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# Science Education in Reggio Emilia-Inspired Altın Çağ Preschools

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## Abstract

This chapter focuses on three aspects of science education in early childhood, namely, (1) the way Reggio Emilia teachers accomplish the early childhood science content and science process skills that children need to acquire at early ages, (2) the philosophy of teaching and learning science in Reggio Emilia preschools—integrated teaching and learning and 3H principle—and (3) the 80 Project. This chapter discusses integrated teaching and learning philosophy and 3H principle of early childhood education, namely, hands-on, heads-on (minds-on), and hearts-on education, because in Reggio Emilia classrooms, children are seen as a whole with their hands, minds, and hearts and education needs to satisfy all. Moreover, this chapter presents some examples and photos of science experiences happened within the project named “80” in Reggio Emilia-inspired Altın Çağ preschools in Turkey so that the teachers can easily comprehend how to get children to work on science projects from the first stage of development of a project to the last one. “80” is a child-sized doll made with craft paper by the preschoolers. The 80 Project presents the journey of the preschoolers who looked for ways to recover 80.

**Keywords:** science, preschool, early childhood education, teaching and learning, science process skills, integrated curriculum, Reggio Emilia approach, 3H principle, Altın Çağ

## 1. Introduction

Reggio Emilia approach is very compatible with preschool science education standards in terms of both science content and science process skills. Distinguished Reggio Emilia teachers believe in active education and create exemplary science projects in which children’s science knowledge and skills can be nourished successfully. Reggio Emilia classrooms provide science-rich contexts of inquiry-based and social-constructivist education where children cooperatively construct their knowledge of science by hand, by mind, and by heart. Children actively work on the projects through hands-on experiences, construct their knowledge of science with their peers and teachers by questioning and theorizing, and love the subject matter by following what they inquire for and what they are interested in. Since Reggio Emilia approach does not provide a predetermined program but instead a heuristic perspective to education of young children, children find a chance to be involved in culturally relevant projects that take into account the unique needs and interests of children and integrate various disciplinary subjects [1] (**Figure 1**).



**Figure 1.**  
*Altın Çağ Reggio Emilia-inspired preschool.*

This chapter aims to show how teachers can help preschoolers happily construct their knowledge and meet standards successfully in their Reggio Emilia-inspired preschools. More specifically, it focuses on three aspects of science education in early childhood, namely, (1) the way Reggio Emilia teachers accomplish the early childhood science content and science process skills that children need to acquire at early ages, (2) the philosophy of teaching and learning science in Reggio Emilia preschools—integrated teaching and learning and 3H principle—and (3) the 80 Project. This chapter discusses integrated teaching and learning philosophy and 3H principle of early childhood education, namely, hands-on, heads-on (minds-on), and hearts-on education, because in Reggio Emilia classrooms, children are seen as a whole with their hands, minds, and hearts and education needs to satisfy all. Moreover, this chapter presents some examples and photos of science experiences happened within the project named “80” in Reggio Emilia-inspired Altın Çağ preschools in Turkey so that the teachers can easily comprehend how to get children to work on science projects from the first stage of development of a project to the last one. “80” is a child-sized doll made with craft paper by the preschoolers. The 80 Project presents the journey of the preschoolers who looked for ways to recover 80.

## 2. Content of science education in early childhood

Early learning and development standards for children posit a concept (e.g., associations, attributes, function as an example for Knowledge Big Ideas, <http://education.ohio.gov>) or a skill (e.g., classifying, comparing, and contrasting, symbolizing as an example for Process Big Ideas, <http://education.ohio.gov>) that preschool children should gain. Standards ideally consist of developmentally appropriate practices that promote children’s cognitive, social, emotional, sensorimotor, and some other development areas, while they are required to be responsive to the cultural and social contexts in which children live. Developmentally appropriate practices emphasize the importance of supporting children’s development and active learning and offering children to engage school experiences such as hands-on and minds-on learning, inquiry-based activity, in-depth research, and cooperative learning [2, 3].

