Review
Analysing Best Practices in Technology Education

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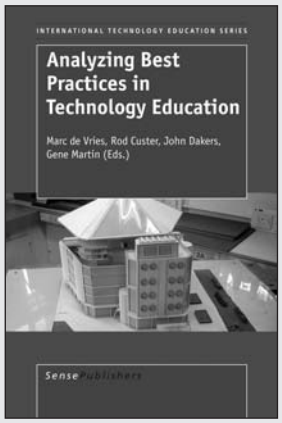

The preface and first chapter of the book, written by Marc de Vries, provide the reader with a clear rationale for the book itself and the structure used within it. De Vries begins by explaining why he believes there is a gap between the outcomes of theoretical educational research and educational practice. He goes on to justify the approach adopted in the book in which within Part 1, the editors provide examples of what they have identified as good technology education practice presented as case studies written up by the teachers involved and in Part 2 eminent researchers from various countries within the field of technology are asked to answer the question: what makes this practice 'good'?

De Vries explains how the team of editors identified examples of good practice from different countries (Australia, Columbia, India, the Netherlands, New Zealand, the UK, and the USA) whilst being careful to select a variety of technological contexts from a mixture of educational situations. He then goes on to describe how the editors organised Part 2 by identifying relevant issues for reflection, splitting them into three groups: the first concerning technology education; the second focusing on the people who teach and those who learn; the third concerning educational strategies. In each chapter in Part 2 the author extracts a different important theme making reference to: the case studies described in Part 1; useful appropriate references from their own research; links to their wider reading around the theme of the chapter. As de Vries quite accurately points out the subsets for each of these topics are endless and far beyond the possibilities of a single book, however as a first attempt within the realms of technology education the reader is provided with an excellent broad range of issues and much to reflect upon.

The structure of the book works well, although if one is to make sense of, and benefit from, each chapter in Part 2 one must read all chapters in Part 1 first.

Chapter 2 by Paula Wine and Judy Moreland is the first case study. It concerns making fermented drinks in a primary school in New Zealand where science and technology are closely related by biotechnology, which forms an important aspect of technology education in New Zealand. There are international and social dimensions to the project set for a multicultural group of pupils, who in teams are asked to investigate a target group for the fizzy drink they are designing. The drink must be based on one of the traditional fermented drinks specified. The planning of the task, the detailed teaching sequence over the four weeks of the project, and the important learning that takes place are all well described.

Chapter 3 by Diane Novak and Patrick Foster also has a multicultural setting, although in this case the project lasted for eight-months rather than the four weeks of the fizzy drink project. The objective of the task for this group of American elementary pupils from four schools was to plan, design, and build a three-dimensional model of a new multicultural, inclusive, and ecologically minded community. The project connected several technological domains such as transportation, construction and communication. Other interesting features of the project described were the involvement of external, real experts and the fact that pupils from different schools learnt to collaborate and negotiate with unfamiliar peers both in person and electronically.

In Chapter 4 Kenneth Pryde from a Scottish secondary school situated just north of Glasgow fluently describes a practical industrial archaeology project at Lanark Mills. The project was carried out by first year pupils which as de Vries explains "…nicely illustrates how historical projects need not be boring paper-and-pencil activities".

Chapter 5 by Tony Cox examines the introduction of new technology learning activities in electronics for senior

secondary pupils in a small rural school in Australia. Evidence of the ways in which animation and modelling can be combined with electronics as a vehicle for design and make activities are clearly articulated. In this chapter Cox also provides evidence to support the fact that showing others what is going on within a technology department is an important means of improving the status of the subject in the eyes of a school.

Chapter 6 also concerns practical activity to explain technological theories carried out by senior secondary pupils, although the contrast between the educational environment and the approach taken by Luis Bernardo Rios Escobar in an Industrial Technical School in Colombia and Cox in Australia is very marked. The project described by Escobar illustrates well that one does not need modern high tech equipment and surroundings in order to achieve challenging and valuable technological learning.

In Chapter 7 Josine Frederik and Wim Sonneveld describe lesson materials developed for a national project introducing design skills within technology education at secondary level in the Netherlands. The learners in this case were secondary school teachers. Looking at and discovering the functional nature of unfamiliar artefacts were used to introduce design skills to the teachers. The authors suggest that the success of the learning materials lay in the fact that they were easily accessible and did not require time-consuming preparation. The evidence from the case study clearly indicated enthusiastic teacher-learners' with the project having the potential for replication in technology education situations in other parts of the world.

Chapter 8 returns the reader to the USA and to high school education, however the situation is very different to the previous case study from the USA in that in this chapter the teacher is a female called Thelma Kastl with an electronics degree and 16 years successfully working in industry before becoming a teacher. The lesson plans described by Kastl target power and energy combining theory with practical activity. What could at first glance seem a sterile uncreative context proved to be a highly motivating, competitive, fun, learning environment in which teams of students developed a device to launch a golf ball repeatedly for the longest distance possible. The students enjoyed the collaborative task so much that Kastl had the teams continue on the theme of power and energy, getting them to design and create 'a spacecraft' that could launch a crew from a launch site to a planet, using breakable eggs as space crew and scoring the accuracy, and gentleness of landing to provide a winning teams' design.

An element of fun is also important in the activities advocated in Chapter 9, the final chapter in Part 1 of the book. In this case study the country is India and the students are of lower secondary age. Swati Mehrotra and Ritesh Khunyaki, in a well written chapter, illustrate how educational research and curriculum development can be combined to meet the requirements of a PhD study whilst also providing sound teaching materials to develop pupils' technological understanding in a classroom situation. The theme of the teaching materials was puppetry. This had previously been a popular art and craft activity in Indian schools, however in the past all students made identical puppets. The thrust of this project was to move the children from being passive receivers of information to a situation where they worked with their peers and their teachers in a collaborative manner. The activity was broadened to encompass producing a play for 6 characters, the puppets themselves, appropriate scenery, and finally performing the puppet show itself. The chapter provides a rich description of how puppetry and story telling can present a very worthwhile situation in which to develop pupils' understanding of technology whilst also developing linguistic skills and important connections to other school subjects.

