

Towards the design of learning scenarios combining activities across multiple spaces

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Abstract. Recent technological advances enable the design of innovative blended learning scenarios combining physical and virtual spaces through mobile and interactive devices and applications. One of the aspects that need to be explicitly considered when designing these scenarios is the physical spatial location where the activities occur. In this context, this extended abstract discusses the following question: Can we help teachers/designers/practitioners define the characteristics of the spatial locations intervening in their learning activities and the technology that link them? 4SPPIces and ISiS are two conceptual models that propose including the physical space as an explicit element when designing blended learning activities. The abstract discusses their main considerations and differences.

Keywords: Educational design, blended learning, virtual spaces, physical spaces.

AcrossSpaces2011 EC-TEL Workshop Extended Abstract

In the last few years, the inclusion of interactive and portable devices in education has opened up new opportunities for learning. The pervasive and interconnected capabilities of these technologies enable the design of innovative learning scenarios combining activities occurring at a variety of physical spatial locations, in and beyond the classroom and inside virtual spaces. In these blended learning scenarios the activities are integrated through a data flow that is transferred from one space to another through different technologies to facilitate a coherent and fluid learning process. Both the space characteristics and the technologies available in a particular learning situation have a direct impact on how the links or transitions between spaces are produced. In this context, the space becomes a key factor to be considered in the design of innovative activities [1].

Recent approaches in the field of Mobile Learning consider the context as part of the design process [2, 3]. Context is defined as an artefact continuously created by people interacting with other people in their surroundings [4]. While context is something abstract and dynamic built up through interactions between people and between people and technology, for us, the space is the planned environment where the activity is going to take place. These physical characteristics and also the technologies available in that space, condition the way interactions occur when

planning and enacting the activity. This abstract compares and discusses two different models, 4SPPIces and ISiS, which introduce this idea of the space as an element to be explicitly considered in the design of innovative collaborative learning practices.

4SPPIces [5] combines 4 factors: (1) the *Pedagogical* method (*what* learners and teachers should perform), the *Participants* (*who* participate in the learning activity), the *Space* (*where* the activity takes place) and the *History* (*what is likely to be varied during* the activity *enactment* that requires a flexible management). Each of the factors is composed by a set of facets that guide practitioners and systems developers in the design of complex structured collaborative practices in which participants with different roles interact, according to a particular learning flow, in activities occurring at different spatial locations. This model can be used as a descriptive conceptual model for stimulating discussions between practitioners and system developers when addressing the design of innovative collaborative activities involving multiple spaces. It can also be useful as a template for practitioners to reflect about the elements that a blended learning activity should consider. The 4SPPIces tool (http://193.145.50.226/4SPPIces_model/) can help in both situations. This tool prompts questions related to each of the factors in the model for guiding the design of the collaborative blended learning activities and the definition of the technologies involved.

ISiS (Intentions, Strategies, and interactional Situations) [6] proposes a specific identification of the intentional, strategic, tactical and operational dimensions of a learning scenario. The *Intention level* describes the designer's intentions, closely linked to the knowledge context which defines targeted knowledge items (competencies, abilities, conceptions or misconceptions, etc.). The *Strategy level* is related to teaching methods, in order to reach goals linked to the intentions formulated at Intention level, the designer opts for the strategy (at pedagogical or didactical level) he considers to be the most appropriate. The *interactional Situation level* represents the tactical level, i.e. the proposed solution to implement the formulated intentions and strategies. Each "interactional situation" is defined as a set of interactions with a specific set of roles, tools, resources, locations, according to the situational context. The *situational context* is defined at an abstract level, which means that only typical elements are listed (i.e.: word processor, mind map...). Physical spaces are represented by the item locations, which are typical abstract locations: classroom, home, Internet connected location... The graphical authoring environment based on the ISiS model is ScenEdit [7]. This tool assists teachers in the design of learning scenarios. Currently, ScenEdit offers some patterns for the different levels (intentions, strategies, interactional situations) elaborated from best practices identified in the literature and communities of practice in order to favour sharing and re-using practices among practitioners.

Each model defines the space from different perspectives. Both differentiate between the virtual and physical spaces. In 4SPPIces, physical spaces are defined by a set of areas associated to a particular task and composed by physical electronic and non-electronic components. The components are defined by their affordance (how it is used), their arrangement (how they are located) and their mobility (portable or fixed). Both virtual and physical spaces are connected through the components of the physical space. In ISiS, the situational context is characterized by a set of variables such as resources and tools that support the activities (documents, videos, digital or

not digital tools and resources, services), locations where activities can take place and roles which can be distributed to the participants (teacher, tutor, student, pupil...).

When designing scenarios with 4SPPIces, the space is an intrinsic factor involved in the design that is related to the other factors in order to achieve a coherent learning process. In short, 4SPPIces makes designers consider the relationships between the Space and the Participants through their location, and between the Space and the Pedagogical method through the activity. The extended model of the 4SPPIces Space factor for specifying physical learning spaces [1], defines the physical environments as the set of the spaces involved in an educational scenario with the artefacts that characterize them and their linkages. Hence, the space is more than the location where the activities occur. In ISiS, each component of the interactional situation (iS), and of the situational context is independent from another. Table 1 shows a summary of the different components of the two models emphasizing how virtual and physical spaces are treated in each.

Table 1. 4SPPIces & ISiS facing the space aspects when designing learning activities

	4SPPIces	ISiS
Participants	Participants: specifies the potential number of people to be involved in the activity and the actual number finally participating, their profile and their spatial location in each activity.	Roles: defines the type and number of actors (small groups, individual, whole class...) to be involved in the activity.
Space	Space: defines the space where a learning activity occurs and the elements that compose it.	Situational context: defines the abstract context used to perform the interactional situation: Roles, Resources, Tools, and Locations.
Virtual Space	Virtual spaces: where participants manipulate virtual elements not necessarily located at the same place.	Resources, Tools manipulated during the activities performed for each interactional situation.
Physical Space	Physical spaces: where the participants directly manipulate the elements of the space. Defined by areas and components with a particular <i>affordance, arrangement</i> and <i>mobility</i> properties.	Locations where activities can take place and can be precise classrooms or other external places (home, outside, enterprise, internet connected location...).

Discussion

Both 4SPPIces and ISiS are descriptive models that represent an ongoing work for inspiring researchers and practitioners in the design of new collaborative blended educational scenarios. First, we contend that practitioners, system developers and researchers can use these models as conceptual means to discuss about the needs and challenges of the future blended learning experiences with an emphasis in collaboration. Second, the two approaches include the definition of the space as an element in the design of scenarios combining virtual and physical spaces. This linkage between spaces is conditioned by the technologies supporting the different activities. Consequently, the definition of the space proposed in 4SPPIces and ISiS can be seen as a first approach for making practitioners reflect about new activities involving multiple inter-related spaces. One way to support this second point is to propose authoring tools in the line of the 4SPPIces tool and ScenEdit for facilitating collaboration between practitioners and system developers in the design of activities involving multiple spaces.

As next steps, we aim to explore how existing works such as [2, 8, 9, 10], which

have experimented combinations of activities occurring at different spaces, address the linkage between virtual and physical spaces. Describing these experiences with the two models we could get a deeper understanding about how the space is treated in each one, identify in which situations would suit better using one approach or the other, or a combination of both, and who is the most appropriate audience for each model.

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