To Unlock the Learning Value of Wireless Mobile Devices, Understand Coupling•

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1. Introduction

Handheld computers will become an increasingly compelling choice of technology for K-12 classrooms because they will enable a transition from occasional, supplemental use to frequent, integral use [1, 2]. Early evaluations suggest teachers and students respond to handhelds favorably [3]. At the same time, these devices will become communication enabled, through wireless technologies such as infrared beaming or radio-based local area networks. The clarity with which we can see the potential has led some to declare that the revolution has arrived and that by rapidly moving to this new technological platform, innovators could achieve large scale impact on learning. Perhaps. But perhaps not.

Every new generation of learning technology brings with it a new deep conceptual issue that learning technologists must entangle in order to unlock the learning value of raw technological potential [4]. The field of computer supported collaborative learning has already successfully tackled two key issues, control and representation [5]. This current research base, however, is insufficient to unlock the value of wireless internet learning devices (WILDs). A third issue, hinted at but not fully explored in prior work [6], now must become our central focus of attention. The issue is the nature of the coupling between social and informatic worlds, and within the social and informatic worlds [4].

To understand the excitement behind WILDs in the classroom, we start with a utopian scenario:

Mrs. Palio, an 10th grade science teacher, has always been interested in her students' visual and spatial reasoning, and she has a deep belief that her students develop visual and spatial understandings of some difficult science concepts before they can adequately verbalize their understanding. But she has never had a quick way to check for visual and spatial understanding in class. But recently her students have been arriving to class with WILDs. Through a small grant, Mrs. Palio

got a WILD herself, some special software, a wireless network and a projector.

Now when she wants to check visual and spatial understanding, Mrs. Palio points camera on her WILD at a page in her text, and captures and image. She then sends the image to everyone in her class, and asks a question, like "Which of these molecules has a double bond?" The students circle the images they believe to be correct. Instantly, all the circles appear on the projected display of the image at the front of the class. Mrs. Palio can now quickly see if all the students agree on what a double bond looks like, or not. She can use this as a leaping off point for class discussions that are tuned to what the students need the most help with.

To understand why the effort to mobilize a product so obviously affordable and desirable as WILDs could get mired in quicksand, consider this reactionary scenario:

Presently in the United States, parents purchase the vast majority of educational handheld for their children, based on recommendations of teachers and rules from testing companies. In particular, math teachers overwhelmingly recommend Texas Instruments graphing calculators, which parents then purchase. This creates an installed base that covers most high school students. On top of such a large, uniform installed base, large scale impact on learning is indeed possible: math curricula have been dramatically reformed to leverage the representational power of instant graphing in every child's hand.

But notice how quickly the potential for scale could unravel as WILDs are introduced. The testing companies adamantly refuse to allow WILDs into college admissions tests, because they allow students to bring in copious

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