Schools are usually required to incorporate standards (both content and skills) into their existing curriculum. Traditional teachers used to give children science content knowledge by using predetermined curriculum in which standards are

incorporated. However, teachers, who believe in Reggio Emilia approach, reconceptualize standards in early childhood education settings and follow a reverse pathway of integrating aspects of standards into their early childhood settings. “We are not mandated but check standards periodically to look at the curriculum, make connection between the work that we are doing and those standards, and pull out some of the standards for professional/parent conferences or undergraduate lessons. We’re not married to standards. We don’t let the standards drive the curriculum, children’s ideas drive the curriculum.” This interview excerpt, from a teacher in an American preschool inspired by Reggio Emilia Approach at a research university in the USA, describes how teachers benefit from standards in Reggio Emilia preschools.

Malaguzzi [4], the founder of the Reggio Emilia schools, states that they follow children’s tread of interest, build the science content and skills on that interest, and create a curriculum “from” children not “for” children. Accordingly, anything can be the topic of a Reggio Emilia project, and teachers take advantage of that project topic, in which children are interested, to help children experience the joy of exploring and learning science content and gaining skills, especially science process skills.

### **3. Science process skills in early childhood**

Children in Reggio Emilia preschools usually conduct research on the topic of their interests and engage in science exploration and experiments. Science process skills (i.e., observing and predicting) and integrated scientific process skills (i.e., controlling variables, building hypothesis, interpreting data, experimenting, and formulating) are one of the essentials of conducting research [5, 6]. Young children usually make use of the basic skills, namely, science process skills, instead of integrated scientific process skills, which are more complicated. While children are conducting research on the topic of a project, they need to use science process skills to be able to actively build their content knowledge and satisfy their natural curiosity in the environment. In Reggio Emilia preschools, children act like a little scientist and use science process skills frequently. Basic science process skills that are used by young children in Reggio Emilia preschools can be defined as follows:

Observation: observing, noticing, and collecting information about the world.

Prediction: making a guess and answering the questions like “What happens if?” and “Guess what happened?”

Identification and measurement/calculation: labeling the information with a name or a feature that has a meaning shared with others.

Comparison: figuring out similarities and differences between/among objects and events.

Categorization/group: organizing and combining information into meaningful units based on comparisons.

Data collection/record: collecting things/information and recording them.

Interpretation/communication: making meaning out of the gathered information, sharing that information with others, and explaining information to others.

Utilization: generalizing information from one place to another and from one experience to another [7, 8].

As stated by Fleer, in order for teachers to achieve effective teaching, they should not only enrich their content/skills knowledge in science; they should also have a strong educational philosophy and pedagogical applications to be able to teach science [9]. Reggio Emilia approach provides a contemporary and an alternative perspective to early childhood science education.

#### **4. Reggio Emilia philosophy of teaching and learning science**

Reggio Emilia approach is examined and defined here from the perspectives of integrated teaching and learning and 3H principle.

##### **4.1 Integrated teaching and learning**

There are many models to integrate curriculum, namely, fragmented, connected, nested, sequenced, shared, webbed, traded, integrated, immersed, and networked model. Each model displays a different type of curriculum, being content oriented and/or single disciplined through process oriented and/or student focused. The integrated curriculum model aims competence in the mean of overall integrated learning competence in math, science, literacy, art/music, and all other discipline domains. Moreover, curriculum integration encourages teachers to take into account children's whole development including cognitive and social development, while integration happens in the program and experiences [10, 11].

In curriculum integration, planning begins with a central topic in Reggio Emilia classrooms and develops through new research experiences (explorations) and theories (children's ideas and hypothesis on how the world works). Children are encouraged to ask questions and addressed to search on their own interests. There is freedom for inquiry, questioning, diverse ideas, and differences. Unlike the separate-subject approach, in integrated curriculum model, there is collaborative planning and conceptual integrity. In the integrated curriculum model, child is in the center (child-centered and child is the one who is questioning), but in Reggio Emilia approach, the child, teacher, and parents are all in the center as being protagonists, and all are questioning [10–13].

Reggio Emilia approach resembles more immersed model because as stated by Fogarty, integration takes place within learners, and immersed learners constantly make connections to the topic of the research. Children control their own learning by choosing the topic which they inquire about and which they are interested in. Teachers constantly observe and collect data about interests of children and then decide what to do next in the planning of the curriculum, just like in Reggio Emilia preschools [3, 10–13].

