

**Converging Technologies: the integration of manual design skills in  
Pattern Technology within a Virtual Learning Environment (VLE) for  
South African design students, with particular reference to swimwear.**

**by Beverley Sutherland**

Submitted in partial fulfillment of the requirements for the Degree of Master of Technology:  
Fashion  
in  
The Department of Fashion  
at the  
Durban Institute of Technology

Supervisors: Prof. G. D. J. Stewart  
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2004

APPROVAL FOR FINAL SUBMISSION

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01/04/2004  
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## **Declaration**

This research project represents original work by the author. Where use is made of the work of others it has been indicated in the text and acknowledged by means of complete references.

Signed by Beverley Sutherland this .....day of November 2004 at Durban,  
KwaZulu-Natal, South Africa.

## Acknowledgements

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed in this thesis and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

In addition I would like to thank the following people:

My supervisors Prof G. Stewart and Mr G. Vorster. Special thanks go to Graham Stewart for helping set up the computer systems and making the SOL CD-ROM work as well as it does: Frances Andrew, for her assistance with the Aldus Freehand® images. My students (2001-2003) who enthusiastically gave their responses in lectures and in the questionnaires especially, Jonathan Jobi and Robyn Mapp. Prof Lindy Stiebel for proofreading. Jessica Blignaut who modeled the trial garments. All the members of industry who made themselves available for interviews particularly, Jorge and Phillipe Nicolau, Karen Fitzpatrick, Ingrid Adams, Christine Tozer, Toni Blackbeard and Pam Laurent. My Colleagues at the DIT, particularly Farida Kadwa and the DIT Research Committee. Colleagues in the Eastern Cape: Cornel Tessendorf (Eastern Cape Technikon), Lorian McLaren (Border Technikon), Tyrone James and Gina Esterhuizen (Port Elizabeth Technikon). I would also like to thank the librarians at the DIT, Don Africana, University of Natal, and archivists at the V&A in London and the Local History Museum in Durban.

Finally, I would like to thank my husband, Ian, and my sons, Andrew and David, for all the support and encouragement that they gave me.

## **Abstract**

This investigation focuses on the research and development of a Virtual Learning Environment (VLE) on CD-ROM to prepare Fashion students for a digitally-based industry. The CD-ROM learning module covers all aspects of swimwear including a history, terminology, appropriate fabrics, block development and the pattern manipulation skills required for second year fashion degree students studying Pattern Technology at the Durban Institute of Technology (DIT). Original artefacts have been developed and tested to ensure that the prototype module in swimwear would provide an accurate and informative body of work on the subject.

The research explores the proliferation of computers and information technology (IT) in this hitherto traditionally classroom-based area of education, and the potential of IT to transform both education and industrial practice.

The module was first introduced to students in draft form during 2000. An action research model was used to test and evaluate the VLE until its final introduction to students via the DIT intranet and on the Internet. After an analysis of student responses gleaned from questionnaires, adjustments were made before the completion of the final prototype.

This research project argues for the many advantages of online learning, and finds support for this view in the inclusion of computerisation in almost every aspect of the fashion industry. Over the past twenty years, pattern technology, crafted by the human hand, has been replaced by the inexorable development of computer aided design (CAD) and computer aided manufacturing (CAM). However, while computerisation of pattern design proceeded in industry, the practice of teaching pattern technology in technikons remained a largely manual, classroom-based activity. This thesis considers the nature of design in order to explore the distinction between art, design, and craft. It then goes on to consider the implications of integrating manual and computer-based design skills in pattern technology.

## **Contents**

Declaration	i
Acknowledgements	ii
Abstract	iii
Contents	iv
List of Figures	v
List of Tables	vi
Chapter 1     The Introduction	1 – 14
Chapter 2     Art, craft design and technology	15 – 27
Chapter 3     The Fashion Industry	28 – 41
Chapter 4     Going digital	42 – 53
Chapter 5     Developing “Swimwear on Line” - SOL	54 – 84
Conclusion	85 – 89
References	90 – 96

## **Appendices**

Appendix A: SOL CD-ROM

Appendix B: Selection of blocks developed for the SOL CD-ROM Module

Appendix C: Student questionnaire (hand-based module).

Appendix D: Student questionnaire (SOL CD-ROM module).

Appendix E: Survey of Technikons IT usage.

Appendix F: Survey of Industry IT usage.

## List of Figures

- Front-piece from Lencek, L. and Bosker, G.1990. *Making Waves (Swimsuits and the Undressing of America)*, New York: Cronical Books.
- Figure 1.1. DIT second year students 2003- using SOL CD-ROM: Sutherland, B. 2003.
- Figure 1.2. Detail of block development, draft instructions and basic block: Sutherland, B. 2003.
- Figure 1.3. Homepage for SOL CD-ROM: Sutherland, B. 2003.
- Figure 2.1. Student work – E. Engelbrecht. “Smirnoff International Fashion Awards”.
- Figure 2.2. Fashion Show Poster, 1995.
- Figure 2.3. from Béné m, L.1997. *Issey Miyake*, New York: Rizzoli Publications.
- Figure 2.4. from Powell, I. 1995. *Ndebele – A People and their Art*, Cape Town: Struik Publishers.
- Figure 2.5. from Krell, G. 1997. *Vivienne Westwood*, New York: Rizzoli Publications.
- Figure 2.6. from Bressler, K., Newman, K. and Proctor, G. 1997 *A Century of Lingerie*, London: Chartwell Books Inc.
- Figure 2.7. from Martin, R. and Koda, H. 1990 *Splash: A History of Swimwear*, New York: Rizzoli Publications.
- Figure 2.8. from Demornex, J. 1991. *Vionnet*, London: Thames and Hudson Ltd.
- Figure 3.1. from <http://www.clofed.co.za/stats.htm>
- Figure 3.2. from <http://www.clofed.co.za/stats.htm>
- Figure 3.3. from <http://www.clofed.co.za/stats.htm>
- Figure 3.4. from Aldrich, W. ed. 1992. *CAD in Clothing and Textiles*, London: BSP Professional Books.
- Figure 4.1. Sutherland, B. 2003. Research project illustration.
- Figure 5.1 Sutherland, B. 2003. Basic leotard block.

- Figure 5.2 Sutherland, B. 2003. Adapted leotard block.
- Figure 5.3 Sutherland, B. 1991. North Beach, Durban.
- Figure 5.4 Sutherland, B. 1991. South Beach, Durban.
- Figure 5.5 Sutherland, B. 2003. Detail from size chart.
- Figure 5.6 Sutherland, B. 2002. Positioning of body measurements.
- Figure 5.7 from Haggard, A. 1990. *Pattern Cutting for Lingerie, Beachwear and Leisurewear*, London: Blackwell Science Ltd.
- Figure 5.8 Sutherland, B. 2003. Digitised illustrations.
- Figure 5.9 from Aldrich, W. ed. 1992. *CAD in Clothing and Textiles*, London: BSP Professional Books.
- Figure 5.10 Sutherland, B. 2003. Vector based illustration.
- Figure 5.11 from *Diva*, 1997. Barcelona: Moda.
- Figure 5.12 Sutherland, B. 2003. Contents menu from SOL CD-ROM.
- Figure 5.13 Sutherland, B. 2003. Detail of history tableaux in SOL CD-ROM.

## List of Tables

- Table 1.1 Critical questions: Sutherland, B. 2003.
- Table 3.1 Sutherland, B. 2003. Results of survey of Industry IT usage
- Table 5.1 Action Research Cycle Table: Sutherland, B. 2003.
- Table 5.2 Sutherland, B. 2003. Results of IT usage survey at Technikons.
- Table 5.3 Sutherland, B. 2003. Analysis of questionnaire: Manual method.
- Table 5.4 Sutherland, B. 2003. Analysis of questionnaire: Computer-based method.

## Chapter 1 Introduction

The key concept informing this research was the integration of technologies that occurs when manual pattern technology methods meet with Computer Aided Design (CAD), both in education and in industry. A virtual learning environment (VLE) – the Swimwear On Line (SOL) module (see the attached CD-ROM, Appendix A) – was developed as a solution to the pedagogical challenges of teaching pattern technology skills integrated with computer technology.

Two distinct but interrelated technological transformations underpin this research. The first technological transformation is one that has profoundly affected the design industry itself. Over the past twenty years, pattern technology, crafted by the human hand, has been replaced by the inexorable development of CAD and computer aided manufacturing (CAM) in the manufacturing process. However, while the computerisation of pattern design in the workplace proceeded, the practice of teaching pattern technology in technikons remained a largely manual, classroom-based activity that relied on individual one-on-one skills transfer from an experienced lecturer to the learners in his/her charge.

Now, a second transformation, in the delivery of pattern technology training has begun. Computerised methods of teaching and learning and the delivery of teaching materials are now increasingly part of design education in general and pattern technology in particular. Driven partly by economic factors (e.g. the rising costs of residential academic institutions) and by the unique advantages that the flexible online delivery of learning materials can offer, the VLE is now a reality. The present research investigates the suitability and effectiveness of the VLE for the delivery of pattern technology training, and asks the questions “what may be lost?” and “what may be gained?” by the increasing use of computerisation in this traditionally classroom-based area of education.

Two strands of technology have followed a similar evolutionary development from manual to the computerised: pattern technology in industry, and pattern technology

teaching. It is the consequences for the future pattern of technology of these two converging technologies that are systematically investigated in this research project.

This project was conceived at a time of great change in South African Higher Education. Government legislation since the first democratic election in 1994 has resulted in a framework aimed at the transformation of Higher Education (HE) in South Africa. Consequently, this research project has been developed within a changing environment. Significantly, during this period the institution where this research project began - Technikon Natal (TN) merged with a “historically disadvantaged institution” (HDI) - the M.L. Sultan Technikon to form South Africa’s first Institute of Technology – the Durban Institute of Technology (DIT).<sup>i</sup>

Within this dynamic environment Universities and Technikons have been called upon to create greater access to larger numbers of students, many of whom have previously been denied entry to higher education due to either political, financial or educational constraints. Much larger classes in design placed a severe strain on the capacity of the staff to teach effectively. This is particularly true in the tertiary sector where the number of academics employed by the institutions was reduced while class numbers increased. Evidence of this trend is that in subjects such as Pattern Technology the ratio of lecturer to student increased from an average of 1:12 (at Technikon Natal in 1992) to 1:25 a decade later at the DIT.

In order to meet the challenges presented by these changes it was evident that both pedagogical and methodological changes needed to be made. To this end, pedagogical innovations such as team teaching and group learning were introduced in Pattern Technology courses at the DIT. In the meanwhile, sweeping technological changes were transforming both education and industrial practice with the proliferation of computers. Significant numbers of students with a good understanding in information technology, if not fully developed computer literacy, were entering higher education institutions.

As software applications were developed for design the role and practice of the designer in industry was also transformed. It could be argued that some design disciplines such as Graphic Design were “re-invented” by new approaches to image

making with the integration of software such as Photoshop®, Aldus Freehand® and Quark Express®. Not surprisingly, it was not long before Fashion Design and Illustration were influenced by the same developments. Hence computers were, initially, introduced into South African fashion design courses as an extension of drawing and illustration subjects as CAD. Computer training was thus added to existing courses, without transforming the traditional delivery of the courses themselves.

During the 1990s it was evident that in industry, the advent of portable computers meant that many designers were increasingly expected to make presentations to clients using appropriate software. A significant feature of this development was that both the designer and the client could interact in developing the ranges. This posed a particular challenge for educational institutions, as students were not only expected to graduate as skilled designers, but also with a proficiency in the use of the computer.

In industry, a parallel development took place on the factory floor as computers were introduced into the manufacturing process. Computer Aided Manufacturing (CAM) began to make an appearance particularly within the larger companies and by the turn of the millennium most large scale manufacturers in Durban such as South African Clothing Industries (SACI), Kingsgate, Playtex, and Celrose had fully computerised their marker making and grading operations.

These two forces – the larger number of students and the rapid digitisation of many important activities of the fashion industry invited this research to address the question of how the computer could also be used as an effective teaching tool in what had previously been a hand based subject Pattern Technology. Hence the critical questions posed were:

<p>1.1 Is there a role for hand-crafted skills in pattern technology?</p>	<p>Secondary data:</p> <p>See discussion in Chapter 3 pages 34, and 35.</p> <p>See discussion in Chapter 5 page 77 (findings tabulated).</p> <p>Primary data:</p> <p>See Appendix C: Questionnaire 1 (hand-based module).</p> <p>See Appendix E: Questionnaire 2 (Technikons IT usage).</p> <p>See Appendix F: Survey of Industry IT usage.</p>
<p>1.2 Does quality improve or decrease when manual-based pattern technology methods are replaced by computer-based methods?</p>	<p>See discussion in Chapter 3 pages 33, 34 and 35.</p> <p>See discussion in new Chapter 3, page 36 “Nicolau explains”:</p> <p>See discussion in Chapter 4, page 43 “CAD is only a tool”.</p> <p>See discussion in the Conclusion on pages 84 and 85. “To address the critical question about quality etc.”</p> <p>Primary data: interviews/ questionnaires:</p> <p>See Appendix E and F.</p>
<p>1.3 At what point in pattern technology does the computer take over from manual skill?</p>	<p>Secondary data:</p> <p>See discussion in new Chapter 3 pages 33, 34, 36 and 37.</p> <p>See discussion in Chapter 4, page 43.</p> <p>See discussion in the Conclusion, page 86.</p> <p>Primary data: interviews/questionnaires:</p> <p>See Appendix F (survey of Industry IT usage).</p>
<p>2.1 Does the VLE and online CD-ROM effectively teach pattern technology?</p>	<p>Secondary data:</p> <p>See discussion in Chapter 4, pages 42 - 43.</p> <p>See discussion in Chapter 5, pages 56 - 58.</p> <p>Primary data: Appendix D (results of evaluation 2).</p>

2.2 Does the VLE and online CD-ROM create student centred learning and enable flexible pace?	See discussion in Chapter 4, pages 49, 50, 51, 52 and 53.  See discussion in Chapter 5, pages 54, 55 and 56.
2.3 Does the VLE and online CD-ROM promote integrated use of the computer?	See discussion in Chapter 4, pages 43, 49, 50, 51 and 52.  See discussion in Chapter 5, pages 54, 59, 60, 64, 69, 70, 75, 76, and 79.
2.4 Does a VLE and online CD-ROM for pattern technology have additional effects of making learners Web-literate ?	See discussion in Chapter 5, page 56.  See discussion in Chapter 4, page 43.
3.1 Do potential students have the necessary PC's and Internet and CD-ROM link?	See discussion in Chapter 1 page 6, 7 and 8.  See discussion in Chapter 5 pages 54, 55, 56, and 57.  See discussion in Conclusion, pages 83 and 84.
3.2 Does the DIT have the necessary IT delivery infrastructure?	See discussion in Chapter 5, pages 75 and 76.  See discussion in Chapter 1, page 6.  See discussion in Conclusion, pages 83, 84 and 85.

**Table 1.1:** Critical questions posed and where they are addressed in the text.

### **Relevance of research**

Fashion design and clothing manufacture are global industries, of great importance to the region of KZN where the majority of South Africa's mass production manufacturers are based. Over the past five years it has become evident that in order to remain competitive, both nationally and globally, manufacturers have had to integrate computers into both the design and manufacturing aspects of their operations. As mentioned earlier, a consequence of these developments is that graduate designers are required to have well developed Information Technology (IT) skills that inform not only research and design, but also the pattern technology component of clothing manufacture. Thus an important focus of this research project is on the convergence of technology which is fundamental to transforming what, hitherto, has been a purely manual craft to one which incorporates a high-end computer assisted process.

As an answer to some of these challenges, this project was developed to meet the specific needs of DIT fashion design students. As such it is situated within the curriculum requirements of the current National Diploma and Bachelor of Technology (B.Tech.) in Fashion. Specifically, the module developed for the CD-ROM has been prepared for second year students at the DIT where the researcher teaches pattern cutting as a part of the Applied Clothing Technology subject. Ten years of experience in this capacity have sensitised this researcher to the difficulty that many students have in understanding the relationship between design and technology.

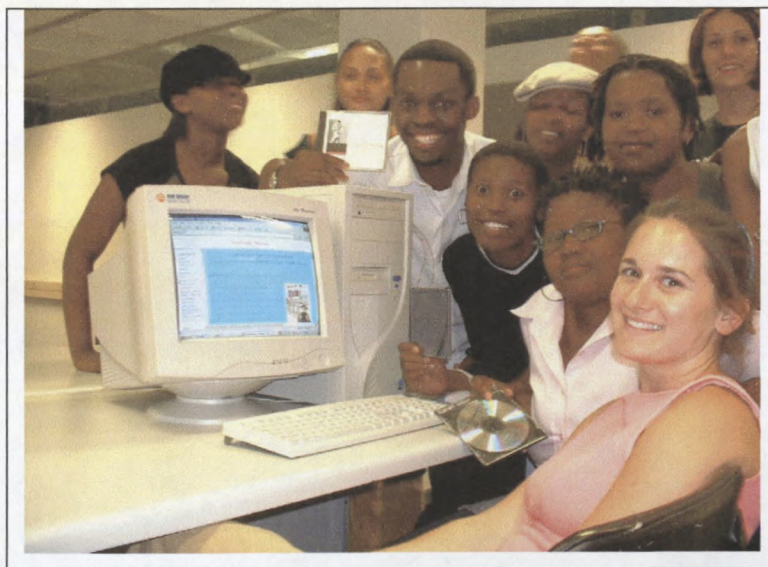
The swimwear module which has been developed as a CD-ROM called “Swimwear On Line” (SOL), and the findings of this research report are intended to make an original contribution to the development of a relevant online instructional module at the DIT, with the potential to be used by a wider range of students throughout South Africa via the intranet.

The paradox for South African design education is that institutions such as the DIT are required not only to meet the needs of a demanding industry, but also the demands of students who have been disadvantaged by lack of adequate educational opportunities at school. As mentioned earlier, all this occurs at a time of staff rationalisation and a dramatic increase in student numbers. However, the survey of literature reveals that these challenges are not necessarily unique to South Africa and that, internationally, an appropriate response to the explosion of information and the issue of larger numbers of students with diverse educational needs may lie in the development of VLE s which allow for connectivity via the Internet (Palloff and Pratt 1999: 3).

Implicit in much of the literature reviewed (Laurillard 1993, Palloff and Pratt 1999, Tiffin and Rajasingham 1995, Van Dusen 1997) is the belief that one of the most appropriate methods of educating and preparing large groups of students for industries transformed by digital technologies is to teach students within an augmented digital environment (Van Dusen 1997: 30). Within the broader design context this is already true of disciplines such as architecture and interior design, photography, multi-media and graphic design and is increasingly relevant to fashion design which, by its very

nature is an information dependent industry. Understanding niche market needs and ever-changing fashion trends which inform contemporary “just in time” modes of manufacture requires continual access to the latest information. As a result, the ability to glean and to understand information from the Internet is fundamental in the education of the designer.

According to Palloff and Pratt, the relationship of the learner to the computer is crucial because it must eventually facilitate rather than obstruct the learning (1999: 63). In the case of Pattern Technology, it is important for the student to feel comfortable with the convergence of technologies, which enables the access of information on a screen. This is obviously of great relevance in facilitating the learning process within a new paradigm. Hence, the way the course material for the module is developed is important. If too complex, it can lead to frustration for the user and the learning process. The module should be visually appealing, especially to design students, easy to navigate with clear user-friendly instructions. Computer-based learning also has the potential to extend the use of the technology to enable learning at a distance. An added benefit is the capacity of providing a course in Pattern Technology which is structured in such a way that it can exploit the benefits of the hyperlinks that the Internet provides. This is invaluable to Fashion students who require continuous updating of material.



**Figure 1.1:** Second year students 2003 – using the SOL CD-ROM

## Research Methodology

Initially this research project began with an overview of the integration of computer technology in both HE institutions and industry in the KZN region. Later this investigation was expanded to include other institutions in South Africa with a particular emphasis upon the Eastern Cape (EC)(Table 5.1). The EC was chosen because of its close geographic proximity to KZN and similarities in the mix of the HE institutions offering the National Diploma and B.Tech qualifications in Fashion Design. To this end, questionnaires were prepared and interviews conducted with educationists<sup>ii</sup> (Appendix E) designers and factory managers (Appendix F) in both the KZN and EC regions. <sup>iii</sup>

An action research model, in which a new approach was tested in practice, and then evaluated, was used. The module was first introduced in a draft form to a class of twenty-two students at Technikon Natal during the third term 2000. (See Table 5.1, page 55). During April 2002, after the merger of the two Technikons in Durban, the improved module was introduced to over thirty students in the newly formed DIT. Once again after an analysis of the student questionnaires, final adjustments were made before work began on the digital module, which has subsequently become the final prototype. The initial prototype was developed between the months August and November 2002 using appropriate graphic, imaging and website software.<sup>iv</sup> After input from student-users, refinements were made throughout 2003 before being presented in this document.

To test the accessibility of the SOL Module as a potential distance-learning tool, the module was published on the World Wide Web on the 21<sup>st</sup> November 2002 at <http://www.nymphs.mlsultan.ac.za/bev/index.htm> and after refinement it was launched in the South African Literature site (SALIT) at the DIT: <http://salit.dit.ac.za/bev/index.htm> during August 2003. This posting of the module on the Internet gave the researcher a test-bed for identifying changes that needed to be made both to layout and content, which was carried out before a final CD-ROM version was prepared at the end of January 2003. It was this CD-ROM version that

was placed on the DIT intranet for easy accessibility by second year students at the Brickfield Road Campus.

### **The Virtual Learning Environment (VLE)**

Current theory and practice in the area of VLEs were identified through the analysis and interpretation of secondary sources. The purpose of developing an online course in Fashion at the second level was to provide a module which would encourage students to learn in their own time and at their own pace, once they had acquired the basics of computer-based learning at first year level. This module was also intended to provide students with supplementary learning opportunities and the ability to recapitulate work at any later stage, thereby allowing flexible learning opportunities.

A qualitative research methodology has been used in this research project. The pedagogical design of the module and the implementation of this module required structured design methods developed and refined through a series of user evaluations. Using an action research cycle of designing, finding solutions, planning, implementing, evaluating and re-evaluating proved to be the most appropriate choice because it is innovative: an important objective when generating new knowledge.

### **Pattern Cutting**

In this research project, the term “pattern cutting” is used in the knowledge that at the DIT the subject forms part of the Applied Clothing Technology module. By its very nature, pattern cutting involves a creative interpretation of the original design and, to this end, all the pattern blocks and style variations included in the module, were interpreted and developed by the researcher from a variety of primary and secondary sources<sup>v</sup> (See Figure 1.2 and SOL Module - Appendix A).

### **Blocks**

A drafted block is represented with vertical and horizontal lines of certain lengths. These vertical and horizontal lines are connected in some areas with curved or angled lines – these lines and curves relate to the three dimensional human figure. An important aspect in understanding the figure as it is interpreted in a flat draft is to

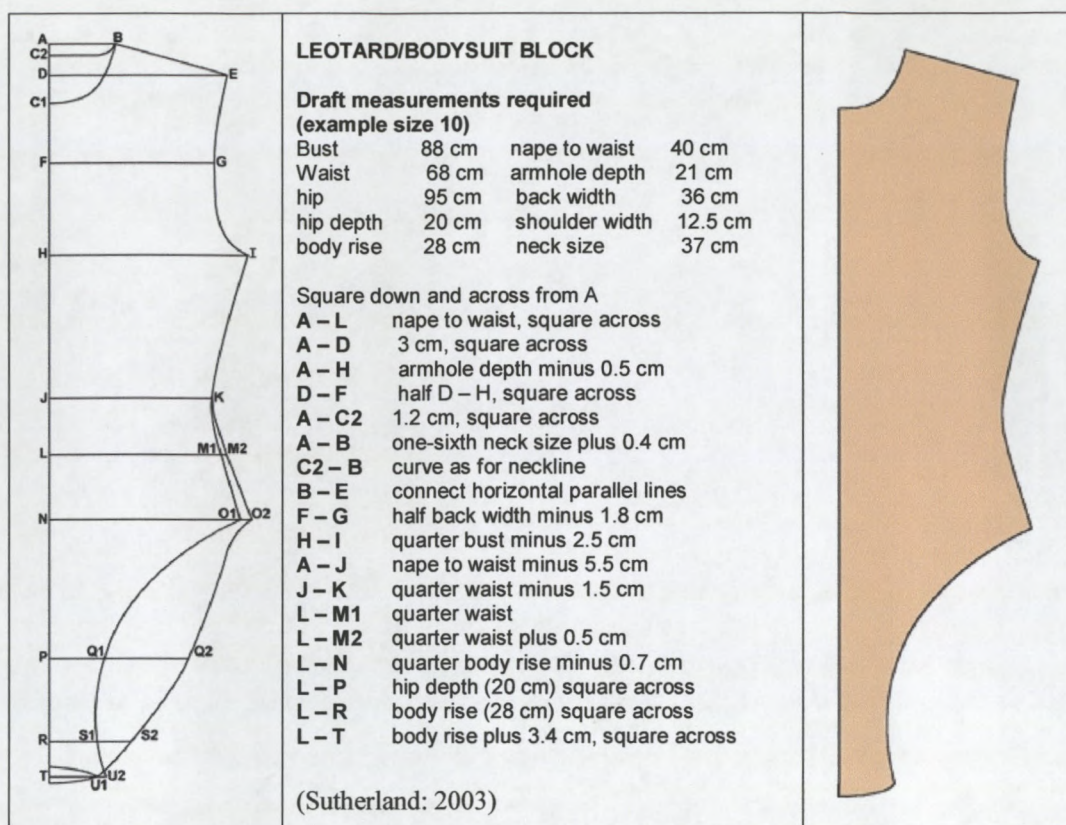
understand what certain lines represent. This will help the student visualise the body while working a draft or style. The blocks and drafts need to be clearly understood and mastered for satisfactory styling to be implemented from these blocks. The skill or craft of styling a design will follow as the student's experience in this field develops.

