# Kaleidostories

## Sharing Stories Across the World in a Constructionist Virtual Community for Learning

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*Abstract*: We live in a society where concepts of self, community and 'what is right and wrong' are constantly changing. Consequently, there is a need for learning environments that encourage young people to actively explore their identity as well as the personal and social values they live by. Computational tools have the potential to foster learning about these issues. However, there has been little research in this area. This paper shows how online collaborative environments can serve as tools to facilitate young people's thinking about moral and identity issues. The paper describes two pilot experiences in which bilingual middle and high school students and their teachers, in five different sites around the world, used Kaleidostories, a web-based narrative tool to support the formation of a virtual community to exchange stories about shared values and role models. The goal of this research project is to explore how new technologies can assist young people to discover their own selves as well as the underlying patterns of thought and behaviour that connect the worldviews proposed by different cultures. The project shows how teachers were able to use the online community to complement and augment their face to face activities and interactions by integrating Kaleidostories into different curricular content areas.

**Introduction**  In today's world, concepts of what is right and wrong are constantly changing. This makes it particularly challenging for young people to construct a sense of self and to identify their most cherished personal and moral values. However, there is mounting pressure in schools and society in general to create learning environments that encourage young people to actively explore these issues. The challenge is not only to educate young people but also to help them to develop in a positive way. Developmental psychology defines positive youth development by referring to 'six Cs' that young people must have: Competence (intellectual ability, social and behavioural skills), Connection (positive bonds with people and institutions), Character (integrity and moral centredness), Confidence (positive self-regard, a sense of self-efficacy), Caring (human values empathy and a sense of social justice) and Contribution (orientation to contribute to civil society).[1]

This paper focuses on how new technologies, particularly collaborative online environments, can foster development of these 'six Cs'. In

particular, the experience described in this paper shows how an online collaborative environment, called Kaleidostories, provided an opportunity to form a cross-cultural bilingual virtual community to learn about different role models and their cherished values, as well as to communicate across cultures to explore similarities and differences.

Although values education is not always part of the curricular content of schools, and there is much debate about the need or benefit of having it as a separate discipline, schools do play an important role in the identity formation and moral development of young people.[2] New technologies purposefully designed to support this on-going and often hidden curriculum can serve to integrate identity exploration into everyday content areas. For example, as this paper will later show, Kaleidostories was successfully integrated into language arts, psychology, and technology classes. The technology provided the opportunity to have a specific time and 'space' dedicated to explore these most human aspects of the learning experience that do not always find a place in the school curriculum.

Kaleidostories is a web-based narrative tool to support the formation of a virtual community to exchange stories about shared values and role models. The system guides users in the creation of a personal online portrait with narratives about the present and about the future, and engages them in learning and talking about those who have influenced them. Users can either select their role models from a library or create their own and add them to the already existing database. The system asks them to write stories that involve the role model's biographical information as well as narratives of personal identification, such as 'why did I choose this person as my role model?' and 'what are the values that I admire him or her for?' The system invites users to link role models' stories with particular values and to define those values in a collaborative values dictionary. This dictionary has all the values that the Kaleidostories community holds as a group, as well as the personal definitions that each individual creates. A dynamic kaleidoscope in the top of the screen graphically represents the virtual community and its members. The kaleidoscope visually displays community patterns of shared role models and values. Each participant in the community is represented by a geometrical figure, whose colour and shape change according to how many role models and values are shared between the logged user and the other participants. Users can communicate with each other in an asynchronous way. The technical specifications of the Kaleidostories environment will be described later on in the paper.

**Kaleidostories as an identity construction environment** Computers are powerful tools for self-exploration. Although they were originally conceived as instrumental machines, computers have another potential. They can serve as a 'second self' or as a psychological machine – not because they have a psyche but because they provoke

us to think about our own.[3] However, most computer applications do not engage users in sophisticated learning about the self. I coined the term *identity construction environments* (ICE) to refer to technological tools specifically designed to afford opportunities for exploring identity and engaging in reflection and discussion about personal and moral values. This term came into existence after a six-year research trajectory that involved several design experiments and prototype testing with varied communities of young people, in after-school setting, community-based organisations and hospitals. All of the design experiments and prototypes involved the use of narratives and the design of computational objects as a way of exploring aspects of the self. The SAGE (Storytelling Agent Generation Environment) computational tool enabled children to create and program an interactive storyteller to share stories about their problems and receive feedback through a comforting traditional tale.[4] The Con-science project involved the use of robotics to explore humanistic concepts. It integrated learning about values and identity with learning about robotics and technology. Children were using LEGO robotics tools to design and program interactive artifacts representing an aspect of their culture.[5] The Zora multi-user three-dimensional virtual environment provided authoring tools for children to create and inhabit a virtual city to explore self and community.[6]

Designing and testing each of these environments resulted in a vast array of lessons about the guiding principles for the design of identity construction environments. We have learned that successful identity construction environments:

- provide a safe space to design and program personally meaningful projects that highlight new concepts and ways of thinking about identity;
- support users to engage in self-reflection and introspection;
- provide tools for users to create a complex representation of self and others, highlighting change over time;
- provide flexibility to express and explore powerful ideas about identity in different ways (eg writing a story, drawing a picture, programming an interactive character, conversing with others, etc);
- provide opportunities to engage in narrative expression, particularly in telling stories about the self;
- engage and motivate users for long periods of time in a natural and self-initiated way;
- make use of networked technologies to create a community to put to test ways of thinking and behaving;
- support the passage from knowledge to action – namely, provide opportunities for learners to express their identity, as well as to explore it through behaviours; and
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In this paper, I will first describe Kaleidostories, an example of a web-based identity construction environment. Then I will present preliminary data of two pilot studies in which middle and high school students and their teachers, in five different sites around the world, used Kaleidostories to form a bilingual virtual community to exchange stories about personal values and role models. Based on this data, I will focus on two case studies. The first is about a 17-year-old boy, who I will call Juan.[7] This case was selected as one that was representative of a successful learning experience with Kaleidostories. In this case study, Kaleidostories was successfully integrated by a teacher into the language arts and the ESL (English as a Foreign Language) curriculum, and it enabled a teenager to change his self-concept as a learner, as well as to explore differences and similarities with other cultures. The second case study focuses on the not-so-successful experience of an 11-year-old girl, participating in the context of the Jewish Sunday school. This case was chosen because it shows how the initial investment and commitment of a girl to participate in the experience was diluted by not having a supporting face-to-face community or teacher. This case study talks about the need to integrate Kaleidostories, or any online educational technology, into the curriculum.