Part 2 of the book entitled "Analysis by Experts" begins at Chapter 10 with John Dakers eloquently focusing on the conceptual and procedural dimensions of technological literacy. Dakers refers to his most recent publication in which well known philosophers discuss their views of technological literacy, whilst he weaves in examples from each of the case studies presented in Part 1 to support his thinking in a very informative manner.

In Chapter 11 Rod Custer deals specifically with ethical values. He describes the close interaction that must occur between culture, values and technology and by using examples from the projects provided in Part 1 of the book indicates how these issues could be dealt with in various contexts and from various perspectives. Unfortunately, Custer has to rely more on potential possibilities than upon actual examples of where this important integration has successfully been carried out within the case studies presented in Part 1. Custer's chapter on ethical values leads neatly into Chapter 12, where Chitra Natarajan specifically targets cultural issues and in this case is able to use the teachers' narratives in every case study to support her thinking in a powerful manner.

Chapter 13 written by Robert McCormick analyses the accounts by teachers to uncover the different ways in which design is manifest within their work. In the context of each case study he analyses the nature of design, the role design plays in the activities described, how explicitly the teacher deals with the design process, and how the

design aspects relate to knowledge. His conclusion is that if students experienced a number or all of the activities described in the case studies then they would have a rich experience of technology, rather than, as he believes happens all too often, pupils being fed a uniform restricted design cycle on a treadmill of design projects that constrain approaches to thinking, problem solving and creativity.

Chapters 14, 15 and 16 all focus on aspects concerning the people involved in technology education. In Chapter 14 John Williams discusses the issues associated with stakeholders in the context of technology education. He begins by referring to theories on stakeholders from the world of business, where much of past research has been carried out. He goes on to discuss a framework of stakeholder relationships and why they are important for 'good' practice within technology education, although as he points out there is little mention of stakeholders within the case studies presented in Part 1 for him to use as exemplar material. In Chapter 15 Ken Volk discusses attitudes, how they are established and how they can enable or inhibit learning. In the context of technology and technology education Volk explains how attitudes are influenced and shaped by interactions with technology and how teachers are pivotal in determining pupils' positive attitudes towards technology. He uses various examples from the case studies to clearly illustrate his point. In Chapter 16 Ann Marie Hill focuses upon motivation. She competently analyses different motivational theories and utilises all the case studies to illustrate how teachers have used a wide variety of tactics to enthuse their students. She concludes by suggesting that taught well technology education actively engages students in authentic learning that is motivational and that such pedagogy offers other subjects a viable, motivational alternative from traditional teaching methods.

The final four chapters in Part 2 deal with strategies for making learners learn what is of value in technology education. Chapter 17 by Judy Moreland and Browen Cowie opens this theme with an overview of teaching approaches and strategies. They begin by providing their view of what technology education needs to be, reaffirming Dakers belief in Chapter 10 that it "… is not only about artefacts, but how and why those artefacts are developed and the impact they might have on people and our world". They illustrate and discuss the implications of this view of technology education by analyzing the ways in which it was taught effectively in the case studies, although as they explain the planning and preparation of teaching materials was largely implicit within the case studies.

The focus for Chapter 18 by Michael de Miranda is the social aspects of learning in terms of cooperation between pupils. De Miranda uses several of the case studies to support his theories. The chapter then narrows down to discuss the place of new technologies, in particular the Internet, to support and enrich such pupil cooperation. De Miranda discusses how emerging technologies and virtual reality are tools for facilitating inquiry and supporting students in participating in their learning rather than allowing them to be passive receivers of information. He concludes by describing some of the difficulties faced by these learners and provides helpful tips for teachers for the effective use of Internet collaboration.

Marie Hoepfl concentrates in Chapter 19 on the importance of differentiation; she explains that it is not simply a set of strategies but that it embodies a philosophy of education that seeks to create meaningful educational experiences for all students that will have benefits beyond the classroom. After describing strategies to overcome the potential for differentiation to be labour intensive she touches on differentiation in technology education (referring to the case studies in Part 1) and for special needs students, classroom management and the role of assessment in differentiated instruction. The final chapter, ably written by Richard Kimbell continues on the theme of assessment where he clarifies the purpose of assessment and explains that a teacher must be certain that they understand the purpose of assessment by asking such questions as: what is being assessed, for whom, and why? He then describes the different types of assessment to be found in the teachers' accounts in Part 1 concluding that teachers need to be aware of the ubiquity of assessment in their educational practice and understand that assessment and learning are tightly interconnected complementary processes.

There are no final conclusions drawn by the editors at the end of the book although if one returns to the first chapter Mark de Vries does provide final remarks in a clear and eloquent manner as a conclusion to his chapter.

Editor's note

The editors…Marc De Vries (Eindhoven University of Technology), Rodney Custer (Illinois State University), John Dakers (University of Glasgow) and Gene Martin (Technical Foundation of America) were awarded The Silvius-Wolansky Award for the Outstanding Scholarly Publication in Technology Education for their work on this book. This Award is co-sponsored by the G. Harold Silvius Foundation and the Council on Technology Teacher Education (CTTE). The award is presented annually by the CTTE to an author (or co-authors) whose scholarship has enhanced the Technology Education profession. The award was presented in Salt Lake City in the USA.