In order to ensure good fit, correct shape and good interpretation of a design, the mock up or trial garment needs to be assessed on the figure form or human model as the trial garment will reveal any faults or confirm good styling. Flat drafting and styling done in conjunction with trial garments will help develop an eye for line and shape and relating the knowledge to flat patterns.

For pattern-cutting students to make sense of the module it was necessary to include information about blocks and fabrics used for bras, swimwear and stretch patterns, also terms and definitions pertaining to this subject needed explaining. Original blocks and instructions for block drafts have been developed by the researcher. (See Appendix B). An initial outline for a flat pattern was created using body dimensions and standard size charts from various reliable pattern-cutting texts. (Haggar (1990), Aldrich (1996) and Defty (1988)). Based on the structure used for block development in most pattern-cutting texts, the researcher had to establish a new structure, which would be clear for both computer-based learning and manual-based learning. It is important to keep the instructions as clear and succinct as possible in order to achieve this end.

### **Patterns as artefact**

It is important to note that all pattern blocks and instructions for block drafts for the module have been developed by the researcher from scratch. As such, they are original artifacts which were developed by a mode of action research. Hence refinement and alterations were made over a period of time after numerous fittings on mannequins and human models and after comments and criticisms of colleagues and students had been considered.<sup>vi</sup>



**Figure 1.2:** Showing some detail of block development, draft instructions and completed basic block

All the patterns were cut on card to be fitted on a standard size 10/34 figure form which is the standard size used in industry. Preliminary prototype garments were manufactured in an appropriate substitute fabric if the original could not be sourced. Once perfected, each garment was manufactured by the researcher using fabrics that reflected either the historical period or style. Fabrics and trims were sourced both in London and throughout South Africa. Once manufactured, each garment was photographed with either a single lens reflex camera or on digital format using FinePix® digital camera 2600 Zoom. <sup>vii</sup>

The illustrated drafts used in the module for the stretch blocks were created using standard body dimensions and size charts from the various reliable texts on pattern cutting referred to above. For the purpose of the digital module a new structure for the illustrated drafts and accompanying instructions was decided upon which would be clear for both computer and hand-based learning. The pattern blocks were interpreted in appropriate stretch fabrics in order to check the fit of the trial garments on the figure form or human model.

Basic blocks are developed for use in Pattern Cutting and serve as templates from which styling follows. As mentioned earlier, the module includes all basic blocks relevant for styling swimwear, underwear, and active-wear, most of which require stretch fabrics. All instructions and illustrations of blocks and styles developed have been tested using second year students as a test group, and feedback from the students taken note of and acted upon. The module programme was conducted over a period of six days, followed by a questionnaire. The questionnaires were developed to investigate how the modules were received by the students with a choice of three or four possible and relevant options (Appendix C). The choices the students made were of particular importance to the researcher in being able to interpret the results and use the information to develop and perfect the work for the final product (Appendix A).

### **The module and the SOL CD-ROM**



**Figure 1.3:** Homepage for SOL CD-ROM

The module and the SOL CD-ROM are also original work, and as such must be considered as artefact in their own right. The module structure includes a brief history of swimwear, the bra and pattern cutting and is intended to function as a digital instructional programme. The historical background (swimwear) in the module is drawn primarily from the researcher's National Higher Diploma report, "A Bigger Splash – a report on beach related sportswear in Durban" completed at Technikon Natal in 1991.

The rest of the thesis is arranged as follows:

Chapter 2 provides a discussion about the nature of design in order to explore the distinction between art and design, and human hand and eye versus machine-crafted production.

Chapter 3 traces the inclusion of computerisation in almost every aspect of the fashion industry, and the implications this has for the types of skill required by industry today, and especially for those training to enter it.

Chapter 4 argues for the employment of virtual teaching and learning methods and for the training of fashion design students, and stresses the many advantages of online learning.

Chapter 5 describes the full action research process used to develop the swimwear on line VLE, including an account of the content creation and analysis of user evaluations.

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<sup>i</sup> The Durban Institute of Technology (DIT) was formed during the course of this project when the M.L. Sultan Technikon and Technikon Natal were merged on the 1<sup>st</sup> April, 2002.

<sup>ii</sup> The questionnaires were sent to all the Technikons on the Eastern Seaboard that offer the National Diploma and B. Tech degree in Fashion Design. In KwaZulu-Natal these included the ML Sultan Technikon (MLST) and Technikon Natal (TN). In the Eastern Cape: Border Technikon (BT), Eastern Cape Technikon (ECT), and Port Elizabeth Technikon (PET). Interviews were held with lecturers teaching both manual-based skills and computer-based skills from all of the above institutions in all the relevant subjects. These included P. Kethro, and A. Parkes (TN), F. Kadwa and F. Patel (MLST), L. McLaren (BT), C. Tessendorf (ECT), T. James (PET).

<sup>iii</sup> Interviews were conducted with the following designers/factory managers and owners: Ms I. Adams (Ingrid Adams Inc), Ms C. Tozer (SACI), Ms T. Blackbeard (Alley Cat Clothing), Ms K. Fitzpatrick (Paytex), Mr J. Nicolau and Mr F. Nicolau (Paris Paris), Ms P. Laurent (Lectra Systems).

<sup>iv</sup> Software used in this project included: Microsoft® FrontPage® 2000 Version: 4.0.2.3821, Adobe® Photoshop® 6, Macromedia® Aldus Freehand™ 10, Microsoft® PhotoDraw™ Version 2.0.0.1129,

<sup>v</sup> For the historical aspect of this project many of the primary sources were garments housed at the Victoria and Albert Museum (V&A) in London and the Old House Museum in Durban, or items of swimwear bought at a variety of second hand shops and flea markets both in the United Kingdom and South Africa. The historical aspect of the research was included in the researcher's National Higher Diploma report - "A Bigger Splash - a report on beach related sportswear in Durban", and has provided a foundation upon which this new project has been developed. Secondary sources are documented in the Bibliography.

<sup>vi</sup> Patterns were cut and then digitised on the Polygon system. Thereafter they were printed on A4 paper before scanning into Aldus Freehand. Unfortunately, this process was time consuming because of the current incompatibility of software.

<sup>vii</sup> All other images included in this text and on the CD-ROM were scanned on a Hewlett Packard ScanJet 6300 ADF.

## **Chapter 2 Art, craft, design and technology**

“Proficiency in his craft is essential to every artist” (Gropius in Bauhaus Manifesto 1919).

In the education of any designer, mastery of basic skills and craft provides the necessary foundation upon which students can build their careers. This is particularly important for students who find they do not wish to work within organised industry, preferring to develop ranges for boutiques or within their communities.

The importance of the handcrafted aspect of pattern cutting imposes a particular challenge for this research project that seeks to situate itself within a digital paradigm. While it is recognized that the fashion industry has rapidly switched to new technologies, the question needs to be addressed as to what is the correct balance between the new digital technology, the skilled hand and the inspired designer, as described by Gropius in his Bauhaus Manifesto of 1919 (cf. critical question number one and discussion in Chapter 2).

Words, terms and their definitions are important in any research project because the meanings given to them create modes of thinking that have an important influence upon how one perceives things. This is particularly true of the nouns – art, design and craft. The fact that the words – ‘craft’ and ‘design’ are also verbs complicates the issue even further. Hence, an artist can ‘craft’ or ‘design’ a work of art. Because the act of creating works of art, craft and design are interwoven, these words have become terms that cannot be divorced from their individual or collective histories.

The draft national curriculum for Design published by the South African Department of Education (DoE) defines design as follows: “Design is a creative process involving research, conceptualization, planning and critical reflection to produce services, environments and products that may be either hand-crafted or intended for mass production” (DoE 2003:1).

If one accepts design as primarily a process, one needs to concede that the term art is an extremely difficult one to define. This is particularly true of art in the African context. According to Vansina “art is a term of Western culture but a very inexact one and the threshold between what may be judged a work of visual art and another kind of man-made object is often a matter of dispute” (1984: 1). This is particularly true within the colonial paradigm where Western Art was perceived by the coloniser as superior to the ‘crafts’ of the colonised. Within this context the term ‘craft’ was often used to denigrate the material culture of the indigenous people. This debate is of particular importance in Africa because the notion of an African Art is relatively new and has only been recognized within a post-colonial paradigm. It is important to note, that during the transition to democracy in a post-apartheid South Africa, there was a plethora of publications that promoted a blurring of the boundaries between arts and crafts in South Africa. Increasingly, South African designers began to use ethnic motifs from ‘traditional’ crafts to signify the political and cultural change in the country.

In fashion design this meant that many South African fashion designers during the 1990s looked to local crafts for inspiration. Initially this tended to be superficial and ranges that featured textiles with geometric patterns and colours that were derived from beadwork or Ndebele or Zulu mural paintings dominated many fashion shows, particularly student shows which sought to associate themselves with what was then referred to as the ‘New South Africa’. In many cases, beadwork was used as accessories that often dominated the garment. What was the work of the designer or the craftsperson was uncertain territory.

Notwithstanding any of the above, the paradox is that in as much as a highly crafted artefact can be elevated to the status of a work of fine art, a highly crafted piece can also remain just that i.e. ‘craftwork’. This is particularly true of what is often referred to in South Africa as traditional crafts or folk art.



Figure 2.1: Student work – E. Engelbrecht, 1993  
 “Smirnoff International Fashion Awards”

Figure 2.2: Fashion show poster, 1995

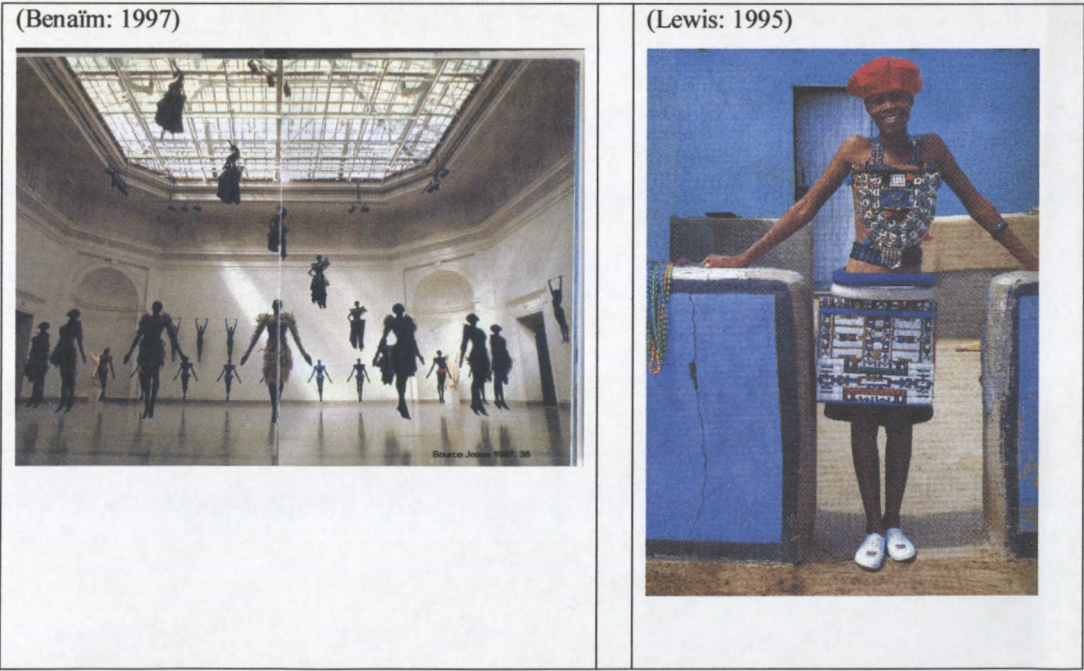


Figure 2.3: Fashion as fine art – Issey Miyake

Figure 2.4: Traditional craft as fashion

This begs the question what is the crucial element that enables craft to transcend itself and become more than merely a craft artefact. It could be argued that it is through the process of design that this transformation can take place. Design depends upon interpretation to distinguish itself from craft, and perhaps this is what Walter Gropius was referring to in the statement quoted at the beginning of the chapter. With the exhibition of the Bauhaus it was Gropius who laid the foundation for modern design education at the Bauhaus so many years ago. Caution also has to be exercised when using terms such as ‘traditional crafts’ because the word traditional denies the dynamic nature of material culture. What is innovative today may be considered a tradition tomorrow.

An important characteristic of craft is that it is a vehicle in which identity is embedded. Craft is deeply rooted in culture. Different cultures may use the same materials in their ‘craft’, but they create very specific identities and can also reveal aesthetic and symbolic values (Athavanker 1997: 1). A South African example is in the collection of beaded tobacco pouches at the Voortrekker Museum in Pietermaritzburg, made by Afrikaans women for their loved ones during the 19<sup>th</sup> Century. The patterns, colours and techniques are drawn from Europe and make these artifacts distinctly different from the beaded pieces made by their Zulu counterparts. It is curious to note that the exuberance and vitality in the colourful beadwork of the Zulu is in turn markedly different from the forms and patterns of the Xhosa people or the Ndebele (See Figure 2.4).

While it is out of the scope of this project to provide a historical narrative or analysis of the terms ‘art’, ‘craft’ and ‘design’ it recognises that a hierarchy has come to exist between them. It also recognises that for cultural and historical reasons the notion of a ‘fine’ art as superior to design and craft is still pervasive. For the sake of brevity this dissertation accepts the contention of art historian Josephson that “the design arts are essentially new forms of art created by the industrial revolution” (1996: 6). Because industrial manufacturing implies mass production and mass consumption, it was inevitable that new values would be placed upon individually crafted artefacts such as

works of art and that craft as a limited form of manufacture would inevitably be re-defined throughout the 19<sup>th</sup> and 20<sup>th</sup> Centuries.

Significantly, it was during this period that the Arts and Crafts movement developed to counter the decline in manufacturing standards due to machine made mass production processes.<sup>i</sup> The leader of the Arts and Crafts movement, William Morris, both as a practitioner and a theorist, tried to reconcile the needs of the newly urbanised mass population with production. No matter how well intentioned Morris and his colleagues were, they could not escape the contradiction that within a mass production paradigm an original work of art or hand-crafted artifact would be assigned greater value and be more expensive to produce than the mass-produced item. However, the lasting legacy of Morris and his movement is that the importance of craft is central to the process of production. Proof of this is that by the end of the 20<sup>th</sup> Century mass-produced products, such as luxury cars – BMW or Mercedes Benz – can be described as highly crafted artefacts. During the 20<sup>th</sup> century, this challenge was the driving force behind the establishment of the Bauhaus in 1919 by Walter Gropius who wrote in the founding manifesto that:

architects, sculptors, painters, we must all turn to the crafts. Art is not a 'profession' there is no essential difference between the artist and the craftsman. The artist is an exalted craftsman. In rare moments of inspiration, moments beyond the control of his will, the grace of heaven may cause his work to blossom into art. But proficiency in his craft is essential to every artist. Therein lies the source of creative imagination. Let us create a new guild of craftsmen, without class distinctions which raise an arrogant barrier between craftsman and artist. (1968:13)

Gropius alludes to the fact that “in rare moments of inspiration” the work of the ‘craftsman’ [sic] can ‘blossom into art’ (1968:13). In fashion this has become the distinguishing factor between *haute couture* garments, which may be handcrafted, rather than the mass-produced ranges available in high street shops.

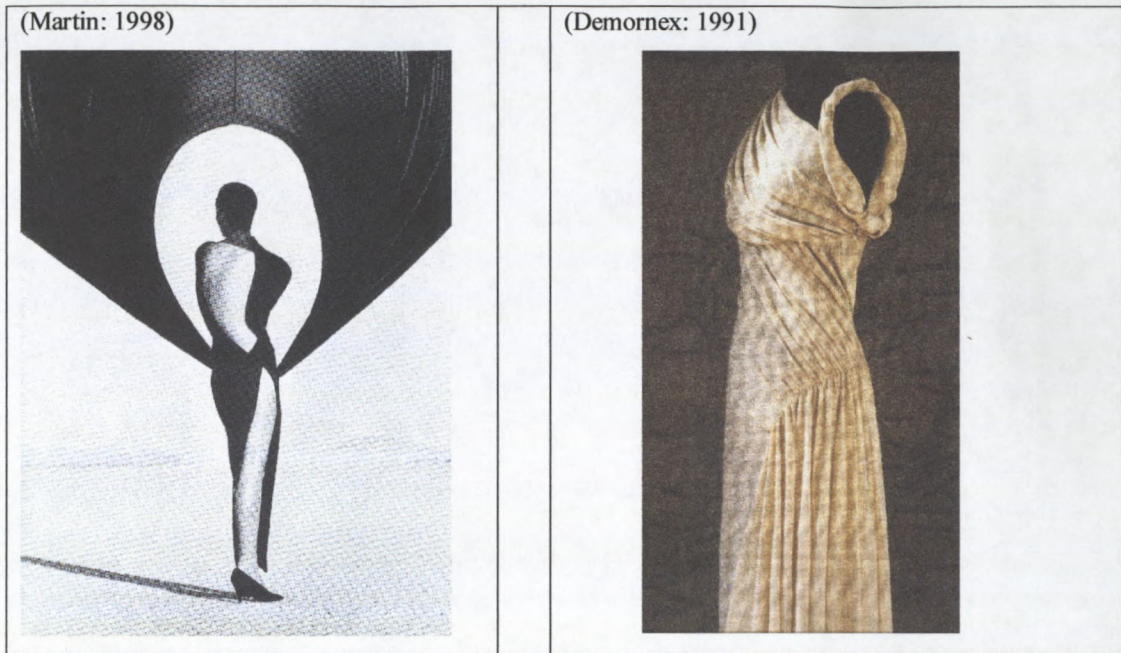


**Figure 2.5:** Haute couture

**Figure 2.6:** Mass-production

Museums such as the Victoria and Albert (V&A) in London celebrate this distinction and during 2002/3 the highlight event on their calendar was a collection of garments by Gianni Versace (b.1946 – 97), significantly entitled “The Art and Craft of Gianni Versace” (See Figure 2.7). Commentary that accompanied the exhibition emphasised his artistic and technical ability as well as high levels of ‘craftsmanship’ in his work.

Versace’s vividly coloured designs on show were expertly crafted and constructed with a meticulous eye for technical detail. To emphasize their relationship to fine art the fabrics and themes emphasized his passion for modern art and the theatre. For example, overt reference was made to Pop Art and words such as ‘artista’ and ‘arte’ were used as inscriptions on some fabrics. A visit to the museum during the course of this research project revealed that in the permanent collection display the contemporary beaded works of Jean-Paul Gaultier (b.1952) are juxtaposed with 1930s garments by Madeleine



**Figure 2.7:** Versace (1946 – 1997)

**Figure 2.8:** Vionnet (1876 – 1975)

Vionnet (1876 – 1975) to exemplify the importance of ‘structure and cut’ (V&A 2003). The fact that fashion can be elevated to the level of a ‘fine’ art via respect for craft is instructive and indicative of the importance of craftsmanship in design. The essence of art within the design of Giorgio Armani (b.1934) is that his ideas are rooted in an uncluttered minimalism, which is derived from modernism, exemplified in his finely cut tailoring. It is note-worthy that Armani’s work was exhibited as a ‘fine art’ statement at the Royal Academy in London during 2003. His ‘collection’ of exhibits included suits, coats and dresses which were mounted on “near-invisible armatures, [which] resembled a gathering of headless angels hovering in subtly lit clouds of pure colour on the incline of a catwalk” (Breward 2003: iii).<sup>ii</sup>

As an academic who for the past 15 years has taught craft-orientated subjects (pattern construction and garment construction), this researcher is aware of the need for fashion students to be encouraged to understand the link between the artistic inspiration in their

design and the importance of the craft of pattern and garment construction in making their ideas a reality.

## **Technology**

Notwithstanding the importance of the skilled hand, Peter Dormer cautions about misconceptions about the nature of craft when he points out that few things in the 20<sup>th</sup> Century can properly said to have been “made by hand” (1997: 137). Since the dawn of mankind people have used tools. The distinguishing factor between humans and animals is that we are capable of using tools to assist us in every aspect of our lives. Embroidery, the essence of a hand-craft, traditionally (hand) worked into designs on fabric has been used for centuries to decorate many items of womanswear. During the 20<sup>th</sup> Century this time-consuming craft, (previously done by hand) has been performed by machines. As mentioned earlier, practical considerations such as the costs of hand-crafted fashion items by the individual craftsperson has had an effect on the philosophical debate on craft. The fashion industry has embraced computer technology and as Dormer notes “modern technology has taken human skills away from the individual and redistributed these skills through machines, systems of production and systems of information”(1997: 137). He expands on how diverse and powerful technology is because it eludes the control of any one person – “the computer offers a means for mimicking the appearances of things we thought uniquely human, including the mark of the hand. This goes to the very heart of craft’s justification for itself in the twentieth century” (1997: 103). The rapid embrace of technology by industry in South Africa requires a critical reappraisal of what are the essential skills and crafts of aspirant designers.

Dormer aptly expresses that although technology as we know it is rooted in craft it is different from craft: “To claim that one possesses a craft is to claim that one has autonomy in a field of knowledge” (1997: 102 – 103). The technology can, in some ways, take over as it can do the job without having to understand how this is accomplished. This ‘loss of autonomy’ can be frustrating and at the same time empowering. Dormer

argues that craft is distinctive and technology is not, the aesthetic of technology is boring and predictable while craft has the potential to provide a variety and an unexpected diversity of form, texture and surprise: “Most contemporary technology has embedded within it knowledge that is not and cannot be ours to possess, but it does not follow necessarily that technology removes the need for personal know-how”<sup>iii</sup> (Dormer 1997: 140).

This is particularly important in fashion where mass produced ranges (often with the edge knocked off for costing reasons) can take on a monotony of sameness, which might otherwise have been lifted by the inclusion of well-crafted details. For pattern-cutting this becomes even more important in that when a design is interpreted for production much can be lost if the art and craft of pertinent nuances in cutting are left off. This in part explains why the works of the great designers are not just about fashion design and style, but characterized by that distinctive edge in superb cutting and craftsmanship. As mentioned earlier the ‘cut’ of the Armani jacket is what creates the excitement about his work as does the constructed elements of work by Alexander McQueen (b.1969), John Galiano (b.1952), and Vivienne Westwood (b.1941).

It is small wonder that, when computers were first introduced during the PC revolution during the 1980s, that there would be apprehension as to the potential role that the computer could play in the fashion industry. One has to accept that initially computers met with resistance from practitioners as well as educationists. However, with the spread of computers during the 1990s into every aspect of the lives of people living within the developed sectors of South Africa and abroad, the new generation of designers, academics and students has had no hesitation in accepting this technology. The delicate balance between the hand and the tool is not an easy one to resolve but in societies that need to progress one needs to be aware of the contradictions and exciting possibilities.

It is interesting and important to note as Forty does that:

For all its benefits, progress can be a painful and disturbing experience. Our reactions to it are often ambivalent: we want the improvements and comforts that progress provides, but when it forces upon us the loss of things we value, compels us to change our basic assumptions and makes us adjust to the new and unfamiliar, we are inclined to resist it. (1992: 11)

One example is the way in which 19<sup>th</sup> Century embroideries which characterized the arts and crafts movement soon gave way to practical and less time-consuming methods. Manufacturers such as Elna and Bernina pride themselves on the versatility of their sewing machines. This is particularly important in developing countries such as South Africa where often the design inspiration is imported, and the necessary technology and skills base to interpret these designs are prerequisites for any large, medium or small enterprise.