Kaleidostories is designed with the assumption that identity is not a monolithic notion, but a dynamic and complex concept. Each individual is composed of a plurality of co-existent and disparate aspects, represented in Kaleidostories by different role models. This multiplicity acquired by identifying with others may not necessarily be harmonic.[8] The challenge is to explore these conflicting values and voices and understand them as part of our complex sense of self. Kaleidostories tackles this challenge by providing a design framework for young people to create, and visualise, this plurality of voices and values as they relate to their models of identification.

Psychoanalytic theory has talked about these issues in terms of introjection and object relations. We internalise or 'take in' important people and things in our lives in order to form inner objects. There is a notion of an ego capable of integrating and unifying an individual's experience and action in an adaptive manner.[9] Postmodern theories of identity talk about self-fragmentation and multiplicity of selves. Research on virtual environments has followed this line of thought and studied how the internet supports people to play with different notions of self and becomes a 'social laboratory for experimenting with the constructions and re-constructions of self that characterise postmodern life'.[10] However, fragmentation and cohesion, multiplicity and a sense of core uniqueness, are all needed to develop a healthy self. James Glass

criticises these postmodern theories of identity by showing how they ignore the terrible pain associated with multiple personality disorder and schizophrenia, the extreme forms of shattered selves.[11] From his perspective, fragmentation is a function of identity as long as it enables multiple co-existing elements to be organised in a persistent cohesive system with stable boundaries between itself and others. Kaleidostories makes concrete these abstract ideas about self, by providing tools for users to make their online portraits composed of many different role models and values, as well as to visualise emerging community patterns. This is particularly useful for teenagers who are struggling to form their own coherent notions of self, by putting together different fragments.

While the primary design goal of ICE is to support exploration of identity and positive youth development, these tools also foster the development of fluency in the areas of technology and narrative. The concept of fluency was first used by Papert to refer to the ability to use and apply a particular knowledge (in his case, knowledge of technology) in a fluent way, effortlessly and smoothly, as one does with language.[12] Developing fluency involves mastering a subject area and the cognitive processes or habits of mind that empower people to think and behave in new ways. As with learning a second language, fluency takes time to achieve and requires hard work and motivation.

Identity construction environments such as Kaleidostories afford opportunities for learners to develop technological fluency by providing tools to become designers of their own computational projects. For example, while using Kaleidostories, young people designed their own online portraits, used digital cameras and manipulated digital pictures. During the process of using technology in a creative way, people are likely to develop new ways of thinking; therefore the computer's role goes far beyond being an instrumental machine. For example, the internet and the nature of Kaleidostories provided a powerful metaphor to think about identity as a network composed of diverse and contradictory elements or values. As mentioned earlier, this way of thinking about identity as a complex construction resonates with current psychological theories.

On the one hand, Kaleidostories helps young people develop technological fluency, while on the other hand, it supports the development of narrative fluency. This means becoming familiar with the narrative genre, and in particular, with the relationship between storytelling and identity formation. Narratives are composed of memories, experiences, knowledge and reflections. They give life to past experiences by making events memorable to others and to us. According to Bruner by telling and listening to stories we make sense of the world.[13] Therefore, by developing narrative fluency, people not only

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learn how to use the narrative genre, but also learn how to find and express their own stories. The act of storytelling is more than a way of using language to narrate an event. It is a process through which we mould our lives, incorporating our knowledge of the world and our personal values and beliefs.

Roger Schank comments with respect to the importance of storytelling to identity formation:

> When people ask teenagers questions in their first job interview or in a college interview, they often give monosyllabic answers, interspersed with frequent 'I don't knows'. One reason for this is that teenagers, unlike adults, haven't got their stories down. They don't know what their stories are, both because they haven't thought about these things before and because their answers keep changing over time. The process of going from not knowing what one's stories are to knowing them and telling them, is what constitutes the process of self-definition.[14]

One of the goals of identity construction environments is to help young people know what their stories are by providing opportunities to develop narrative fluency. This means becoming familiar with the narrative genre, but also learning how to find and express their own stories.

In the next section, I present the theoretical foundations upon which the work presented in this paper lies, the constructionist theory of learning developed by Seymour Papert, and the role of narrative theory in identity formation and moral development. These schools of thought have informed the research presented in this paper in two major, and very different, ways. First, by proposing a pedagogical model of how to design and use computational environments with the goal of supporting learning. Second, by providing a framework to understand narrative as a key element for the construction of a sense of self and therefore as a key element that needs to be present when designing computational environments for learning about the self, ie identity construction environments.

## Theoretical foundations
### Constructionism: the role of new technologies for learning

In terms of pedagogy, the design and study of Kaleidostories is strongly influenced by the constructionist theory of learning developed by Seymour Papert.[15] The paper by Eisenberg in this volume explores this theory in depth and re-examines it in the light of the newly developed technologies. Constructionism asserts that people learn better when they are engaged in building personally meaningful artifacts and sharing them with others in a community. It implies a hands-on, project-based methodology, and its roots can be found in Piaget's constructivism. Piaget argued that the child is not a *tabula rasa* who blindly sucks in

knowledge, but is an active builder of intellectual structures. While Piaget was concerned with developing an epistemological theory, explaining how knowledge is constructed, Seymour Papert advanced it as an active theory of learning. Papert's constructionism carries an interventionist perspective; it not only aims at understanding how knowledge is constructed, but also tries to make use of such insights in developing learning activities and environments. For this purpose, it views the computer as a powerful tool to support new ways of thinking and learning.

There is a long-standing constructionist tradition in the design of educational technologies and approaches to support teaching and learning about mathematics and science. For example, researchers in science education have been largely exploring the idea of learning through design;[16] however, academics and practitioners in the area of human development (psychology, civics education, moral and values education, humanities, etc) have rarely explored this concept. The humanities have preferred to engage learners in introspection, reflection and discussion about issues of identity. The goal of the research presented in this paper is to take the best of both worlds and offer opportunities for learners to introspect, reflect and discuss, as well as supply the tools to become designers and makers of their own projects. For example, in the case of Kaleidostories, learners were making online portraits of themselves and their role models, as well as communicating with others in a virtual community.

Within constructionism, some research has looked at how immersive computer learning environments can support discussion of personal and cultural values. In these experiences, technology drew people into a higher level of mutual respect and collaboration, and gave them an increasing sense of autonomy, interpersonal awareness and self-confidence.[17] While this research made use of general-purpose programming environments such as Logo and the LEGO Mindstorms robotic kit to learn about identity and values, my research on identity construction environments focuses on the use of technology specifically designed with these goals in mind.[18] For example, in Kaleidostories, learners create a virtual community populated by personal role models. By describing these heroes with narratives and values, learners purposefully engage in reflection about identity and moral issues.