Charbonneau states that competency is one of the factors that is needed to be "successful." All other factors are understanding the relevancy of what they are learning in the classroom to life in the "real world," applying what they learn to that real world, making their own decisions comfortably and trusting in their own ability to do so, questioning and inquiring thoughtfully and creatively, using problem solving skills, and having realistic and high expectations for their own performance [14]. According to those factors, Reggio Emilia children appear to be competent. Moreover, Charbonneau indicates that formal measurement and evaluation models do not provide enough information about how children think and process concepts and how they assess their own learning. However, Reggio Emilia teachers accomplish that successfully through pedagogical documentation of all protagonists of education including children and the program.

## 4.2 3H principle in education of young children

The term 3Hs used by Inan [5] is new to science literacy, but the idea behind 3Hs is not new to science educators. The acronym 3H principle stands for “hands-heads-hearts-on education.” “Hands-on” science education stands for children’s active engagement with science, “heads-on” science education stands for inquiry-based education, and “hearts-on” science education stands for interest-based science education. These three qualities of science education, namely, hands-on, heads-on, and hearts-on, refer to education and development of the whole child. Such whole-child perspective considers cognitive aspects of learning (e.g., inquiring, categorizing, reasoning, predicting, interpreting, and theorizing), social aspects of learning (e.g., discussing, being a part of the learning community, cooperating, sharing, communicating, playing, learning from each other), language aspects of learning (e.g., communicating ideas using hundred languages, using technical terms), physical aspects of learning (e.g., engaging with both small motor skills and large motor skills like writing, drawing, jumping, running), and affective skills (e.g., satisfying their own interests, inquiries, and needs, working on love of subject matter in a playful context, caring about others, and having fun) [5, 15].

Reggio Emilia approach proposes an ideal early childhood science education by making use of a wide variety of theories, such as constructivism, social constructivism, play, and inquiry-based education. All those theories emphasize various strategies for education of young children. Taking those theories into consideration, Reggio Emilia teachers create a context for hands-on, heads-on, and hearts-on science education and get all three to work together. Projects, when maintained by appropriate teacher support, enriched environment, and documentation, create a playful context in which children can be actively and happily engaged in their science-related inquiry [5, 15].

This chapter presents the extended example of a negotiated science project, the 80 Project. The 80 Project is a co-constructed project that emerged at Altın Çağ preschools which are Turkish preschools inspired by Reggio Emilia approach. The 80 Project emerged out of a group of children’s interest in ambulances and the teacher’s initial planning with emergency services and took its direction from children’s interests and the teacher’s support, enrichment, and deepening of this interest. I describe how this emergent, integrated, science-rich project started and developed with some photos so the teachers can easily comprehend how to get children work on science projects from the first stage of development of a project to the last and how elements of this particular preschool accomplish curriculum integration and 3H principle of early childhood education and satisfy children’s hands, minds, and hearts.

## 5. The 80 project

It was a regular school day in Reggio Emilia-inspired Altın Çağ preschools, and a group of 5- to 6-year-old preschoolers was playing in the classroom. Nobody knew that a long, productive, and joyful science project was started. The 80 Project was started with examining body organs by making a child-sized doll with craft paper named by the preschoolers “80” at the beginning of the school year (September), and then the project was evolved into ambulance, hospital, and drug production through January, and the story of curing the doll at the hospital lasted until the end of the school year.

Child A: If the doctor does not give us a prescription, we cannot take a drug, and we cannot recover.

Child B: Why are all of the drugs being sold in the pharmacy?

Child C: Doctors examine the patient first, and then we go to the pharmacist, who stays somewhere different.

Child A: Doctor, how do you know what drug will cure me?

Three children looked so excited about a wounded patient pretending to be in the ambulance. They were trying to help the patient who hurt his leg. The children were using some cloths to carry him from the ambulance to the emergency room. However, the cloths were not really helpful to carry him. Some more children started going into that pretend play. Some of them were pretending to be doctors, some of them were nurses, one was the ambulance driver, and one was the wounded person.

The preschoolers were laying their cloths on the floor, and one was pretending to be a patient and putting himself down on the cloth as if it was a wheeled bed or a surgery table. The teacher of the classroom, Didem, decided to add a fitted bed sheet, because it was stronger and bigger than child cloths to carry someone. Then, the preschoolers started using it. Pretend doctors were covering the wounded knees and legs with napkins and wipes, and the patient was recovering suddenly.