In *Objects of Desire – Design and Society since 1750*, Adrian Forty suggests that consumers and producers tend to have difficulties in comprehending new media outside the framework of existing technologies. He illustrates this point by looking at the design of a new communications medium during the 1920s: the wireless. He points out that when broadcasting began early radios were “crude assemblies of resistors, wires and valves” (1992:11). He maintains that in order to transform radios into desirable commodities, manufacturers felt that they needed to refer to the past, hence early radios were often housed in a wooden cabinet “which imitated a piece of antique furniture” (1992:11). Gesche (1999) expands on this point with an illustration of how early television sets during the 1950s were placed in cabinets that made them “radios that you could look at” (Gesche quoted in Joseph 2001: 227).

Similarly, it could be argued that the hardware design of the computer itself makes reference to two technologies of the past: the television (monitor) and the typewriter (keyboard). It is significant that the computer in the business environment was associated with notions of modernisation and the white or grey of modernism soon became the dominant colour. It was only during the 1990s that manufacturers such as Apple® began to transform notions of what computers could look like with the launch of the i-Mac.

In this context, early editions of software can be seen as having business filing systems as their reference point. However, with the rapid, imaginative development of software and exploitation of the capacity for individual computers to be connected to form a complex information retrieval environment, research projects such as “Swimwear On Line” are made possible. In doing so, the pedagogic possibilities are expanded in new and exciting ways.

In many fields of design the computer has transformed the actual process. This is particularly true when images can be scanned and created or transformed by specialist software and the computer is linked to the Internet. As Bruce Wands points out with reference to graphic design “e-design is very different from traditional design. Print is static; Internet is not” (Wands in Heller 2001: 21).

While this is particularly true of disciplines such as Graphic Design it is equally true, to a lesser or greater degree, of most of all the other design fields – architecture, interior and industrial design, textiles and fashion. As Wands goes on to say,

The speed and precision of the digital environment is a great aid to the designer. In the digital world, more time is spent designing and less time is spent on the production process. Changes in drawings and layouts are easier to make and take less time. It is now possible to show clients more variations of a design idea, and designer and client can sit down together at the computer to refine the design. (2001: 21)

My discussions with designers in South Africa (Nicolau 2003) indicate that this aspect of computers in design has already had considerable impact in South African firms that are highly computerised. Not only does the client have more say, but production lines can be informed of detail changes in an instant. All indications are that very soon the consumer will become a participant in the production process, although this presently does not apply in South Africa, many first world regions have launched prototypes of the Virtual Dressing Room (VDR), in which the consumer is invited to make design choices.

The development of the 3D body scanner<sup>iv</sup> enables individual consumers to have their specific body measurements taken in a manner that informs the garment production process. This process also enables the consumer to make choices about shape and styling, fabric suitability, colours and accessories. When home shopping from the privacy of one's own home becomes a widespread reality the design, manufacture and retailing aspects of the fashion industry will have to be redefined. It is not too difficult to conceive how the superfluity of different computer and software systems used in the clothing industry will soon converge to revolutionize the process from the consumer to the producer and the retailer. The large number of websites claiming to provide virtual dressing rooms (e.g: <http://www.eddiebauer.com> <http://eshop.msn.com/> <http://www2.victoriassecret.com/>) is an indication of where the future may lie.

The implications for fashion design and production could be far-reaching. Tony Walsh, who was responsible for the installation and management of one of the first CAD systems in the UK clothing industry, maintains that "albeit a very powerful tool (in the hands of an experienced clothing technician) [it is] still useless without the skills of the designer, the grader and the lay planner" (Aldrich 1992: 70).

Craftspeople can be defined generally as people engaged in a practical activity where they are seen to be in control of their work. They are in control by virtue of possessing personal know-how that allows them to be masters or mistresses of the available technology, irrespective of whether it is a mould, a hand tool, an electrically driven machine or a computer. As Dormer concludes "it is not craft as 'handcraft' that defines contemporary craftsmanship: it is craft as knowledge that empowers a maker to take charge of technology"(1997:103).

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<sup>i</sup> The Arts and Crafts movement developed in England as a protest against the character of mid-Victorian manufactured products and slowly evolved during the period 1850 – 1920 into an international campaign for design reform. One of the main leaders of the Arts and Crafts movement was William Morris who was

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both a philosopher and a practitioner. His designs were less important than his ideas, yet both have continued to inspire generations of followers. Morris was engrossed in every detail of the design and production process. This was in response to the shoddy workmanship, indiscriminate use of materials, inefficient forms and elaborate ornamentation that characterized most mid-Victorian manufactured products. Morris and others involved in the Arts and Crafts movement believed that by initiating a programme of reform, they would improve the quality of design and thus strengthen the character of the individual and of society as a whole. To achieve their goal, they strove to ensure that traditional methods of handcraftsmanship would survive, despite competition from machine production; to ameliorate the working conditions of artisans and craftsmen, and to encourage artistic collaboration among workers. Their intention was to improve the quality of life for everyone by restoring integrity to the objects common to daily living.

<sup>ii</sup> Fashion curator Fiona Anderson of the National Museums of Scotland has raised the concern that “prejudice, fear and suspicion still surround the status of fashion within many galleries. This sometimes takes the form of fashion being tolerated as a form of entertainment which will pull in the crowds, with no acknowledgement of the serious contribution it also makes to the educational role of the museum.” (Anderson in Breward 2003: iii)

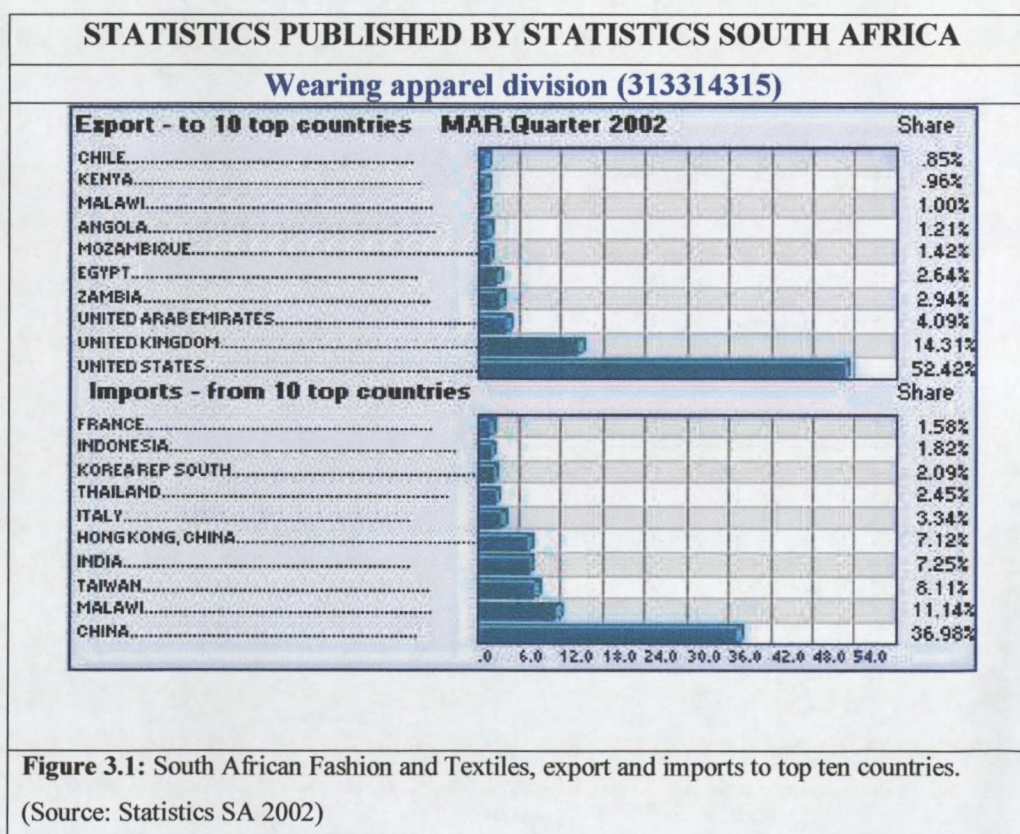
<sup>iii</sup> For example, a garment machinist, whether he or she is a professional or an amateur, may rely on a flat-bed machine and an electric press, but the technology is quite useless without the machinist’s personal know-how of how to sew garments and what different sorts of threads to use for different sorts of fabrics, or which heat setting requirements are needed for different types of yarn. They are in control by virtue of possessing personal know-how that allows them to be masters or mistresses of the available technology.

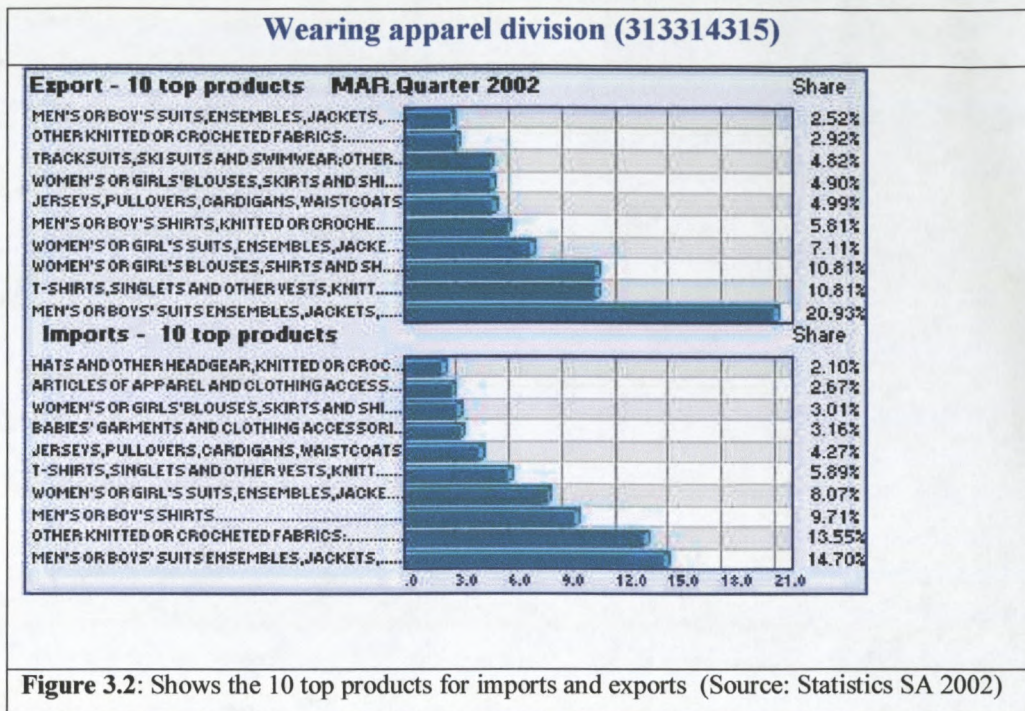
<sup>iv</sup> 3D body/fashion scanner can be situated in a scanning booth where a computer takes 300 000 measurements and creates an exact model of the body. The computer can manipulate the body to be seen from all angles and rotated, to provide a “virtual changing room”, and the statistics can be stored on a smart card for future use in other stores.

## Chapter 3 The Fashion Industry

There's more to the fashion industry than style. Technology has revolutionized the face of the fashion and textile industry, with developments like e-commerce, digital printing, machinery design and production automation weaving their way into the fabric of the industry, both locally and abroad. (Russouw 2001:10)

According to statistics published by the Clothing Federation of South Africa during 1999, the clothing industry is consistently in the top league of manufacturing industries in the country. Statistics published by Statistics South Africa for the same period reveal that the Clothing Manufacturing Industry was worth R10,995 million per annum (Statistics South Africa, 1999). An analysis of 2002 statistics, published by the DTI, indicates that the South African industry comprises approximately 70,000 employees countrywide, a third of whom are employed in KZN. Hence clothing manufacture is an important industry to the region as it is labour intensive. The fashion industry in general draws upon other related regional industries such as textiles and feeds into the national retail chain (See Figure 3.1).

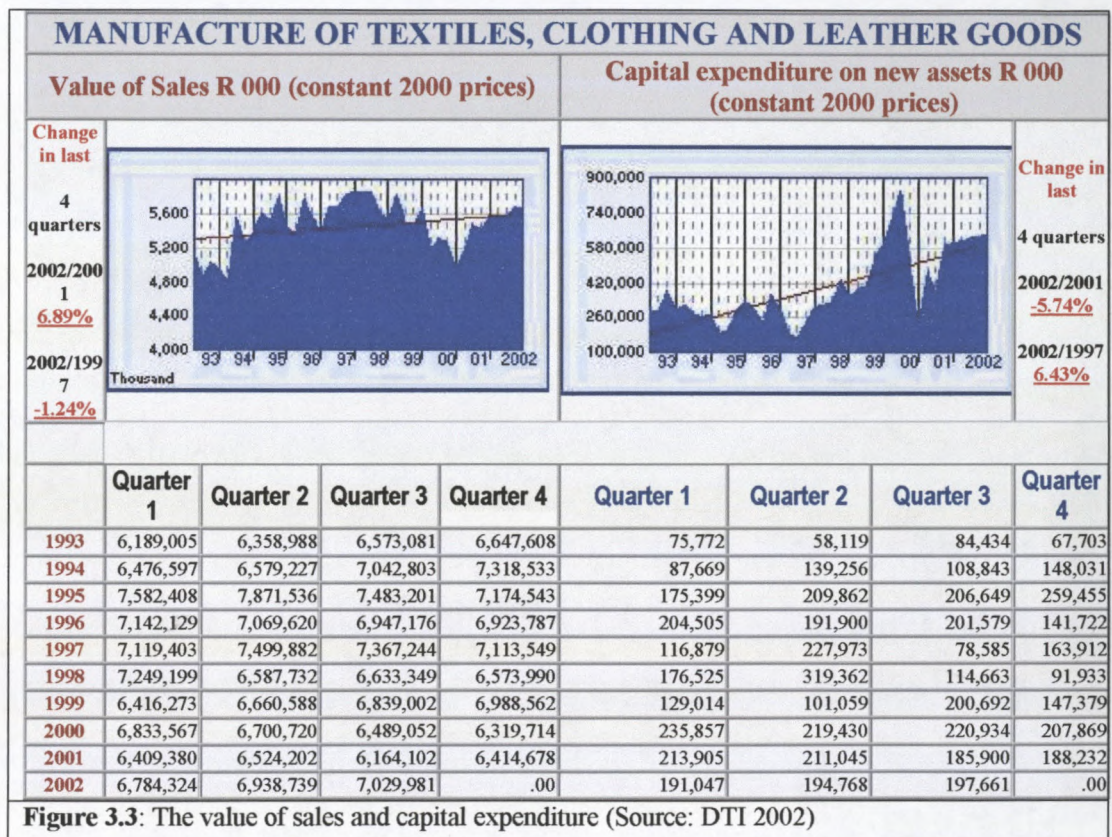




The 2002 figures reveal that in South Africa there are approximately 6,565 manufacturing companies of which, according to Phillippe Nicolau co-director of the Durban based manufacturer and retailer 'Paris Paris,' approximately two thirds can be described as Small or Medium Enterprises (SME's) (personal communiqué with Nicolau, 2002). An analysis of the 2003 statistics indicates that 1,324 manufacturing firms produce women's and misses' athletic clothing and sportswear, while 1,200 manufacturing firms produce men's and boy's sportswear and athletic clothing. This number includes large Durban-based manufacturing companies such as Playtex and South African Clothing Industries, and SMEs such as Paris Paris and small design studios such as the Durban Designer Emporium. Each of these manufacturers produces products for both local and export markets.

The above findings support the Department of Trade and Industry (DTI) observation that exports have been rising since 1994 and in 2002 export clothing earned more revenue than that spent on imported items (See Figure 3.1 and 3.2). Of particular significance to this research project is the fact that, of the top 10 export products, Tracksuits, Ski Suits and Swimwear are the seventh largest export product earners for the South African clothing industry (DTI 2002). In order to retain this position and

improve the capacity for swimwear to earn valuable foreign exchange, manufacturers need to ensure that they are able to maintain their global competitive edge and maintain their capacity to meet international standards. This emphasizes the need for Fashion Design education to conform to global standards by keeping abreast of the latest developments in technology. Figure 3.3 indicates that capital expenditure on new assets within the textiles, clothing and leather industry has more than doubled over the last decade whereas the value of sales has remained constant.



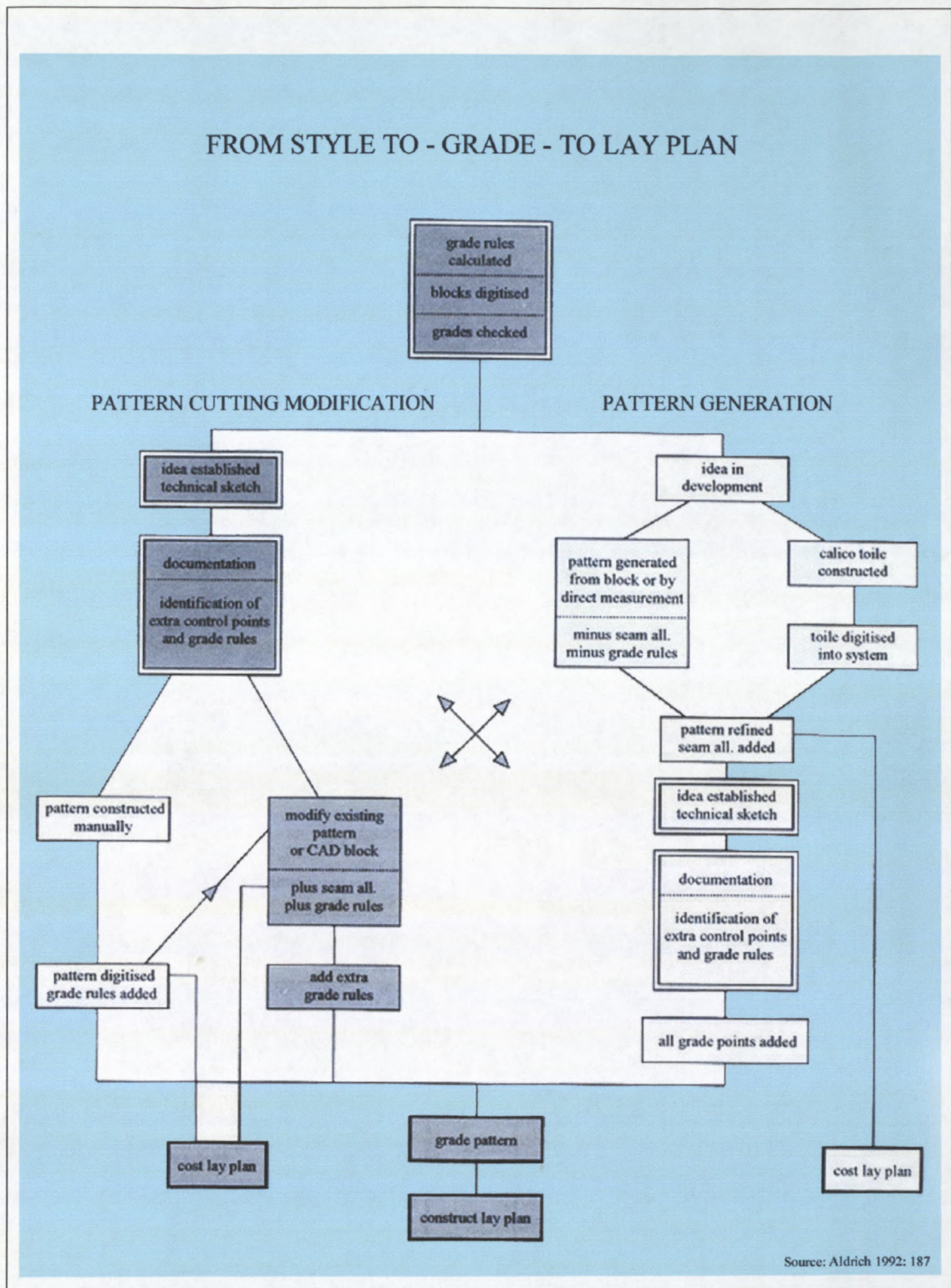
### Process: design and production

To test the assumption that computer technology is firmly established in the South African fashion industry, Durban based manufacturers were surveyed. The researcher conducted several interviews with designers, directors, pattern makers, production managers, sample cutters, machinists and graders. The researcher's years of experience in the fashion industry, together with a study of recent literature on the subject of computerization, informed the view that manufacturers face an ever-

increasing pressure to adopt some degree of computerization especially in the larger companies. In order fully to appreciate the nature of this integration, it is instructive to clarify the fashion product process and the role that computers play in the industry.

Briefly explained, it is the responsibility of the designer to produce the ideas and to translate them and their designs into working 2D sketches accompanied by fabric swatches. These designs need to be interpreted by a pattern maker, who assesses the proportions and balance of the design and the fabric handle to develop the first set of patterns. According to Taylor, 'the pattern is the hub, around which everything else rotates' (1990: 6). The ability to take a sketch and construct the pattern, which when cut out in cloth and made up will accurately represent the style in proportion, silhouette and size, requires long training in many areas. Taylor maintains that a better title for the pattern cutter would be 'pattern designer' or 'pattern engineer' (Taylor 1990: 8). Flat pattern cutting is widely used because of its sizing accuracy and the speed with which complicated designs can be constructed. Basic garment patterns, derived from statistical measurements are adapted 'on the flat' in line with the original design using measurements from a size chart and heuristic knowledge.

The designer needs to have extensive knowledge in all aspects of production (See Figure 3.4). An added benefit for the designer is to be able to produce patterns in order to anticipate production processes and design styles that are capable of being mass-produced for a given market and price bracket. Often choosing fabrics and trims is left up to the designer. Current fabric ranges are shown by textile representatives to designers. Sample lengths are ordered for the construction of the prototype for the new range. It is the responsibility of a designer to coordinate a range by keeping in touch with the buyers, the directors, production managers and the various representatives. Other tasks include the supervision of designs, sketches and patterns as well as attending shows, travelling abroad and buying fabrics and trims, always being aware of the cost.



**Figure 3.4:** Shows the route from pattern styling through to lay-planning both for manual pattern construction and pattern modification using CAD. (Source: Aldrich 1992: 187)

## **Computer technology and the clothing industry**

According to Taylor, the origins of computer-aided design (CAD) were developed by Howard Hughes at the Hughes Research Company in 1960 when he initiated a development program involving computer-driven devices relating to two-dimensional applications: 'this means any drawing or cutting processes carried out on flat surfaces' (1990: 23). During the same year, the Hughes Research Company publicly demonstrated a working laser and eight years later, in 1968, Hughes, working with Genesco, successfully developed a computer-controlled machine using a laser beam to cut cloth at speeds and accuracies far in excess of conventional means (1990: 23).<sup>i</sup>

Taylor goes on to state 'it became apparent that this technology would lend itself to the manufacture of clothing and with the help of Autographics, a company with generations of garment-manufacturing experience, Hughes designed a system that would streamline the two difficult processes called 'grading' and 'lay planning' ' (1990: 23). This system was in effect the first CAM system available to the manufacturer of clothing. Eventually Hughes' company was bought out by Gerber, a US company which had already specialized in the development of computerized bulk cloth-cutting machines, and had devised a system on which they had patents and copyrights. According to Taylor the Hughes system, which was CAD/CAM up to the 'lay planning' stage was developed by Gerber for bulk cutting. Initially using a mainframe Hewlett Packard computer, Gerber eventually adapted their system to IBM-based machines which was 'cheaper and [lent] itself to a fuller integration with other devices and software' (1990: 23). (See Table 1.3, page 40).

The early versions of these systems were very costly so not many were sold between 1968 and 1978. However, two other companies emerged at around the same time: they were the Camsco Company in the USA and Lectra Systems, a French company which began development in 1975 and marketed their first system in 1978.<sup>ii</sup>

## **Pattern Generating Systems (PGS)**

Drafting patterns on a computer is known as Pattern Generating Systems (PGS). However, most companies using PGS use the system for pattern adjustments or the development of basic blocks, or basic styles. An example would be new pocket positions, or new seam positions to generate a modified style from the same block. This system is of great value for standard and basic design. However, a weakness of current systems is that the pattern development for more original and intricate cuts, where innovative drape or complex style lines are used, favours the manual method of producing a pattern. The reconciliation of mass production and hand-crafted patterns is an important issue that was raised in Chapter Two.

However, contemporary practice is that exclusive styling is retained for niche markets where bulk cutting is not as important and is priced accordingly. Hence, the education of designers needs to prepare students to function within both paradigms. While computer systems can be used in various ways to speed up the process of pattern development as Karen Fitzpatrick, a director and designer of Playtex, puts it ‘computers may have changed the scenario but not the end-product’ (personal communiqué with Fitzpatrick, 2002). Fitzpatrick emphasized the importance of manual pattern cutting, a practice still carried out for the prototype sample at Playtex, especially for more complex design and in particular bra design.