One of the tenets of constructionism is the need for a community of learners to share projects and to explore ideas. Some research has focused on face-to-face learning communities,[19] while other research has explored different forms of online learning communities in which learners are put in the role of content producers, and not merely that of consumers of information, and at the same time, take on different roles involved in the teaching and learning process.[20]

Computational tools designed with a constructionist approach support users as designers of their own projects by making both personal and epistemological connections.[21] While these tools have the potential to enhance learning, Papert stresses that it is important not to fall into the technocentric fallacy, the assumption that technology by itself can produce changes.[22] In a constructionist environment, tools are only one element of the social and cultural context in which learning happens. However, as this paper will later show with the case of Kaleidostories, when tools are designed with a specific purpose, they can play a central role in fostering a learning experience.

The technocentric fallacy has largely permeated educational technology. For example, research has found that, despite the nationwide large investment in new equipment and wiring of public schools, most of the computers 'end up being souped-up typewriters' used in unimaginative ways.[23] Teachers are not well prepared to know how to effectively integrate technology into the curriculum or to re-think the curriculum in the light of new technologies. These problems are in part due to the technocentric approach that puts too much emphasis on the technology and very little on the conditions in which the technology will be used. Making it possible for educators and children to use computers expressively and in creative ways involves not just the deployment or development of new tools, but also a framework to provide social support for learning.[24] Later, this paper will show the framework provided by the teachers participating in the Kaleidostories experience.

**Narratives: their role in identity formation and moral development** The use of narratives in identity construction environments such as Kaleidostories is inspired by the uses of storytelling in both educational and psychotherapeutic experiences.[25] Narrative has become a tool that is highly utilised to teach and learn about values and to understand moral development.[26] It has a long and universal tradition in programs aimed at moral and character development education. Stories such as fairy tales or myths, and biographies of historical and religious figures, are used to introduce universal human values and role models to children. As Johnson points out, 'only within a narrative context can we fully understand moral personality (the self) and its actions.'[27]

In traditional experiences, the authority (the teacher, the curricula, the community, the institution) presents stories such as fairy tales or myths to the children that introduce universal human values.[28] For example, historical or religious figures are used as role models. However, many of those role models are far removed from children's everyday experiences and become empty vessels, with no invested meaning on the part of the child, and rarely accomplish the envisioned identification process. To avoid this trap, in Kaleidostories children are invited to create their own role models and to narrate how and why they chose them.

However, children might have different role models that do not always help shape a coherent sense of self. For example, values taught by different role models might be contradictory. Narrative, or the ability to tell a coherent story out of fragments, plays a major role in integrating the plurality of co-existent role models or 'disparate selves'[29] acquired from others.[30] Kaleidostories provides an interface that enables learners to visualise the multiplicity of role models and values as a colourful kaleidoscope with many stories to read.

Narrative serves a double-edged descriptive and constructive function with respect to identity formation. The descriptive function supports the finding of coherence between the diverse internalised role models and stories of our experience, thus allowing us to have a coherent life story to present to others and to ourselves.[31] The descriptive function is embodied in self-description genres such as conversational personal stories[32] and autobiographies[33] and allows the organisation of the facts after they occurred. Kaleidostories serves the descriptive function of narrative with respect to identity formation by providing a framework for children to write personal stories about their past, present and envisioned future and to write the biographies of those who have influenced them. The constructive function of narrative enables them, through external dramatisations, to play out our chorus of voices and diverse roles in the world. This function of narrative with respect to identity formation is played out in Kaleidostories by allowing community members to engage in asynchronous communication and discussion. However, this function is not yet fully explored since children are not provided with purposefully designed tools to engage in role-playing and perspective taking.

Narratives operate at three different vital levels: cognitive, emotional and social. Kaleidostories offers a design framework to support children to engage with these three different aspects of narrative. At the cognitive level, narratives are fundamental constituents of human memory that provide a distinctive way of ordering and understanding experience.[34] Research has shown that new experiences are interpreted in terms of old stories and generalised story scripts.[35] Kaleidostories provides a space for users to tell their stories and to organise their experiences in terms of past, present and future. Second, at the social level, the tales that one knows and can tell define the social group or culture to which one belongs. Myths, legends, and traditional tales provide a sense of continuity between generations as well as models for human behaviour.[36] By immersing children in a virtual community to share role models and values, Kaleidostories fosters social interactions through narratives and provides a space for children to explore the different social groups or cultures to which they belong. Last, narratives play an important emotional function. As Anna Freud[37] and others have shown, through the verbal-play experience of storytelling, people can

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find not only recreation but also self-cure. Kaleidostories was not explicitly designed to use in a psychotherapeutic setting. However, its narrative approach serves some of the same emotional functions as those of narrative therapy.³⁸ In sum, from cognitive, social and emotional standpoints it is important for young people, and adults, to have a place to tell their stories. Identity construction environments such as Kaleidostories provide one such place.

**Kaleidostories** Kaleidostories is a web-based identity construction environment that focuses on the use of narrative to explore identity, role models and values in the context of an online community. The system guides users in the creation of a personal online portrait with narratives about the present, 'who am I?' and about the future, 'who or what do I want to become?' (see figure 1). Here is an excerpt from a personal narrative about the present written by a 16-year-old girl:

> I'm from Honduras and I have six brothers and one sister. But not all of them are here in the United States. The only two that are here are my mother and my little brother Jefferson. Plus I have another family and they live here in the United States. When I say that there's another family I mean that my mother's friend took me in when my mother wasn't here and I lived with them for almost I think 8 years. But they aren't really my family but I would like to call them my family because I live with them for such a long time.

Kaleidostories also guides them in learning and talking about those who have influenced them. This may include anyone: family members, role models, anti-role models or even fictional characters.

Children can either select their role models from a library or create their own and add them to the already existing database. The system asks them to write stories that involve role models' biographical information as well as narratives of personal identification, such as 'why did I choose this person as my role model?' and 'what are the values that I admire him or her for?' For example, a 14-year-old American girl chose Hillary Clinton as a role model and supported her choice with the following narrative piece:

> Just recently there has been a lot of talk about the scandal of Hillary Clinton's husband Bill Clinton. It shamed the nation to hear that the American President was caught having an affair behind the first ladies [sic] back. A lot of people did not know what to think. But the one person who counted the most stood up for him and backed him through it all. That one person was Hillary.
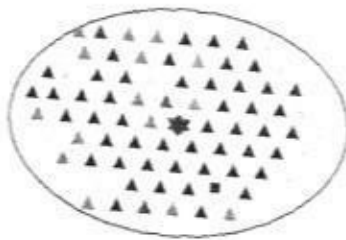
Figure 1

Figure 2

The system invites users to link role models' stories with particular values and to define those values in a collaborative values dictionary. This dictionary has all the values that the Kaleidostories community holds as a group, as well as the personal definitions that each individual creates (figure 2).