Since the preschoolers were getting more excited during the process of this pretend play, the teacher decided to enrich the play and add some more materials, such as bonnet, bib, scissors, gloves, cotton, body/organs, stethoscope, bandage, blood pressure device/sphygmomanometer, and so on. Moreover, since Reggio Emilia approach aims to create an environment which displays and supports cultural integrity, the teacher allowed the preschoolers to bring their toys or materials from home. For example, in order to make herbal drugs, some preschoolers brought plants or beans from home (**Figure 2**).

The preschoolers continued to work in the classroom by using newly added materials and make visits to the playground and outside the school. They started investigating medical materials and making a special place for patients. They used tiny ropes to weave and cover a table. They said that nobody except patients and doctors can enter this place and then patients are not allowed to exit this place and even touch the ropes. The teacher said that it is like a quarantine room at hospitals, and patients, who might have an infectious disease, are not allowed to leave the



**Figure 2.**  
*Preschoolers are experiencing medical materials.*



**Figure 3.**  
*Weaving the table with tiny ropes to create a quarantine room at the hospital.*

room. With the help of enriched physical environment and materials, the preschoolers started working on more in-depth inquiry questions (**Figure 3**).

Child D: You might have cancer and I will write you Calpol and antibiotics.

Child A: Doctor, how do you know what drug will cure me?

Child B: I will give you a pink pill.

Child C: I will give you cream and antibiotics. My mom has a blackberry cream.

Child A: I think that antibiotics are sour.

Child C: No, I think that they are delicious.

The teacher was systematically asking herself questions (see **Table 1**), listening to the dialogs among children, observing and documenting what preschoolers were playing and discussing, and asking questions at circle or project time, because teachers inspired by Reggio Emilia at Altın Çağ preschools observe the interest and grab onto that if there is a lot of potential and then build on it by reinventing the classroom environment and asking provocative questions. The teacher said that the preschoolers were interested in ingredients of drugs and inquired about how to make drugs and cream. As stated by Strozzi and Vecchi, “In considering a significant experience such as that which is lived in a preschool, nothing should be neglected, not even the most apparently insignificant or marginal details” [16]. The teacher started asking the preschoolers provocative questions such as:

- How can drugs cure people?
- Why are colors of drugs all different from each other?
- Some drugs are cream; some are capsules. Are there drugs in various forms?
- Why does taste of drugs vary from each other?

- 
- What do children know?—What do they inquire?
  - What hypothesis do they have?—What do they want to know?
- 

**Table 1.**  
*The teacher frequently asks herself those questions.*

The teacher enriched the environment by putting different versions of drugs and encouraged them to draw and paint those. The preschoolers realized that drugs are in different forms, like pills, capsules, syrup, and tablets. Since Reggio Emilia teachers believe that classroom is a reflection of life, Didem was not only setting up materials and hands-on experiments depending on what the preschoolers were interested in but also taking them to field trips. She decided to take the preschoolers to an herbalist to explore how to make plant-based drugs. The teacher said, “We participate in professional development studies in the related content and child education, cooperatively work with atelieristas and pedagogistas, check resources and read books on various topics in which we feel insufficient and frequently take preschoolers to field trips to provoke their inquiries and enrich our knowledge.”

The preschoolers started making drugs by mixing stuff, asking deeper questions, making more statements, and producing deeper hypothesis on drugs after visiting an herbalist.

Child A: How can we make chemical and organic drugs?

Child B: Can we make drugs with milk of fig leaves?

Child C: Can we make colorful drugs by smashing scallions and tree leaves?

Child A: Plants also need drugs, because otherwise bugs eat leaves of plants.

Child B: Immunization has also drugs inside.

Child C: Cia beans become jello, how come? (When he mixed Cia beans with water, water became jello.)

Child D: What seeds come from what plants? (examining a cucumber to see the seeds inside).

Child A: They should take the drug dough to the factory so that they can make drugs. Otherwise, they cannot make drugs at school. She said that they need a truck to take the dough to the factory.

Child N: I agree with Arya.

The backbone of curriculum integration is to develop a theme according to interests and needs of children. The teacher said that especially the dialog on drug production between preschoolers just above made the teacher think that this might be a good start of a fruitful project, because the preschoolers were so eager to mix stuff to make drug dough since the previous week. The teacher was right on this foresight about making herbal drugs, but she did not include some of the other project ideas that emerged at school since some other ideas were given priority to investigate. On the other hand, sometimes the teacher wanted to include some ideas but had difficulty in finding out what preschoolers were really interested in. For example, two preschoolers were talking on animals and drugs as follows:

Child B: Animals also need drug.