Chase maintains that technology has paved the way for the ever changing, highly accelerated fashion world to offer products more quickly, less expensively, and in greater abundance than ever before. She points out that consumers have demanded it, retailers have prodded manufacturers, and technology has offered the means by which every fashion supplier’s goal of ‘better product at a better price’ can be realized (1997: xi). Locally this view is confirmed by Pamela Laurent, the representative of Lectra Systems, who maintains that large companies in South Africa use the system primarily, to ‘increase turn over at a much lower base cost’ (personal communiqué with Laurent, 2003). (See Table 1.3, page 40).

However – crucially – Chase is of the view that the human hand and eye still plays an important role in the contemporary design and manufacture process. She explains that although computers serve as tools for designers, merchandisers, patternmakers and graders, current technology has not replaced the skills required to engineer a prototype pattern, or replaced the experience it takes to check a nest of graded patterns for accuracy. On the artistic level Chase goes further and maintains that ‘computers will never be assumed to have the colour sense or the eye for proportion and detail that a designer feels intuitively’ (1997: 4).

However, education still needs to prepare for change. Despite the importance still placed on the human hand and eye, common practice in the local and global industry today is clearly set on a path of technology that will enable a seamless process between design, manufacture and retail. Chase concedes this point when she notes that ‘the idea of interconnectivity, which links information from computer to computer all over the world, is becoming a reality both in terms of design and manufacture of the product and in terms of merchandising and marketing that product’ (1997: 4). Both nationally and internationally many pre-production processes have already been simplified or eliminated by the use of computers. It has happened with dramatic effect in the textile industry where digital printing has already redefined design and the production process.<sup>iii</sup>

### **Contemporary practice in South Africa**

The fashion industry uses two basic computer systems, one for design and one for pattern making. Usually these two functions are divorced from each other with one system being used for pattern manipulation and another for design. To perform both functions separate systems must be purchased because few companies have integrated their pattern making and design packages.

An interview with Jorge Nicolau, the owner and Director of the Durban based company Paris Paris, revealed that with the introduction of Lectra Prostyle system in 1995 ‘Paris Paris changed forever’ (personal communiqué with Nicolau, 2002). He

pointed out that this totally integrated system impacted on the design processes, as no manual skills were needed for the designs, technical drawings, or show boards, and that product development cycles were shortened dramatically through the use of CAD/CAM for the patterns, grading and marker making. He also pointed out that electronic data information systems (EDI) made tracking and stocking of merchandise at the retail level much easier than they were before. (See Table 1.3, page 40).

Nicolau expressed how helpful it was to their business to have exact records of a particular customer's buying patterns that could be analyzed to provide personalized marketing strategies that led to enhanced sales. In a separate interview, Philippe Nicolau, co-director of Paris Paris, expanded on the benefits of having an integrated computer system. He pointed out how he had created libraries from scratch, using Lectra Prostyle to facilitate easy access to different figure-forms, blocks, textiles, colour-ways, styles, and patterns (personal communiqué with Nicolau 2003).

The Lectra system provides styles with drape, shading and textural effects, folds, tucks and creases can be shown quickly and efficiently. Technical drawings can be quickly adapted for style variation and minor style changes made. The same can be done for the pattern making where drawing from existing libraries, style/pattern changes are done with ease. Once the pattern is complete, the grading is automatic. No digitizing of each pattern is required. Nicolau explained how the layout and marker-making follow this process and the marker printed, and within a short period, the style is ready for the cutting room.

Nicolau explains that prior to relying on computers in the industry:

We hand painted our fabric designs and any additional colourways. Now with the computer, combined with our artistic talents, we have incredible ability to create prints, wovens, knits, repeats and colourways with amazing efficiency. We can now also send the prints directly to our fabric suppliers, via e-mail or on CD-ROM. The system gives us great versatility and reduces turnaround times. In merchandising, we concentrate on how our prints visually coordinate with other prints. We also utilize the merchandising tools on the computer for texture mapping in order to make a stronger visual statement and to sell our ideas to the

buyers. The buyers are able to build their lines without the time and expense associated with producing real samples. (Personal communiqué with Nicolau, 2003)

The experience of the SME is repeated in larger companies in Durban. Karen Fitzpatrick, a director and designer at Playtex, one of the largest underwear companies in South Africa which employs over 1,600 people, explained the role of CAD and CAM in the company's operation in an interview with the researcher. According to Fitzpatrick the garment design process is highly specialized, requiring a combination of design creativity and technical pattern making skills, as well as a thorough knowledge of fabric performance. All of these are critical skills that educational institutions try to incorporate into their curriculum in order to prepare students for the industry. Computers were introduced to Playtex between 1995 – 2000 for obvious reasons:

accuracy, speed and efficiency together with employment costs being lowered (less time taken to cover more tasks). The product process in the fashion industry affects every person in the chain, from the designer to the marker maker. All the links in the chain must be trained technicians who know how to instruct computers to do the work. (personal communiqué with Fitzpatrick 2002)

### **Design and retail**

It is clear that in the debate about computers and their usefulness in the industry, it can be noted that companies willing to invest in the technology will do so as a means of securing a long term future for themselves. After discussion with many involved in the local industry, it is clear that computer usage is favoured for certain activities and not others. In the main, the local industry still favours the use of the human hand and eye for pattern cutting in particular, rather than the skilled technician using a mouse and screen. However, this scenario might not apply to the design process/show boards or even grading and lay planning where computer usage and systems are more prevalent.

According to Gray, Rosella and Aiken (1999) the relationship between retail buyers and designers in the manufacturing companies forms a crucial link in the supply chain and is central to the production of goods that will meet market desires. 'By its very nature the Fashion Industry is fickle and unpredictable so the inbuilt understanding of consumer choice, trends and media influences is essential to the creation of clothes that will sell' (Gray et al. 1999). In South Africa the supply-chain is controlled by retailers such as Woolworths, Edgars, Fochinis, Truworths and Mr. Price and, while the cost savings are an obvious outcome when computers are used in design and manufacture, the value added to the creative process should not be underestimated. The interactions between all the parties in the supply chain (from raw material to retail outlet) involve the discussion of fabrics, garments and presentation methods and these all require the use of visual material.

Many companies are not only reliant on the supply chain and its efficiency in getting the merchandise to the retailer in time but it is important to ensure that the product delivered meets the expectations of the client. Emerging computer technology, including an infrastructure for virtual enterprise and more capable software, is continually being developed for the industry (particularly the industry in first world regions). Much has been said about the industry bracing itself for more radical change in the not so distant future. However, there has been no evidence of 'virtual changing rooms' mentioned in the previous chapter appearing on the high streets or in the shopping malls.

### **The future of retail fashion**

Notwithstanding the above, prior to 2001 the British Government spent R34 million in support of new technologies such as 3D scanning and virtual dressing rooms. However, it appears as if their widespread introduction in clothing stores is still a long way off. Yet, significantly, many swimwear companies were offering services such as virtual enterprises on-line, most notably, Victoria's Secret (accessed from Internet URL: <http://www.victoriassecret.com> 4/7/2003). This development is of particular importance to this research project. As Carey notes, the idea of the virtual changing

room was first developed for Japanese women who were too shy to be fitted for underwear (Carey 1999: 66).

The Head of Fashion and Textiles at Port Elizabeth Technikon (PET), Gina Esterhuizen maintains that 'the quality of the image [in 3D imaging] is immaculate but it is not really a commercial reality yet [and that] visual printing and body scanning are other positive developments, but are unlikely to take off locally for some time ' (Esterhuizen in Roussouw 2001:10).

However, manufacturers abroad claim that body scanning promises better figure measurements using a technique which is known as 'made-to-measure' (MTM). This process requires that the body is scanned using a PC at the retail stores, and thereafter the individual's measurements are fed into a PC and finally made available when the consumer is on the Internet. The theory is that the consumer is able to call up the store's website and drape a virtual 3D image of themselves in any item on offer at the online store. Currently, MTM body-measuring systems use a laser beam or two cameras to scan a customer's body and create a 3D image in the associated computer system. The measurements calculated by the system are sent to a manufacturer's factory by telephone line or the Internet.

According to Ian Dewar, director of CAD for CAD, which supplies Telmat body measuring systems in the UK, 'it is now possible to have a personalised garment on the cutting table within two minutes of the customer being measured. Measuring booths will need to be integrated into the whole clothing industry' (Dewar 1999).

In spite of the promise of MTM the current reality is that it still needs to be defined, developed and financed. Initially, it will not replace the pattern cutter or traditional tailor.<sup>iv</sup> Opinions reflected from my research into MTM is that retail is still not prepared for this and according to Gray (1999) the public will be disappointed if it is led to expect a full MTM service too soon.

Company name	Computer system favoured	Software used for design	Software used for pattern making	Software used for grading	Quality implications	Role of hand-crafted design skills	Year of purchase
Paris Paris	IBM PC's Lectra	Lectra Prostyle Adobe Photoshop®	Lectra	Lectra	Improved quality/faster	Still important	1995
Playtex	Gerber	Gerber/Photoshop® Artworks/Microsoft PhotoDraw®	Gerber	Gerber	Faster production time	Manual skills still used more than computer skills for design and patterns but not grading.	2000
SACI	Investronica, IBM, Microsoft VIP, Styleman/Fast Pealt, Accountability G.S.D.	Corel Draw	Novel	Novel	Better quality, improved production process	Very important	1990
Alley Cat	Gerber	Photoshop 6.0 Primavision	Gerber	Gerber Intermarket networked and linked	Speeds up design process and often has more complete & better finish	Computer is just a tool and cannot carry out feelings, textures and results that freehand work can. Most computer work starts from manual.	2000

**Table 3.1:** Results of survey of Industry IT usage

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<sup>i</sup> Both these companies also specialized in the development of the laser cutter, and marketed a laser with their system that would cut patterns in card and also single-ply cloth or leather.

<sup>ii</sup> According to Pam Laurent, the Durban based representative for Lectra systems, Gerber and Lectra are the most widely used CAD/CAM systems in South Africa today (personal communiqué with Laurent 2003).

<sup>iii</sup> Textile computer software programs are used for the creation of new textile designs, for the colour separations used for printing purposes and for the engraving of the rotary printing cylinders utilising laser-engraving processes.

<sup>iv</sup> Traditional tailors are taught to consider many factors: the human body is not symmetrical; one shoulder may be lower than the other; a person may stand to attention in the booth but slump, round-shouldered, in the street outside; dinner suit trousers need to accommodate a large meal as well as the wearer; younger people may prefer a self-supporting, waist-hugging trouser style, but older people may prefer a less constricting waistband and braces. Current measuring booths cannot provide the same degree of attention. Garments may need widespread re-proportioning, and not just simple length adjustments (Carey 1999: 66).

## Chapter 4 Going Digital

Few technologies have offered as much potential to change research and teaching in the arts and humanities as digital imaging. (Besser & Trant, 1995: 7)

Although this comment by Howard Besser and Jennifer Trant in *Introduction to Imaging* refers specifically to the impact of retrievable images in digital fine art archives, it is equally applicable to the retrievable images and data used in the current project. This project situates itself within a triangle with Fashion Design with specific reference to Swimwear and Pattern Technology as the apex (see Figure 4.1). On either side of the base of the triangle are Technology Issues with specific reference to retrievable digital images and data (L) and, on the other, Education Issues with specific reference to interactive-learning, virtual learning environments (VLEs) and the potential of distance learning<sup>i</sup> (R) respectively.

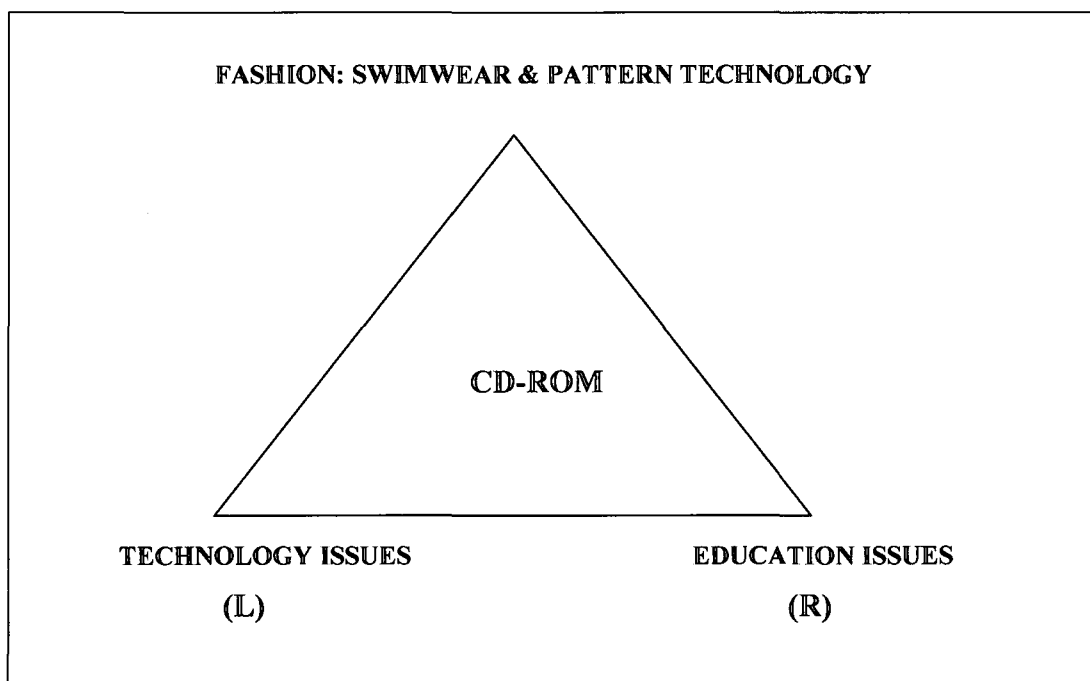


Figure 4.1

Thus graphically illustrated, this research project could be defined as interdisciplinary. Yet the process that has produced the “Swimwear on Line” (SOL) CD-ROM has been a ‘holistic’ one in which all the elements have been integrated. This

integration has resulted in the type of paradigm shift hinted at by Besser and Trant. The development and testing of the SOL CD-ROM with students on both the (DIT) intranet and via the Internet leaves little doubt as to the potential for radical change both in pedagogical and professional practice.

In the previous chapter current changes and the potential for even more radical change in industrial practice have already been described. These developments have informed the development of the SOL CD-ROM and VLE as an appropriate pedagogical response for students at the DIT. In the preparation of the SOL module, and its application in a VLE, the potential of the computer to go beyond being a mere 'tool' in either the design or the pedagogical process is evident. In the words of Marshall McLuhan "the medium is the message" (McLuhan and Fiore 1967).

If one accepts that designers and users have such obvious physical expectations of technology, it is not surprising that we have equally influential preconceived ideas of what we expect technology can or cannot do. Hence early perceptions of the role of computers in design was that they functioned merely as 'just another tool.' Even the term 'computer aided design' has re-enforced the idea that the computer are merely an addendum in the design process. However, Aldrich is of the belief that people who say, that "CAD is only a tool" have had limited experience with it. She, on the other hand, exploits the "chameleon characteristics of CAD, its amorphous qualities and capacity to be moulded into many different *directed* forms" (Aldrich ed. 1992: xi). This point of view is very relevant to a VLE and training in pattern cutting and perhaps more appropriate than the present industrial work environment (i.e. a scissor and paper approach). If the CAD medium has changed the design process so fundamentally, then learning may be enhanced by being located within a VLE.

Many educators recognize the potential of the web for transforming their own teaching methods and reaching more learners. Similarly, this researcher has found that while developing a module for fashion students on the World Wide Web, one needed to embrace new features and functions of the technology, which is ever-changing. The flexible and adaptable technology provides students with access to discussion forums,

video with updated clips, radio stations world wide, and masses of information on almost any topic. The web has created a unique forum for learning that provides increasing opportunities for learners.

### **Distance learning / contact education in South Africa**

If one has have access to the Internet, educational qualifications are now potentially just a few mouse clicks away. Contact education and distance learning were, until recently, contrasting modes of education. Distance learning was also usually considered the poor cousin of face-to-face learning. These assumptions are increasingly being challenged.

As recently as 1994, an international commission into distance education in South Africa stated:

Leaving aside a few recent productions, the typical study guide is uninviting, dull and impersonal. Little if any scope is provided for students to interact with the ideas they are meeting. Students are considered to be subservient and the text ensures they will be. This image was contrasted starkly with the supportive and interactive educational experience supposedly enjoyed by face-to-face or 'contact' students – a myth, as many of us will know. (Glennie 2000: 34)

The contrast between contact and distance education however is exaggerated. The scenario is changing as new technologies and approaches to teaching and learning converge.

Currently, in both traditionally face-to-face and distance education institutions, there are a growing number of students interacting with well designed learning resources (available in print, online or video), listening to lectures on satellite broadcasts, participating in conventional or virtual groups, joining residential sessions and communicating with educators via e-mail. (Glennie 2000: 34)

The emergence of so-called 'dual mode' institutions, traditionally contact universities

and technikons that have introduced distance education programmes, is one of the most significant developments in distance learning specifically, and higher education more generally. This significance lies in the large numbers of students reached by these programmes, students who might not otherwise have received the benefits of higher education.

According to a report by The South African Institute for Distance Education (SAIDE), *Lessons in Application of Technologies*:

Distance education has come to be seen as provision for those people denied access to face-to-face education (either because they cannot afford the latter or because circumstances demand that they study on a part-time basis), and it remains one of the two key reasons for its implementation in South Africa (the second promises to drive down unit costs of education). (Deane 2001: 37)

VLE's using new technologies enable flexible delivery options for programmes. Traditional institutions now boast sizeable percentages of distance education students. Many universities and technikons have combined traditional delivery strategies, paper-based assignments, blackboards and lecturers with new technologies to enhance virtual learning for distance students. Courses may be stored and extracted directly from electronic databases, accessed on the World Wide Web, distributed on, or broadcast on, television.

Distance education and contact education are called by different names, such as 'mixed mode', 'telematic education', 'flexible learning', 'reduced contact' etc. The advantage of the resulting blurring between distance and contact education is that, whatever the institution, educators can now concentrate on designing quality programmes using teaching and learning strategies appropriate to the learners' contexts and the educational goals. As previously mentioned in the introduction to this chapter, many educators are doing so in reaction to new challenges, particularly the economic and political imperative of access and life-long learning.

As institutions see the shift in their student bodies towards older students, working students, poorer students and students from remote areas, they are compelled to devise programmes that do not require regular attendance at set times at a central venue. Freed from the restrictive notion that most learning takes place within the walls of a classroom, providers apply more flexible and often more pedagogically sound strategies, including the extensive use of information communication technologies.

In the higher education sector, we now see a notable increase in the number of such programmes at traditionally contact institutions. Rand Afrikaans University (RAU) and the Universities of Pretoria, Stellenbosch, Port Elizabeth and Potchefstroom are among the traditionally contact tertiary institutions that have made revolutionary changes to their delivery strategies in order to accommodate distance learners.

In a recent survey conducted by the South African Institute for Distance Education (Saide) we found that most programmes using "distance education" strategies are aimed at relatively small numbers of post graduate students. The large-scale programmes are generally confined to a couple of sectors, notably nursing and teacher education. The numbers are not as great as they might appear, given that headcount numbers are usually provided and these can translate into as little as one-fifth of the number of full-time equivalent students. (Glennie 2000: 34)

Tessa Welch is the coordinator of course design and quality assurance at Saide and she maintains that: "aside from public provision, however, a feature of the Nineties has been a rapid growth in the provision of teacher education at a distance through public-private partnerships" (Welch 2000:39). She estimates that 40 000 teachers are involved in the distance education programmes delivered through these partnerships (these are not full-time equivalent numbers). Welch goes on to say that this will mean that UNISA and the distance education campus of Vista University will be the only two dedicated public distance institutions offering teacher education.

Academic institutions are in transition. Much of the change is due to economic pressures from mounting costs and demands by the business world for graduates with the ability to function well in a knowledge society with greater diversity.

HE Institutions, such as the technikons, are increasingly responding to these changes and demands by turning to the use of the Internet to deliver courses to students at a distance, as well as to enhance educational modules/programmes that are delivered on campus. According to Horgan:

Universities are feeling the pressure to control costs, improve quality, focus directly on customer needs, and respond to competitive pressures. Information technology (IT) has the potential to solve many of these problems. It can change the roles of students and faculty, facilitate more learner-centered, personalized education, save money through improved business processes and distance education, and expand the scope and content of the curriculum. (1998: 1)

A number of quality assurance bodies have been established in South Africa to protect the public from exploitative educational providers. Nationally, the government has established the South African Qualifications Authority (SAQA) to develop a National Qualifications Framework (NQF) to ensure quality control throughout the country. Initially some providers (of dubious worth) established low-cost distance education, but these programmes were of poor quality with little support given to students, and as a result, poor pass rates. Coordination is required for the development of learning resources and the provision of learning centres. Distance educational opportunities are being offered to marginalized communities in remote corners of the country by some highly developed centres, such as the one at the University of Natal and at the DIT, so it is now conceivable that students in the Eastern Cape could enroll without taking up residence away from home.

However, online learning requires funding and the political will to redirect substantial resources to support a digital educational network. Research at Saide has demonstrated that distance education is not intrinsically cheaper, as the costs are dependent on course construction and student enrolment (2000: 34). It is surprisingly rare to find a programmer with a background in fashion or textile design. A computer is only as good as its software, and then only as good as the user. Therefore to write software for the clothing industry the author needs to get inside the mind of the

pattern cutter or textile designer and understand what tasks they find difficult, boring or time-consuming and identify how a computer system could assist.

### **Synchronous and Asynchronous Learning**

Several educational programs have been developed that involve students interacting with a software application on a computer, with no interaction occurring among groups of learners. This is known as computer-assisted education or computer-based training. Other programs are more interactive (Hanna et.al. 2000: xvii). Web-based interactions can be synchronous or asynchronous. Synchronous interactions are those in which learners log on to a course site at the same time, and interact with each other in real time, for example activities such as brainstorming, role-playing, and discussing course content in real time. Asynchronous interactions are those that do not take place in real time. Learners participate in asynchronous course activities at times that are convenient to them. Participants in this form of computer-mediated learning can read and comment on the topic under discussion at their leisure. The delayed interaction allows learners to pace themselves and to reflect before contributing to the online discussion (Hanna et.al. 2000: xvii).

A new paradigm is developing in education. Successful learning requires an active approach between the instructor and the learner. While the teacher or instructor defines the structure of the course and the content, the students have more flexibility to work and explore the content collaboratively or to work on their own. The instructor's role as expert or (sole imparter of knowledge) no longer applies. The nature of the relationships and interactions between the teacher, the learner, and the institution changes with computer-mediated distance education, distance learning therefore needs to be redefined. The website of the California Distance Learning Project (1997) presents a number of definitions of distance education, generally referring to the provision of learning resources to remote learners and involving both distance teaching (the instructor's role in the process) and distance learning (the student's role). Key elements to distance learning are presented as follows:

- The separation of teacher and learner during at least a majority of each instructional process.
- The use of educational media to unite teacher and learner and carry course content.
- The provision of two-way communication between teacher, tutor or educational agency; and learner.
- The separation of teacher and learner in space and time.

“Key to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions” (Palloff and Pratt 1999: 5).

A recent study by Twigg indicated that many students are concrete-active learners, that is, they learn best from concrete experiences that engage their senses. Their best learning experiences begin with practice and end with theory (Twigg 1994: 16). Many instructors, seeking to improve their practice and the learning outcomes for their students, have incorporated active learning techniques such as working collaboratively on assignments, participating in small-group discussions and projects, reading and responding to case studies, role playing, and using simulations.

### **The role of technology to the teacher, and the learner in the classroom.**

In contact teaching, technology is not as prominent as it is when learning takes place online; in online learning, “the technology is always present and dominating in terms of the attention it demands from both teacher and learner (Hanna et.al.2000: xviii). The technology needs to be incorporated creatively by the learner and the teacher.

As mentioned previously, technology enables learning to occur across distances. According to Hanna, “even when used effectively it is a constant presence in the classroom that must be incorporated conceptually into the instructional and learning plans for the class. When used ineffectively, it can serve as a powerful deterrent for learning” (Hanna et.al. 2000: xviii).

However, as in the case of the SOL VLE developed for the purposes of this research it may also have a face-to-face component, and involve both online interactions and classroom meetings (See Figure 4.2).