Finally, what links users together in Kaleidostories is the kaleidoscope always in the top right corner of the screen. The kaleidoscope visually displays community patterns of shared role models and values (see figure 3). Each participant in the community is represented by a geometrical figure, whose colour and shape changes according to how many role models and values are shared between the logged user and the other participants.

Figure 3
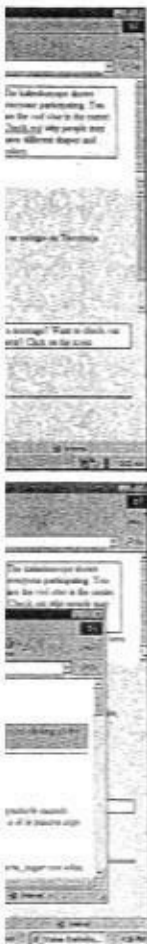
In addition, the kaleidoscope also acts as a navigational device. At any point in their session, users can explore other children's pages by clicking on the shapes in the kaleidoscope. Once they travel to the other user's page, they can discover what similarities and differences exist between them and communicate with them by leaving bulletin board-like messages.

Kaleidostories runs on a Windows NT Java-based webserver and is implemented in Java. Data entered by the children is stored in and recovered from a database using Java servlets. All the web pages in Kaleidostories are dynamically created by Java during run-time so that what the user sees on screen is as close to the most current data as possible.

The Kaleidostories identity construction environment was designed to engage children in a variety of both online and offline learning experiences:

- *Introspection*: children use multimedia to create online portraits of themselves including stories, pictures, links to other websites, etc. These portraits include narratives about who they are now (the real self) and who/how they'd like to be (the ideal self). Here is an example written by a 13-year-old girl:

> In thirty years I would still like to be known as a nice and loving person. And also in the future I would like to travel around the world and help the poor people with their problems such as sickness and to discover all the nice places that I haven't been to.

- *Identification and differentiation*: the American psychologist Erik Erickson describes the process of identity formation as characterised by a tension between differentiation and identification: the need to find boundaries between self and others, and the need for integration into a major whole consisting of family, culture and society.[39] Kaleidostories involves children in this dual process by engaging them in the creation of portraits of their role models. In order to do this, they must reach out to their families and communities to find role models and search for relevant information. They tell stories about them, photograph their favourite objects and make links to relevant websites. Kaleidostories' design leads children to write stories that reflect the characteristics (values) that they most admire in their role models.

- *Values exploration*: the system has a seed library of abstract universal values (such as friendship, justice, responsibility, etc). Children can add their own values to the library as well as link them with their own personal definitions that ground those abstract concepts to concrete situations.

- *Community building*: children can explore each other's role models and compare values and definitions while using the kaleidoscope to visualise community patterns.

- *Communication*: children can contact each other and engage in asynchronous communication about both the process and the products within the Kaleidostories experience.

Kaleidostories was designed for 'the lowest common denominator' to allow children from schools with diverse degrees of connectivity speeds and technological capabilities to access it. This design decision puts forward the idea of content, as opposed to the 'bells and whistles' approach usually featured in children's websites.[40] It emphasises children's stories, instead of animations or cool graphics.

In the next sections, the paper will first describe the kind of experiences had by children using Kaleidostories by presenting two pilot studies that have been conducted in bilingual sites (English/Spanish) in different parts of the world and by showing how the virtual community worked. Later, it will present the research methodology for this work as well as the data-collection process. The core of the paper is the presentation of two case studies. Finally the paper will analyse results by describing what worked well, and what didn't, and will conclude with a final section on future directions this research might take.

**Participants: sharing stories across the world**

I conducted two different four-month online pilot studies with Kaleidostories. First, I did a study with three bilingual sites (Spanish/English) in different parts of the world: a bilingual class in a Cambridge public high school, USA, an elementary school class in Torrevieja, Spain, and a youth group from a Jewish Sunday school in Buenos Aires, Argentina. The total number of participants was 49: 45 children between 10- and 17-years-old, three teachers (one per site) and myself as a researcher. Second, I conducted a pilot study with only Spanish speaking sites: the same elementary school class in Spain, two schools in Colombia and a high school class in Argentina. In this second study the number of participants was 83: 77 children between 10- and 17-years-old, four teachers (one per site), myself as a researcher and a project assistant.

During both studies, although all the sites were participating in the same Kaleidostories experience, every local teacher decided to integrate the tool into his or her curriculum in a different way and with different goals. For example Marion, the Cambridge teacher, integrated Kaleidostories into her 'Spanish literature and issues of adolescence' elective class. She focused the semester on asking students to write stories about role models in Spanish, a language that most of her students spoke well but were not comfortable writing. After the first

couple of sessions using Kaleidostories, Marion decided to develop her curriculum around the Kaleidostories experience. For example, she would ask students to browse the online Kaleidostories library and choose a role model that had played an important role in the life of a certain culture or community. She then would ask students to research the relevant biographical data and to write their own opinions about her or him. Sometimes she would chose to focus on a family member who children looked up to. She would ask them to interview the person or any other relatives and then transform the dialogue into a story. Marion's curriculum, in terms of writing about role models, mostly focused on the difference between biographies and personal stories or viewpoints, because she noticed that her students' entries in Kaleidostories were showing signs of confusion between those two types of narratives. In terms of technological fluency, Marion was a novice computer user, but she was eager to learn. Her goal was to help students develop narrative fluency in Spanish, as well as engage them in exploration of different cultures. Some of her students were recent immigrants from Latin American countries, struggling to adjust to American society, while others were first generation American, confronting the tension between their parents' worldview and values, and those of their peers.

The teacher in Spain, Ernesto, was a technology instructor. His students learned very fast how to use Kaleidostories and the different associated tools, such as Photoshop, and produced the largest amount of online material and email exchanges. Ernesto decided to focus his class on Kaleidostories' values dictionary and did in-depth work with his students writing stories to express their most cherished values. Although this wasn't part of his syllabus, he felt that Kaleidostories enabled him to help his students develop technological fluency, while also engaging them in thinking and discussing issues that he knew were important for pre-teens but that did not have many opportunities to surface in the context of his class – or the school experience.

Emilia, the Argentinian high school teacher who participated in the second study, taught psychology and sociology, two elective courses. She used Kaleidostories as a way to help her students ground their theoretical readings in a concrete personal experience. For example, as a final assignment, she asked them to write a paper reporting how the online community evolved over time and what kinds of narratives of personal and social identity emerged. By participating in Kaleidostories her students took the role of researchers, and analysed how the experience evolved. Like Marion, Emilia was also a novice computer user, eager to learn and not afraid to ask her students for help. Emilia was very outspoken about the need to let her most technologically fluent students take the lead and help each other out, even to conduct mini-workshops during her class-time, so she could concentrate on

developing a curriculum that would integrate Kaleidostories into her content areas.

