

DIRECT MANIPULATION INTERFACES FOR LEARNING APPLIED TO STATISTICS

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Statistical knowledge has become a requisite for a wide range of fields of study, which can be seen by the number and size of the introductory statistics courses offered at University level. Given the diverse nature of the students taking these courses, a range of teaching styles are required in order to appeal to all learners. To get students to “think statistically”, these methods should include a mixture of logical argument, activities and simulations with real-world examples and anecdotes.

Visual and interactive tools are often used to engage students and foster group discussion and discovery [1]. In particular, a direct manipulation interface, which involves the use of icons to manipulate and interact directly with data rather than writing programs, engages both visual and kinaesthetic learners and acts as a focal point for group discussion and discovery [2].

In this paper we describe an application, DMIL (Direct Manipulation Interfaces for Learning), running on a touch screen ultra mobile PC that is used to illustrate introductory statistics concepts, such as sampling methods and hypothesis testing, using a problem-solving approach. Groups of students cooperate to solve problems by directly manipulating icons using the touch screen. In this way the students learn through group discussion, visually and through moving, doing and touching. We design the interface so that the icons being manipulated are tailored to be relevant to the student's field of study and to encourage the students to think more deeply about the statistical concepts and hence to learn more effectively.

To assess the effectiveness of the application, it is designed to monitor how the students perform the required tasks. We will employ this information in conjunction with a student questionnaire to gauge the helpfulness of the tool for learning statistical concepts. In addition, we will present early results and a demonstration of DMIL.

References

[1] Sedig, K, Klawe, M. and Westrom, M. (2001). Role of Interface Manipulation Style and Scaffolding on Cognition and Concept Learning in Learnware. *ACM Transactions on Computer-Human Interaction*, 8(1):34-59.

[2] Holst, S. (1996). Directing Learner Attention with Manipulation Styles. *Proceedings of the CHI '96 Conference Companion on Human Factors in Computing Systems: Common Ground*, 43-44