

# Feeling Dice: a game-based methodology to develop emotional competence in preschoolers

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## Abstract

Emotional competence has a huge importance in many areas of development, since early childhood. Its link to the relational context, supported by constructive perspective theories, confirms that children capable to regulate their emotions have more satisfying and meaningful relationships with adults and peers. This could represent a fundamental resource to cope with developmental challenges or with difficult circumstances, such as the current social distancing: supportive relationships together with the ability to communicate and manage emotions can really make a difference in children's developmental path.

Our work presents Feeling Dice, an educational methodology based on the blended learning perspective. It aims to promote and support the development of emotional competence in children from 5 to 7 years of age, using different tools and both individual and group processes. We can define Feeling Dice as a learning ecosystem, in which the relationship between children and their caregivers allows to explore the storytelling in both dimensions, such as reading and understanding short stories ("Guess the emotion") and the guided creation of narratives ("Tell a story"). We present the design of a methodology that can be used by any caregiver in several contexts of children's life. The next operative step will be the project implementation.

## Keywords 1

Emotional Competence, Learning Ecosystem, Storytelling, Linguistic Competence, Emotional Lexicon, Blended Learning, Educational Technology, Serious Game, Tutor, Artificial Tutoring System.

## 1. Introduction

The current focus on emotional competence development has a very solid foundation. It has been widely demonstrated how much a high level of emotional competence is related to several achievements in different areas, since early childhood. Children capable of regulating their emotions have more satisfying interactions both with their peer group [53, 55, 57] and their teachers [28, 34]: this leads not only to a more successful academic performance [26, 58, 13], but also to the construction of meaningful relationships.

Facing all the developmental challenges or trying to overcome particularly difficult times, such as the current social distancing and isolation, make the emotions play a key role in children's daily life: supportive relationships together with the ability to communicate and manage emotions can really make a difference in children's developmental path.

Emotions are a complex process, triggered by both internal and external stimuli, involving several levels of functioning: the neurophysiological level, concerning changes in the nervous system activity; the expressive level, which affects all kinds of communication, such as facial and verbal expression; the phenomenological-cognitive level, which concerns the particular subjective evaluation that characterizes a given emotional experience. The harmonious integration of all these levels of

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functioning leads to the development of emotional competence, defined, from the constructivist perspective, as the individual ability to experience, understand and use emotions in a functional way, promoting a good relational and social adaptation [50, 51]. Extensive literature highlights how every individual can acquire several skills and competences throughout his or her lifespan, learning to manage the emotional experience [20, 11, 36, 37, 5, 16, 44, 45].

In this paper we describe the first stage of our work, involving literature research and tools' ideation and design; the next steps will concern implementation and data collection. "Feeling Dice" consists in a set of educational tools that, in the context of a specific methodology, aims to promote and support the development of emotional competence in children from 5 to 7 years of age. A child's life during the second childhood takes place, mainly, in two realities of fundamental importance: the family and the school context. So, we have thought of two specific tools that ensure in a very simple way a continuity of the proposed training in different conditions and times. The first is a digital tool - "Guess the emotion"- in which the child's task is to analyze a given stimulus, such as an image, a word or a narration, in order to deduce the emotion associated with it; the second tool - "Tell a story" - is a kind of board game in which a group of children produce a short story inspired by the pictures represented on the sorted cards and the emotions selected throwing a dice. These two educational tools play their role within a specific methodology, which involves the construction of a framework of meaning through educational play. There are several studies that have led to see games as powerful educational tools [2, 21, 22, 6, 40, 49].

The focus is on some particular components founding the complex construct of emotional competence, in Saarni's constructivist perspective [50, 51, 52]: the ability to perceive others' emotions basing on situational and expressive clues; the appropriate verbal expression of one's and others' emotions, clearly linked to language development and in particular to a subset of the lexicon, the psychological lexicon, which appears in spontaneous linguistic production at the end of the second year of life and is consolidated between 3 and 5 years [48, 3]. The name "Feeling Dice" highlights the key points of the project with a wordplay; while the word *Feeling* clearly refers to the emotional sphere, the term *Dice* has a dual meaning: in the English language it refers to dice, an integral part of the tools used in this methodology, but the same term, in the Italian language, refers to a particular form of the Italian verb *dire*, 'to say', creating an important link with both the verbal emotional expression and the storytelling, the central tool in this methodology.

