convince B that this "cup" is very special and you can't live without it… The buyer can use these three attitudes as an underline talking to the seller:

1. Do I need it? (skeptic)
2. I really need it! (curious)
3. I would rather buy something used. (negative)

Observations

Status seemed to be a complicated and controversial concept among the teachers observing the introduction to the pilot of the process drama. Several of them were critical of using the concept, because it is understood as a sociological concept, describing social status. As such, in Greek, with many unemployed, they argue that it is offensive. The Greek one, they said, is an egalitarian society, and status as a concept is not easily understood.

In later talks with a Greek drama colleague, he couldn't understand the reaction, and said status was a common concept to describe and act a role in Greek as well. It seemed to us that the teachers had bigger problems in accepting status as a part of the role, than the participants. Whatever the reason might have been, the exercise was difficult to implement with the kids. It might have been a challenging time of the day; they seemed to be tired when they continued after lunch, with a weakened energy. It was difficult for us to keep the group, and make them work together as a group. We discussed afterwards if we should have given priority to practice and less attention to the concepts as such. It is difficult to keep attention over time. And it should be possible to practice the exercises in a more simple, understandable way.

This situation may look like the situation in math: a movement away from working with symbols to examples that make it possible to work in a more intuitive way. It is easier with icons (III) than symbols (3). The use of cards as a signal to change status worked well.

4.3.9. ROLE CATEGORIES

Duration 5 - 10 minutes	**Materials** None	**Age** 9-11 and 12-14	**Prerequisites** none
Math - topics Communication Argumentation and reasoning Problem solving Creative thinking	**Theatre** Exercise	**Life skills** Creative Thinking, Coping with emotions, Effective communication, Effective relationship	

Keywords - group improvisation, role categories: sceptic, curious, democratic leader, mediator.

Purpose - repeat the idea of role categories and clarify possible uncertainty about them.

Description – Group improvisation – with four participants: Divide the role categories between you: *the sceptic, curious, democratic leader* and *mediator.*

Arrangement: You are sitting in a cafeteria in school and discussing the question of using laptops in schools – and each role according to its role category. Change and repeat.

Make a comment afterwards how this worked for you, and how these role categories can be expressed more clearly. Change the role category and repeat a few rounds.

Observations

It is clearly hard to tell if the children are holding on to their role categories, so we went around and tried to look at body language and so on.

4.3.10. IMPROVISATIONS ON ROLE CATEGORIES

Duration **10** minutes	**Materials** coloured cards	**Age** 9-11 and 12-14	**Prerequisites** none
Math - topics Communication Creative thinking Problem solving	**Theatre** Exercise	**Life skills** Effective communication, Creative thinking, Critical Thinking	

Keywords - improvisations, signs, focus

Purpose - Strengthen the idea of role categories in a playful way.

Didactic materials - cards of different colours, signals different attitudes

Description – 1. warm up: The participants are instructed on the use of the three cards: RED (you stop!) - YELLOW (you wait) - GREEN (you go!) and you rehearse this by making commands as they go about in the room.

This is how the colours affect the players:

Red: You are sceptic, you wait, and take no chances.

Green: You are always on the go! Positive and curious.

Yellow: Waiting, lets see what happens, think it through….

2. When the group is familiar with the game, you make them stand in two lines, partners face to face. The A group is also faced by a teacher, who gives the As signals to change attitude by changing the cards of different colours; we use the same cards with the colours RED - YELLOW - GREEN. We establish the rules: RED: STOP - GREEN: GO - YELLOW: wait, and the whole group acts according to which colour is held up by the teacher.

3. Then we use these colours in an improvisation where they two by two are trying to sell something at the market and the buyer shows different attitudes according to the colour card that is being held up by the facilitator. The buyers act accordingly to the attitudes of the colour being held up.

5. THE PROCESS DRAMA: *THE STONE SOUP*

Justification

This folk story is known in many European countries,[1] although it is often set in China,[2] and therefore also recognised as a Chinese folk story. It is known by different names, such as *axe soup, button soup, nail soup,* and *wood soup.* The story is understandable and deals with topics that can be connected to life skills. It has a classical, ritual composition, from harmony through disharmony to a new harmony. However, the approach through process drama will add some challenges for the participants, by creating roles that have differences in perspective, and based on the role categories which are central for the TIM project (democratic leader, curious, sceptic, mediator).

☐

Duration 4 hours	**Materials** Props: Buckets – one for each family and one for the stranger, 4 whiteboard pens, stones, tape, camera. Costumes:	**Age** 9-11 12-14	**Prerequisites** Teacher needs to know the story.

[1] https://en.wikipedia.org/wiki/Stone_Soup

[2] http://geowonderland.blogspot.com/2015/02/stone-soup-chinese-tale.html (Downloaded 14.04.20)

	Mayor: robe or suit jacket, marking high status *Wanderer*: stick and poor robe, marking low status. *Families*: Scarfs or ribbons of different colours to mark the faction, and the different group identities. Tables, chairs and cloth.		One teacher is possible, two teachers are preferable.
Math – topics Division Problem solving Argumentation and reasoning Communication Role categories Change of perspective Creative thinking	**Theatre** Methods: Teacher-in-role Conventions: Narration, Whole-group role play, Improvisation, Still-image, Mime, Thought Tunnel; Ceremony, Meeting Music: Stravinsky: *The Rite of Spring*	**Life skills** Decision making, Problem solving, Creative thinking Critical thinking, Self-awareness, Empathy Assertiveness, Equanimity Resilience, Cope with emotions and stress.	

Key words: process drama, teacher-in-role, participation, play, attitudes, dialogue, role categories.

Purpose:

- To present and experience central math concepts in a fictional, lifelike situation, challenged by different roles and role categories – and later to be used in math.
- Explore the idea of sharing under difficult circumstances.
- Experience a process drama as a learning process.

Description for the teacher

The drama is happening in a village situated around a lake, and the participants are grouped in four families, representing the four peoples of this fictional country *Equatia*. The families have their names after their location in the area: North, East, West, South (NEWS), and get a corner of the room as their location. The drama starts in a harmonious state, a happy and prosperous life in the village, which is after a while challenged by drought and hunger. In this state, the villagers meet a foreigner, a poor wanderer, who begs for food and drink. Thus the participants, in their role as villagers and combined with the assigned role categories, are challenged by this quest for help and empathy.

It should not be too easy to decide to help, according to their own state of hunger. Therefore the task of the Teacher-in-role is to argue for refusing to help, reminding the villagers of their own situation, because they also suffer from drought. However, the Teacher-in-role may as well challenge an early refusal to help, and it is the dialogue between different perspectives and attitudes that can make the drama to a challenge and a learning process.

The process drama sticks to the folk story, and therefore the wanderer manages to convince the villagers that it is wise to help, and thus the story ends in a happy way. They create a celebration when the wanderer leaves them, and the harmony of the village is recreated, although the drought still exists.

Two or one teacher

The process drama will benefit from having two teachers involved; 1: Narrator / Mayor, and facilitator - the one who leads the lesson, 2: The wanderer, photographer and the assistant to the mayor. If there are more teachers involved, the roles can be distributed otherwise. TIR (Teacher-in-role) shows how she/he will mark the role with the special clothing and says that as narrator, the teacher will have no costume.

Variation: The process drama can work for both 9-11-year olds and 12-14-year olds. The younger ones may meet a less confrontational Teacher-in-Role, and less demanding math tasks.

Signs in the setup:

Blue: instruction to the teacher
red: instruction from teacher to students
green: comments, adjustments

1. Introduction

Key words: roleplay, role categories, storytelling, framing, defining space

Purpose: Setting the frames for the drama to begin, making decisions about roles, defining the fictional room, occupations, establishing the families.