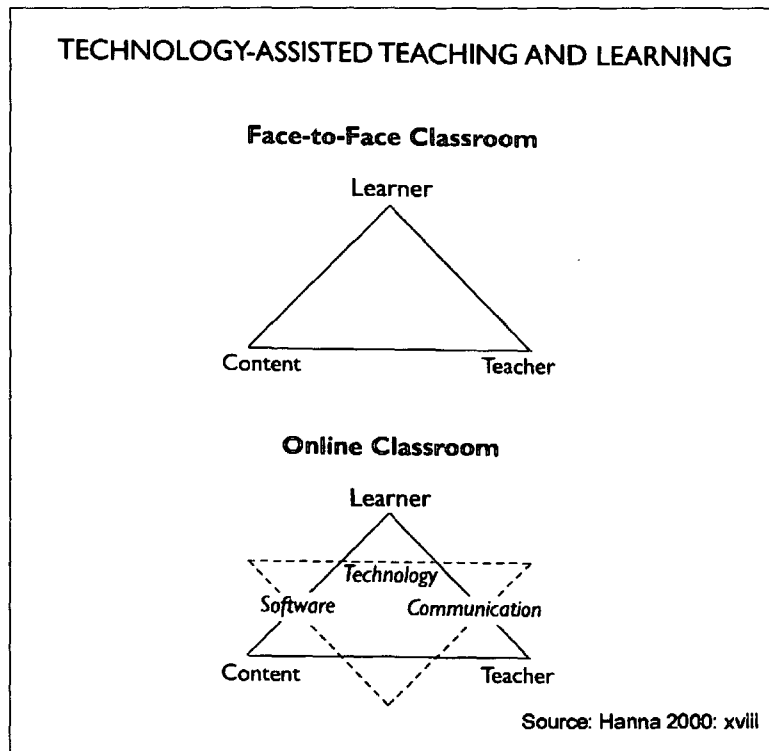


Figure 4.2

The environment of online learning actively engages both the learner and the teacher with multiple interactive strategies, with the prime focus on the learner. In planning and organizing an effective learning environment, critical decisions were made. The decisions made in the planning depended upon the specific context and instructional goals and systematic evaluations at key points in the process. Context and content, technology and teaching, were all considered and used with a constructivist approach.<sup>i</sup>

Online modules require more preparation than face-to-face teaching. The research methodology required a multi-stage approach in which it was necessary to test the initial framework for the SOL VLE module, then after discussion and analysis of the initial questionnaires, the introduction of a revised version.

## **New issues and concerns for online learning**

Many students become addicted to technology and can even experience personality shifts - the issue of isolation is an issue when communicating electronically. However, Palloff and Pratt point out that, "the notion of virtual as opposed to human contact in electronic communication sets up an artificial dualism. Because people generate communication, even if it's textual, virtual communication *is* human" (1999:35).

Although some might consider online courses lonely, virtual contact may be an advantage to the shy, reclusive person, who prefers no physical or visual contact. Other issues of concern include physical problems that can be experienced as the technology is used extensively, such as carpal tunnel syndrome, back problems, and headaches. Many students who suffer from performance anxiety in the face-to-face classroom may be more comfortable online and more active in responding to students. The ability to be a successful instructor in today's academic institutions both in cyberspace and the face-to-face classroom takes a unique set of talents.

Today's technology (all powerful and full of potential) has vast implications for the educational community. According to Palloff and Pratt, how people look, or what their cultural, ethnic, or social background is, become irrelevant factors in this medium, which has been referred to as the great equalizer, limited only by time and access, not by distance or social class. Children today are being weaned on media interaction of various forms. Involved in everything from video games to the Internet, our youth is coming to expect more active and visual ways of seeking knowledge and entertainment. Adults, including educators, however, are for the most part newcomers to this technological arena. As a result, something of a technological generation gap is emerging. "A rift has opened between how education is viewed and delivered in the classroom and how we are beginning to obtain knowledge in our society (1999:16).

## **THE VLE**

Online learning is often considered to be an entirely Internet based activity, however, VLEs also provide great versatility for students to communicate via e-mail or on CD-

ROM. This facility provides a personal touch so necessary for communicating and learning. For distance learning to be effective, an appropriate medium of contact with students needs to be created. To that end specialist software such as WebCT has been developed. These programmes enable the lecturer to create a communications environment in which the objectives of the course, the curriculum, the instructional materials and tests can be provided to the students on enrolment. The students are able to post their photographs and personal details on the general notice-board and are able to communicate with the lecturer and other students irrespective of the distance in time and place, hence the term “virtual learning environment.”

An effective virtual classroom does the following:

- provides the tools learners need when they need them
- creates an environment conducive to learning.
- it brings together educators and learners to share information and ideas.
- it allows learners to experiment, test their knowledge, practise completing tasks and apply their knowledge.
- it provides mechanisms for evaluating performance.
- it provides a safe haven in which learning can take place.

A classroom such as this is no different from a *real* classroom.

VLEs can be established either on the World Wide Web via the Internet or on a smaller scale within the intranet of a single institution. Because the institutions on the South African Eastern Seaboard lacked the requisite networks and infrastructure, it was not possible to establish a VLE on the Internet. For the purposes of this research project a VLE was created, for a limited period of time, on the DIT intranet at the Brickfield Road Campus in order to test the suitability of the SOL module.

In addition to the positive responses from the students to the interactivity of the SOL module, it is significant to note the number of enthusiastic comments made about the multiple choice questions that were included in the quiz at the end of the SOL module. This served as a good measure of learning achievement and module

evaluation. Because the quiz section was assessed, it encouraged students to interact and work through the module (See Findings, page 80).

The SOL module with its links to the Web has the ability to transmit and share information in many different formats. Along with text it also presents information in sound bites, such as music, voice or special effects. Graphics are enhanced through animation or video clips. The use of electronic media in VLEs “has turned a tried-and-true method of instruction into a hot commodity” (Porter 1997: 36).

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<sup>i</sup> It is educational or training information, including the instruction and experience that learners gain, although they are physically distant from the source of that information and instruction (Porter 1997:1).

## Chapter 5 Developing “Swimwear On Line” (SOL)

In this project, the researcher has developed a visually appealing online instructional module with specific reference to swimwear and pattern construction for Pattern Technology students at the second level of study at the DIT. This module is called “Swimwear on Line” (SOL). As has been mentioned in the previous chapter, this module, developed for DIT students, has the potential to be used by a wider range of students throughout South Africa and beyond to enable learning at a distance. The intention of the researcher was to create a user friendly, interactive, multimedia module to suit fashion design students who, by nature, enjoy visual stimulation within the course structure. Furthermore, the module was structured to exploit the benefits of the Internet. The links that the Internet provides are invaluable to Fashion students who require continuous updating of material, due to seasonal fashion changes. The module has been developed and refined over time to allow for user evaluation and feedback (See Figure 5.1 Action Research Cycle: Development of the SOL VLE).

### Action Research Cycle : Development of SOL VLE.

1.	Development of basic module.	See page 54
2.	Learning materials delivered in (hand-based) ‘manual’ form.	See page 77 evaluation of results
3.	<b>Evaluation/Testing manual learning materials.</b>	See pages 54, 77
4.	Learning materials adopted and re-designed according to Step 3 Evaluation (improved module).	See pages 54, 77
5.	Online prototype (VLE) developed.	See page 54
6.	<b>Evaluation/Testing of VLE.</b> Online Prototype VLE through web publication, technical presentation, navigation and hypertext issues only.	See page 59
7.	Adaptation and re-design of VLE.	See page 59
8.	Learning materials delivered in VLE.	See CD-ROM
9.	<b>Evaluation/Testing.</b>	See Appendix D

Table 5.1: Action research Cycle Table

Before developing the computer-based module, a manual-based version was developed and introduced in 2001 at Technikon Natal to a group of twenty-two students. Upon completion of the module the students evaluated the course material (See Figure 5.1, Step 1). Responses to student questionnaires helped inform the researcher in planning and implementing changes for the CD-COM version (See Figure 5.1, Step 5). The CD-COM prototype was developed between February and November 2002 using appropriate graphic, imaging and website software<sup>i</sup> (See Figure 5.1, Step 5).

During April 2002, the improved module was introduced to over 30 students at the newly-formed DIT. To test the accessibility of the module as a potential distance-learning tool, SOL was published on the World Wide Web on Thursday the 21<sup>st</sup> November 2002 at <http://www.nymphs.mlsultan.ac.za/bev/index.htm> (See Figure 5.1, Step 5). The posting of SOL on the Internet informed the researcher of changes that needed to be made to both layout and content, which was carried out before a final CD-COM version was prepared by the end of January 2003 (See Figure 5.1, Step 7). The same version was placed on the DIT intranet for easy accessibility by second year students at the Brickfield Road Campus: <http://salit.dit.ac.za/bev/index.htm> (See Figure 5.1, Step 8). This enabled the students to have the opportunity to access SOL within a virtual learning environment (VLE) at the technikon with a lecturer present. Students with access to the Internet at home had an added opportunity to access this site during their own time (See Figure 5.1, Step 8). Thereafter, further evaluation of the responses to student questionnaires were undertaken in order to interpret and draw conclusions (See Figure 5.1, Step 9).

## **Investigation**

Prior to starting the development of the instructional module for the CD-COM, it was necessary to investigate the integration of manual skills and computer-based skills in Design and Pattern Technology in the fashion schools and departments in other South African Technikons and conclusions drawn from a comparison of both methods.<sup>ii</sup> The

researcher compiled a questionnaire (Appendix E) covering the four areas in which computers are used in South African Technikons:

- i) Creative Design
- ii) Drawing and Illustration
- iii) Pattern Technology
- iv) Grading and Marker-making

This investigation as shown in Table 5.2 revealed which technikons used computers, the number of computers and when they were introduced. It was equally relevant to know what software programmes were favoured and the effect of computers on student work in respect of quality, subject integration, and at what level computers should be introduced. The findings reveal that software such as Primavision, Adobe® Photoshop® 6, and Macromedia® Freehand™ 10, were favoured by most institutions teaching Creative Design, design process and Technical Drawing.<sup>iii</sup> For pattern-making and grading the most obvious choice amongst all the technikons is the Lectra Prostyle Systemes. Merging institutions such as the ML Sultan Technikon and Technikon Natal benefited by having joint assets to share, however where differences in operating systems existed, these had to be addressed and new and appropriate goals set. Other institutions will face similar issues of compatibility as mergers take place, which may be more easily solved through shared IT and VLE expertise. Both the Internet and intranet systems within the technikons could provide, and in some cases do provide, added possibilities.

Responses to other questions revealed that although computer-based learning is steadily increasing, the need for manual pattern-making skills is indispensable especially for first year fashion students, as this manual skill/knowledge needs to be in place prior to computer-based learning (See table 1.1, No1.1 “role of hand-crafted skills”).

The investigation has shown that although each of the above mentioned Technikons<sup>iv</sup> are connected to the Internet, the design computers are not all integrated and networked. The DIT facility, which has the largest number of computers amongst all

the institutions surveyed, has since the relocation to the Brickfield Road Campus had all the computers networked together and linked to the Internet. The fact that there is a mixture of operating systems in each of the technikons has complicated the matter. For example the DIT uses IBM and Applemac platforms for design, illustration and technical drawing. IBM PC's only are used for pattern technology and grading. Despite the incompatibilities it can be argued that the benefits of the different operating systems is that students are given instruction in a broader range of formats.

This investigation has revealed that for there to be a total integration of the resources in institutions on the Eastern Seaboard, small but vital steps need to be taken to ensure that students could gain access to the Internet in order for the SOL module to be accessible on line. In the interim, computers need to be networked in order to facilitate the creation of a VLE via each institution's Intranet.

The Online Learning Centre (OLC) at the DIT has the ability to enable all stakeholders in online learning to work together to build an infrastructure and resources so that online learning can become a sustained activity that is integrated into the curriculum.

## Fashion Design computer usage in South African Technikons

**Table 5.2:** Tabulation showing computers used in Fashion schools in Technikons.

Tabulation showing computers used in Fashion schools in Technikons in the Eastern Seaboard region of South Africa. See Appendix E.				
Institution	Software	Year of acquisition	Work stations	Level of subject integration
Border Technikon	Lectra Prostyle for creative design, drawing and illustration, & TD (mostly)	2000 - 2003	3	2 <sup>nd</sup> yr – 45 students 3 <sup>rd</sup> yr – 15 students
	Lectra Modaris for pattern-making and grading	1997	3	2 <sup>nd</sup> yr - 45 students 3 <sup>rd</sup> yr – 15 students
Eastern Cape Technikon	Adobe Photoshop 6.0, Microsoft photo Draw, and Primavision for creative design, drawing and illustration and TD.  No computers for pattern-making, grading and lay-planning.	1995 – 2000	5	2 & 3 yr level
Port Elizabeth Technikon Linked via intranet & Internet	Primavision for creative design Access to Photoshop (no instruction on it).	2000 – 2003	7 – 10	3 <sup>rd</sup> yr level
	Painter and Freehand for design process	2000 – 2003	10	3 <sup>rd</sup> yr level
	Primavision, Painter, & Freehand for drawing and illustration.	2000 – 2003	10	3 <sup>rd</sup> yr level
	Lectra Systems for Grading (1 mother station – 7 restricted seats)	1995 – 2000	1	3 <sup>rd</sup> yr level
	No computers used for pattern making.			
M L Sultan Technikon Not linked to intranet	Adobe Photoshop 6.0, Coral Draw, Microsoft Photo Draw, Freehand and Primavision for creative design.	1995 – 2000	15–17	2 <sup>nd</sup> yr level
	Adobe Photoshop 6.0, Coral Draw, Microsoft Photo Draw and Freehand for drawing and illustration and TD.	2000 – 2001	10	1 <sup>st</sup> yr level
	Lectra Prostyle for grading	2000 – 2001	10	2 <sup>nd</sup> yr level
Technikon Natal Not linked to intranet	Adobe Photoshop 6.0, and Freehand for creative design.	1995–2000	18	2 <sup>nd</sup> yr level
	Adobe Photoshop 6.0, Freehand and Gerber for design process, drawing & illustration and TD. (Appendix E).	1995–2000	18	2&3 yr level
	Polygon for grading	1995–2000	1	3 <sup>rd</sup> yr level

Durban Institute of Technology (DIT) Linked via intranet & Internet	Primavision – creative design (15-IBM, 15-Applemacs)	2001–2003	30	2 & 3 yr level
	Adobe Photoshop 6.0 – creative design	2001–2003	22	2 & 3 yr level
	Freehand – creative design.	2001–2003	22	2 & 3 yr level
	Adobe Photoshop 6.0, Coral Draw, Microsoft Photo Draw and Freehand for drawing and illustration and TD.	2001–2003	15	2 & 3 yr level
	Lectra Prostyle for grading.	2001–2003	12	2 & 3 yr level

## Outline

For a subject such as Pattern Technology, it is important for the student to feel comfortable with the new digital tools for pattern design and manipulation, which enables the access of information on a screen. This is obviously of great relevance in facilitating the learning process within a new paradigm. Hence, the way the course material for the module is developed is important. If too complex it can lead to frustration for the user and hinder the learning process. However, as previously stated, a basic level of computer literacy is assumed at second year, and the purpose of developing an online course at this level was to provide a module which would encourage students to learn at their own pace. This module was also intended to provide students with supplementary learning opportunities and the ability to recapitulate work, thereby allowing flexible learning opportunities.

Integral to the second year syllabus are modules in swimwear and underwear (lingerie). The SOL module has been developed to meet these needs. First year fashion students undertake the fashion courses with little or no background in fashion design, only an interest in and enthusiasm for the subject. At the DIT the fashion degree program has been developed on a modular system in which each of the modules are condensed to provide the learner with as much material as possible. The prerequisite for the second year level of study is to have passed Pattern Technology 1 where the basics for Pattern Technology are taught. This prior knowledge enables the learner to proceed with Pattern Technology 2. The SOL module builds on this prior

knowledge and goes further to include all basic blocks relevant for styling swimwear, underwear, and active-wear, most of which require stretch fabrics. The SOL module instructions and illustrations of blocks and styles developed were evaluated in Step 2 of the Action Research Cycle (See Figure 5.1, page 55). Feedback from the students was also recorded and incorporated into the re-design of the CD-COM. The interactive nature of the SOL CD-COM offers background knowledge with which the students can interact in their own time. Hyperlinks built into the VLE enable cross-referencing and specific links to important sites on the Internet.

There is a very real concern amongst academics and employers that basic knowledge may need to be reinforced and the SOL module attempts to address this by providing information that is comprehensive and time saving. Fashion students are visually trained so that it makes sense to provide clear illustrations to communicate information. To this end SOL offers detailed instruction backed up with illustrations. The illustrations and instructions are devised to give cross-references and show close-up views, back views and side views (See Appendix A: SOL CD-ROM).

The drawings and illustrations are clear and interactive and provide information on how to construct blocks and style patterns for active wear garments. A glossary, using descriptive text for terms and definitions helps learners to become familiar with fashion and pattern technology terminology and language, and allow them to re-enforce their basic knowledge of the subject. This module also provides access to other information, such as the appropriate choice of fabrics, the history of swimwear with specific reference to beach related sportswear in Durban, and useful Internet links to fashion/swimwear sites (Appendix A: SOL CD-ROM). These built-in resources are intended to broaden the learner's knowledge about these interesting aspects of the fashion degree.

It is intended that the SOL module will provide learners with the knowledge and skills they need to interpret designs from their initial conceptualisation, to the development of the designs to produce a finished pattern and garment. Design, pattern technology and garment technology are all interdependent. Pattern technology enables the learner

to gain an understanding of the body shape by using measures of length, width and depth (as horizontal, vertical or curved lines) and relating them to the figure/body shape and this in turn enables the learner to design more creatively and accurately. It is important to develop a visual awareness of the lines and their positions while constructing blocks. Once this very important aspect has been mastered, the skill of styling will follow.

Figures 5.2 and 5.3 below show construction lines and their positions while constructing blocks.

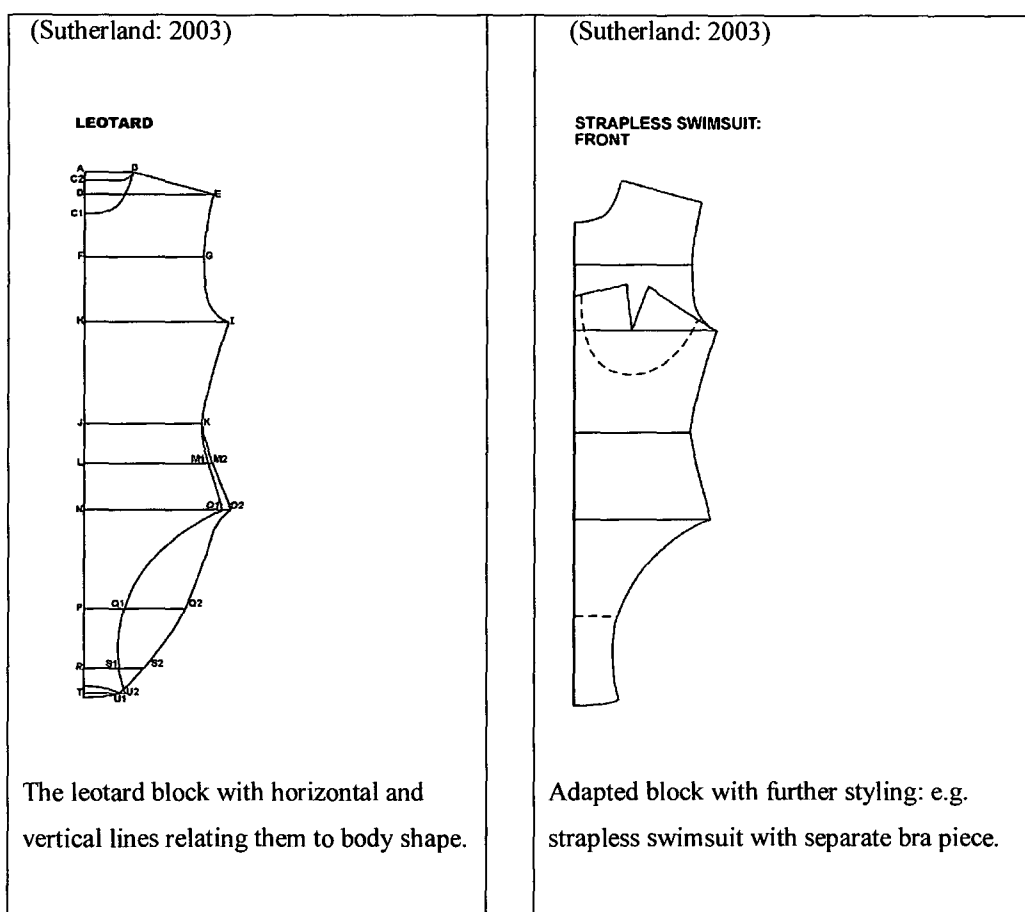


Figure 5.1: The basic block

Figure 5.2: Adapted block

In order to understand how the module was planned and developed it is necessary to explain pattern design and pattern cutting in more detail, since this is the central theme of the module and the research project. Pattern cutting, by its very nature, involves a creative interpretation of the original design. Other well-used terms are pattern construction, pattern technology and pattern making. 'Pattern Making' is

currently used as a term that refers to computer-based design to distinguish it from Pattern Cutting which is used to describe the manual-based method.

A pattern cutter can be described as a person with a sense of design and engineering. Successful flat patterns are based on understanding the human body and its proportions. This understanding will ensure correct shape, good fit and balance and the correct placing of style lines and features such as pockets, buttons, gathers etc. A styled pattern is the design of a garment cut on paper in various shaped sections. It includes both the fit as well as the style. The fit is derived from perfected basic blocks, while different styles are achieved through the manipulation of darts, placing of style lines, and shaping and reshaping of the outline of the block.

It is important that pattern cutting takes cognisance of the design process. As mentioned in the discussion of 'craft' in Chapter 2, patterns are not just flat shapes but rather an interpretation and an understanding of the flat technical drawing (Defty 1988: 5). The technical drawing is what assists the pattern cutter in the interpretation of designs, as not all patterns are the same. Hence, the development of patterns is an intrinsic part of the creative process. (See also Chapter 3, page 31 "art of creating patterns", page 34 "weakness of current PGS system", and page 35 "human hand and eye still important").

Pattern cutting should be used in conjunction with a figure form, from which a design may evolve, and proportion and line can be checked and corrected. The more complicated styles should be made up into a trial garment or 'toile' so that the pattern can be assessed on a form and on a moving figure. Pattern cutting is a creative craft, but one that has a mathematical basis. From season to season fashion changes and there is no limit to the styles that can be created and crafted. A core feature of the SOL module is that it seeks to integrate the design process with the craft of pattern cutting. The module is designed to provide the learner with the ability to craft patterns for swimwear, from past, present and future styling and also to develop design awareness and keep it adaptable to change.

The cyclical nature of fashion makes flat pattern designing a fascinating and rewarding subject to learn. The basic principles in pattern design are to have an ability to interpret 3D designs into 2D flat patterns. Technical skills required include the ability to construct basic blocks using mathematical formulas. Designers require a fashion sense with the ability to design, interpret and construct while bringing balance and harmony to the design.

### **Early beginnings**

One of the earliest examples of modelling and draping of garments is to be found in Africa c.3000 BC. Egyptian mural paintings show predominantly white, draped garments made of wool, cotton and linen as early as 3000 – 500 BC. However, according to Defty the earliest traces of blocks used for structured garments are to be found during the 13<sup>th</sup> Century when block patterns were primitively fashioned of wood (1988: viii). It was not until the middle of the 19<sup>th</sup> Century that a book, compiled primarily for tailors (the pioneers of flat drafting), came into print which Defty maintains proved to be “one of the technical beginnings of the good basic systems of drafting in use today” (1988: viii).

Traditionally, designers and pattern cutters use a draft system of vertical and horizontal lines taken from body measurements. These lines are devised in conjunction with proportionate scale<sup>v</sup> measurements for a specific size, (for example size 34/10), to create the draft or block, which is connected with curved or angled lines relating to the human figure. This ‘Proportionate Measure System’ is an accurate method used to create basic blocks. According to Defty “this system has proved to be the most reliable for producing good block patterns with the minimum of discrepancies from flat draft to figure” (1988: 2).

An important aspect in understanding the figure as it is interpreted in a flat draft is to understand what certain important lines represent. This will help the student visualize the body while working a draft or style. Patterns can be developed using a combination of these methods i.e. using a pattern draft system<sup>vi</sup> in combination with drape or adapting existing patterns for slight change and pattern alteration.

## **The development of blocks for swimwear/sportswear<sup>vii</sup>**

As previously mentioned, there is a lack of accurate reference with regard to stretch blocks for swimwear both nationally and internationally. To present a feasible and workable module, it was necessary for the researcher to develop new stretch-blocks and block instructions. As such they are original artefacts, outcomes of the mode of action research used in this project. Hence refinement and alterations were made over a period of time after numerous fittings on models and mannequins and after feedback from colleagues and students had been considered.