Considering the numerous tools reported in the existing literature for the development and the assessment of emotional competence, Feeling Dice methodology integrates several of the identified aspects, aiming to a complexity consistent with the target construct. The procedures found in literature can be divided into two main categories. In the first one, the child's task is to associate specific stimuli (such as images or short narratives) with one of the suggested emotions (examples of these procedures are: Affect Knowledge Test [14]; Test of Emotion Comprehension [7, 1, 46]; Test di Lessico Emotivo [25]). In the second category, the child's task is to produce a real narrative, supported by the tangible materials of the instrument, which usually focuses on the emotional experience of one or more characters [9]. In both cases, the fundamental presence of a tutor is provided, to encourage children to think about the tasks and their answers and to provide positive or negative feedbacks, when needed.

We can define Feeling Dice as a learning ecosystem [8], in which the main characters, children and their Tutor, enter into a particular network of relationships with the provided tools, first of all storytelling. Storytelling calls into play both linguistic and emotional competence; an appropriate use of this tool allows the strengthening of both competences and the increasing of the psychological-emotional lexicon [4, 31, 32, 59]. For these reasons, since the 1970s storytelling has become a subject of research even among psychologists [56]. The use of storytelling is particularly suitable for interventions in early childhood, because of its familiarity due to its early and frequent presence in children's life, in the form of speeches, anecdotes, autobiographies [56].

Not only produce a storytelling is a useful tool to assess and develop child's mental skills [9]; indeed, recent studies show how reading and discussing narratives with emotional content can improve the emotional competence in children between the age of 7 and 9 [33]. In the children's literature, it is possible to find a wide range of proper materials to influence and stimulate emotional competence [31].

Our project aims to exploit all the potential of storytelling, so it becomes a double tool: not only the reading of tales based on the emotional antecedents identified in the literature, but also the guided construction of short narratives. The role of the Tutor is to follow the discussion of the students closely

and consider when and how to contribute to their learning [19, 23]. This is fundamental to motivate children to think, know and talk about their own and other people's emotions [60] and to make the reading activity more effective with children in kindergarten [35, 42].

Feeling Dice can therefore be described as a guided integration of different interacting tools that try to overcome one of the limits of all the tools in the literature, combining the two main activities related to storytelling: reading and creating.

## 2. Design

Feeling Dice (FD) aims to promote and support the development of emotional competence in children from 5 to 7 years of age, through the use of different tools and both individual and group processes. The crucial conditions of Feeling Dice ecosystem are:

1. The learning community:
  - The children, between 5 and 7 years of age;
  - The tutor, who may be a teacher, an educator, a parent or any adult trained to conduct activities with the group of children.
2. The educational tools:
  - “Guess the emotion”: a digital game with three different levels of difficulty. In each one the request is to associate specific stimuli to the corresponding emotions, in order to promote an extension of the child's emotional-psychological lexicon. The game is explained and lead by the e-tutor, through instructions, tips and feedbacks.
  - “Tell a story”: a face-to-face game which promotes the creative and active construction of stories by the children, to ensure their first-person involvement as main characters of their own development path. This activity is guided and supported by the Tutor, both for the child and the peer group.

All these different components interact with each other within a narrative dimension that provides a framework of meaning aimed to promote children's involvement and motivation. Thanks to the two different games, it is possible to integrate the individual dimension with the relational one, including two of its aspects fundamental for the target age: the collaboration with the peer group and the relationship with a significant adult (i.e., the tutor).

In the next phase, the game implementation will concern tangible materials and a digital architecture. Both tools will provide for one or more of the following tangible materials:

3. The colors dice, which has a different color on each face: blue, red, green, yellow, purple, orange; these are the same colors according to which the cards are divided.
4. The emotions dice, on which the six basic emotions are represented in the form of stylized facial expressions: joy, sadness, anger, surprise, disgust, and fear.
5. A one-minute hourglass.
6. 36 cards which present, on one side, one of the 6 colors of the first dice, according to which they are divided into six groups, and on the other side a landscape that will be connected to one of the 36 narratives, through a numbering.
7. 36 short stories in which the main character faces daily life situations; the end of each short story triggers an explicit emotion, which the player has to guess it.