Equipment:Available chairs and tables, an empty space, 5 buckets, 4 whiteboard pens in different colours for 4 groups, a cape for the mayor, a dirty/worn out cape for the stranger, a stick, a big pan and a big ladle, music fra *The Spring Offer* by Stravinsky and a music device.

Preparations: Make sure you have all the equipment ready from the start, cf. a list above. Clean the space/ classroom from chairs and tables by putting them along the wall, they might be useful to some extent later in the making of the drama. Backpacks and stuff that makes "noise" in the room are put away, alongside cell phones, airpods and other devices. Gather the class in a circle in the middle of the room to sit down and have a good start.

Variation 1

Teacher:

Teacher welcomes the class to the process drama lesson and explains:
We are soon going to explore a story together. In order to do so we need to prepare some groups.[3] I will now divide you in four groups and you will go to one corner each, where you make a 'nest' as a family. You can use some tables and chairs, and cloth that I will provide for you. The groups will have different agriculture: a) vegetable farm; b) an olive and olive oil farm, c) an animal farm, d) a family of tomato peasants.[4] You will also divide the roles inside the family together. Everybody has to be a person (not a farm animal) and all have to be over 12 years of age. Before you go: do you remember the work we did on the roles yesterday (or earlier this morning?), when we played with red, green and yellow light? Now we will use this way of marking different kinds of roles you will have in the drama. At one point you will be given a ribbon with one of these colours, and I just want to be clear on that we agree what the colours mean (here you can be in dialogue taking ideas from the children with their own words)

[3] Here there is a variation 2 for the group 9 - 11 years, see further down in document.
[4] The teacher should avoid silly or 'funny' suggestions that create too much distance to the drama.

- If you are **red (stop!)** You have to listen to everyone and let everyone argue and make the decision and do what is the best for most in your family, but you have to decide.
- You are **yellow (wait!)** you are sceptic and see problems with the other arguments and suggestions.
- You are **green (go!)** and curious, and willing to see the possibilities in a new situation.
- You are **blue** and the mediator and try to delay conflicts; you are a diplomat. You do not make the decision. [5]

Instruction to the teacher:
While the groups establish their room and roles, the teacher can move around between the groups helping them by asking questions and supporting their choices, and helping them to find their roles.

Students
The groups create their own family, and with different status, related to the family business, suggested by the teacher. The groups decide the family business in dialogue with the teacher, and then they create the roles and role status (the relationship between the roles):

- Parents, one or two
- Children
- Grandparents

Instruction for the teacher:
When the groups have worked for a few minutes on establishing the roles and the farm, the role categories will be distributed by you (and / or a teacher 2 if you are two teachers and can work simultaneously with more groups). The handing out of role categories are done in role when the play begins and you as a teacher walk around as the mayor to visit the families, (look at episode 1). You define who is the democratic leader, sceptic, curious, and mediator in the family by handing out the ribbons and clarifying the relationship between them (their status).
If you are two teachers the other one can be in roles as a photographer who wants to take a picture to the local newspaper. You give instructions to the groups to make a family photo / still image to help find the roles.

[5] If it is helpful and available it would be good to place a grown up /teacher in the role of the mediator, it can help the children to maintain their playing but in a subtle way.

Comment: This picture might later in the drama be shown to a journalist (Colleague-in-role) making a reportage from the village and/or the mayor as he/she later walks around in the village to visit the families.

Teacher to all:
All of you have a small secret / an imaginary item of importance you always carry with you, what might it be? Take a minute to think about what it is and where you got it, then you can tell the secret to one other person in the family.

Comment: This can help the participants to establish their roles, and help them find a story for themselves to share.

Teacher to all:
Before the drama begins, we have to agree where to have a square at the shore of the lake where people meet and the mayor may give information to all the families.

A short discussion in class comes to an agreement. The teacher marks the place with a tape at the shore of the lake.

Variation 2
Preparations: in addition to mentioned props you need a box with four different agricultural descriptions, such as below.

Instruction to the teacher:
After welcoming the class to the process drama lesson in the circle, the students pull a note with one of four professional activities:

- A farmer's family (breeding chickens)
- A vegetable grower's family (olive and herbs)
- A vegetable grower's family (tomatoes).
- A vegetable grower's family (onions).

Instruction:
Some of you might have the same note.
You are going to move in the room, thinking of your family's business that was on the note. Think about how it's like to do this form of farming all day, where do you think you can feel it in your body? As you walk around you might want to try to express this in how you walk, are you light? Heavy? Strong? Tired? How do you perform your farming, can you mime the actions? After a while you start to look around, and maybe you will see someone else who is performing the same actions as you do? If so, without speaking to each other, gather as a group.

Comment: when all are grouped it might be interesting to hear if they found their families or not? What were the important signs you saw in each other or not? In this way we create the groups.

From here the variation 2 follows the preparations from establishing roles and space

The process drama begins: The story

Key words: narrator, narration

Purpose: setting the fictional frame

Description

The teacher as NARRATOR

Once upon a time in a fair country far away, there lived four peoples/families: The Northerners, the Easterners, The Westerners and the Southerners. They lived peacefully together along the shores of the great lake Equatio. They were friendly and hospitable people who enjoyed visiting each other, and the occasional company of travellers passing by. The land was prosperous, and the crops were plentiful.

EPISODE 1: <u>Visit by the mayor.</u>

Key words: teacher in role, roleplay, role categories, mime, improvisation

Purpose: engagement, physical and emotional involvement in the story by acting together, meeting the mayor that enhances the feeling of the fiction. Establishing the play.

Description:

Teacher to all: Now go to your farms and start the daily work in your families by miming and improvising. Try to remember your place and status in the family as you play. At one point you will have a visit from the new mayor in town that wants to visit you to get to know the village people**.**

Teacher- in- role (TIR): The mayor.
The Mayor of the village arrives. TIR goes from farm to farm asking questions about their living conditions, special resources from their harvest this year, and if they have all they need. Focuses on harmony, how the livestock are doing and if they have any special happy news. In this way TIR helps the students more into the fiction, and in establishing their roles.

Comment: If the next part is not done in the preparations, the mayor can do it in role:
When the mayor arrives, she gives a task to each family member, and gives a ribbon to each of them. The colours and instructions match those of the "Improvisation on role categories" (4.3.10)

The students
The students can improvise and play for a while and can also be encouraged to visit other farms to do some trading of goods, etc. This goes on as long as the teacher(s) sees that the play is in a flow.

The teacher as NARRATOR to all (teacher 2)
After many good and prosperous years, however, the rain failed (for several years). This led to a terrible drought and the harvest was scarce and the resources no longer plentiful. One day the mayor assembles the people along the shores of the lake to remind them that the resources in the land were scarce and that they must be extra careful to make them last.

EPISODE 2*:* <u>The Mayor assembles the four families.</u>

Key words: teacher in role (TIR), decision making

Purpose: warning of a peak in the play, something is disturbing the peace, stressing the situation, the participants must work even more closely, collaborate and find solutions

Description for the teacher

The Mayor assembles the group around her/him in the centre of the room (around the lake), to discuss the situation. The Mayor is worried and tells the families to go back to their places and start to plan how to make the resources last.
Teacher (2) puts on the music fairly loud.

Comment: As they are back in their groups, and while they are talking, they hear strange sounds (Stravinsky: *The Rite of Spring*) and might begin to wonder what's going on. The mayor is standing on the shore looking worried. There might be a tension in the room leaving the students a bit unsure of what to do, and this is alright for the moment.