### **Secondary sources of importance**

Particularly influential in the development of patterns for this module have been a number of texts, most notably Haggar's *Pattern Cutting for Lingerie, Beachwear and Leisurewear* (1996). Haggar specialises in pattern cutting for lingerie, beachwear and leisurewear all of which have a strong link to this research project. Haggar has proved to be an accurate and reliable source for patterns in the researcher's experience of teaching this subject and consequently, her work has informed "Part 1 – The Bra" which is included in the SOL module.

A local reference that has proved to be particularly useful is *The Fascinating Art of Creating Patterns* (1988) by Alyce Defty who was the Head of Fashion Design at Technikon Natal during the period 1970 – 1995. Significantly, Defty developed her text for students at Technikon Natal and, as such, it acts as a precursor of, and inspiration for, this work. However, comments made by students in interviews for this project and in less formal contexts indicate that they find Defty's work "too wordy". Many find it difficult to relate to the pedagogical design of the block drafts (personal communiqué with students 2003). Notwithstanding student reservations, Defty's text offers comprehensive knowledge and information in respect of fashion terms and definitions. On the subject of computers and pattern cutting one text has been particularly influential – *CAD in Clothing and Textiles* (1996) by Winifred Aldrich, which has informed the theoretical background of this research project. However, on a practical level, an investigation of Aldrich's patterns indicates that her blocks are

unsatisfactory for the fit requirements of the SOL module. After having made up a 'toile' of the Aldrich blocks as part of the preparatory research it was clear that new and original blocks for stretch patterns were required. Hence, all the blocks included in the CD-ROM are original works by the researcher.

Discussions with academics in the Eastern Seaboard region indicate that both of the above-mentioned texts are the most widely used in South African fashion schools and departments. Each of these texts deals with block development and block manipulation, and both have been integral in paving a way forward for the researcher's original work on block development for swimwear using stretch fabrics for the SOL module.

### **Swimwear – A brief historical background**

It could be argued that throughout the 20<sup>th</sup> Century there has been a progressive trend towards more leisure time in affluent societies. This is particularly true of the developed world and affluent communities in developing countries such as South Africa. The increase in leisure time has been important with respect to the development of sportswear, particularly swimwear, as a separate apparel sector in fashion design. By the turn of the millennium, health consciousness and the 'cult of the body' emphasised by the media ensured that there was greater interest in leisurewear and active-sportswear, particularly swimwear and gym-wear.

Included on the SOL module is a broad introduction to the history of swimwear with particular reference to Durban (See Appendix A). The interactive nature of digital information retrieval makes it possible, and desirable, to include as much background information as possible. The inclusion of a historical background enables the curious student to explore, and hopefully, develop an appreciation of the past and how it often informs current practice. The reference to development of swimwear in Durban is also an explicit effort to stimulate the interest of DIT students in local history. In this manner it is intended to make Design History accessible in an informal context and in an interesting way.

The inclusion of a history of swimwear also emphasizes the way in which changes in the social and technological context inform design. As Probert noted, it was for medicinal reasons that people took to seawater: “In the 19<sup>th</sup> Century, sea bathing from ‘bathing machines’ became popular, involving immersion, but not swimming, clad in heavy silk or woollen garments, as a cure for many illnesses” (1981: 7). Thereafter clothing for swimmers gradually evolved to allow more movement to the bather, although it was not until 1907 that an Australian swimming champion, Annette Kellerman, designed the first truly practical swimsuit.

As middle class concepts of leisure changed during the late 19<sup>th</sup> Century, a different concept of dressing for leisure also developed. On the beaches it was inevitable that parading to see and be seen should become a spin-off from swimming and have practical implications for the development of swimwear.



**Figure 5.3:** North Beach, Durban

**Figure 5.4:** South Beach, Durban

## **Textile technology and Swimwear**

During the first fifty years of the 20<sup>th</sup> Century, swimwear was characterized by “engineering, elastic, emancipation and enjoyment” (Lencek and Bosker 1989: 55). New textile technology encouraged the development of new fabrics that helped to create a ‘second skin’ suitable for swimming. These changes are linked to changed attitudes about the enjoyment of life and emancipation of women. Early costumes in Durban, contrary to the requirements of the climate and the practicalities of swimming, covered the wearer from knee to neck. Swimming costumes were not fashionable essentials at the beginning of the century. Hot dark colours were considered appropriate as they did not reveal too much of the body beneath when wet. The fabrics were thick and made of Serge (a twill cloth, hard wearing and made from worsted or woollen yarn) which became even heavier when wet. By 1914 fabrics that were stretchy were used and swimwear became thicker but closer fitting.

## **Stretch fabrics and considerations**

The revolutionary fabrics of the twentieth century provide women with comfortable fashion. Earlier decades of fashion, would hardly recognize the unrestrained, liberated bodies of today, clothed in underwear that gives both physical support and freedom of movement. Much of the styling today would not be possible without the extraordinary advances in the twentieth century of both textiles and technology. (Bressler et al. 1997: 75)

The importance of man-made fibre cannot be underestimated, affecting cost, fit, and comfort of all types of underwear, swimwear and active wear. New developments in fibre and fabrics with all the blends available and the versatile characteristics they lend, have brought about great changes in pattern development and design for the fashion industry. As Bressler et al put it: “Sexual politics, modern technology, a rapid succession of fashion styles and the development of global communications in all its forms – television, newspapers, and film – have conspired to blur the line between outerwear and underwear” (1997: 75).

The 20<sup>th</sup> Century heralded dramatic changes to lingerie, swimwear and underwear due largely to technological advances in textiles. Elastane fibres have replaced rubber to give stretch properties to fabrics. According to Bressler et al, Lycra, the first elastane fibre, was invented by the company Du Pont, in 1959<sup>viii</sup>. It carried all the qualities of elastic but was far more adaptable – it offered more support, was lighter, more powerful, but at the same time much less bulky than elastic. Du Pont's research led to the development of stretchy fabrics, better known as Spandex and Lycra, which literally changed the shape and construction of all underwear and swimwear. The composition of swimwear fabrics is mostly a blend of synthetic fibres, such as Lycra and nylon fibres or a blend of natural fibres such as cotton and Lycra. The elastane content in Lycra can be as little as 2% and this small amount can make a remarkable difference to the fabric's body-hugging characteristics.

The phenomenal strength and lightness of these fabrics is ideal for sportswear. Advances in textile technology offer fabrics with great versatility when combined with other fibre providing added softness and comfort. “Swimwear fabrics are able to withstand exposure to strong sunlight, sea-water and chlorinated water and are resistant to many chemicals and also to perspiration” (Haggar 1990: 155). Other qualities for widespread use of synthetic fabrics are that they are less absorbent, and therefore sag less with the weight of water, dry more quickly and are resistant to damage by lotions.

## **Stretch**

These stretch characteristics make it possible for stretch patterns to be cut without complex body shaping, i.e. bust darts or gathers can be avoided if needs be. The blocks are constructed to be smaller than the body measurements and to stretch to the body shape. The stability and recovery rate (ability to return to the original state) in stretch fabrics with elastane content is ideal for active wear applications. Knitted fabrics (without elastane) also have the ability to stretch but their recovery is not as good. Stretch and relaxation properties are not always the same and blocks need to be tested for fit. There is about a 20% reduction in size from woven basic block to stretch basic block. Fabrics can be measured on an instrument for their stretch properties,

however, the blocks need to be developed so that the garment when worn in a stretched position has good visual appeal, i.e. fitting snugly, not too tight or too loose.

If the stretch value is too high the garment will feel uncomfortable and if too low the appearance will not be optimized. The pattern blocks for stretch garments are based on this ‘visual stretch’. Other factors that will affect the stretch properties are:

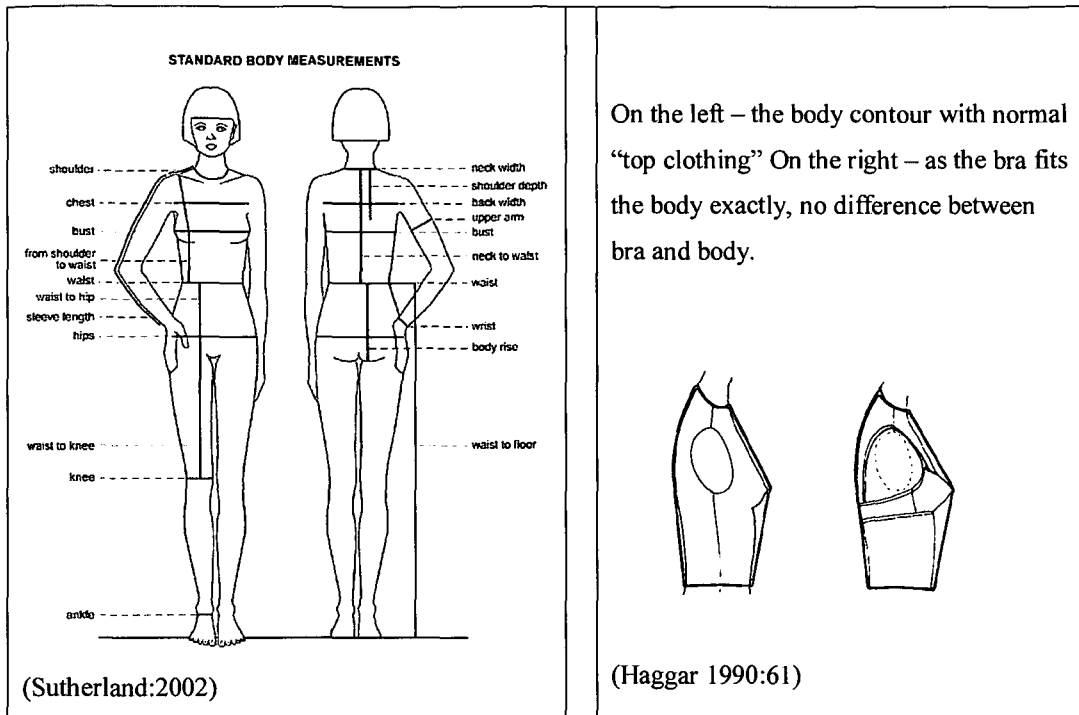
- 1) weight and thickness of the fabric
- 2) visual stretch when worn (basic fitting).
- 3) horizontal visual ‘action’ stretch (visually acceptable stretch when the body is in action).
- 4) vertical effects of horizontal stretch (the reduction in the vertical measurement and compensating two-way stretch) i.e. the decrease in measurement of the fabric vertically when the fabric is stretched horizontally.
- 5) amount of recovery after the fabric has been stretched. The ideal recovery rate is 100%.

**Importance of ease allowance**

When drafting the basic dress, bodice, sleeve, skirt or trouser block for woven fabric, ease is incorporated into the blocks, and subsequently is removed when developing blocks for stretch fabrics. The size chart table shows easing allowances for body measurements and how much easing is removed in each specific block. Elasticity replaces ease in blocks using stretch fabrics. According to Haggar, “the inherent elasticity generally provides sufficient ‘give’ to replace this ease” (1990: 216).

Size	6	8	10	12	14	16	total Block Drafting Measurement
Bust	80	84	88	92	96	100	98
Waist	60	64	68	72	76	80	72
Hips	86	90	94	98	102	106	99

**Figure 5.5:** Detail from size chart (See SOL Module Appendix A)



**Figure 5.6:** Positioning of body measurements  
(See SOL Module Appendix A)

**Figure 5.7:** the difference between body and bodice outline. (See SOL Module Appendix A)

When cutting a pattern one normally reduces the width and length of the blocks according to the elasticity of the fabric, however, many fabrics are now being developed with stretch /elasticity in the width only. These fabrics alter the width, and to a lesser extent alter the length. These developments have been engineered for comfort in closer fitting garments, however, active sportswear and in particular, swimwear is better suited to fabrics with most elasticity.

The stretch blocks developed for Part Two of the SOL module are for super stretch fabrics with the two-way stretch properties mentioned above. Different fabrics require modifications to the blocks and thicker fabrics or low-recovery rates require more horizontal ease allowance. Fabrics without two-way stretch also require more vertical ease allowance. The blocks for this module are drafted for fabrics with a basic visual stretch rating of between 15 – 20%, which covers most two-way stretch fabrics available locally.

### **Types of Blocks for Swimwear**

Blocks for swimwear are cut with ease allowances removed. As previously mentioned, stretch fabrics are used for their body hugging qualities. Stretch blocks may vary slightly depending on the amount of elasticity included in the blend. They may also vary depending on the construction of the weave. For this reason blocks must be made up into trial garments to check the accuracy and comfort of the fit. The trial garment needs to be assessed on a model to reveal any faults or confirm good styling. This in turn helps the student develop an eye for line and shape and relating the knowledge to flat patterns. This is practised in the fashion industry generally, to avoid costly mistakes and to check styling detail. To ensure precision for mass production, the trial garment for swimwear is cut in the same fabric. Hence any module intended to function within a VLE has to make provision for students to hand-cut the patterns and manually make a 'toile' for the final fitting.

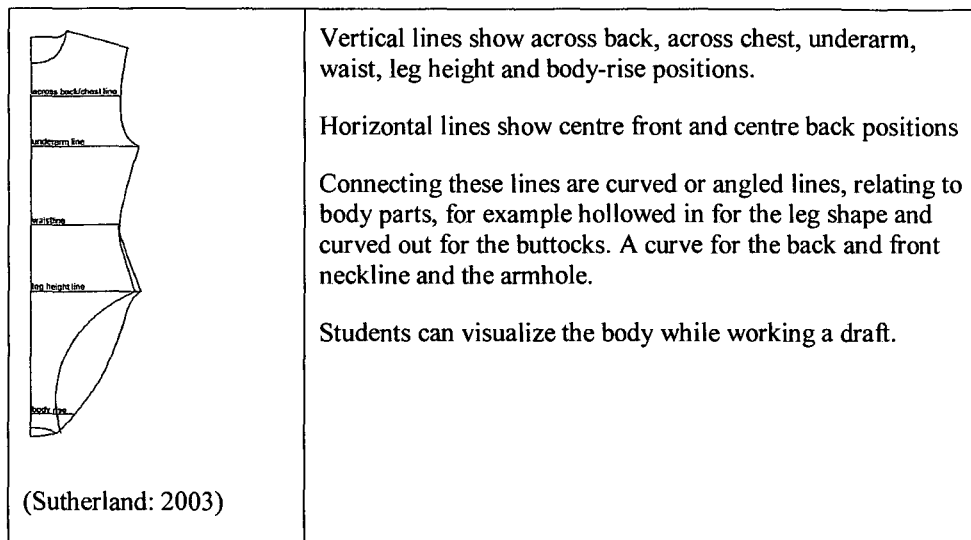
### **Block development**

Clear illustrations and instructions have been developed for the SOL module to provide a succinct structure for block development suitable for stretch fabrics. Blocks have been developed using body dimensions from standard size charts (See Figure 5.5). The block structures have been tested by students during both computer-based and manual learning sessions. Basic blocks are developed for use in pattern cutting and serve as templates from which styling follows. These blocks need to be clearly understood for satisfactory styling to be implemented from them. With experience, the skill or craft of styling a design will follow.

### **Converting full-scale blocks to digitised illustrations for the CD-COM**

As mentioned earlier, in developing the blocks for the SOL module the researcher tested the fit of each pattern by manufacturing a number of prototype garments which were fitted and refitted to a size 34/10 woman's standard figure until the final cut was perfected. Thereafter the blocks were drafted by conventional hand cutting methods using pattern card and scissors. Once completed, the patterns were then digitised on

the Ploygon © Xtzym 2000 and the digital pattern was then scanned and transferred into Aldus Freehand®. These images were converted to JPEG format and saved at 70 – 100 dpi. (standard computer monitor display is 72 dpi). This was done to reduce computer memory problems as well as problems with scale should students choose to print out material (Figure 5.8).



**Figure 5.8:** digitised illustrations

### Module use of digital images

In developing the SOL module, a digital-image database has been created and then related to a text database that describes them and their content. This procedure necessitates selecting technologies, which will define how the module and its content will look. In this process the researcher identified issues that arose and charted certain points where decisions needed to be made regarding technical specifications. As Besser and Trant explain when dealing with technology one needs “to develop a strategy that does not limit or foreclose future options and that offers a likely upgrade path” (1995:7).

The users and uses of an image database need reassessing, and the composition of a digital image plays a critical role in determining its character and usefulness. Some of the details that need to be considered when creating digital images – bearing in mind that image quality is cumulative – are considerations such as the type of scanner used. Throughout this project a Hewlett Packard ADF 6300 was used to ensure that all

images were copied at a minimum of 2400 dpi. This has ensured the overall quality of a digital-image archive.

A digital image is defined by Bresser and Trant as:

[an image] composed of a set of pixels (picture elements), similar to dots on a newspaper photograph print, arranged according to a predefined ratio of columns and rows. Each pixel represents a single colour or grey-scale value. The number of pixels in a given area defines the resolution of an image. Resolution is a measurement of clarity, or detail, and can refer either to an image file or the device, such as a monitor, used to display the image. (1997: 7)

Besser and Trant note that coloured digital images are displayed differently on the printed page than on a monitor. In print, colour is represented as light reflecting off ink, in the secondary colours of cyan, magenta, and yellow – CMYK. On a monitor, colour is represented with emitted light, as varying intensities of the three primary light colours: red, green and blue in RGB colour.

Images are converted to digital form using a scanner. During image capture, an image is 'read' or scanned at a predefined resolution and dynamic range (digitising). The resulting file is then formatted and tagged so that it can be easily stored and retrieved. The image-capture process is very labour-intensive and therefore costly. Image capture, combined with cataloging and indexing, may account for 90 percent of the cost of building an image database. (1997: 10)

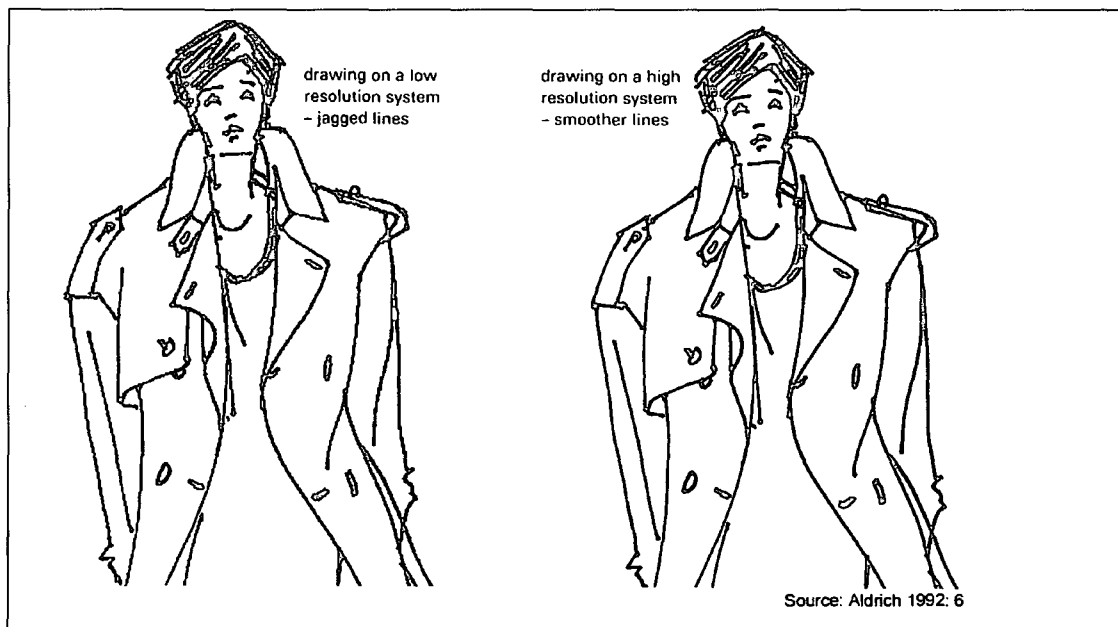
### **The Website**

In order to be viewed clearly the web page size should be 800x 600 pixels (this characterises average current monitor displays) and the image file size used in developing the SOL module was generally between 30 – 70 KB. Print resolution is more commonly expressed in terms of dots per inch (dpi). On average, the dpi for this project ranges between 1200 and 2400, image file resolution and output (print or display) resolution combine to influence the apparent clarity of a digital image when it is viewed.

For this research project Adobe® Photoshop® and Adobe® PhotoDeluxe™ were the most appropriate software choices for image file compression to ensure less room taken up on disk space. The compression method is known as JPEG, a lossy

compression scheme, meaning that some data is lost during the compression. JPEG compression works well with continuous tone images, such as photographs, and also for distributing images on the World Wide Web (WWW), as has been done extensively in this project.

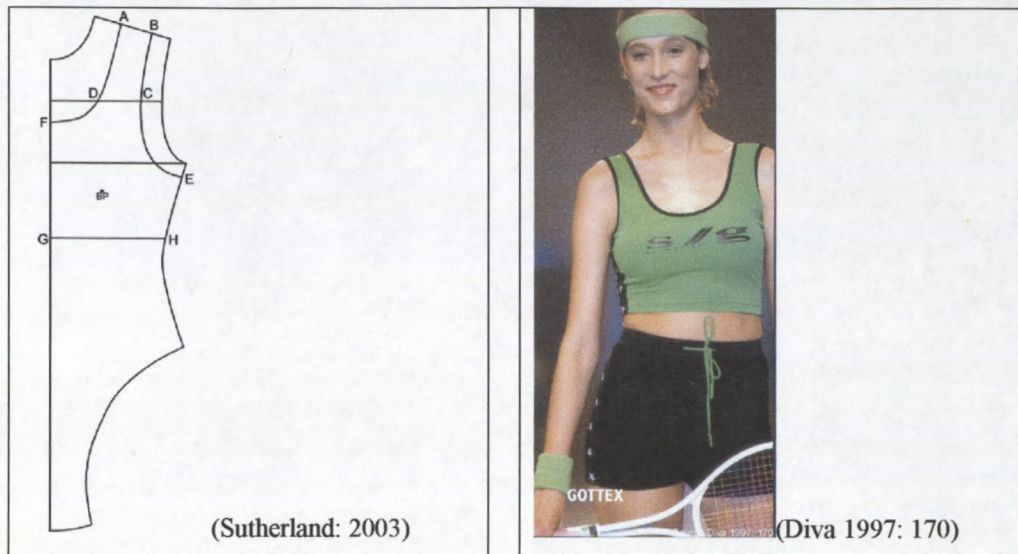
Both programmes have been useful in serving different functions. The drawing programmes being vector based, offer line drawings very suited to illustrations where lines will print smoothly at any resolution. The file sizes are smaller and more suitable for Web application. Raster-based displays, also called bitmapped images, are offered by paint programmes such as Adobe® Photoshop® 6, which has been used in this project. The image is a series of pixels rather than a line, not as suited to the pattern-making illustrations but ideal for the photographic images in this project as more colours are available in the latter. (See Figure 5.9)



**Figure 5.9:** left – low resolution, right – high resolution

Generally, the images in this research project are photographic images, of fashion models, textiles and highly coloured detail, so for this reason it was best to choose the high to maximum option when saving a JPEG depending on whether disk space or preserving most image data was being considered. For Format options, the default

setting of Baseline ("Standard") was used. Images in this module have been created in a raster-based paint programme and others in a vector – based drawing programme (See Figures 5.10 and 5.11).



**Figure 5.10:** Left – Vector based – ideal for illustrations and line drawings

**Figure 5.11:** Right – Raster based bitmapped images – ideal for photographic images

### Structuring the SOL CD-COM

In the development of the SOL CD-ROM, FrontPage®2000 software was used to create and publish the SOL website. The website is made up of individual files called web pages which have been transferred to a host computer called a web server.

Second year fashion students at the DIT have access to this site from computers on the DIT premises and therefore need not pay an Internet Service Provider (ISP) as is usual for some courses.

The homepage takes up only one screen, effective for learners to see all the information on this page at one time. All the files for the website were created using Microsoft FrontPage®2000, including a Hot Potatoes quiz for student self-evaluation. Thereafter, MS Explorer was used to build the folder and file structure for the site and MS FrontPage to author the HTML pages. Hypertext mark-up language which allows one to place graphic images and wrap text was used and WS-FTP to upload the

folders and files to an Internet server. The server makes the site available to students who request it using a Web browser. Updates of the document ensure that the content is always current.

The design of a website is crucial to its success, and the criteria used in designing the SOL website were interactivity, easy access, and ensuring that all the links work with a short time to load. Students become bored and frustrated and even leave the site should it take too long to upload. Included on the website are clear aims and objectives for the students to follow. SOL also includes background information and details about the course i.e. the institution, the title of the module and the course, email and web addresses, lists of required and /or suggested materials needed to complete the module.