Regardless of the particular choices made by teachers regarding ways of using Kaleidostories and integrating it into their content areas, preliminary data analysis shows a strong correlation between the involvement of teachers in the experience and the involvement of students. The teacher's involvement was judged by two main components. One was their planning and integration of Kaleidostories in their curriculum, observed by emails they sent to a dedicated Kaleidostories emailing list. The other component was the number and quality of the entries the teachers created on their own sites.

The more involved the teacher was in participating in email exchanges and in creating his or her web page with personal portraits and role models, the more involved his or her students were in participating in the Kaleidostories community. The exceptions were the extremely motivated or unmotivated students for whom the involvement of the teacher did not really make much difference. For example, the teachers from Colombia only had a very limited participation in Kaleidostories, and they created websites that did not reflect in depth who they were or what their values or role models were. They were very outspoken about the fact that their students needed to complete certain amounts of work in Kaleidostories per day. By analysing the creations done by these students, it is clear that they were merely completing an assignment and not opening their hearts or minds to the task.

In both studies children added their own personal role models to the library, and very rarely used already existing ones. For example, sports players, popular singers and movie stars, as well as family members, friends and well-known figures, such as Mother Teresa of Calcutta, were chosen as role models. Children also added their own values and definitions to the collaborative values dictionary. Friendship and love, in both studies, emerged as the most popular values with the most definitions. Some definitions were simple, such as 'Friendship is easy: two people meet and they become friends' and others were more complex: 'To study can have very different meanings for different people. For example, studying well may mean that you know the clues to memorize something or it may mean that you can find connections or that you just sit and have many doubts or that you ask many questions'.[41] In the follow-up online interviews, most of the participants said that they enjoyed best the experience of communicating with others with similar ideas but from different countries, thus exploring differences and similarities between their role models and values.

**The community at work** Kaleidostories enabled the formation of a virtual community composed of young people and teachers from many different countries and two

different languages, Spanish and English. In order to foster a sense of community, Kaleidostories provided mechanisms for engaging in asynchronous communication, for visualising community patterns by looking at the shapes and colours of the kaleidoscope interface, and for exploring similarities and differences among members through the collaborative values dictionary.

Both students and teachers engaged in asynchronous communication extensively. Most of the exchanges occurred between students from different countries and followed a similar pattern. During the first exchanges, students commented about what they read on each other's online portraits (eg 'I see that you like horses. I also love horses. ... My dad has a couple of horses in the farm and we go there on vacations'[42]). Later on, after receiving a response, they ventured into new territories (eg 'I know nothing abut Colombia. I just heard there are lots of troubles there and that it is a very dangerous place. Is that true?'[43]). With the exception of a handful of students, no long lasting relationships were formed. Students tended to interact more with other students who had posted their pictures, and very few students tried to interact with teachers. More than 50 per cent of the students participating in the experience sent messages to me. Most of them were curious about how we created the technology and if were we planning on commercialising it. Some wanted to know if I had seen their web pages and what my thoughts were about them. At the beginning I played a very active role in responding to each message, but later on I decided to fade into the background. This decision was partly made because I did not want to become the centre of attention and I wanted to see how other relationships formed, and partly because I did not have time to respond to all the similar messages sent to me. Teachers communicated with each other as the research assistant and I provided a teachers-only mailing list. Most of the messages were about how to improve things that were not working in the community, questions about how to tackle certain challenges, and ideas for engaging in collaborative activities. The teacher from Spain emerged as a leader and posted very long messages. One of his suggestions was to set up a synchronous conference for kids to communicate with each other in real-time and to participate in a questions and answers game about each other's countries. However, the difference in time zones made this impossible.

One of the key design features of Kaleidostories is the kaleidoscope interface that serves to visualise shared community patterns. The hope was that children would be curious about the changes in shape and colour of the kaleidoscope interface and would explore their similarities and differences on their own. However, this did not happen in a spontaneous way. Teachers had to ask their students to browse each other's role models and values in order to identify how many of them they had in common. For example, in the case of the school in Argentina, the teacher gave a

concrete assignment to students to write about how the Kaleidostories community was formed. Most of the students participating in the experience had an average of only one shared role model and three shared values. Therefore the kaleidoscope showed no major overlaps and this created a problem in that it was harder for children to easily find connections. One of the reasons for this was that children did not browse the library of role models. They tended to create their own role models (best friends, relatives, heroes in their own countries, local athletes) and therefore only children from the same school and country knew them. In schools in which the teacher took an active role in orchestrating a curriculum to integrate the technology, such as the schools in the USA and Spain, children tended to pay more attention to the kaleidoscope interface. However, in other cases, such as the experience in the Sunday school in Argentina, children only learned about the meaning of the different colours and shapes of the kaleidoscope at the end of the experience, when asked to respond to a final questionnaire.

**Method** In this article I choose to focus on two case studies: one in which Kaleidostories was successfully used and the other in which Kaleidostories did not work as well. The first study is about a teenage boy using Kaleidostories at the Cambridge high school in the USA. The case was not chosen randomly. It was selected as a representative example of how the experience of participating in Kaleidostories engaged a young boy in both identity exploration as well as the development of narrative and technological fluency. Since we were able to collect both online and face-to-face data, this case study is richer than other ones for which we only had online data. The second case study is about an 11-year-old girl in Argentina, participating in the context of her Jewish Sunday school. For this study I collected only online data. This case was chosen because it shows how the initial investment and commitment of a girl to participate in the experience was diluted by not having a supporting face-to-face community or teacher. Therefore, this case study talks about the need to integrate Kaleidostories, or any online educational technology, into the curriculum.

**Data collection** In order to evaluate the experience, I used a mixed qualitative and quantitative methodology. The Kaleidostories central server saved a log of every interaction and creation done in the system by each particular user and captured the date and time of the occurrence, so that changes over time could be detected. That data is very messy and is in the process of being analysed and coded. This paper does not report quantitative results. It presents two case studies that are representatives of the two kinds of learning experiences that students had while participating in Kaleidostories.

Teachers were asked to send us basic demographic information of their participating students, such as gender and age; teachers were also requested to participate in a monthly online exchange to discuss how

the experience was going and to provide feedback to each other as well as to the researchers. This feedback was used to further develop new design features into Kaleidostories as well as to better understand the experience. At the end of the pilot studies, each teacher was requested to send a written evaluation of the experience. Students were asked to complete an online open-ended questionnaire evaluating both the experience and their own learning. They were also requested to give their input regarding design decisions to improve Kaleidostories. Questions sent out to students were the following:

1. How would you describe to a friend what is Kaleidostories?

2. How did you choose which role models to create?

3. If you had to give advice to some friends who are not sure about who their role models are, what would you tell them to help them choose them?