EPISODE 3: A stranger arrives.

Key words: roleplay, TIR, improvisation, status

Purpose: to bring in a person who disturbs the peace, makes the drama more intense, enhances disagreements and might be agitating different approaches to the "problem": how do we deal with what we don't know? The confrontation between the stranger (low status), the mayor (high status) and the families is crucial for the involvement of the situation.

Description: A stranger of poor clothing approaches, accompanied by the music of Stravinsky.

Teacher in role (TIR) **as The Poor stranger** (teacher 2)
The poor stranger arrives slowly, there is a possible tension because of the music, and an uncertainty about the situation. The villagers may stop him, and the Mayor may ask to create some distance, because they do not know who this person is. He might even bring with him diseases. The stranger asks the people for food and water, but everyone (probably) refuses due to the situation. He tells them that he belongs to a group of travellers that have left their homes because of the drought in their own village. He has even left this group because he starves.
The four families and the Mayor take a step aside from the lake and discuss if the village can make a contribution, listening to different arguments, but the mayor concludes that they have to be careful as the resources are scarce

Comment: during this phase it is likely that the families will gather around the centre where they earlier met the mayor, if not, the mayor can show them a sign that they should come. The mayor will be more or less skeptical depending on the attitude and comments from the children.

NB! The Mayor promotes the attitude of not helping the foreigner, and has to adjust his/her attitude according to the groups attitude: if the families are very sceptic the mayor might be more welcoming, if the families are very nice and kind and wants to give him everything, the mayor has to be firm and strict (add more status).

TIR as the poor man

The stranger asks for permission to make a fire on the shore and if he/she may take a bucket of water from the lake. He is given permission in the end by the mayor, either with consensus from the crowd or with some resistance from the crowd.

EPISODE 4: <u>The traveller's dream</u>

Key words: tableau, making picture, tunnel or thought, change of perspective

Purpose: taking a step outside the fiction of the families, inviting the participants to step in the shoes of the visitors' fellow travelers and their concerns about starving, It gives them the opportunity to explore other aspects of the drama. This is also what we call a *poetic action* and by its form working in silence and out of realism it gives time to reflect upon the situation in an aesthetic way

Description:

The teacher as NARRATOR

As he went to sleep by the lake at night, the stranger had a dream of speaking to all his friends, in which they were telling him what they advise him to do.

Instruction for teacher (1)

The facilitator now makes a break and tells the participant to take a step out of their roles as farmers. They are now invited by the facilitator to imagine that when the poor man fell asleep that night, he had a dream ... and we can make the dream of the stranger come alive by making two lines, as a "tunnel of thoughts" as he leaves his group to meet the villagers: what would his friends give him as an advice on his/her way? The participants are the walls of the tunnels, speaking out loud and giving advice to the stranger, one by one as the other teacher goes around and puts the hand on the shoulder of each student. If someone doesn't want to speak out loud that's okay. Enhance the importance of what they would advise is totally up to them, they don't know the right or wrong answers.

Comment:

The facilitator might have to stress the importance that the participants do NOT stay in their family-roles at this point, but as the fellow travelers of the poor man. They can also be instructed to make a position as a still image around the stranger one by one. This is a very poetic moment that can give reflection to the drama. Use time on this part.

Teacher to all:
Lying on the shore of the lake, the stranger felt the comfort of his people, and he suddenly remembered the idea of making a stone soup.

TIR as The poor man:
He/she rises and says it loudly: Now I know, I will make the stone soup before I leave!

This would be a logical place to put a break in the drama
As a discussion here it could be interesting to know if the children know about stone soup and what it is made of? It might help them into the next part of the play after break.

Could we help or not?

Key words: roleplay, decision making, confronting thoughts

Purpose: engagement in arguing for/against helping the stranger enhance empathy/antipathy, they have to stand up for themselves in their families

Description:

NARRATOR (making a recap)
Standing in front of the lake, the stranger felt the comfort of his people, and he suddenly remembered the idea of making a stone soup. And he kindly asked the people of the village to help him with ingredients for the soup.

When the four families came back to their corners of the land, some of them started to feel bad about the way they had treated the stranger.

Instruction teacher to all:
In the role of the family members, you discuss if your family should share your food or not. You go back to your houses and discuss the new situation.

Variation: To get into the arguments and way of thinking within your role category (sceptic, curious, etc) you first go in groups with your own role category/colour from the different families, discussing a couple of arguments from their role categorie's point of view.

Comment: This can be done out of role, supervised by the facilitators, helping the students to understand the perspective of their role category. The teachers can instruct/guide with these arguments and send them back to their families:

1. The sceptic starts to hesitate and refuses to help the stranger.
2. The curious ask questions about why and are eager to get to know the stranger.
3. The democratic leader wants all views to be presented and discussed, has an open mind, but may be reminded about the views of the Mayor.
4. The mediator tries to mitigate the conflict.

The teacher to all:
The families argue about the situation: should they help the stranger and his fellow travellers or not? What do you think of making a stone soup? If you decide to help, you discuss how you can help the stranger.

Comment: The important thing is to be aware of the different attitudes and perspectives to sharing, not what they conclude and decide. But what they decide affects what's happening next.

If the participants need suggestions, the facilitators may help, according to the family businesses. For example:

The northerners brought a bucket of onions.
The southerners brought a bucket of meat.
The easterners brought a bucket of tomatoes.
The westerners brought a bucket of olives.

EPISODE 5: <u>At the shore with the stranger.</u>

Key words: roleplay, improvisation, sharing, meeting obstacles

Purpose: the drama moves towards an end; the traveller might be helped, but what about the families? Should they share and how?

Description:

Narrator

At the shore the Stranger was preparing the soup. The four families, whether they decide to help the stranger or not, sent one member of the family to explore what the stranger is doing.

The poor man (TIR) to all:

If you decide to help me, I leave a bucket outside your door for you to fill with whatever you decide…

Teacher to all:

If one or several of the four families decide to help, you bring your contribution in a bucket by writing and drawing on the bucket; if a family (one of the NEWS) refuses to help, one in this group still goes to the shore to have a look. You can write and draw on the bucket what they will give to the soup.

Comment: In this way the acting creates both involvement and distance to the fiction: they still talk about and believe in what they are willing to share, although it's just written on the bucket.

Improvisation between the poor stranger and the four spokespersons and the mayor.

The mayor can help the conversation by asking questions like:

- Does he have enough ingredients to make the soup?
- Does he need more? What is needed?
- How does he treat the relation of ingredients?
- Can he just add something without considering the amount of another ingredient?

The stranger asks the four spokespersons to go back to their families. If some has refused to help, he asks for a minor contribution for the soup. He tells the four that if they give some amount of resources, everyone may share the soup. Even his fellow travellers. If all families bring resources with them, the soup will soon be ready.

Variation

We may investigate the possibility that the stranger is totally strange to the way of thinking in how to divide, where he comes from, everything is shared equally. If they will help him, they must make a division according to, for example the amount of people in their family. We suggest that there could be a break and a task made out from Mathemart at this point.

Episode 6: Preparing for a feast

The teacher-facilitators should consider if there arises one more obstacle, and this could be decided by or with the students. If there are no more obstacles, maybe because of time, we go on towards the end. Depending on the outcome of the decisions in the group we can have different outcomes:

1. The villagers shared in a fair way and prepared for a feast with the stranger, and celebrated the sharing.
2. The obstacle can be the information that the group of travellers are getting closer, and that they have a big need of supplies. What can we do? Discussions.
3. The stranger suggests that they make enough soup so he/she can bring with her/him soup for his fellow travellers, and the village may share the rest. **The mayor arrives**, accepts the sharing, but raises the question of how to share:

- Shall they share according to the amount of contribution?
- Shall they share according to their needs?
- Shall they share according to the number in each group?
- Shall the divide be divided into four?
- Another suggestion or way of solving the challenge?