Child E: Injection is done to muscles, but there is no muscle in animals.

Child B: Animals run fast; that's why they get sick quickly.

The teacher wanted to enrich the classroom by putting a frog body toy, and two children tried to explore inside the frog and cure the frog, but their interest did not last long. The teacher realized that they were not really interested in animals.



**Figure 4.**  
*Examining, drawing, and experimenting with herbs.*

She caught what the preschoolers were really interested in, namely, curing people by mixing stuff to make drugs, and set up the physical environment accordingly.

At first, the preschoolers used macaroni to make fake drugs and painted them with watercolor. The teacher was looking for opportunities for “teaching on the fly” and thought that it might be a good time to introduce informative sources, such as books, because choosing appropriate children books is one of the right teaching methods in science. After reading books, watching informative videos, and conducting research on the Internet about how to make real drugs, the preschoolers wanted to use real plants and herbs. They started making organic drugs by squashing leaves, garlic, daisy, flaxseed, linden, flowers, *Aloe vera* plants, and some other plants that they collected outside the school (**Figure 4** and **Table 2**).

Child H: How can we get liquid from roots of the plants that we grow in pots?

Child Z: What part of the root should we use?

The preschoolers wanted to get the liquid out of the plant to make organic drugs, and they were surprised that some of the plants have more liquid than others and some are oilier than others, such as hazelnuts. They also realized that liquid taken from different plants has varied colors and smells different. The teacher asked the preschoolers if they can create new colors by using that liquid and then color paper to make an exhibition of those papers.

The teacher created places where they could investigate the plants on the light table, create colored paper, and make drugs by using beans and roots of plants that they planted in pots before and plants that they collected outside the school. They drew pictures of daisy, flaxseed, and linden to compare them with each other and compared dried ones with nondried ones and whole ones with sliced ones.

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Since the preschoolers were confused and inquired on *Aloe vera*, the teacher opened Expert TV for children to get information on what they wanted to know. She also asked them to draw aloe vera while watching Expert TV at the same time and checked if they could make association, for example, Expert TV says that aloe vera could make hands softer, and the preschoolers draw hands with aloe vera. Then a preschooler came up with the idea of squeezing liquid from aloe vera by using an injection syringe and said that the liquid is sticky. Then all other children became interested in and put the liquid on their hands to make them soft. However, since their hands became sticky, they cleaned their hands immediately with a tissue, and then they realized that their hands became softer.

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**Table 2.**  
*Experiences with *Aloe vera*.*

The preschoolers also drew germs on the computer, made X-ray films on the computer, drew pictures on the light table, created body of 80 with craft paper, and used treads to make blood circulation. All kinds of art activities in that Reggio Emilia-inspired preschool aim to create a platform where preschoolers' ideas and hypothesis related to the world can develop, be enriched, be actualized, and be visualized.

Child D: Recipes says that tea water should be hot, but I drink cold tea.

Child Y: No, we should not drink cold tea; it might make us sick.

One day, they had herbal tea for breakfast and started asking questions about the vitamins inside herbal tea, such as daisy, linden, and rose hip. They were interested in understanding ingredients of liquid, such as vitamins and minerals inside liquid. During group time, the teacher asked children what vitamins are good for health and what fruits/vegetables provide what vitamins. Discussions started, and the preschoolers said, for example, orange has vitamin C, and it is good for cold. However, they were more excited about the rose hip tea (rose hip means a nose of a bird in their native language, Turkish). They said that rose hip cannot be something to drink, because it is a nose of a bird and a running nose will not be something nice to drink.

The teacher brought some provocations, such as experiments, videos from Expert TV, and field trips to some of the trees on the school way. After watching videos about herbal tea, vitamins, colors, and sequences of how to make tea, the preschoolers made some experiments to make herbal tea. The teacher provoked them to use science process skills all the time. The preschoolers started measuring ingredients of tea and making guess on heat of the water (hot, warm, or cold). They used many recipes and used various scales to measure water and herbs to make herbal tea. By mixing cold and hot water, they experienced how to make warm tea. They also compared bagged daisy teas with whole daisies. They opened bagged daisy teas to observe how they are different from whole dried daisies **Table 3**.