4. Did you learn something new about yourself using Kaleidostories? What?

5. Did you learn something new about others using Kaleidostories? What? From whom?

6. Did you learn something new about values using Kaleidostories? What?

7. What do you think values are?

8. What did you like most about Kaleidostories?

9. What did you like less about Kaleidostories?

10. What suggestions could you give me to make Kaleidostories more fun?

11. Is there something else you would like to say?

The teacher and students from the Cambridge public high school in the USA were also interviewed face to face and were observed and videotaped participating in the Kaleidostories experience. This was an important component of the data collection to see how Kaleidostories was integrated into the face-to-face curricular activities that the teacher was doing. Since this was the only local school, we only collected face-to-face data in this site.

**Case Studies Juan and Che Guevara: a personal learning journey** Juan is a 17-year-old recent immigrant to the USA from a poor village in El Salvador. At the time of the study he did not speak English yet and had severe problems writing in Spanish. Juan didn't need to write in his previous life, and it wasn't clear for how long he had attended school. Shortly after immigrating to the USA, he joined the school in Cambridge and he worked after school hours in a store. Juan had many discipline problems and was suspended a couple of times for bringing 'dangerous weapons' to school and for engaging in gang fights. However, Juan was very soft-spoken and had a kind manner. Teachers complained that he did not invest enough effort in their classes, that he never completed his homework and that he lacked the

discipline and interest in investing time for learning. Marion, his bilingual teacher, thought that some of Juan's learning problems were due to undiagnosed dyslexia. However, no testing was conducted at the time of this study to corroborate this intuition.

Juan had a very good relationship with Marion. When she introduced the Kaleidostories project to her class, Juan became very interested. However, he started to work on the project later than his classmates because he had been suspended from school for gang fighting. With a lot of effort and many spelling mistakes in Spanish, Juan became very involved in Kaleidostories. The first challenge for him was to be able to type the URL and his login and password without spelling mistakes. In an email exchange with a child from Colombia, he conceded that for the first time in his life he realised the need to 'write well' so the computer could understand him and 'do what he wants it to do' (ie take him to the Kaleidostories site). Fortunately, at this early point of his first encounter with the internet, Juan didn't know yet about internet bookmarks, so he had to focus on his typing task.

Kaleidostories presented him the challenge of learning to use computers and, at the same time, allowed him to open up about aspects of his inner life that he wouldn't share during regular school activities. It gave him an opportunity to share with others what his life was like before coming to the USA. He started by creating his online portrait with a very short autobiography and a very big picture:

> I am Juan. I am 17 years old and I like to go dancing with my friends. I come from El Salvador.[44]

It took Juan approximately 30 minutes (more than 60 per cent of the class time devoted to Kaleidostories) to write those two sentences. After receiving emails from two girls in Spain asking more about him, he added the following to his online portrait:

> I have many friends.[45]

In the following sessions, he created three role models: his older brother, his aunt, and Che Guevara. For each role model he wrote why he chose them, and included stories about their lives and their favourite objects and pictures. For example, he wrote that he chose his older brother because he is very well respected in his gang and he is very strong and everyone listens to him. He chose his aunt because she is very nice and always has time for him. He chose Che Guevara because 'he was a revolutionary leader. He fought hard to give freedom to the people and to give food and he also fought against the rich people who exploited the poor workers. My dad really admires Che Guevara and me too.'[46]

Juan's first narratives were full of both spelling and grammatical mistakes. This posed a dilemma for Marion, who wasn't sure if she should intervene before the stories were uploaded into the system or if she should step back. If she helped him with the spelling she was afraid that she would have discouraged him from writing. If she did not help him with the spelling, she felt that she wouldn't be doing her job as a teacher. Finally, after consultation with the other teachers involved in Kaleidostories and myself, she decided not to correct him and to let him continue with his high motivation. Within weeks, Juan showed a complete change of attitude towards writing, and most generally, schooling. While during the first weeks he would come late to class, as time went by, Juan became consistently the first person to show up. Dyslexic or not, the fact is that, for the first time in his life, Juan was doing something that he had never done in the context of school work: paying attention to what he was writing, because otherwise he couldn't be understood. The problem was authentic and not just a capricious request from the teacher or the educational system.

Juan's kaleidoscope had lots of different colours and geometrical shapes representing the role models and values that he shared with others. As Juan became popular in Kaleidostories and exchanged more emails with users around the world, he started to care, for the first time, about his poor spelling because it was a barrier to being understood by others around the world. For example, a younger girl from Spain complained to him that she could barely understand his emails and that if he was as old as his portrait said, then he should know how to write better. Timidly at the beginning, and vehemently later, Juan started to ask the teacher and his classmates to correct his writing. Marion, the teacher, was impressed by this change in attitude and shared this with the other teachers participating in Kaleidostories through the teachers-only mailing list.

All through the process, Juan used the kaleidoscope as an interface to access other children's creations as well as to post messages to their clipboards. Most of the messages exchanged were with social purposes such as 'I like your picture', 'I really like what you are writing about and I promise I will answer all your questions if you keep writing to me', 'I am happy that I met you over the Internet. I've never been in Spain. Is it nice?' Soon after he posted his story about Che Guevara he started receiving emails from kids who also liked Che Guevara. However, after a couple of exchanges, Juan showed a great deal of frustration because he learned that most of the other kids didn't know who Che Guevara 'really' was. He complained that they liked him because he had become a popular teen idol whose image sold very well in stores. For Juan, however, Che Guevara meant something different. He was a link between him and his dad, and a symbol of a revolutionary leader. This can be better understood by knowing that

Juan's family emigrated from El Salvador for political reasons. However, Juan didn't go as far as to publish this in his online portrait or in his email exchanges. He only shared this information in one of the face-to-face activities related to Kaleidostories organised by his teacher.

As time went by, Juan started writing more complex stories and he eventually became an expert user of the computer. He would come to school after-hours to use the computer in the library, and he would help his classmates with technical difficulties in exchange for their correcting his spelling. Juan's development of narrative and technological fluency helped him become a more confident learner and to gain a higher sense of self-esteem. The Kaleidostories experience fostered a social context that helped a teen start to change his sense of identity from an outsider to a well-liked and respected member of the community, from a 'trouble kid' to an eager learner.