<p><b>CONTENTS</b></p> <p><a href="#">Preface</a></p> <p><a href="#">Introduction</a></p> <p><a href="#">A brief history of swimwear</a></p> <p><a href="#">Swimwear 1902–2002</a></p> <p><a href="#">About blocks and fabrics used for swimwear</a></p> <p><a href="#">swimwear definitions</a></p> <p><a href="#">Pattern cutting terms and definitions</a></p> <p><a href="#">Fashion and technical terms</a></p> <p><a href="#">Women's standard size chart</a></p> <p><a href="#">Module 1(swimwear on line) SOL</a></p> <p><b>PART 1</b></p> <p>The bra block and variations</p> <p><a href="#">a brief history of the bra</a></p> <p><a href="#">the bra construction</a></p> <p><a href="#">the bra block</a></p> <p><a href="#">bikini top with halter ties (style A)</a></p> <p><a href="#">strapless half-cup with underwires (style B)</a></p> <p><a href="#">underwired full-cup bikini style (style C)</a></p> <p><a href="#">underwired full-cup bikini (style D)</a></p> <p><b>PART 2</b></p> <p>The basic blocks for stretch fabrics</p> <p><a href="#">basic stretch skirt block</a></p> <p><a href="#">basic stretch leotard and sleeve block</a></p> <p><a href="#">basic stretch dress and sleeve block</a></p> <p><a href="#">basic stretch top block</a></p> <p><a href="#">basic stretch leggings block</a></p>	<p><b>PART 3</b></p> <p>Adaptations of stretch wear patterns</p> <p><a href="#">bra top swimsuit</a></p> <p><a href="#">strapless swimsuit</a></p> <p><a href="#">swimsuit with low back</a></p> <p><a href="#">two-piece swimsuit</a></p> <p><b>PART 4</b></p> <p>Further variations adapted from the basic stretch blocks.</p> <p><a href="#">bikini top</a></p> <p><a href="#">bikini pant (thong)</a></p> <p><b>Tests</b></p> <p><b>Links</b></p>
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**Figure 5.12:** Contents page from SOL CD-ROM.

	<p><b>1907</b></p> <p>Tight fitting black wool one-piece. Designed by Annette Kellerman an Australian champion swimmer. The first truly practical swimsuit. Reference: Lencek &amp; Bosker 1989:36</p>		<p><b>1930</b></p> <p>Tailored two-piece "Beach Suit." Tight unisex style. Daringly cut lower neck. Longer armholes. Belted, sometimes with mock pockets. Bare legs. Top could be detached for men. Reference: Lencek &amp; Bosker 1989:71.</p>
	<p><b>1940</b></p> <p>Peek-A-Boo cut. Often cut in glamour fabrics. Ruching and gathered detail to emphasize bust. Lastex panels disciplined the hips and tummy Reference: Lencek &amp; Bosker 1989:84.</p>		<p><b>1955</b></p> <p>Ruffle top bra. Empire line and halter-neck. Front and back shirring. Often cut in cotton. Reference: Lencek &amp; Bosker 1989: 105.</p>
	<p><b>1955</b></p> <p>Strapless two-piece. Exotic animal prints. Pants cut without vestigial skirt with higher leg. Padded bra cups sewn with seams to create 1950's structured, artificial look. Reference: Martin &amp; Koda 1990: 114.</p>		<p><b>1960</b></p> <p>Turtle neck with exposed sides. futuristic designs cut in "wet look" fabric. No longer structured natural look. Second skin shaped to reveal body. Reference: Probert 1981:68</p>

**Figure 5.13:** Detail of history tableaux on the SOL CD-ROM.

A great number of images were needed for this website and these image files needed to be adapted in order to be incorporated into web pages. MS Image composer was used for this purpose. As previously mentioned, all these images needed to be captured and prepared for digitisation or scanning; thereafter the digital files were edited to suit the project aims and the target audience. Many of the images used are photographs taken by the researcher of the original artefacts using a digital camera or single reflex camera (SLR) and therefore are not subject to copyright. However, images from secondary sources have been credited with source information. This

swimwear module provides students at the DIT, and beyond, with access to many digital images on the subject to assist in learning and research. This has the potential to be networked via other CD-ROMs or the DIT's intranet and future linking with external institutions via the Internet.

However, to thoroughly evaluate the SOL module, it was necessary to develop and test it on a CD-ROM as well as a module taught in the conventional way. The course material was developed so that manual-based classroom methods of learning were integrated with computer-based methods. The module ran over a two-week period (four days with five periods per day). Both groups received the same information albeit in a different form. After completing the SOL module the students were asked to respond to a questionnaire. (see Appendices B and C to investigate how the modules were received by the students).

#### **User evaluation**

The module continued to be developed and refined over a six month period (April – September 2003) to incorporate user evaluation and feedback. This involved a cycle of planning, designing, implementing, evaluating and finding the best solutions to problem areas (See Table 5.1, page 55 Step 8). In the “manual method test”, all the information was given in hard copy to be kept in files. The aim of the module was to teach Pattern Cutting to second year students who already had prior knowledge from first year level. The module was taught over a period of four days and an evaluation questionnaire was completed by the participants at the end of each section.

The questionnaires included a choice of three possible response options to investigate how the module was received by the students (Appendices C & D). Student responses were analysed to develop and perfect the work for the final product. The questionnaires and student responses on the “manual method of learning” have been included in Table 5.3 (See below).

**Analysis of Questionnaire – the manual method of teaching PT, a module on swimwear.**

Questions	Response 1 (R1)	% students to (R1)	Response 2 (R2)	% students to (R2)	Response 3	% students to (R3)
1. How have you found this module?	essential to skills required for PT.	50	enjoyable	50	challenging	40
2. Did you find this background information :	useful and interesting	60	useful	30	not essential	10
3. Are the notes and illustrations on the stretch blocks clear and easy to follow?	yes	100	no	0	maybe	0
4. Does it help to have the teacher demonstrate the draft before doing it oneself ?	Yes	90	no		maybe	10
5. If the module were taught through the medium of notes and illustrations without a teacher present how would you manage?	With ease	10	with difficulty	90	a waste of time	0
6. Have you understood how to construct basic blocks for stretch fabrics?	Yes	100	no	0	Maybe	0
7. How important do you think it is to have a set of stretch blocks?	essential	40	helpful	60	waste of time	0
8. Do you think that you could interpret basic swimwear designs after having completed the stretch module and brief?	Yes	80	no	20	Maybe	0
9. Have you read the notes given on the history of swimwear and stretch fabrics.	yes	60	no	10	some of it	30
10. If yes, have you understood all the information given in the notes?	Yes	90	no	0	not applicable	10
11. Did the explanation preceding the start of the module help in being able to complete the module?	Yes	100	no	0	made no difference	0
12. How did you find the history quiz?	could answer all	90	could answer a few	10	could not answer any	0
13. How did you find the pattern technology quiz?	could answer all	90	could answer a few	10	could not answer any	0
14. How did you find the stretch quiz?	could answer all	100	could answer a few	0	could not answer any	0
15. How have you found the brief?	essential in learning how to interpret designs	90	challenging	40	enjoyable	10

**Table 5.3:** Manual method

**Tabulation showing student responses to a questionnaire on computer-based method of teaching pattern cutting (Some students chose 2 responses hence percentage not adding to 100%)**

Questions	Response 1 (R1)	% students to (R1)	Response 2 (R2)	% students to (R2)	Response 3	% students to (R3)
Q1 How have you found this module?	essential to building skills for pattern construction	80%	challenging	20%	enjoyable	20%
Q2 Did you find the background information?	useful and interesting	80%	useful	10%	not necessary	10%
Q3 Does it help to have the teacher demonstrate the draft before doing it yourself?	yes	90%	maybe	10%	maybe	0
Q4 If the whole module were taught through the medium of notes and illustrations without a teacher present how would you manage?	with difficulty	90%	with ease	10%	a waste of time	0
Q5 Do you think it is desirable to have a teacher present to help while completing the swimwear drafts?	essential	40%	useful	60%	not necessary	0%
Q6 In following the module have you understood how to construct basic blocks for stretch fabrics?	yes	100%	no	0%	maybe	0%
Q7 Is the module easy to follow on CD-Rom without a teacher present. How did you manage?	with ease	100%	with difficulty	0%	a waste of time	0%
Q8 Do you think that working on this module has improved your computer literacy skills?	yes	70%	no	30%		
Q9 How would you rate your computer literacy?	fully computer literate	80%	partially computer literate	20%		
Q10 Have you read the notes given on the history of the bra, background information etc.	yes	80%	no	20%		
Q11 Did the explanation given by the lecturer preceding the start of the module help in being able to complete the module?	yes	100%	no	0%		
Q12 How did you find the history quiz?	could answer all	90%	could answer a few	10%		
Q13 How did you find the pattern technology quiz?	could answer all	90%	could answer a few	10%		
Q14 How did you find the stretch quiz?	could answer all	100%	could answer a few	0%		
Q15 Would it be beneficial to work on the module in your own time?	yes	90%	no	10%		
Q16 If yes, would you find it beneficial to work at your own pace at home or at the technikon?	home	40%	technikon	60%		
Q17 Does it help to have certain text hyperlinked?	useful	100%	not necessary	0%		
Q18 Did you use the links provided?	often	50%	a few times	50%		
Q19 Do you think that you could interpret simple swimwear designs now that you have completed this module?	yes	100%	no	0%		

**Table 5.4: Computer-based method**

## Findings

The students commented on the convenience of having the work available on CD ROM, which enabled them to work at their own pace, place and at a time of their choice. It also allowed for students to extend their knowledge beyond just what was covered in class time. Some students found it useful to make notes about problems encountered and which sections of the module they enjoyed in particular. Student feedback from the early control group (April 2002) was of particular importance especially since it was taken into consideration before the development of the final CD ROM (Appendix B). Students using the computer-based method, commented on the visually appealing aspects of the module, which included a history of swimwear. Many students mentioned how helpful they found the dateline with visual references (see Figure 5.13) as many fashion students often design with reference to past styles and periods to create a 'retro' look. While working on the technical / pattern cutting, students commented that, with the click of a mouse, they could refer to a relevant image which could be enlarged to show extra detail.

The results and findings made a significant contribution to the development and improvement of the CD ROM. The questionnaire confirmed the assumption that most students are computer literate. It is significant that an overwhelming majority of the students in both groups found the module essential to building the skills required for pattern cutting. However, many students found the module challenging. Half of the students used the links although the links were not central to the brief given and the students felt no pressure to use them. Future revisions of the module will incorporate this kind of research into the brief, with adequate time allowed to do so. When asked if it was helpful to have certain text hyperlinked, student responses were unanimously positive.

Both groups found the background information useful and interesting. From the students comments and recommendations it was clear that the quiz was an important part of the module as it appeared to encourage the students to work through the module. One of the most revealing responses was to the question on how easy it was

to follow the draft instructions and illustrations on CD-ROM without a teacher present, most students found it easy to follow without a teacher.

However, all the students felt that the explanation given by the lecturer preceding the start of the module helped them complete it. Students also found it helpful to have the lecturer demonstrate the draft before doing it themselves. When asked if it were desirable to have a teacher present to help while completing the module brief, the response showed that 40% felt it essential while 60% felt a teacher would be useful. Positive responses to both teacher-oriented and VLE-orientated features do not indicate a conflict, but rather support the approach where the two technologies, one which is computer-based and the other manual, can be used in tandem with each other.

When asked about the quiz, which enabled the students to find the answers for themselves by going through the SOL module in their own time, students responded very positively (See Tables 5.3 and 5.4). These responses support the conclusion that the CD-ROM encouraged interaction between student and material. The extent to which the visual nature of the course material enhanced the subject is also apparent. The overall responses were extremely positive as the students found the module to be visually appealing and easy to navigate, with clear user-friendly instructions and illustrations.

An obvious advantage in creating a VLE is that the instructions can carry additional hyperlinked information, (e.g. as pop-ups) which could be valuable in the learning process. It was also clear that there was the potential to develop and use the VLE technology to enable learning to take place at a distance. One important caveat, however, needs to be noted: developing instructional modules is time consuming and cannot be done without considerable research time and financial assistance.

An overall conclusion based on a review of all the responses from the students is that all the main objectives of this research project to present the subject content of the Pattern Technology Course for second year students in a flexible and interesting

manner have been met. Perhaps the most revealing response is contained in this quotation from one of the student respondents:

I really enjoyed this fresh and new way of learning patterns. It gave me a better overview of the subject that we are dealing so that we can fully understand what we are doing and feel more excited about it. It's far more motivating when you get home to pop the CD in and be stimulated with colour images and informative information (especially when info is directed to the place we live and therefore find more relevant), than to page through page after page of black and white notes that haven't been made relevant but are just photocopies of theoretical notes used in a bygone area [sic]. Thank you for a most enjoyable module, I hope there will be many more to come. (Anon. 2<sup>nd</sup> Year DIT student 2003)

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<sup>i</sup> Software used in this project included: Microsoft® FrontPage® 2000 Version: 4.0.2.3821, Adobe® Photoshop® 6, Macromedia® Freehand™ 10, Microsoft® PhotoDraw™ Version 2.0.0.1129, Adobe® Acrobat® Reader 4.0, Microsoft™ Publisher 2000 SR-1, FinePixViewer Version 1.1.02E and Hot Potatoes™ Version 5.

<sup>ii</sup> In the course of this research project, interviews and consultations were conducted with academics in Fashion departments at Border, Eastern Cape and Port Elizabeth Technikons in the Eastern Cape. In KwaZulu Natal, prior to the DIT merger consultations were held with academics at the M.L. Sultan Technikon and colleagues at Technikon Natal.

<sup>iii</sup> H D Lee send their employees on training courses to learn Photoshop® and Freehand™, two of the most useful and favoured software programmes both in the industry and in the technikons.

<sup>iv</sup> PE Technikon has all their workstations networked via the intranet as well as being linked to the Internet. The software programmes have also been upgraded since 2000. James also commented on the difficulty of adapting the fashion design course to accommodate and include all the necessary software instruction needed, on top of what is already taught and still necessary for fashion students. (personal communiqué with Tyrone James 16/9/2003).

<sup>v</sup> The scale used in basic pattern construction for drafts is a working scale of proportions of the bust, chest, hip or seat prominence dimensions (proportionate measure system) which enables one to construct an entire draft using extremely few direct body dimensions (Defty 1988:6).

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<sup>vi</sup> Pattern Drafting is the use of vertical and horizontal lines of certain dimensions, taken from the human figure or size charts and applied to a system whereby the lines form part of a basic block pattern. Thereby interpreting 3D designs into 2D flat patterns taking depth factors into account

<sup>vii</sup> Sportswear took on a new meaning in the Sixties. Clothes were designed to look sporty although not worn for sport. By the mid-decade, the new sportswear craze had hit, a one-piece exercise suit by Rudi Gernreich inspired by a dancer's leotard and tights, appealed to both professional and social dancers, who were quick to recognize the advantages, and comfort, of such a suit (Bressler et al. 1997: 75).

The Sixties led the way for active-sportswear to cross over into a new fashionable look in sportswear.

<sup>viii</sup> Spandex – a synthetic polyurethane fiber – became generally available. Composed of segmented plastic foam, spandex fibers could be covered with silk, cotton, wool, sharkskin, or faille to provide a stretchable, light-weight yarn. Lycra, Dupont's commercial name for spandex, possessed great tension, spring, and excellent figure control – in addition to being light, soft, supple and cool – making it ideal for a swimwear look that stressed shape, vibrant colour, and a clingy silhouette (Lencek 1989:115).

<sup>vi</sup> This history was initially developed as part of a National Higher Diploma report "A Bigger Splash" (Sutherland 1991).

## **Conclusion and Recommendations**

One of the primary outcomes of this research project was the development of an interactive SOL module on CD-ROM, designed specifically for second year DIT Fashion students for use within the Pattern Technology course. The completed SOL module on CD (See Appendix A) is the outcome of the research process arising from the critical questions posed in Chapter One.

As the discussion in Chapter Two emphasized, there is a need for students to feel comfortable with the convergence of technologies, which enables both practical design and access to information on a screen. This is of great relevance in facilitating the learning process within the digital paradigm. This project was conceived in the belief that computers themselves are an essential technology that fashion students need to be familiar with, even in the manual-based subjects such as Pattern Technology. Student feedback has shown that the majority of students at second year level have already developed basic computer literacy and, most importantly, show no signs of technophobia. It is clear that the younger generation is ready to embrace this technology as an integral part of the learning process. Perhaps this explains why they enjoyed working at their own pace in their own place and in their own time. Evaluation of the SOL module has consistently supported the theory of the VLE as espoused by various notable academics (Pratt and Paloff (1999), White (2000) and Porter (1997).

The enthusiasm of the students and their positive responses to the questionnaires (Appendix C) indicate that it is feasible, and even desirable, to make a predominantly manual-based subject such as Pattern Technology accessible within a digital environment. Happily, during the course of this project, the merger of the two Durban based Technikons came into being. Hence, the newly formed DIT made this research project available to all students studying fashion within the KZN region, and thereby facilitated a primary aim of the original proposal.

The DIT has developed an adequate infrastructure at the Brickfield Road Campus for Fashion Students to be able to access the SOL module on either the intranet or the Internet. Students' responses to the CD-ROM indicated that they enjoyed the capacity

of hyperlinks to extend their learning beyond the confines of the institution and, in the process, helped broaden their subject knowledge.

The tests carried out in the course of this research project indicate that the development of more modules within this and other subjects is not only possible, but essential. This requires the purchase of appropriate hardware and software (CAD/CAM) systems. The DIT to this end has purchased both Apple Macintosh and IBM PCs with all the relevant software packages necessary for Fashion Design instruction (Appendix E). This is positive in that students are exposed to different operating systems and the Technikon is able to offer the wide range of software applications vital to the Industry (See Table 5.1: Technikon table and Table 3.5: Industry table). The findings support regular updating of the IT, which may have to be sustained by students being required to pay annual computer levies.

For institutions on the Eastern Seaboard to maximize their limited resources, small but vital steps need to be taken to ensure that students can gain access to an intranet/Internet in order for the SOL module to be accessible from a distance. Discussions with academics in the Eastern Cape indicate that in order to facilitate VLEs in their respective institutions, intranet and Internet links would need to be established as a matter of urgency. Although facilities have been recently established at PE Technikon, the Eastern Cape and Border Technikons are still in need of special funding.

To address the critical question about quality in the digital paradigm, the researcher observed how successfully the computer could be integrated into fashion design subjects such as pattern technology. However, it is evident that computer based methods of design and production are not sufficiently well developed totally to replace manual skills (See page 34). For the foreseeable future, digital methods will only be used to augment the teaching of hand-crafted skills in the learning environment. Similarly, the lecturer cannot be totally replaced within the VLE as the fashion industry has not entirely forsaken manual based methods in the development of complex designs and pattern construction. Nevertheless, current trends in the South

African industry are towards the integration of the two technologies with all their added benefits.

Notwithstanding the above, this research project indicates that this particular platform can be successfully extended to enable teaching of handcrafted skills through the use of digital visual aids (i.e. video clips, sound, close-ups) and integrate them within a digital environment. Further, given the development of the necessary infrastructure at all Technikons mentioned above it is clear that the capacity of this technology to enable students in different parts of the country to receive instruction within the VLE is feasible.

However, it is not inconceivable that within the next decade advances in technology, financial constraints and student demands for flexible learning will make this mode of delivery highly desirable. In the short term it could be argued that modules such as SOL would enable the development of exciting short courses that would facilitate working learners and large numbers of students to enjoy the benefits associated with this mode of delivery.

### **Towards the future**

The South African consumer's desire for a more personalized range has been partially satisfied with the plethora of smaller retail outlets, which cater for more personalized garments. The success of outlets such as the Durban Designer Emporium (DDE) and Young Designer Emporium (YDE) is attributable to the demand for a more personalized approach in preference to the 'off the peg'/mass-produced type of retail clothing available at large retail stores. Not unexpectedly, this has encouraged many young South African designers to open small businesses as a viable career alternative to working in larger companies. Even so, it needs to be noted that large companies such as SACI and large retail stores such as Truworths, Woolworths, Edgars etc. have had to cater for exclusive ranges with smaller units per range. This is a trend which appeals to many fashion conscious consumers.

In the near future, fashion consumers will be able to access the latest fashion shows or catalogues on the Internet. On-line retailing has the capacity to revolutionize buying.

Alternatively, if a traditional retail environment is preferred, future fashion customers could step into a booth to have every detail of their figures scanned, recorded and fed to the computer. As Carey states:

Within two years, shopping for clothes in Britain will mean stepping into a 3D scanner shaped like a photo booth where infrared lights will read more than 300 000 points. From there, in a 'virtual changing room' on the computer's screen, you'll be able to try on every outfit in the store, and see how they fit your 'virtual' body. The statistics, once scanned, can be stored on a smart-card and used in other stores as well. (Carey 1999:66)

We live in a century in which new technologies are replacing old systems in order to avoid human error, to refine and to speed up production, and to avoid systems which carry huge risk. Automated methods and systems are being developed that are extremely precise and highly efficient. Designers will soon feel the pressure of having their skills mimicked by computer programs, and automatic computerised construction of pattern making has been developed to a point where MTM garments can be constructed within minutes for individual measurements.

This projection of totally automated systems is something that the South African industry has yet to look forward to (See Figure 3.5). For the foreseeable future the local industry and retailers are unlikely to match the projections of journalists such as Carey quoted above. Yet in education it is realistic to imagine a future in which student portfolios are presented on a CD-ROM for assessment. This is a future in which students, having already obtained the required competency in manual-crafted pattern cutting and garment construction also have the ability to present their work on a CD-ROM. This is the type of education which will prepare our students for a rapidly changing world.

The results of this research project clearly indicate the value of CAD/CAM in current fashion courses. Design students have a visual intelligence which, when using CAD as a means of expression, can in fact make more time available to work with ideas. The VLE can widen visual and practical experience and give access to a new medium that would have been denied if working manually.

The benefits of a digital environment for the fashion industry and fashion education are numerous, and include speed, accuracy, productivity, and communication. But the most important tool of the fashion designers' trade is imagination, which only humans possess. The challenge for the future is how to combine this 'human software' with developments in computer software and technology. A holistic education of a designer is to educate the hand, the heart, the mind and the eye. Computers offer unique ways in which each of these facets of design education can be extended. Yet students should still take heed of Peter Dormer's advice:

“Drive the tool rather than be driven by it” (1997:146).

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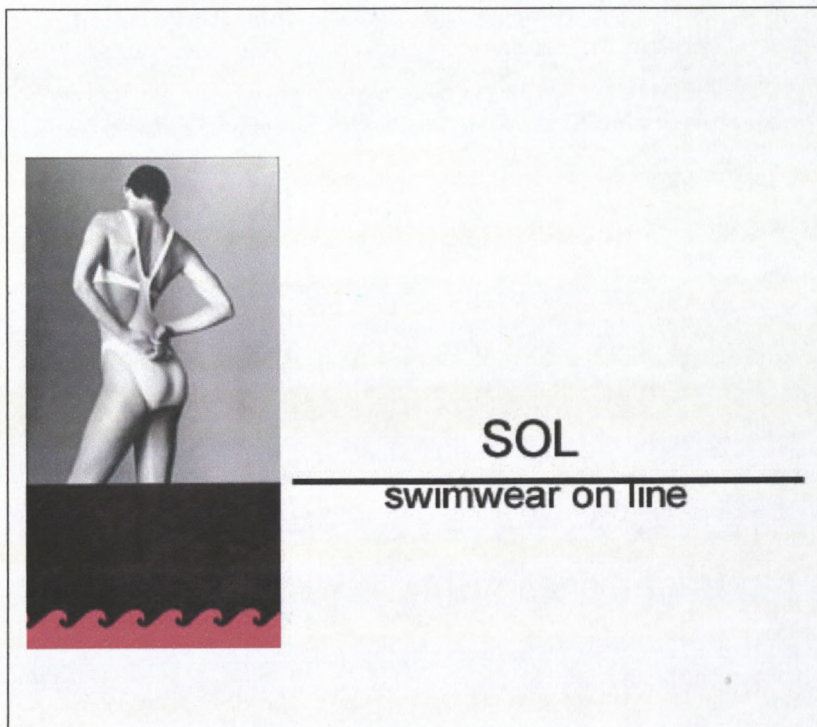
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## **Appendix A**

### **CD-ROM Module**



CD-ROM placed at the back of the thesis.