The preschoolers watched a drug factory video and said that people are making dough by pouring something like flour into the liquid mixture. They also started making their own drugs by using the liquid they squeezed from plants and mixing it with flour. Then, they checked a real drug to see if their drug was hard enough. They had a problem with the liquid they squeezed from plants by smashing them,

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Weight versus volume

The teacher asked the children to use the recipe they got from Expert TV, but the preschoolers got confused about how to measure 1 l hot water and 250 g rose hip. They tried to measure a bottle with a ruler. Then, the teacher brought various sizes of bottles to the classroom, and a discussion started on how to measure 1 l hot water. They realized that two half liter bottles make 1 l, but when they put two bottles on top of each other, it becomes longer than 1 l bottle. After working on various kinds and sizes of bottles, they realized that liter works only for liquids, not hard ones. They stopped measuring it with a ruler and started making their own liter by using bottles. At first, they put numbers on the bottle randomly. The teacher provoked them by bringing measurement cups and bottles with numbers on it, and the children compared them with their own bottles. It is important to note that the teacher already showed them measurement cups before the project, but none of the preschoolers were interested in, and none of them questioned how those numbers work on it. However, when they needed to measure water, they were more interested in such provocations that the teacher created, such as various sizes of bottles and photos of bottles presented on the table by the teacher. As seen in this exemplary project, the projects help children use their intellectual acts, and their wonderful ideas come true eventually through many trials and errors, and teachers accomplish the goal of raising questions and leading reflection, research, and adaptation.

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**Table 3.**  
*Tea making and measurement.*



**Figure 5.**  
*Examining, drawing, and experimenting with plants.*

because they could not color the drug dough as they wished. Then, they decided to add acrylic color to the drug dough (Figure 5).

Spontaneous events and teacher's purposeful planning deepened and extended children's interests. The teacher added more plants/herbs to the investigation table for children to observe, draw, examine, compare and contrast, and mix them with water, namely, mint, sweet basil, black tea, beans, pepper, lavender, linden, flax-seed, chia seed, garlic, and green/dried tea leaves. The preschoolers discovered that the dried tea leaves give more texture and leave more color into the water than the green ones. They painted and colored the paper by using the plants. After that, they created posters by adding statements of what to cure under the name of the plants. The children were practicing reading and writing during the project whenever it was needed. They hanged those posters to the walls so that everyone could see what plant can cure what illness (Figure 6).

When the 80 Project was going on in the class, some other long-term and short-term projects were happening at the same time, too, such as snails, city, map, plants, planets, clay masks, graduation ceremony and party organization, molds, robots and producing energy with windmill and potatoes, and light break in water. Sometimes different projects united, for example, the preschoolers made paint by soaking blue paper into water, and they used that blue-colored water as eye drops to cure eyes of their doll (Figure 7).

The preschoolers used different things like cabbage to make colored water and eventually to make drugs. They made three experiments (one with soap, one with bleach, and one with lemon juice) to make different tones of a color from light to dark, because drugs also have different tones of colors (Figure 7).

The preschoolers used bottles and pipes to fill the basins. They were experimenting with the pipe system and trying to figure out which basin will be



**Figure 6.**  
*Writing "daisy is good for stomachache and insomnia."*



**Figure 7.**  
*Drug making with cabbage and colored water.*



**Figure 8.**  
*Drug factory: pipe system and solving math problems.*

filled first with the mixture they made from a cabbage. They were so excited to solve that problem (**Figure 8**).

The preschoolers made syrup by using red paper and water. They also used coffee, vinegar, water, and oil to make syrup and realized that density makes some stay up and some stay down. Moreover, they said, “the mixture with vinegar makes bubbles, but the mixture with coffee does not make bubbles when I put my finger into the mixture.”

When the preschoolers used cloths and paper to make a surgery table, they were able to put their dolls onto that surgery table. However, they also wanted to lie down, and the surgery table they made was not hard enough to carry them. They decided to use their own school bed as a surgery table and asked the teacher to carry a real bed into the classroom and use it as a surgery table then.

The Body Project contributed to children’s science knowledge and shaped the emergence and the course of the 80 Project. During the process of the 80 Project, the preschoolers examined the topic more deeply. They read books and magazines related to body parts and hospitals, science, and ambulances, made an X-ray machine, and examined photos, X-ray films, brain tomography, cardio, cardiac graphs, heart massage, first aid, rescue breathing, bandage, plant names, organs like gall bile, allergic reaction, eye drops, pediatric thermometer, various forms of drugs, and so on. The preschoolers experienced and gained a lot of new technical terms, but sometimes they would not be able to pronounce it correctly, for example, Child N calls stethoscope as “steloscope.” They also wanted to visit an x-ray center in the city. However, the center did not accept to host children in the x-ray center since it is not good for children’s health.