Kaleidostories not only engaged youth in the development of technological and narrative fluency in an integrated way, but it also provided a framework that encouraged reading and writing as fundamental tools for communicating with others. Therefore, as stated by Marion and as shown through her students' productions, in particular Juan's case, a side effect that we were not anticipating in this research was that it helped bilingual learners to find a meaningful activity through which to express themselves in writing to an engaged authentic audience of peers.

**'My anti-role models are the Nazis'** Melanie is an 11-year-old participating in the Kaleidostories experience through the Sunday school she attends in her synagogue in Buenos Aires, Argentina. In contrast to the involvement shown by Marion, the Cambridge teacher in the USA, Melanie's teacher, Laura, presented Kaleidostories to her students and then told them to use it on their own from their homes or from the school library. She did not incorporate it into her curriculum, and neither did she plan face-to-face activities to complement it. Laura did not participate in the teacher's mailing list and didn't create her own personal online portrait.

Melanie was a novice computer user who received lots of help from her dad to connect to Kaleidostories for the first times. She was a very sophisticated writer in Spanish and she was the first child to discover a bug in the software: a word limit imposed on the length of stories. She chose as her first role models Moses, Einstein and ... the Nazis. She wrote the following narrative about why she chose them:

> I do not understand why the Nazis exist. Why do they kill people who are different? In the first place, no one should ever be killed. During the Second World War the Nazis killed Jewish people as well as gypsies and Christians and blacks and many

other people. After learning about that I felt very sad and every time I think about the Nazis I want to start crying. I do not understand why the Nazis exist but I know that we must remember that they existed, and exist, so these things do not happen again. "

Ana, a girl from Spain quickly responded to Melanie's story by asking her why, if she hates them, she chose them as role models. Melanie replied that Kaleidostories didn't have a place for choosing anti-role models and so she thought that by reading her story others would learn what she thinks about them. Melanie was right. Many kids sent her messages about her choice and her story. As the designer of the technology, I learned an important lesson: the need to give as much flexibility as possible to the authors and creators. For example, in the second generation of identity construction environment that I designed, the Zora virtual city, children have the option of creating both heroes and villains. "

By looking at Melanie's creations and postings over time, it is clear that her level of engagement greatly decreased in intensity. She was highly involved in Kaleidostories for the first two weeks, stopped using it at all for almost a month, then came back to it for a couple of days and never again logged in. In the questionnaire that was sent out to children at the end of the experience, Melanie said that she really liked Kaleidostories and reading stories from other children around the world, but that she felt lonely because no one else in her class was using it. She also said that she tried to write in English instead of Spanish a couple of times, but that her English wasn't good enough for her to write stories.

In contrast with Juan's experience, Melanie did not have a supporting face-to-face community with whom to share what was happening in the online community or from whom to ask for help when needed. She developed a certain level of technological fluency thanks to her dad's initial help, but she did not master the tool. For example, in the final questionnaire she asked whether the different colours in the kaleidoscope meant something or if it was just random choice. She complained that she wanted a different colour and that she didn't like the magenta that her shape displayed most of the time. She couldn't figure out that magenta meant that she shared more than three values with other kids around the word. She couldn't ask her nearby peers or teacher either. Melanie missed out on an important aspect of the Kaleidostories experience, ie the possibility of visualising through the kaleidoscope, patterns of similarities and differences with others in the virtual community.

In terms of narrative fluency, Melanie's stories were very well written both from a grammatical and orthographic point of view. Her stories

were deeply personal and she certainly opened up and talked about herself. In her initial online portrait she wrote:

> I am Melanie. When I was borne we spent a year in Argentina and then we left for three years to Israel. During those three years I met my best friend, Hana. After Israel, we came back to Argentina and my brother, Uri, was born. Then, three years later, my little sister, Shula, was born. I went to first, second and third grade and now I am in fifth grade. I like baseball and I like the Internet. I have a rabbit named Bianca and a turtle named Bats.[49]

Later on Melanie chose her baby cousin, Julia, as her role model. She wrote:

> One day when I came back from school my mom told me that my little cousin Julia was born. At the beginning I couldn't see her as much as I wanted to, but later I was able to see her almost every day. Now she is a year old and she is a bright sun and a star. All together. I loved her a lot, up to the sky and even higher. She is blond and has blue eyes. She never cries and goes with everyone. She smiles all the time. I love her a lot. And I am her oldest cousin but I learn a lot from her.[50]

Melanie used Kaleidostories to write complex stories for her age. However, she also described herself as someone who likes writing. It is very hard to make any correlation between Melanie's narrative fluency and her involvement with Kaleidostories. As stated earlier, Kaleidostories played an important role for extreme cases of low-achieving students, such as Juan, but not for average or high achieving students.

The same can be said in terms of identity exploration. While Melanie was able to open up and tell stories about herself and her role models, this is more likely not due to her participation in Kaleidostories but to her general introspective awareness. In the final questionnaire, when asked if she learned something new about herself, she simply wrote 'no'. Melanie used the tool as a personal diary, instead of as a gateway to a community of peers. This was in part due to the lack of support from her own local community and teacher, and the lack of face-to-face peers who were also engaged in the experience, which would have made participation in Kaleidostories more attractive.

**What worked well?** As an identity construction environment, Kaleidostories provided a safe place for young people to explore their sense of self through the use of technology. The influential psychologist Erik Erikson showed how one of the biggest tasks for children in the age range of those who were

involved in Kaleidostories is to grapple with identity issues. Unfortunately, schools have very little space and time explicitly dedicated to this, and most of the use of technology is a long way from helping them to explore their inner world. The experience reported in this paper shows how Kaleidostories promoted this kind of learning.

More specifically, Kaleidostories's main goal was to provide a design framework for children and teachers from different countries to learn about each other's cultures by exploring similarities and differences regarding role models and values. As shown through Juan's case study, this was successfully accomplished. Juan's story is representative of the learning experienced by the majority of children with a supportive face-to-face community and a well integrated curriculum in which Kaleidostories played a central role. However, as shown through Melanie's case study, the experience was not so successful in terms of helping children to form a virtual community to learn about each other in the absence of a dedicated and committed teacher and a curriculum developed around the technology.

One of the strengths of Kaleidostories is its constructionist nature. As shown in the paper, teachers from diverse disciplines were able to adapt the tool to their own curricular needs and were able to easily integrate it with their sociology, technology or language arts courses. Furthermore, Kaleidostories played an important role in providing an opportunity for children to read and write in both English and Spanish, and to improve their writing skills with an authentically engaged audience of peers. Skilful teachers were able to use the tool to augment the face-to-face possibilities of interaction and discussion by engaging in some of the online activities proposed by Kaleidostories.