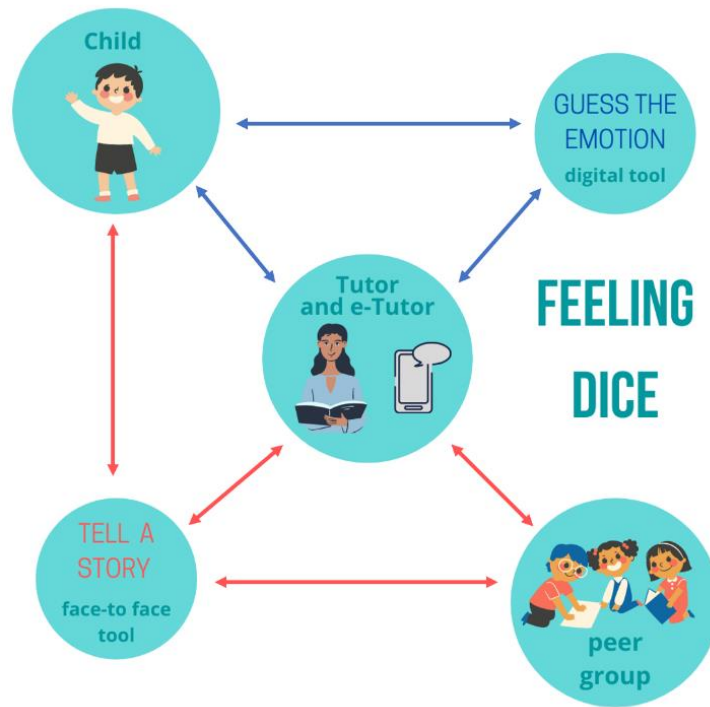
As regards the digital game “Guess the emotion”, its structure will be articulated on Hyper Activity Books [17, 18], a general architecture created to design and implement educational tools connecting books and tangible materials. Its great flexibility makes it widely compatible with a vast number of educational materials, of course including storytelling. The implementation is made possible by STELT (Smart Technologies to Enhance Learning and Teaching), an integrated software and hardware environment that connects digital applications to tangible materials [39]. STELT implements augmented reality systems based on RFID/NFC technology that allows to create an environment suitable for active learning by children [38]. This technology uses tags that can be applied to any type of object and are detected by small readers.

In that way our digital tool, “Guess the emotion”, would be composed by:

1. An active table to recognize real objects using RFID technology;
2. The software with the e-Tutor, the artificial agent managing the feedbacks:

- The tangible objects, such as the emotions and colors dice and the 36 scenarios' cards.

The game will be first proposed to a learning community formed by children aged 5 to 7 years and their tutors. The activities can continue in parallel domestic gaming sessions, that also involve parents. This will allow students to generalize their expertise to everyday environments and situations to train it better and better through comparison with the people with whom they feel more comfortable. In Figure 1 it is possible to observe a functional representation of the proposed learning ecosystem (FD), which involves the interaction of the child with the E-Tutor in “Guess the Emotion”, and a more complex interaction between the child, the Tutor and the peer group, through the “Tell a Story” tool.