The preschoolers were still so interested in curing each other, covered each other's injured parts with bandage, put each other to the surgery table, invited the teacher into their play, and asked her if she could be a patient (they played such pretend play of going to hospital and taking the teacher to the hospital). The teacher entered a doll into the play, because the preschoolers were so eager to experiment some creams on someone's body. For their security, the teacher entered the doll as a patient, and then the project developed into production of drugs and curing the doll named "80." The preschoolers made a series of surgeries on 80, but 80 died at the end. And then they built a hospital and a pharmacy. Each doctor had his/her own room, and they put their names on doors at the hospital. During the process of the 80 Project, they learned "emergency room," "ambulance materials," "drug production," "hospital," "ambulance," "important phone numbers," "body parts," "organs' functions," "germs," "good and bad bacteria," "measurement: liter," "skeleton/X-ray films," "blood circulation," "first aid/heart massage and rescue breathing," and so on. The preschoolers also made drug boxes and cash and brought them to the pharmacy to sell the drugs in boxes. They used the drama language a lot. End of preschool was coming, those preschoolers were ready to go to the elementary school, and the project ended because they said that 80 died. However, the project did not really end, because the preschoolers excitedly said that they put 80 into the recycle bin and 80 will recover there. On the last days of the school, the preschoolers said that three babies were born out that recycle bin. It might be the beginning of new journeys and new Reggio Emilia-inspired projects!

## 6. Ohio's new learning standards: kindergarten through grade 3

Standards, which are aimed to provide a comprehensive approach for supporting children's development and learning, represent essential skills that support children's learning of an academic content. **Table 4** presents the three standard statements that are accomplished during the process of the 80 Project. There are some more standards that are accomplished by children during such project, but the ones on the table were chosen on purpose, because they refer to the topic "innovation and invention" in which children exceeded standards in most cases and accomplished even third-grade standards. This table shows how related national science standards were met and even exceeded quite naturally in the course of doing the 80 Project.

Pre-kindergarten (3–5 years)	End of grade 1	End of grade 3
<b>Standard statements:</b>	<b>Standard statements:</b>	<b>Standard statements:</b>
Use imagination and creativity to interact with objects and materials	Interact with a wide variety of objects and materials without concern of product or outcome	Interact with a wide variety of objects and materials with the end product as the focus
Use creative and flexible thinking to solve problems	Identify differences between problem types, and adapt strategies based on the type of problem	Work backward from a proposed solution in order to solve a problem
Engage in inventive social play	Engage in elaborate, inventive, and social play	Negotiate and integrate the ideas of others in the elaboration of inventive social play

Reference: Retrieved from <http://education.ohio.gov> [August 27, 2018].

**Table 4.**  
 Topic: innovation and invention.



**Figure 9.**  
*Learning community is negotiating and discussing the 80 Project.*

Moreover, the 80 Project in Reggio Emilia-inspired Altın Çağ preschools included all of essential qualities of science education, got all three Hs to work together, and thus satisfied hands (active engagement with science in a hands-on way), minds (inquiry-based science education), and hearts (the interests and needs of preschoolers). Accordingly, since the ultimate goal of curriculum integration is the “whole child” and competence in the mean of overall developmental competence in social, cognitive, linguistic, emotional, and physical domains, all the development areas were accomplished during the process of the 80 Project, such as social development: They cooperated, negotiated, took turns, trusted each other, overcome fear of doctor, took social responsibility, shared stuff and experiences with each other, and so on. Since teachers accept democracy as a part of the classroom culture, they support children to take an active role in the process of democratization. The preschoolers were able to share their ideas in a democratic atmosphere, listen to each other, and participate in projects as they wanted, became aware of the roots of conflict, and had an opportunity of learning ways to manage them constructively. Furthermore, out of 19 children, all started writing, and 17 out of 19 started reading (writing prescription, shopping at pharmacy, and cash design). It is also essential to note that Child N started writing first and then started reading, which is different than the conventional reading and writing. The preschoolers achieved all the standards for their age and even achieved some of the standards of first and upper grades (**Figure 9**).

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