**What did not work?** Kaleidostories lacked the capability to include direct, synchronous communication through real-time chat. It also lacked the flexibility to express a more complex sense of self, in which other aspects beyond role models were explored. One of the most successful design features of Kaleidostories was the collaborative values dictionary. However, it only supported the expression of values as narratives and did not afford users the opportunity to put to test those values through actual behaviours in the online community. In later research, I address those issues by providing mechanisms for people to engage in collaborative tasks, such as city building, so as to establish an environment in which values would surface through actions in the community.[51]

Kaleidostories' design did not facilitate the passage from knowledge to action, nor from identity expression by writing personal stories to identity construction by reflecting about those stories and thereby

providing opportunities to change behaviours and values. Although there was a sense of community, represented by the changing patterns of the kaleidoscope, the tools for self-organisation and forums for discussion were missing. This is essential to form a responsible community in which values are developed not only as narratives but also through action.

On a different note, as shown in Melanie's case study, Kaleidostories was not fun enough to engage participants to use it on their own for a long a period of time. After the initial excitement of creating online portraits, role models and values, and getting to know other participants in Kaleidostories spread around the world, which lasted approximately three months in each study, teachers reported that children started to decrease their enthusiasm for logging into Kaleidostories. They complained that they already knew everybody, that 'it wasn't fun enough' and that 'there isn't much to do'. As shown by the preliminary data, a big effort from the teachers was needed in order to engage students and keep them on track. For example, they started to organise more face-to-face activities to complement the online experience. When the teachers were not active participants in the experience, such as Laura, Melanie's teacher, students didn't have a local face-to-face community with which to explore both technical and content related issues around Kaleidostories and the experience became less rich.

## Conclusions

Identity construction environments, such as Kaleidostories, foster children's exploration of identity while engaging them in the development of technological and narrative fluency. Therefore, they serve to integrate technology into curricular content areas, as well as into the 'hidden curriculum' that covers some of the most pressing issues that pre-teens and teens are struggling with, such as 'who am I?', 'what are the values I hold and cherish?', and 'who do I identify with?', and that do not always have a dedicated time and space in the classroom.

However, the notion of identity construction environments might misguide people to fall into the technocentric fallacy of giving undue centrality to the computer in the learning experience.[52] As shown through Juan's case study, and by the teacher's reports on Kaleidostories, much of the learning experience was crafted and realised in the face-to-face environment. However, the use of the tool was central to the kind of explorations that followed. In order to achieve a successful learning experience, there is a delicate balance between the use of ICE and the design of activities, within these environments and the classroom, to create a positive social and learning context. Although identity construction environments provide a design structure that naturally leads young people to think about issues of identity, they need to be complemented by the specific goals of the individual teachers. Kaleidostories provided a way for teachers to learn from each

other, as well as for students to engage in a different type of activity than the ones they usually did in school, both in terms of content explored and tools used.

One of the strengths of Kaleidostories was its design to support the formation of an online community that would complement, and not replace, face-to-face interactions. For example, students used the tool to write about their role models and engage in some discussion about similarities and differences between cultures. Later on, the best teachers were able to use face-to-face opportunities to expand on what had happened online. For example, the sociology teacher in Argentina asked students to pick a role model appearing in Kaleidostories and write an essay about how different cultures would talk about that person from their own point of view. And the technology teacher in Spain dedicated a whole unit to explore with his students the collaborative values dictionary and its entries. However, when there was a lack of face-to-face interaction and teacher participation, the experience was not so successful, as presented in Melanie's case study, in which a wonderful teaching opportunity was lost.

At a personal level, learning environments such as Kaleidostories provide an alternative to monolithic ways of thinking about identity which do not take into consideration the personal struggles of living in multi-cultural societies with multiple and even contradictory models of identification. At a social level, making this idea accessible for young people serves a double educational function: preventing hate crimes based on the fundamentalist belief that there is only one 'right' way of being, and consolidating democratic societies. Unfortunately most schools do not have a specific time and curriculum dedicated to this, and their use of technology is limited to learning about maths or sciences or to browse the internet to find information. In very few circumstances do they use the power of virtual communities to explore issues of identity and culture.

**Future work** Both students and teachers provided important feedback that is informing the re-design of Kaleidostories. The main suggestions were to include the use of sound, since teenagers express much of their identity through music, to incorporate a synchronous chat system that would enable instant communication between participants, and to embed synchronous role playing activities into Kaleidostories. As shown by research, role-playing games on the internet have a tremendous potential to explore issues of both online and off-line identity.[33] Teachers said that diverse forms of synchronous communication would help maintain the long lasting interest of their students in the activity and would also open up a new universe of possible collaborative activities, when time zone differences are not an issue.

Since the pilot studies were conducted, we have implemented a self-contained Kaleidostories server that teachers can download and install into their own schools, if they have the technical equipment, and therefore be in complete control of the experience, the Kaleidostories variables and the virtual community. For example, a history teacher is changing the general look of Kaleidostories to use it as a way to get his students to share stories about fundamental historical figures. His hope is to recruit other teachers around the world who would be interested in joining their courses online. In this way, teachers could become not only practitioners but also researchers, very much in the spirit of what Emilia, the Argentinian psychology and sociology teacher did with her students. Ongoing work is also looking at different methodologies for analysing the rich and varied set of data obtained from both pilot studies.

The experience reported in this paper shed light on some pressing research questions regarding the use of virtual environments to foster positive youth development. There is mounting pressure in society to create environments to help young people develop in a positive way. However, most of the programmes either in schools or in after-school settings, ignore the role that technology is already playing in children's lives and lack the vision and skills to conceive how new technologies could be successfully integrated to complement ongoing efforts.

From 1993 to 1999, the number of Americans connected to the internet grew from three million to 80 million. Families represent one of the fastest growing segments. By the end of 2002, some 58 per cent of USA residents are expected to access online services from the home.[54] Virtual environments present a unique opportunity to promote the positive development of young people and their communities. How does one design these environments? What kind of technologies better serve this purpose? How does one successfully integrate these tools into new programmes so they can be scalable and sustainable? How does one develop an interdisciplinary approach, so that research can be meaningful for both scholars in youth development or education and computer scientists, as well as for practitioners and teachers working with youth?

The long-term research agenda behind the work done with Kaleidostories is to develop a transdisciplinary research programme with three purposes. First, to exploit the potential of new technologies to support positive youth development. Second, to construct a shared language and scientific methodology to enable collaborations between computer scientists and researchers and professionals in the area of child development and education. Third, to conduct a three-fold research programme with theoretical contributions, innovative design of computational technologies and empirical research to evaluate results of interventions using these technologies in complex real-world settings,

such as schools. It is my hope that the work presented in this paper will encourage more research about the role of technology with respect to identity formation in young people.

**Notes**

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