Comment: In discussing this, we use the role categories. They discuss in their families or as a big group depending on the climate in the group at this point. The question can also be continued in the math lesson after the process drama.[6]

EPISODE 7: The feast

Key words: making decision, dance, ritual,

Purpose: find a way to land the drama in a way that sums up what they have decided, restore the peace in the village by making a ritual together that rings in the fellow experience of the drama.

Description:

Instruction for the teacher

[6] What ideas do our math colleagues have about the math possibilities in the situations described in this draft? Set theory? Is a bucket of vegetables worth more or less than a bucket of fish, olives, meat, etc? Could the students create alternative currencies? (One fish equals four vegetables: one spoon or one spoonful of salt, spice, etc.?

When the celebration of sharing is to be prepared, the teacher invites the students to discuss how it could be done, and then what preparations are needed. It could include a song or a dance the participants know or want to learn for example. The four families arrange the celebration; e.g., a dance, ritual or song in the centre of the room, and they say goodbye to the stranger, with soup for his fellow travellers.

The narrator
The fasilitator sums up how they decided to divide the soup and describes the celebration based on what they did….
The villagers bid the stranger goodbye at the shore.

The fiction is now broken.

8. Summing up
Key words: comments, reflections, evaluation.

Purpose: to express and clarify the experience and immediate ideas of learning outcomes and possible weaknesses of the work.

Description
We sit down in a circle. The students are invited to make their comments on what they now have experienced, and how the drama worked for them. The teachers tell the students that the drama will be continued with math lessons, applying the role categories in math teaching.

The participants discuss the process drama, how they experienced the situation, if they have been to such situations earlier, if something in their attitudes were challenged and/or changed.

9. Exploring different approaches on how to use mathematics in process drama

One example without fiction:
Present a task which probably will be solved differently. Ask a student to present one solution. Ask the other students to be curious, which means to ask questions until they fully understand. Good questions could be focused on how this solution was reached, why this method was chosen, and why the student thinks this is correct. When the details of the students' thinking are revealed, ask another student to present an alternative solution. Then repeat with students asking

curious questions until details of the thinking is clarified. Then ask students to be authorities, by deciding which of the two methods are correct, and if both are correct, which is most effective, or easiest to understand, and request them to explain and argue for their view.

One example with fiction:
Two teachers present different solutions to a problem (or one teacher switching between two roles). The students first task is to understand each solution and logic behind it (be curious until they fully understand all details, without judging - the teachers must not give all the information at the first question to create a dialogue). The students' second task is to decide which is correct, and if both are correct which is most effective, or easiest to understand.

In both cases there is a need to do meta-talks with the students before, and possibly during, about what it means to be curious (good questions to ask, not judging) and democratic leader (decide based on evidence from the curious phase, and always explain and argue for any decision). Later one can add other role categories, such as sceptic.

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5.1. MATH WITHIN THE DRAMA

Sharing, number sense and measurement concepts
Key words: measurement, problem solving and mathematical communicating
Purpose: Create mathematical processes through which students acquire and apply mathematical knowledge and skills in measurement, number sense and logical

thinking.
Didactic materials: paper and pencil
Description: In episode 1, when the mayor speaks in the square, the mayor's assistant (colleague in role) adds to the mayor's talk that there has been some disagreement lately about how to exchange goods; if you exchange tomatoes and chicken, what are fair exchange conditions between the two, i.e., a fair price for exchange (as there is no monetary system in the village). Discuss this situation in each
family and talk to other families about a fair relation in future exchanges of goods.
The student should be challenged to write down what they consider to be a fair exchange for what they grow on their farm. This means that the family that grows tomatoes discusses and finds out how many grams of olives they want for each tomato, or how many dl of olive oil they want for 1 kg of tomatoes. They must also decide how many tomatoes they want to pay for an egg or a chicken. Once they have written down their proposals for barter, they can visit the other families and agree with them on what is a fair trade.

Duration: The discussion about fair trade for their goods is part of the process drama and takes place while the students have gone to the place that is their home. It happens at the same time as they establish the families and wait for a visit from the mayor.

Observations: The discussion about trade and what will be a fair exchange between the various goods may be the subject of further discussions and tasks in a mathematics lesson after the process drama is over. It can easily be linked closer to different units of measurement such as kilograms, grams, liters, and dl.

Sharing, number sense and measurement concepts
Key words: measurement, problem solving and mathematical communicating
Purpose: Create mathematical processes through which students acquire and apply mathematical knowledge and skills in measurement, number sense and logical thinking.
Didactic materials: paper and pencil
Description
There might be a discussion in episode 6 at the shore with the stranger, in the process drama "The stone soup" where the students (the families) must discuss how to share 11 Litres of soup between families. In addition to the mathematical problem of 11: 3, "The mayor" in the village raises questions based on ethical issues of how the three families can share the soup:

- Shall they share according to the amount of their contribution?

- Shall they share according to their needs?
- Shall they share according to the number in each group?
- Any other suggestions or ways of solving the challenge?

When discussing this, the students use the roles as part of farmer families, but mainly the role categories where each student is either an democratic leader, a curious, a sceptic or a mediator. These role categories can then be seen as characteristics of their personality or family role. Students actively generate a broad variety of ideas about the problem. The task of the curious students is to ask why and how and not give up until they really understand. This creates explanations and arguments. The task of the sceptical students is to find alternative approaches and solutions, which will create a debate of which is the best. To be sceptic is more demanding than to be curious as this includes the task of finding alternative suggestions, which demands some understanding, while asking how and why is an easier approach as one seeks understanding. The task of the mediator is to reduce conflicts during this debate, trying to connect different approaches, which might be more demanding than being curious, but not as demanding as being a sceptic. The task of the democratic leader is to listen to all suggestions, and then decide. This is part of the student's role in a play, as either the elder of the family or a chief. This is a democratic leader with a positive authority, and the student might act as a curious, sceptic or mediator on the way to get insight into all the arguments. The effect of these role categories is that the students should evaluate and debate ideas. They discuss different arguments and examine the problem, reaching the best solution, or developing new ideas and directions for the group.

Duration: a minimum of 30 minutes.
Observations: It is important that teachers in role manage to keep the excitement and keep the students in fiction. It allows multiple possible solutions to be discussed not only the purely mathematical solution with 11: 3 =

Sharing and fraction
Keywords: division, fraction
Purpose: Problem solving through which students acquire and apply mathematical knowledge and skills in division and fraction.
Didactic materials: picture of a fish, paper and pencil

Description
Instruction for the teacher

In the continuation of The Stone soup, we keep the context with the farmer families. The students are given more problems to solve, and in this step the problems are more mathematically oriented. The students are still in the role, that is, they are both related to their farmer families and the role categories. The new problems follow the context with the families but are detached from the stone soup context and more explicitly a math problem. The new problems are related to situations that could arise in the market.

A task for younger students (7-9 years):

A day at the market there are only two big fish available. All three families would like to buy fish. How do you suggest that they can share the fish in a fair way between families?

Comments: Through drama-situations students use their imagination and break loose from fixed patterns of response in mathematics. Figure 1 shows one of the solutions from one of the groups.

