

Contextual Mathematics Through Pervasive M-Learning Technologies for Developing Countries

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Education of mathematics has been very theoretical for a long time and students often feel anxious about it. In many developing countries, where illiteracy is still common phenomenon, math is perceived as even more abstract subject. Basic math skills are essential for success in several aspects in every day life such as studying, working, managing house hold finances, and trading. Even more are math skills important for scientific and technological developments on which today's leading industries in developed countries are based. In order to tackle this problem, this paper proposes an model of a system where mathematics is learnt through everyday problem solving practices. In this approach mathematical awareness is raised through ethnomathematics where a learner recognises the mathematical relevance of the surrounding environment and culture, thus being able to place abstract mathematical concepts to concrete contexts. Lowering the bar of abstraction in mathematics will not only increase the motivation of the learner but will also yield better overall learning results and eventually will affect at bigger scale to economies of developing countries. When technology comes along with the traditional approach of ethnomathematics, learners can complement their current mathematical training by independent, everyday learning practices.

Unlike land line and wired Internet connections, mobile devices are widely spread in developing countries. Examples of these devices range from mobile phones to cheap mini laptops (e.g. One Laptop Per Child Project). When enhanced by recent advancements of pervasive m-learning technologies (e.g. wireless sensors, GPS), these devices can be used for learning contextual mathematics. The proposed system is based on a previously developed model of a pervasive m-learning solution, the Myst family. First implementation of the Myst family is the SciMyst, a pervasive mobile learning game for a science festival where players explore the physical environment while solving intriguing problems related to surrounding objects. The game uses wireless technologies and smart environment to accomplish context sensitiveness. Deep experience received through the development and use of SciMyst and its derivatives is utilised in designing a pervasive m-learning tool for learning contextual mathematics in developing countries. This tool, tentatively named as MathMyst, will be able to recognise user's context and propose appropriate information and problems to solve. Appropriateness is decided according to the context and personal profile of the user which regards cultural and educational background, existing skills, learning style and speed, and personal preferences. As an example, a farmer learning fractions of numbers could be given a task to divide a set of beans instead of a cake which is more common symbol of division in western countries. Constructing a technology-driven ethnomathematics learning system in a context of developing countries requires utilisation of participatory design methodology, hence the development process will firmly involve the local people.