**Figure 1:** Feeling Dice – a functional representation of the methodology.

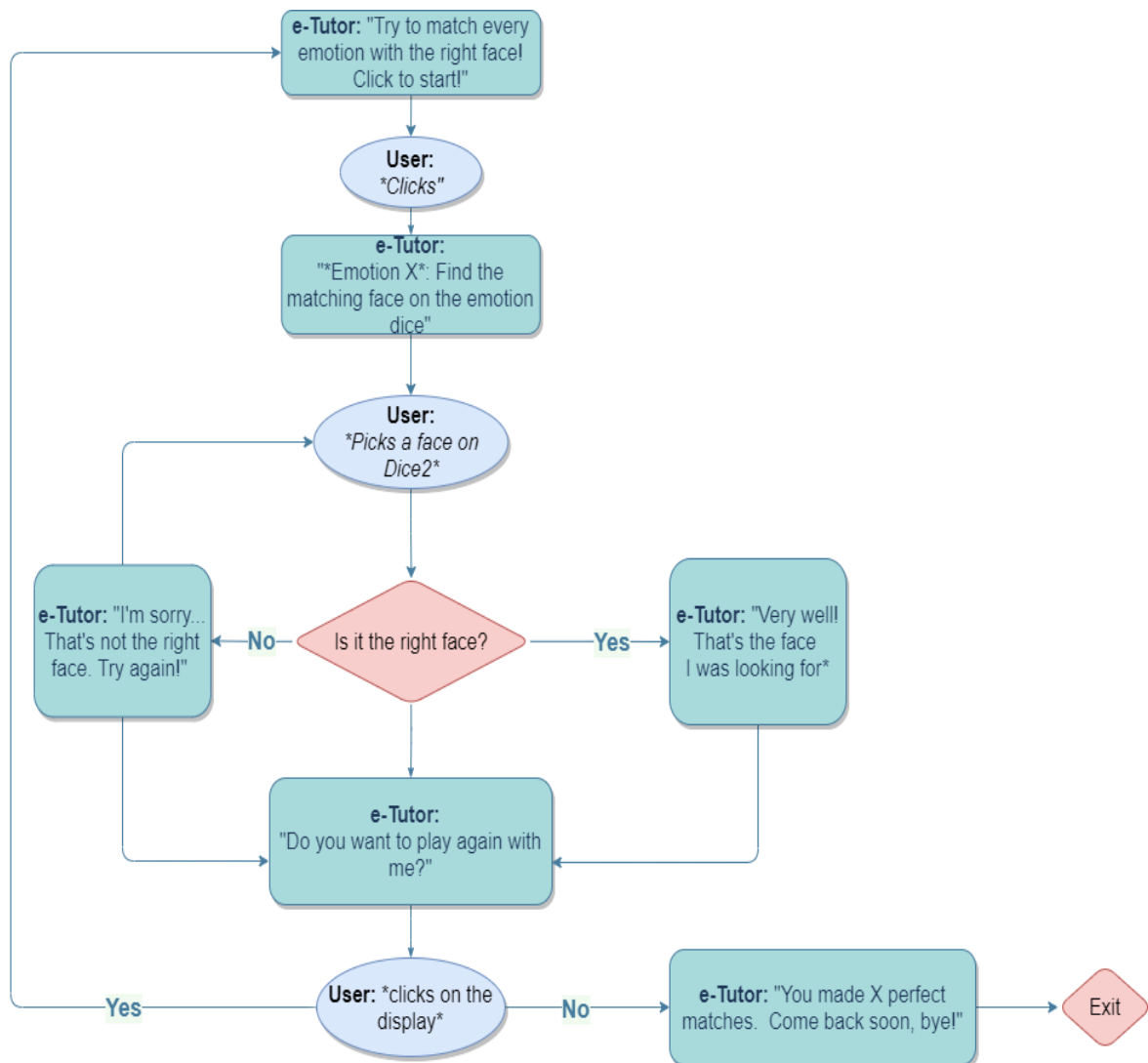
## 2.1 “Guess the emotion”

This tool is a digital serious game, designed to be integrated with tangible materials. It is divided into three difficulty levels, in which the player’s task is to guess the emotion starting from a determined stimulus, whose complexity gradually increase from level one to three.

The design is to refer to an agent-based approach, in which players, tutors and any other figure who operates, directly or not, are conceived as agents [47]. The agents who interact with the game directly can be defined onstage agents (OSA), whereas the ones who interact indirectly affecting OSA actions are defined backstage agents (BSA) [12]. In “Guess the emotion” there are two OSAs: the player and the e-Tutor, who reads the words-stimuli or the short stories, asks questions to involve the child creating an interaction and gives positive or negative feedbacks basing on the answers, when needed. Indeed, in the three levels of the game there are different feedbacks for right and wrong answers. This helps to increase the child's involvement: in case of a right answer, the e-Tutor will say a sentence like "You're right! Jay is very sad for losing his bike"; in the case of a wrong answer, the feedback will be something like "I'm sorry, but Jay doesn't seem so sad...Why don't you try again?". The e-tutor will record all recognized emotions, as well as all the mistakes made, for each game session; this data will then be available to the Tutor and used to monitor constantly each child’s improvements and difficulties.