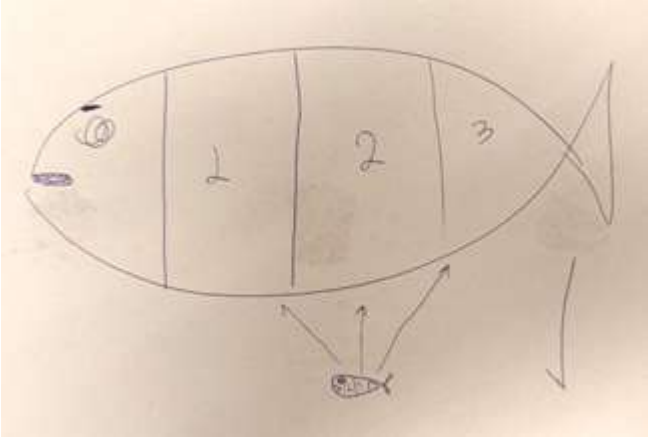

Figure 1. Example student's solution
(figure, see Annex B: process drama and math)

The problem-solving approach encourages students to reason their way to a solution. As students engage in reasoning, teachers further encourage them to make conjectures and justify solutions, orally and in writing. The communication and reflection that occur during and after the task can help students not only to articulate and refine their thinking but also to see the problem they are solving from different perspectives.

Duration: a minimum of 30 minutes.

Observations: It is important that teachers in role manage to keep the excitement and keep the students in fiction. It allows multiple possible solutions to be discussed not only the purely mathematical solution with 1 : 3 =

Algebra
Keywords: Algebra with several unknowns
Purpose: Problem solving through which students acquire and apply mathematical knowledge and skills in algebra.
Didactic materials: picture of the task, manipulatives, like beans in three different colors.

Description
Instruction for the teacher

In the continuation of The Stone soup, keep the context with the farmer families. Give students more problems to solve, and in this step the problems should be more mathematically oriented. The students are still in the role, that is, they are both related to their farmer families and the role categories. The new problems follow the context with the families but are detached from the stone soup context and more explicitly a math problem.

A task for older students (11-14 years):
After some years the people in the village found some rare stones (emeralds) in the mountains. They started to use them in exchange for food. One day at the market one family made this trade (figure 2):

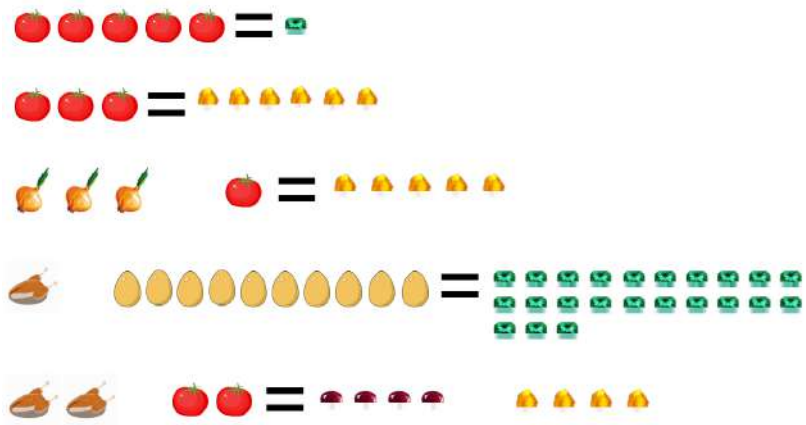

Figure 2 Math problem

Is it possible to find out how much the family had to pay for one tomato, one onion, one egg and one chicken? Is it also possible to find the value connection between the different stones; the yellow, the green and the red?

Comments: Explanations of the task:

- Five tomatoes cost one green emerald

- Three tomatoes cost six yellow emeralds
- Three onions and a tomato cost five yellow emeralds
- A chicken and ten eggs cost 23 green emeralds
- Two chickens and two tomatoes cost four red and four yellow emeralds

The groups should have "stones" available (figure 2, Annex B). Beans of different sizes could help represent the problem.

Figure 2. Beans of various sizes to represent the stones.

Students must try to figure out how much they have to pay for each of the vegetables. The second task is simple: six yellow emeralds for three tomatoes means that one tomato costs 2 yellow emeralds.

Then they can solve the third task: if they remove a tomato and two stones, three yellow emeralds remain to be divided into three onions. An onion costs a yellow emerald.

Then they can solve the fifth problem. If they remove the tomatoes and four yellow stones, two chickens and four red emeralds remain. A chicken costs two red emeralds.

Now the problem remains to find out how much the eggs cost. To do so, they must determine the relationship between the values between the three emeralds. They know that a tomato costs two yellow stones. That means five tomatoes will cost 10 yellow emeralds. The first task shows that five tomatoes cost one green emerald. This means that a green stone has the same value as 10 yellow.

But now it stops. The task does not provide enough information about the relationship between green and red stones.

Instruction for the teacher

The students work on the problems in the groups for a while before the teacher goes around and asks how the work is going and whether they think they have enough information to solve the problems. The mathematics problem does **not** have enough information to find a solution. It is part of the problem that students have to discover that there is a lack of information. The teacher then gives them additional information that allows the task to be solved (figure 3, Annex B).

This trade was also done at the market:

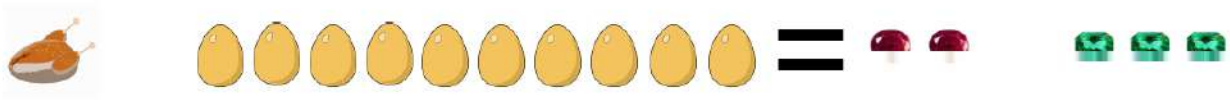

Figure 3, Additional information

Comments: The additional information provides enough information about the relationship between green and red stones. A red stone has a value of 10 green. Students can now see that 10 eggs cost 3 green, which in turn is the same as 30 yellow. Each egg costs three yellow stones. The task is solved.

The drama context provides opportunities for the students to think creatively when they interpret the problem and make choices about how to solve the problems. They think critically as they justify their interpretation of the problem and evaluate their solution. They use mathematical sense-making methods to analyze the situation.

This way of working with mathematics is in line with the ideas around deeper learning and an emphasis on competencies that are central in the future. Students will become good problem solvers and discover connections in and between mathematics and real world problems. It is these contexts that facilitate deeper learning and understanding in the subject. Skills such as critical thinking and problem solving, collaboration across subjects, agility and adaptability, initiative and entrepreneurship, effective communication, understanding and analyzing information, and curiosity and imagination, have consequences for how one thinks teaching mathematics should be.

Duration: a minimum of 45 minutes.
Observations: It is necessary that the students work without interruption from the teacher at start-up. It is also essential that the students get to work long enough with the first part of the task even though it is not actually solvable. An important part of the problem-solving task is to determine that they need additional information.

6. DEFINITIONS AND TOOLS

The theoretical framework of TIM Methodology includes some main concepts linked with life skills definition. Below we report some definitions useful to the teacher to contextualize the use of this methodology.

Self efficacy: Self-efficacy is the judgment of personal capabilities to organise and affect courses of action to attain goals. Introduced by Bandura (1977), the concept of self-efficacy has been researched extensively in the field of psychology and education. Motivation, self-regulation, attribution, goal setting, choice of strategies for attaining goals, feedback, and culture are some of the major determinants of self-efficacy. The sub-processes involved are setting goals, working towards goal attainment, anticipating outcomes, and evaluating the progress based on self-regulation of thought and action (Schunk, 2000).

Mathematical Self Efficacy: the perception of effectiveness relating to the ability to successfully face and solve problems and objectives relating to the domains of mathematics.

Self Esteem: by self-esteem we mean the subjective and lasting sense of one's personal value, based on self-perceptions.
The way we perceive ourselves (SELF PERCEIVED) depends on:
a.) EXPERIENCES: knowledge of things acquired through tests made by ourselves. For example, a child who collects a string of bad grades in school will feel himself incapable.
b.) JUDGMENT OF OTHERS: the opinion and opinion of the people around us about ourselves.

Self evaluation: The term "EVALUATION" refers to "VALUE", i.e. the need to evaluate in order to "extract value" from the experience one has. Self-evaluation means performing a metacognitive operation, that is, distancing oneself from one's own self, objectifying one's own experience/lived experience and looking at them as other than oneself. This metacognitive operation does not only mean giving oneself an opinion at the end of an activity, but it is an operation that:

- starts from planning, that is, from the choice of objectives before the task;
- continue to monitor, i.e. on how the task is progressing and on the necessary adjustments;
- continues after the task, when it is necessary to decide how to act and plan the next steps.

From a self-learning perspective, the pupil puts into play his or her ability to learn, that learning to learn that is so much talked about. But one becomes competent in knowing how to learn; for this reason self-assessment is a skill to be built.

Fear of Mathematics (or Mathematics Phobia): Tillfors (2003) defined phobia as learned emotional responses and it causes frequent severe and intense anxiety. Mathematics Phobia can be defined as a feeling of anxiety that hinders one from efficiently tackling mathematical problems. Many students have a negative attitude towards mathematics which influences their approach to solving mathematics problems which may result in phobia and subsequent poor performance in the subject area. Tobias and Weissbrod (1980) indicated that mathematics phobia is the panic, helplessness, paralysis, and mental disorganization that arise among some people when they are required to solve a mathematical problem. Gier and Bisanz (1995) see the construct as feeling of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations. Prolonged feeling of mathematics phobia impacts negatively on the interest of students in the subject.

Math anxiety: Math anxiety has been defined as: 'feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations' (Richardson & Suinn, 1972, p. 551).

Health Literacy: Health literacy is linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise and apply health information in order to make judgements and take decisions in everyday life concerning health care, disease prevention and health promotion to maintain or improve quality of life during the life course (WHO, 2012)

Mathematical Literacy: Within the framework of the OECD Programme for International Student Assessment (PISA), mathematical literacy is defined as an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen. Mathematical literacy is concerned with the ability of students to analyse, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations. (Source: OECD 2009).

OECD PISA Math Competences: OECD PISA 2015 defines three mathematical processes and seven fundamental mathematical capabilities. Below you find the definition of them and their relationships.

	***Formulating* situations mathematically**	***Employing* mathematical concepts, facts, procedures and reasoning**	***Interpreting*, applying and evaluating mathematical outcomes**
Communicating	Read, decode, and make sense of statements, questions, tasks, objects, images, or animations (in computer-based assessment) in order to form a mental model of the situation	Articulate a solution, show the work involved in reaching a solution and/or summarise and present intermediate mathematical results	Construct and communicate explanations and arguments in the context of the problem
Mathematising	Identify the underlying mathematical variables and structures in the real world problem, and make assumptions so that they can be used	Use an understanding of the context to guide or expedite the mathematical solving process, e.g. working to a context-appropriate level of accuracy	Understand the extent and limits of a mathematical solution that are a consequence of the mathematical model employed
Representation	Create a mathematical representation of real-world information	Make sense of, relate and use a variety of representations when interacting with a problem	Interpret mathematical outcomes in a variety of formats in relation to a situation or use; compare or evaluate two or more representations in relation to a situation
Reasoning and argument	Explain, defend or provide a justification for the identified or devised representation of a real-world situation	Explain, defend or provide a justification for the processes and procedures used to determine a mathematical result or solution Connect pieces of information to arrive at a mathematical solution, make generalisations or create a multi-step argument	Reflect on mathematical solutions and create explanations and arguments that support, refute or qualify a mathematical solution to a contextualised problem
Devising strategies for solving problems	Select or devise a plan or strategy to mathematically reframe contextualised problems	Activate effective and sustained control mechanisms across a multi-step procedure leading to a mathematical solution, conclusion, or generalisation	Devise and implement a strategy in order to interpret, evaluate and validate a mathematical solution to a contextualised problem
Using symbolic, formal and technical language and operations	Use appropriate variables, symbols, diagrams and standard models in order to represent a real-world problem using symbolic/formal language	Understand and utilise formal constructs based on definitions, rules and formal systems as well as employing algorithms	Understand the relationship between the context of the problem and representation of the mathematical solution. Use this understanding to help interpret the solution in context and gauge the feasibility and possible limitations of the solution
Using mathematical tools	Use mathematical tools in order to recognise mathematical structures or to portray mathematical relationships	Know about and be able to make appropriate use of various tools that may assist in implementing processes and procedures for determining mathematical solutions	Use mathematical tools to ascertain the reasonableness of a mathematical solution and any limits and constraints on that solution, given the context of the problem

10 LIFE SKILLS

The term *life skills* means the ability to assume positive behaviors that allow you to deal with effectively the demands and challenges of daily life.
In 1993, the Department of Mental Health of the World Health Organization (WHO) confirmed these individual's psychosocial abilities of the personal, social, interpersonal, cognitive and affective area, as privileged techniques for the promotion of Health Education in school environment.
The choice of life skills teaching techniques takes place according to the age of the students. The most used methodologies in the school environment range from the simple dissemination of information (Information Giving Model) to the more participatory techniques, such as Peer Education, Life Skill Training, Team building and Role Playing, up to more complex and structured approaches, which they may include a combination of the above, aimed at developing *self-empowerment*.

The theoretical assumption underlying the life skills teaching is the "Theory of social learning" developed by Albert Bandura (1996) according to which learning is an active acquisition that occurs through the transformation and structuring of experience. According to this theory, individuals don't passively undergo the influences of their environment, but they maintain a relationship of mutual interaction with it and they can improve their level of self-efficacy by acquiring new knowledge and skills to face and manage different and problematic situations. Learning can occur either through direct experience or indirectly, by observing and modeling one's actions on those of others with whom one identifies, or through the formation of skills related to the specific situation, such as self-assessment, which builds trust to be able to carry out a certain behavior.

The learning of life skills can be grouped into three main areas:
- **learning to know**: cognitive skills inherent in decision making, problem solving and critical thinking;
- **learn to be**: personal skills that allow you to increase the internal "locus of control", manage emotions and stress;
- **learning to live together**: social skills inherent in interpersonal communication, the ability to negotiate and/or oppose refusal, empathy, cooperation and teamwork, giving support.

The school represents the ideal place, where individuals can learn to develop the skills towards an adaptive and positive behavior, which enables them to face, effectively, the demands and challenges of daily life and equip them with good training tools, which allow them to orient themselves competently to protect themselves and their health, assuming responsibility.
Life skills are a tool that can enhance the teacher's teaching action, as they promote students' psychosocial skills.
WHO considers that the optimal age group for learning these skills is between 6 and 16 years, in which any health risk behaviors are not yet consolidated.

EMOTIONAL SKILLS

SELF-AWARENESS: Self awareness is the awareness about oneself (self consciousness). It includes one's recognition of themselves, one's character, one's strengths and weaknesses, desires and dislikes. This helps the adolescent to understand his/her self worth and builds his/her confidence to face life boldly. It also enables one to identify ones weaknesses or negative personality traits and consequently improve oneself. Some of the self related terms are improperly used as synonyms are self image, Self concept and Self esteem.