The first level [Figure 2] has the main objective to make the game and its modalities familiar to the child. Indeed, in this first phase, the child’s task is to link a verbal/acoustic stimulus to one of the six

basic emotions (joy, sadness, anger, fear, surprise and disgust). On the screen will appear the word of one of the six emotions considered, the e-tutor will read it out loud and ask the child to choose the corresponding stylized face, among those represented on the emotions dice. The aim is to create or strengthen a first link between the basic terms of the emotional lexicon, labels of specific emotions, and their representation in the form of stylized facial expression.



**Figure 2:** Guess the Emotion – Level 1

The structure on which the second and third levels are built remains very similar to the first one's. The most obvious difference is related to the stimuli proposed to the player in each level. Thus, in the second level [Figure 3] the player will find photographs and/or portraits to associate with the basic emotions; in the third one [Figure 4] the stimuli will be short stories, in which the main character lives specific situations that trigger one of the six basic emotions considered in the game.

The levels guide the child to a gradual generalization in the recognition of emotions in different characters, from the analysis of pictures depicting facial expressions, to the reading and comprehension of a short story about the emotional antecedents of the main character.

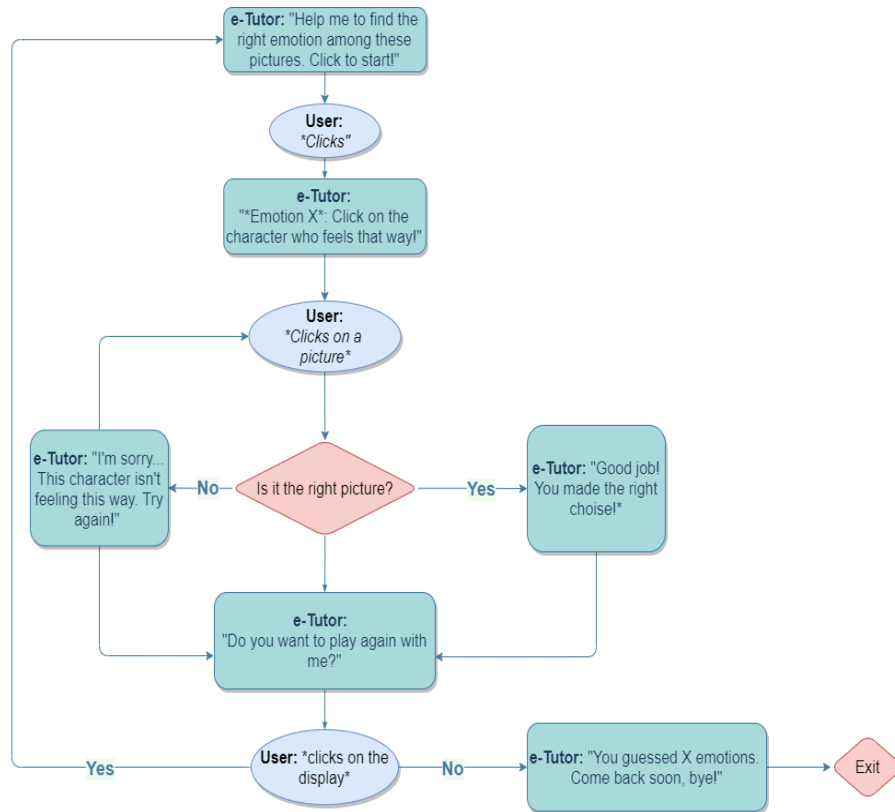


Figure 3: Guess the Emotion – Level 2

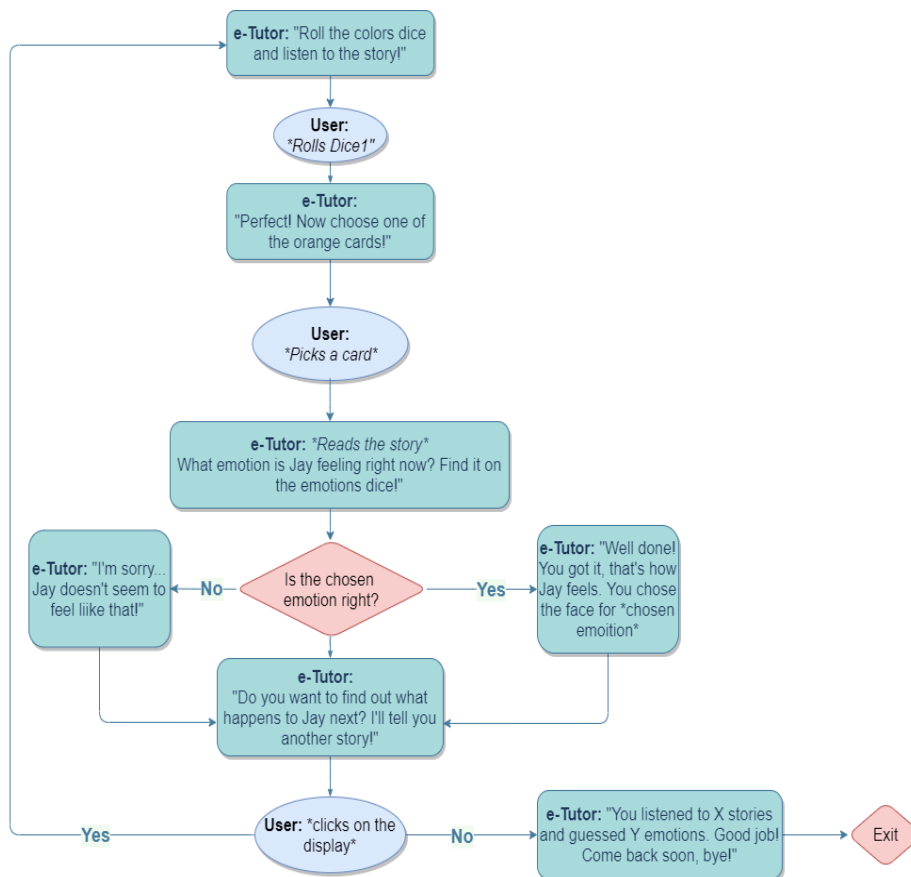


Figure 4: Guess the Emotion – Level 3

In the third level are available thirty-six short stories, six for each one of the six emotions considered. As result, every story is linked to a specific basic emotion (joy, sadness, anger, fear, surprise and disgust) and to one of the thirty-six cards depicting the protagonist in different contexts. Exactly like the cards, they are organized into six different colors, too. In each group we will find a story for each one of the selected emotions. In all the stories, the main character deals with daily life situations. At the end of each short story, an emotion is triggered in the main character: the child's task is to eventually guess that specific emotion.

The basic structure of the stories is based on the emotional antecedents reported in literature [29, 15]. Thus, it is possible to summarize that every single story is developed on the basis of the following situations, to trigger a specific emotion:

- satisfaction of a desire: happiness;
- loss: sadness;
- offensive action suffered: anger;
- uncontrollable and threatening event: fear;
- pleasant and unexpected event: surprise;
- repulsion towards an object: disgust.

An example of the stories proposed in the game is shown in the image below [Figure 5]:

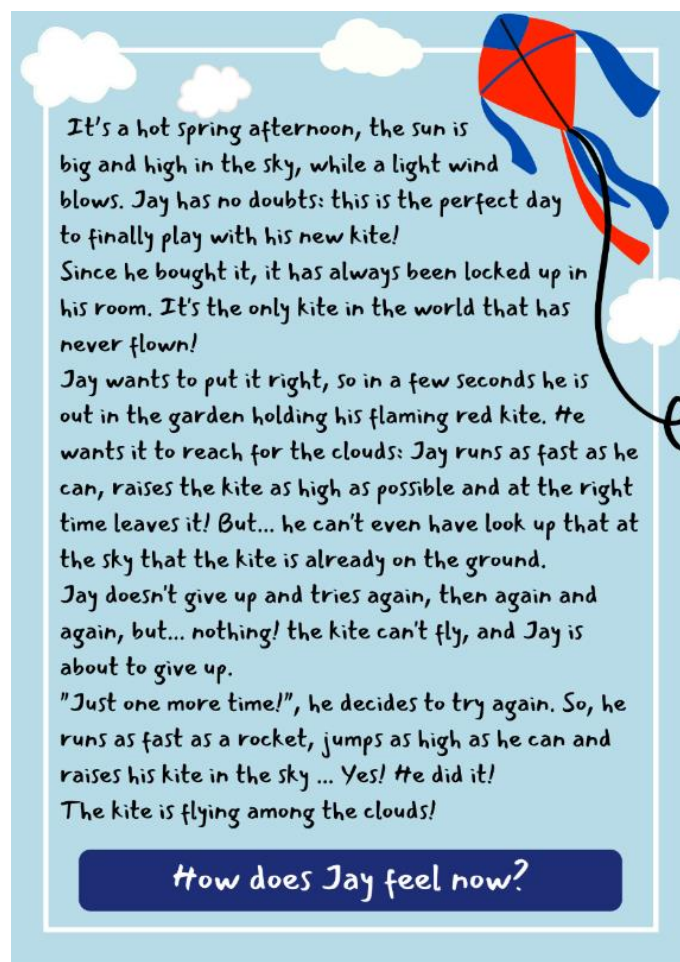


Figure 5: Guess the Emotion – An example of short story about joy

## 2.2 "Tell a story"

The purpose of this game is to foster an interactive and creative dialogue with the tutor and - if it is present – with the peer group, supporting the thesis according to which emotional competence is born and develops within the framework of social exchanges [51, 52]. However, since each social exchange



is unique and unpredictable, the dynamics of the game can be defined as semi-structured: it starts from a series of pre-established rules, but each session can be different depending on the number of participants and their more or less active involvement.

The first player rolls both dice: according to the color on the first dice, he will pick one of the 6 corresponding cards; looking at the image represented on the card and the emotion on the second dice, the child will create a short story on these two elements, in the time marked by the 1-minute-hourglass. Once the time has expired, the next player (or the same, if the only one) will throw the dice again and continue the story, enriching it with the new two elements.

Fundamental in this mode is the presence of the Tutor, who has the task to guide and support the player or the group, stimulating discussion with questions and observations and promoting an active exchange between participants. The ways in which adults can encourage the children involved to share as much as possible with the group consist in asking questions that can stimulate the initiation of dialogues and conversations. When the storytelling activity also includes this type of discussion in the group, stimulated primarily by the Tutor, we can talk about interactive or dialogic reading activities.

Participation in these interactive dialogues also allows to highlight the personal children's emotions felt during the reading sessions, thanks to the familiar contents of the stories or the discussion that follows it and to any connections between the topics addressed during the activity and the personal experiences of children.

### 3. Conclusions

This work made it possible to design a methodology structured on several tools, which can be used both by educators and teachers of kindergarten and primary school, and by parents or any other caregiver in several contexts of children's life. Taking inspiration from Blended Learning [10, 24, 30, 41, 54] Feeling Dice aims to set the child at the center of the learning process, replacing a classic mode of knowledge transmission with a more interactive one, thanks to the presence of other students and the tutor. So, the proposed model is a learning ecosystem that, through its complexity, attempts to integrate the different strengths that characterize tools in the literature [27, 43].

The main goal of FD is to promote the development of emotional competence. A more specific goal involves a particular component: the appropriate expression of one's emotions and the understanding of others', using language. This inevitably recalls the child's linguistic and communicative competences, but also other different components of emotional competence, such as the ability to recognize and label basic emotions and to understand their situational antecedents.

Feeling Dice is designed to create a learning community, various and enriched with all personal attributes of the students, but also led by one only goal: learning. All that was enhanced by the coherence and the highest personalization of proposed contents.

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