Some skill examples/ descriptors:

- I often think about ways to make myself feel better;
- I'm usually aware of my emotions;
- I know exactly how I'm feeling;
- It's important to me to understand what my feelings mean;
- I often know what caused my mood;
- I like to write down what I'm feeling and analyze it;
- I can talk about mood to others;
- I'm confident to communicate what I feel

Scales and tests suggested: Emotional Self-Awareness Scale (ESAS); Self-Responsibility Measure (American Camping Association, 2013); Rosenberg Self Esteem Scale (1965); Self-Consciousness Scale (Fenigstein et al., 1975

COPING WITH EMOTIONS: coping with emotions helps the individual to recognizing and understanding own and others emotions. This skill helps to know that it is normal to have strong feelings and that feelings are neither positive nor negative. Accepting feelings is the first step towards learning to have more control over them. Life skills enable the individual to learn healthy, positive and safe ways to express these feelings. It enables an adolescent to recognize emotions in oneself and others, to realize its effects on behavior and to respond to emotions appropriately. Uncontrolled emotions like excessive sorrow and anger are referred to in this dimension.

Some skill examples/ descriptors:

- When I want to feel more positive emotion (such as joy or amusement),
- I change what I'm thinking about;
- When I want to feel less negative emotion, I change the way I'm thinking about the situation

Scales and tests suggested: EMOTION REGULATION QUESTIONNAIRE (ERQ) Reference: Gross, J.J., & John, O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology, 85, 348-362.

EMOTIONAL SKILLS

COPING WITH STRESS: Coping with stress enable the individual to recognize the sources of stress, understanding its effects and relax without making the situation worse. This skill provides the strength to face positive or negative stressful situations. Deal with accompanying emotions and look for solutions that are most beneficial. It also discusses a strategy to control stress and to overcome it.

Some skill examples/ descriptors:

- When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm;
- I do what has to be done, one step at a time;
- I make a plan of action;
- I put aside other activities in order to concentrate on this;
- Seeking social support for instrumental reasons;
- I just give up trying to reach my goal.

Scales and tests suggested: The COPE inventory (Carver, Scheier, & Weintraub, 1989)

SOCIO-RELATIONAL SKILLS

EMPATHY: Empathy is one's ability to understand and accept different kinds of people around them who are different in many respects. Empathy is our mental capacity to accept without emotional disturbances, of people in distress as if we are in such a distress situation. It includes understanding one's feelings as well as providing emotional support for that person. Empathy also help to encourage nurturing behavior towards people in need of care and assistance or tolerance. It helps an adolescent to understand and accept others who are different from him/her.

Some skill examples/ descriptors:

- Unhappy movie endings haunt me for hours afterwards;
- The suffering of others deeply disturbs me;
- I am good at predicting how someone will feel;
- It is easy for me to understand when my friends are sad;
- I enjoy making other people feel better

Scales and tests suggested: Empathy Quotient (Baron-Cohen & Wheelwright, 2004); Griffith Empathy Measure (Dadds et al., 2008); Kids Empathetic Development Scale (Reid et al. 2011)

SOCIO-RELATIONAL SKILLS

EFFECTIVE COMMUNICATION: Effective Communication is an efficient tool for the establishment and maintenance of good social and working relationships with people. It is a way of reaching others by transmitting ideas, facts, thoughts, feelings and values. One's ability to express himself/herself both verbally, in ways that are appropriate to our cultures and situations. It enables an adolescent to express his opinions, desires and fears clearly by using verbal and not verbal communication, and para-verbal expressions. It also trains the adolescent to ask for advice and help from others in times of need.

Some skill examples/ descriptors:

- I use my tone of voice to reinforce what I am trying to say;
- When talking to someone, I try to maintain eye contact;
- My body language reinforces what I am trying to say;
- I recognize when two people are trying to say the same thing, but in different ways;
- I try to see the other person's point of view;
- I organize thoughts in my head before speaking;
- I find ways to redirect the conversation when people rattle on and on.

Scales and tests suggested: Communication Scale (Barkman & Machtmes, 2002a) Reading Grade Level: 5.7; Youth Outcomes Battery – Series of 12 subscales (American Camping Association, 2013); Communication Scale, Youth Life Skills Evaluation Project at Penn State (Susan Barkman and Krisanna Machtmes, 2002)

INTERPERSONAL RELATIONS: Interpersonal Relations are known as survival skills which is very imperative for establishing and maintaining social relationships. Interpersonal skill is to initiate and maintain positive relationship with other individuals and de-link unconstructive relationship, with minimum disturbances to both. Relating with others is an important life skill and one of the most important forms of human intelligence and called as people skill, which provides warmth, caring, support and collaboration that give life its excitement and potential for joy and personal fulfillment. It teaches an adolescent to relate to other people in a positive manner. It also helps him/her to develop the ability to end relationships constructively

Some skill examples/ descriptors:

- I would help a classmate who I did not know well with a homework assignment;
- I am good at communicating with my class mate;
- I ask others for feedback;
- I value the contributions of my classmate when I work in a team;

Scales and tests suggested: NRI (Network Relationship Inventory (cfr link https://www.midss.org/content/network-relationships-inventory-relationship-qualities-version-nri-rqv%E2%80%94) ed una scala di prosocialità (Carrizales, A., Perchec, C., & Lannegrand-Willems, L. (2019). Brief report: How many dimensions in the prosocial behavior scale? Psychometric investigation in French-speaking adolescents. European Journal of Developmental Psychology, 16(3), 340-348).

COGNITIVE SKILLS

CREATIVE THINKING: Creativity is typically used to refer to the act of producing new ideas, approaches or actions. Creativity thinking promotes different individual ability, including metacognition, intra/inter personal ability, problem finding and problem solving, identity development, social involvement and job/scholastic achievement. Creativity is the ability to produce work that is both novel (original and unexpected) and appropriate (useful or meets tasks constraints). It helps an adolescent to respond in a flexible manner to various challenges of life. School is one of the most important context to develop children and adolescents' creativity. Creative potential can be expressed by divergent thinking, the ability to produce more answer to solve problem in an original and flexible way.

Some skill examples/ descriptors:

- I trust my ability to solve new and difficult problems
- I am usually able to think up creative and effective alternatives to solve a problem.
- I like different things
- I like to ask questions about aspects of things that nobody thinks about

Scales and tests suggested: Torrance Test of Creative Thinking; Test TCD : Divergent thinking and creativity test (Frank Williams); Assessing creativity: The Test for Creative Thinking - Drawing Production (TCT-DP)

CRITICAL THINKING: Critical thinking is defined as logical thinking and reasoning including skills such as comparison and classification; Critical Thinking is that mode of thinking about any subject, content or problem in which the thinker improves the quality of her or his thinking by skillfully taking change of the structures inherent in thinking and imposing intellectual standards upon them. A skill that enables an adolescent to analyze information and experiences objectively. It also helps to recognize factors like family values, peer and media pressures that influence attitudes and behavior.

Some skill examples/ descriptors:

- I think of possible results before I take action;
- I get ideas from other people when having a task to do;
- I develop my ideas by gathering information;
- When facing a problem, I identify options;
- I can easily express my thoughts on a problem;
- I am able to give reasons for my opinions;
- It is important for me to get information to support my opinions

Scales and tests suggested: Critical Thinking in Everyday Life Scale (Perkins & Mincemoyer, 2002)

COGNITIVE SKILLS

DECISION MAKING: Decision Making is the ability to choose the best amongst the various alternatives or options in many life situations. The skill to analysis and weigh the pros and cons of alternatives and accepting responsibility for the consequences of the decision with confidence. It enables an adolescent to make constructive decisions about one's life like choice of a career or marriage partner, type and quantity of dietary intake etc. It teaches that, decision be made only after assessing different options and their effects.

Some skill examples/ descriptors:

- Consider the risks of a choice before making a decision;
- I consider the benefits of a choice before making a decision;
- I make decisions based on what my parents tell me;
- When faced with a decision, I realize that some choices are better than others;
- I make a decision by thinking about all the information I have about the different
- choices.
- I prioritize my choices before making a decision.

Scales and tests suggested: Making Decisions in Everyday Life Scale (C. C. Mincemoyer & Perkins, 2003); Making Decisions in Everyday Life, Youth Life Skills Evaluation Project at Penn State (C. C. Mincemoyer and D. F. Perkins, 2001)

PROBLEM SOLVING: Problem Solving skills enable us to deal constructively with problem that arises in our live. This skill is helpful to settle an issue, solve a problem or to resolve a conflict. It enables the person to get out of the uncomfortable situation and accomplish one's need without using anger, coercion, defiance, aggressive behavior or force. Scientifically, problem solving is a process to bring an opportunity for a positive act. It helps an adolescent to solve his/her problems by using creative and critical thinking.

Some skill examples/ descriptors:

- When I have a problem, I first figure out exactly what the problem is;
- When I have a problem, I look at what is and what should be;
- I look at a problem from many different viewpoints (my own, my friends', my parents', etc.);
- When solving a problem, I look at all possible solutions;
- If my solution is not working, I will try another solution.

Scales and tests suggested: Solving Problems Survey (Barkman & Machtmes, 2002); California Healthy Kids Survey Resilience and Youth Development Module (RYDM)

Bibliographic references:

- Skills for Health – Skills based health education including life skills: An important component of a Child-Friendly/Health-Promoting School, WHO, 2003
- Life skills education school handbook: prevention of noncommunicable diseases - Approaches for schools. Geneva: World Health Organization, 2020.
- La promozione della salute nelle scuole: obiettivi di insegnamento e competenze comuni, ISS Italia, 2008

LIFE SKILLS CAKE

7. SCHEDULE-TIME FOR A SCHOOL YEAR TIM EVALUATION

This scheme is aimed to trainers and teachers interested to use the TIM' methodology in teaching mathematics. The diagram indicates the tools that can be used during the school year to detect the effects of the use of TIM in pupils. Furthermore, in the first part, some practical indications are given in the use of self-assessment tools, for those teachers who were identified by the School Managers as expert trainers and in charge of transferring the TIM methodology to the entire faculty of the school.

Operational indications for TIM methodology TRAINERS			
TARGET and PURPOSE OF THE OBSERVATION - MEASUREMENT	**TOOLS-QUESTIONNAIRES**	**TEST ADMINISTRATION PROCESS - DATA DETECTION**	**VARIABLES OBSERVED**
The level of training and self-efficacy of mathematics teachers, who participated to TIM Methodology training	Test for Teacher (pre and post): It includes the teacher's self-efficacy scale, the TIM competency scale, the math teacher's anxiety scale. The scales can be used separately, except if you want to correlate multiple indices simultaneously.	The scales must be compiled before the start of TIM training and subsequently at the end of a TIM implementation period at school, not less than 3 months of lessons. If the experimentation period coincides with an entire school year, it may be useful to use the TIM self-efficacy scale and that of skills as a logbook. Therefore it is proposed to compile the two tools also in the middle of the school year, to observe the intermediate improvements.	1) The self-assessment of TIM's specific skills (before and after), therefore the effectiveness of the training program organized for the school; 2) The teacher's level of self-efficacy in classroom management and the use of innovative methodology in mathematics teaching: it is possible to observe whether TIM increases or decreases self-efficacy in teachers. 3) The level of anxiety of mathematics teachers and whether or not this factor influences the use of TIM in the classroom.

Advice on using the questionnaires: for a correct administration of the scales and analysis of the results, we recommend you to collaborate with someone with knowledge about data analysis and / or test programs in general. Teachers, however, can keep the results on the self-assessment scales as a logbook, which can be used as a track for a participatory group assessment laboratory.

Operational indications for Mathematics Teachers (using TIM methodology)

TARGET and PURPOSE OF THE OBSERVATION - MEASUREMENT	TOOLS-QUESTIONNAIRES	TEST ADMINISTRATION PROCESS - DATA DETECTION	VARIABLES OBSERVED
The metacognitive skills and mathematical self-efficacy of a pupil aged between 8 and 13 years inclusive.	Student test (pre and post): includes ME.MA. math anxiety scale and ME.MA. metacognitive skills and beliefs about effectiveness in mathematics scales. For this research, 3 of 4 scales of the original instrument were used and validated in English	Both tests should be administered at the beginning of the school year, before the start of mathematics lessons and then at the end of school. It may be useful to agree with the individual students on some skills to work on specifically and to use the questionnaire as a logbook, proposing an intermediate monitoring session. These tests can be freely associated with an emotions self-assessment scale, co-constructed with the student or with the class. It could be used as a logbook to develop the competence of self-assessment in pupils.	The level of metacognitive skills and mathematical self-efficacy can be measured for each pupil and as an index of improvement in the class. These indices can be correlated with pupils' achievements. You can compare the learning levels of multiple classes, or among teachers using different methods of teaching mathematics.
The level of math anxiety of a pupil between the ages of 8 and 13 inclusive.			The level of anxiety in mathematics indicates the pupil's attitude towards this subject. Specific emotional states towards mathematics can be correlated with the evolution of metacognitive and

			cognitive skills, and personal beliefs about It.
Well-being at school, classroom climate and the relationship between teacher and pupils, in a class of pupils aged between 8 and 13 years inclusive.	The class climate scale; The scale on the pupil-teacher relationship. For this research a questionnaire was used with questions on the class climate and the relationship with the teacher validated in English	It is advisable to administer both scales at the beginning and at the end of the year, when it is possible to imagine a continuity in the pupil's academic career with the class. The teacher can thus observe the dynamics of inclusion that develop among the pupils and in his relationship with them, using TIM.	The level and quality of the classroom climate perceived by pupils; the perception of the teacher's teaching effectiveness, from the pupil's point of view.
Life skills development, in a class of pupils aged between 8 and 13 years inclusive.	Life skill scales (chosen from those recommended by the literature) and life skills cake, co-building together with the class shared definitions of the skills, at the beginning of the school year (starting from WHO definitions).	The teacher uses the life skill scales as a logbook. It can choose to create a development diary for the class or for each pupil and It can structure the mathematics lessons with TIM, using the exercises proposed by the manual. It can develop one or more life skills with the class. The logbook should be completed several times during the school year (at least at the beginning, in the middle and at the end of school). The teacher may involve the pupils to fill in one own logbook allowing them to learn the self evaluation competence.	The level of life skills perceived by pupils throughout the school career. Increasing the declared life skill level generally corresponds to greater personal self-efficacy.

Advice on using the questionnaires: for the correct administration of the scales and for the analysis of the data collected with the tests, we recommend you to collaborate with someone who has knowledge of administering tests and of statistical analysis programs. In fact, it is necessary that the administration of the tests to the pupils has to be done by a neutral person, in the event that the pupil has to express himself towards his teacher.

Furthermore, by collaborating with psychologists, professional educators and professionals of child neuropsychiatry, it is possible to identify, for each pupil (especially those with special learning needs and specific learning disturbances) some self-assessment and monitoring tools about his neuro-cognitive development. This helps to have a more equal and in-depth knowledge of the whole class group.

Finally, the life skills assessment can be planned with the development of key citizenship skills.