## Appendix B

## **Appendix B: Selection of blocks developed for the SOL CD-ROM**

### **PART 2**

The basic blocks for stretch fabrics

[basic stretch leotard and sleeve block](#)

[basic stretch dress and sleeve block](#)

[basic stretch top block](#)

[basic stretch skirt block](#)

[basic stretch leggings block](#)

### **PART 3**

Adaptations of stretch wear patterns

[bra top swimsuit](#)

[strapless swimsuit](#)

[swimsuit with low back](#)

[two-piece swimsuit](#)

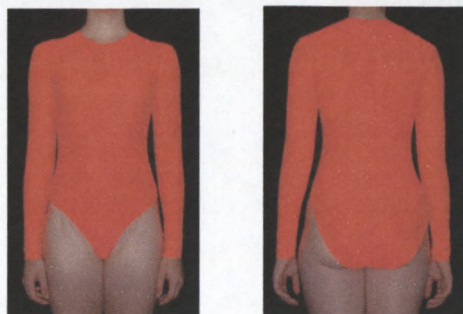
### **PART 4**

Further variations adapted from the basic stretch blocks.

[bikini top](#)

[bikini pant \(thong\)](#)

## STRETCH LEOTARD AND SLEEVE



### DRAFT MEASUREMENTS REQUIRED (EXAMPLE SIZE 10)

bust	-	88 cm	nape to waist	-	40 cm
waist	-	68 cm	armhole depth	-	21 cm
hip	-	95 cm	back width	-	36 cm
hip depth	-	20 cm	shoulder width	-	12.5 cm
body rise	-	28 cm	neck size	-	37 cm

	<p><b>Square down and across from A</b></p> <p><b>A – L</b> nape to waist, square across</p> <p><b>A – D</b> 3 cm, square across</p> <p><b>A – H</b> armhole depth minus 0.5 cm, square across</p> <p><b>D – F</b> half D – H, square across</p> <p><b>A – C2</b> 1.2 cm, square across</p> <p><b>A – B</b> one-sixth neck size plus 0.4 cm (6.5 cm)</p> <p><b>C2 – B</b> curve as for neckline</p> <p><b>B – E</b> connect horizontal parallel lines/shoulder measure -0.5 cm</p> <p><b>F – G</b> half back width minus 1.8 cm</p> <p><b>H – I</b> quarter bust minus 2.5 cm</p> <p><b>A – J</b> nape to waist minus 5.5 cm</p> <p><b>J – K</b> quarter waist minus 1.5 cm</p> <p><b>L – M1</b> quarter waist</p> <p><b>L – M2</b> quarter waist plus 0.5 cm</p> <p><b>L – N</b> quarter body rise minus 0.7 cm</p> <p><b>L – P</b> hip depth (20 cm) square across</p> <p><b>L – R</b> body rise (28 cm) square across</p> <p><b>L – T</b> body rise plus 3.4 cm</p> <p><b>T – U1</b> 5 cm</p> <p><b>T – U2</b> 5.5 cm</p> <p><b>N – O1</b> one-fifth hip measure</p> <p><b>N – O2</b> one-fifth hip measure plus 1 cm</p> <p><b>P – Q1</b> 4.7 cm (crutch width for front)</p> <p><b>P – Q2</b> one-seventh hip measure</p> <p><b>R – S1</b> 4.7 cm</p> <p><b>R – S2</b> 8.3 cm</p> <p><b>A – C1</b> one-sixth neck size plus 0.5 cm, draw in front neck curve</p> <p><b>P – Q</b> gusset lining position for front</p>
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Draw in armhole curve, from E through G to I for front and back

Draw in side seam for front from I to K and M1 and on to O1

Draw in side seam for back from I to K and M2 and on to O2

Mark a point 0.4 cm out from K and curve for both front and back side seams

Mark a point 0.8 cm up from T and curve for back crutch

Mark a point 0.7 cm down from T and curve for front crutch

Trace off the back and front blocks separately

The BUST POINT is situated 8 cm in from the C F line on the underarm line and 3.5 cm below this line (the shift is due to the stretch fabric).

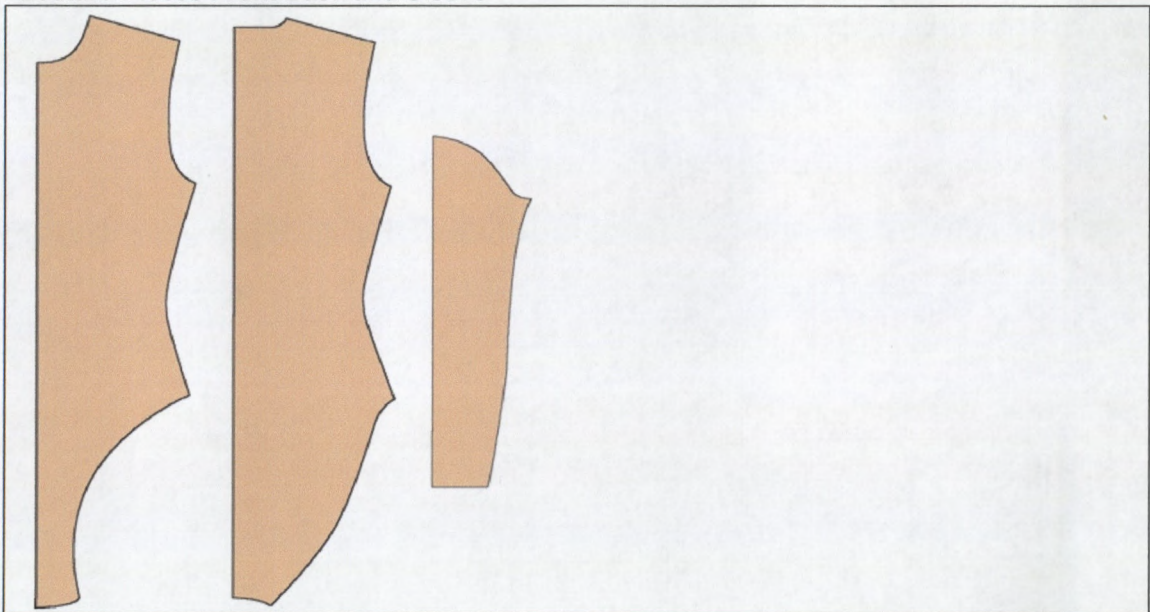
NOTE The stretch leotard sleeve block may be used with this block

NOTE The draft is instructed for convenience in size 10, however other sizes can be constructed using the same draft instructions.

NOTE All stretch blocks have their seam allowances already included (6 mm).

NOTE This block is drafted for maximum stretch fabrics such as Lycra. More ease would be required for partial stretch fabrics.

#### Leotard Pieces Front Back and Sleeve





Styling below can be developed from the blocks above



## STRETCH DRESS BLOCK



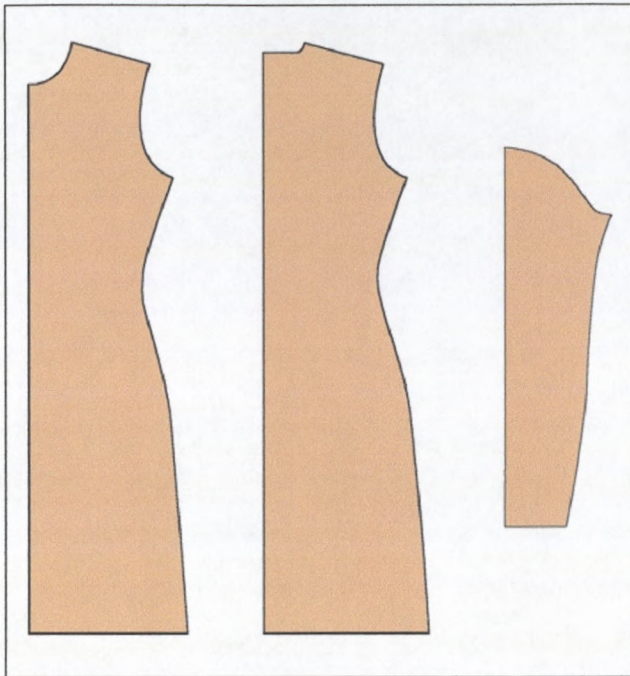
### Draft measurements required (example size 10)

Bust	- 88 cm	nape to waist	- 40 cm	hip depth	- 20 cm
waist	- 68 cm	armhole depth	- 21 cm	neck size	- 37 cm
hip	- 95 cm	back width	- 36 cm	shoulder width	- 12.5 cm

### Stretch dress illustration and draft instructions

	<p><b>Square down and across from A.</b></p> <p>A – L nape to waist plus 0.5 cm, square across</p> <p>L – R waist to knee minus 10 cm, square across</p> <p>A – D 3.5 cm, square across</p> <p>A – H armhole depth, square across</p> <p>D – F half D – H, square across</p> <p>A – C2 one-eighth the measurement A – F, square across.</p> <p>A – B one-sixth neck size plus 0.4 cm (6.5 cm)</p> <p>C2 – B curve as for neckline, use bodice block neck shape</p> <p>B – E connect parallel lines, using the shoulder measure</p> <p>F – G half back width minus 1.2 cm</p> <p>H – I quarter bust minus 1 cm</p> <p>A – J nape to waist minus 5.5 cm</p> <p>J – K quarter waist</p> <p>L – P hip depth (20 cm)</p> <p>L – M1 quarter waist plus 0.5 cm</p> <p>L – M2 quarter waist plus 1.2 cm</p> <p>P – Q1 quarter hip minus 2.5 cm</p> <p>P – Q2 quarter hip minus 1 cm</p> <p>R – S1 quarter hip minus 0.6 cm</p> <p>R – S2 quarter hip plus 1 cm</p> <p>A – C1 one-sixth neck size plus 0.5 cm, draw in front neck curve</p> <p>Draw in armhole curve, from E through G to I.</p> <p>Draw in side seam for front from I through M1 and Q1 and on to S1.</p> <p>Draw in side seam for back from I through M2 and Q2 and on to S2.</p> <p>Curve out line M1 – Q1 at midpoint, x for 0.5 cm.</p> <p>Curve out line M2 – Q2 at midpoint, x for 0.5 cm.</p> <p>Trace off the back and front blocks separately.</p>
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**Dress block pieces front, back and sleeve**



**Styling below can be developed from the block above**



## STRETCH TOP

### Draft measurements required (example size 10)

bust - 88 cm	nape to waist - 40 cm	hip depth - 20 cm
waist - 68 cm	armhole depth - 21 cm	neck size - 37 cm
hip - 95 cm	back width - 36 cm	shoulder width - 12.5 cm

### Stretch top illustration and draft instructions

**Square down and across from A.**

<p>A – L</p> <p>L – R</p> <p>A – D</p> <p>A – H</p> <p>D – F</p> <p>A – C2</p> <p>A – B</p> <p>C2 – B</p> <p>B – E</p> <p>F – G</p> <p>H – I</p> <p>A – J</p> <p>L – P</p> <p>J – K</p> <p>L – M1</p> <p>L – M2</p> <p>P – Q1</p> <p>P – Q2</p> <p>A – C1</p>	<p>nape to waist plus 0.5 cm, square across.</p> <p>waist to knee minus 10 cm, square across.</p> <p>3.5 cm, square across.</p> <p>armhole depth, square across.</p> <p><math>\frac{1}{2}</math> D – H, square across.</p> <p><math>\frac{1}{8}</math><sup>th</sup> the measurement A – F, square across. (1.5 cm).</p> <p><math>\frac{1}{6}</math><sup>th</sup> neck size plus 0.4 cm (6.5 cm).</p> <p>curve as for neckline, use bodice block neck shape.</p> <p>connect (horizontal) parallel lines, using the shoulder measure.</p> <p><math>\frac{1}{2}</math> back width minus 1.2 cm.</p> <p><math>\frac{1}{4}</math> bust minus 1 cm.</p> <p>nape to waist minus 3 cm</p> <p>hip depth (20 cm).</p> <p><math>\frac{1}{4}</math> waist.</p> <p><math>\frac{1}{4}</math> quarter waist plus 0.5 cm.</p> <p><math>\frac{1}{4}</math> quarter waist plus 1.2 cm.</p> <p><math>\frac{1}{4}</math> quarter hip minus 2.5 cm.</p> <p><math>\frac{1}{4}</math> quarter hip plus 0.5 cm.</p> <p><math>\frac{1}{6}</math><sup>th</sup> neck size plus 0.5 cm, draw in front neck curve.</p>
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Draw in armhole curve, from E through G to I.

Draw in side seam for front from I through K1 and M1 and on to Q1.

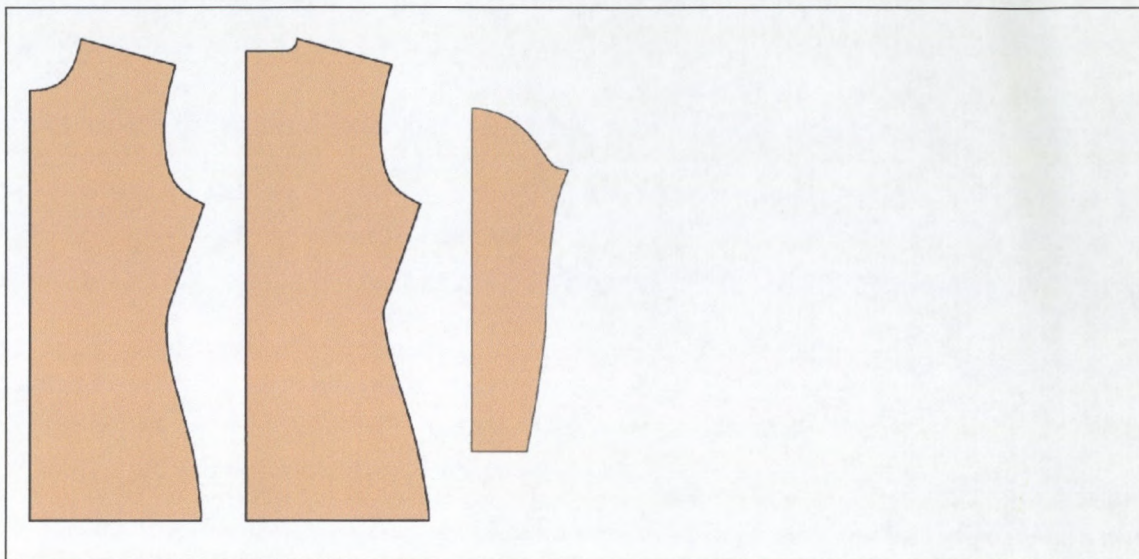
Draw in side seam for back from I through K2 and M2 and on to Q2.

Curve out line M1 – Q2 at midpoint x, for 0.5 cm.

Curve out line M2 – Q2 at midpoint x, for 0.5 cm.

Trace off the back and front blocks separately.  $\frac{1}{8}$ <sup>th</sup> the measurement A – F, square across. (1.5 cm).

### Stretch top block pieces back front and sleeve



**NOTE** The BUST POINT is situated 8 cm in from the C F line on the underarm line and 3.5 cm below this line.

**NOTE** The stretch dress sleeve block may be used for this draft (long or short).

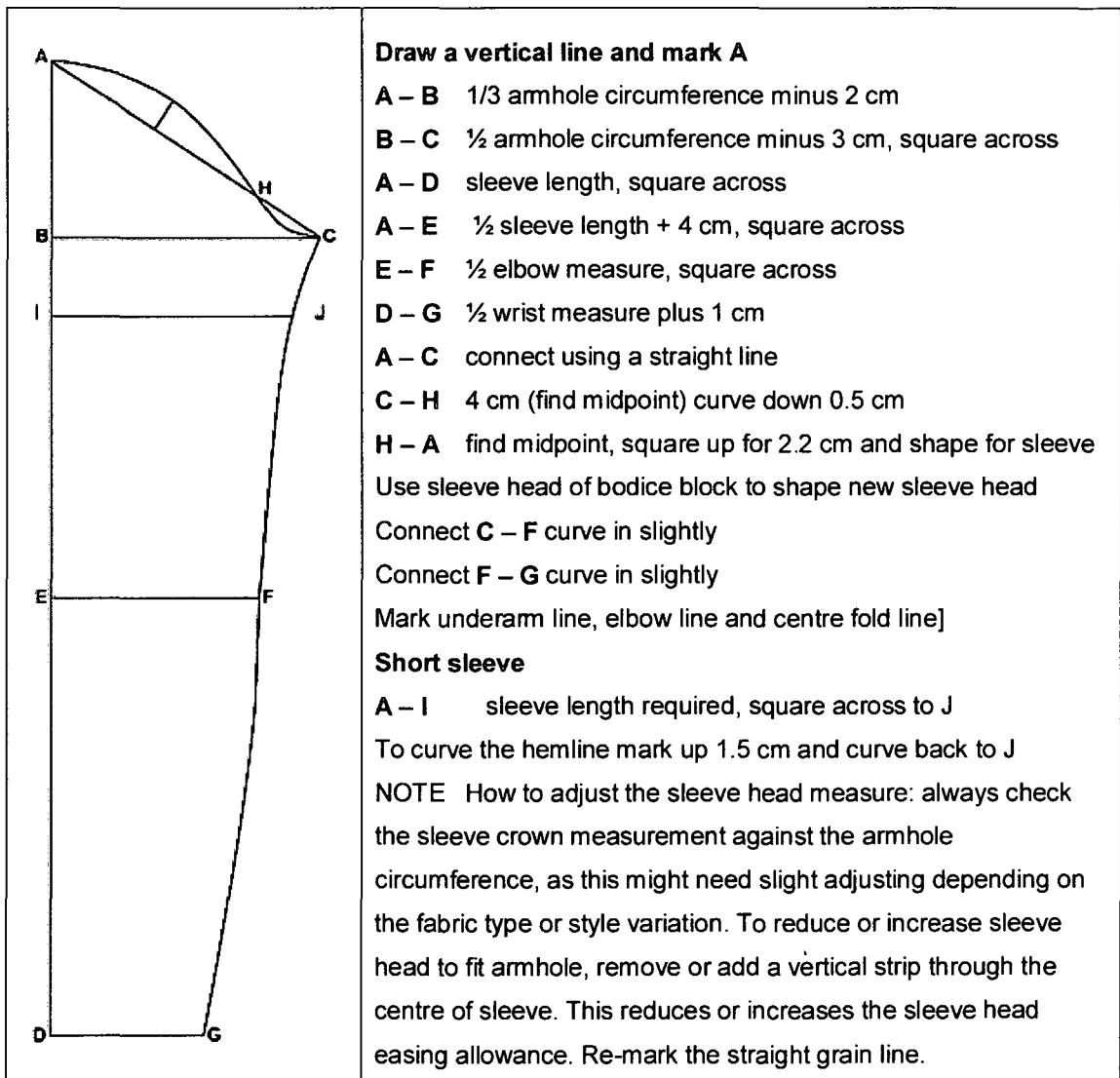
**NOTE** All stretch blocks have their seam allowances already included (6 mm).

**NOTE** This block is drafted for maximum stretch fabrics such as Lycra. More ease would be required for partial stretch fabrics.

### Styling below can be developed from the blocks above



Wrist measure – 16 cm



## STRETCH SKIRT

### DRAFT MEASUREMENTS REQUIRED (EXAMPLE SIZE 10)

waist to hip	-	20 cm
waist to knee	-	60 cm
waist	-	68 cm
hip	-	94 cm

### Stretch skirt illustration and draft instructions.

	<p><b>Square down and across from A</b></p> <p><b>A – B</b> hip depth (20 cm)  <b>A – C</b> waist to knee (60 cm)  <b>A – D</b> quarter waist plus 1 cm  <b>D – E</b> Square up for 1.5 cm to locate E  <b>A – E</b> Curve fro the front waistline  <b>A – F</b> C F position 0.5 cm above A on the C F line  <b>F – E</b> curve for back waistline  <b>B – G</b> quarter hip  <b>C – H</b> quarter hip plus 1.3 cm  <b>E – G</b> draw a straight line, find midpoint, square out for 0.9 cm to locate x  <b>G – H</b> draw a straight line          Trace off from A for the front skirt block          Trace off from A for the back skirt block</p>
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### Skirt pieces front and back

### Styling below can be developed from the blocks above

<p>Notches indicate matching position for side seam</p> <p><b>front</b>      <b>back</b></p>	<p>LEGER Diva 1997: 57</p>	<p>LEONARD Diva 1997: 51</p>
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## STRETCH LEGGINGS

	<p><b>Measurements required – example size 10</b></p> <p>             waist – 68 cm      waist to knee – 60 cm              hip – 95 cm      waist to floor – 103 cm              ankle – 23 cm      body rise – 28 cm              knee – 35 cm         </p>
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### Stretch leggings illustration and draft instructions

	<p><b>FRONT</b>  <b>Square down and across from A.</b>              A – B body rise minus 2 cm, square across.              A – C waist to knee minus 2 cm              A – D waist to floor minus 7 cm, square across              B – E quarter hip measurement minus 4.5 cm              E – F square up for one third A - B measure - 0.6 cm (8 cm)              A – G quarter waist measure plus 0.5 cm              G – K square down 1.5 cm              A – K join for front waist position              B – H quarter hip measure              E – x measures 2.7 cm along 45° angle              K – F join with a straight line              F – H join and curve passing through point x              C – I half knee measure minus 1 cm              D – J half ankle measure plus 1 cm  <b>Draw inside leg seam</b>              H – I join and curve the line inwards 1 cm at midpoint.              I – J join with a straight line</p> <p><b>BACK</b>              A – L quarter waist minus 1.8 cm              L – M square up for 2 cm              A – M join to form back waistline              E – x measures 3.4 cm along 45° angle              M – F join with a straight line              H – N equals 1.5 cm              F – N join and curve passing through point x              I – O equals 1.5 cm              J – P equals 1 cm  <b>Draw inside leg seam</b>              N – O join and curve the line inwards 1 cm              O – P join using a straight line              Trace around front and back sections, mirror the front and place the side seams together, to form a one-piece pattern.              Add 2 cm for elastic casing at the top and 1 cm hem allowance at bottom.</p>
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## BRA TOP SWIMSUIT

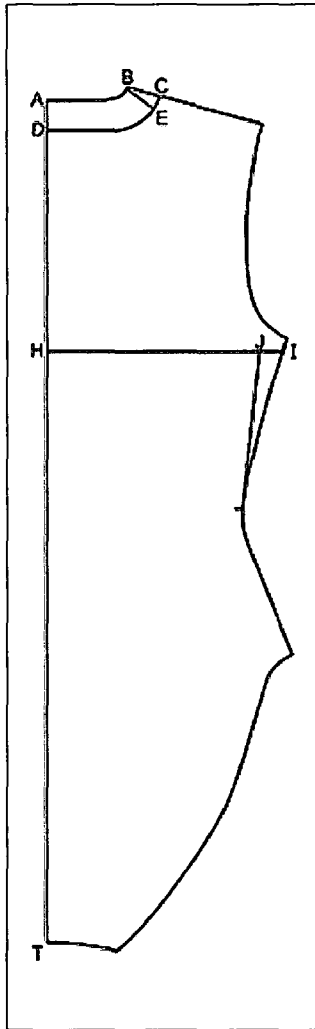


### Draft measurements required (example size 10)

- bust - 88 cm
- armhole depth - 21 cm
- shoulder width - 12.5 cm

### Bra top swimsuit illustrations and draft instructions

	<p><b>Front section</b></p> <p><b>Trace off the front leotard block and square down and across from A</b></p> <p><b>A – T</b> forms the centre front line, place the block along this line</p> <p><b>B</b> is the shoulder point of the block</p> <p><b>A – D</b> 3 cm, square across</p> <p><b>D – F</b> half D – H, square across and mark G</p> <p><b>A – H</b> armhole depth minus 0.5 cm, square across</p> <p><b>B – E</b> connect horizontal parallel lines, using shoulder measure - 0.5 cm</p> <p><b>H – I</b> quarter bust minus 2.5 cm</p> <p><b>H - X1</b> half measurement H - I minus 2 cm, join B - X1</p> <p><b>B - X1</b> equals X1 - X2.</p> <p>Swing a line, the length of B - X1 to create a 10 cm control dart between these two lines</p> <p><b>X2 - E</b> draw a line 3 cm long to touch the DE line</p> <p>Draw in armhole line E through G to I. Draw in bra shape (see following section), draw new neckline and seam line in bra cup. Shape the new neckline as required for the design.</p>
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## Front bra section

### Bra shaping

- X3** is placed 3.5 cm from I on the H - I line.
- X4** 2 cm in along the H - I line, squared up to touch the armhole line.
- X5** is squared down for 6 cm from the H - I line.
- X6** is placed 1.3 cm from H on the H - I line.
- X7** is squared in for 1 cm from the CF line

### How to create a larger cup size for the top and lower sections of the bra

#### Top Section

Open the dart line at the lower edge the required amount (example shows 1.5 cm) Raise the curve of the top edge 0.5 cm.

#### Lower Section

Draw a vertical line through the lower cup from the bust point; open the upper edge the required amount. (example shows 1.5 cm) Raise the curve of the top edge 0.5 cm.

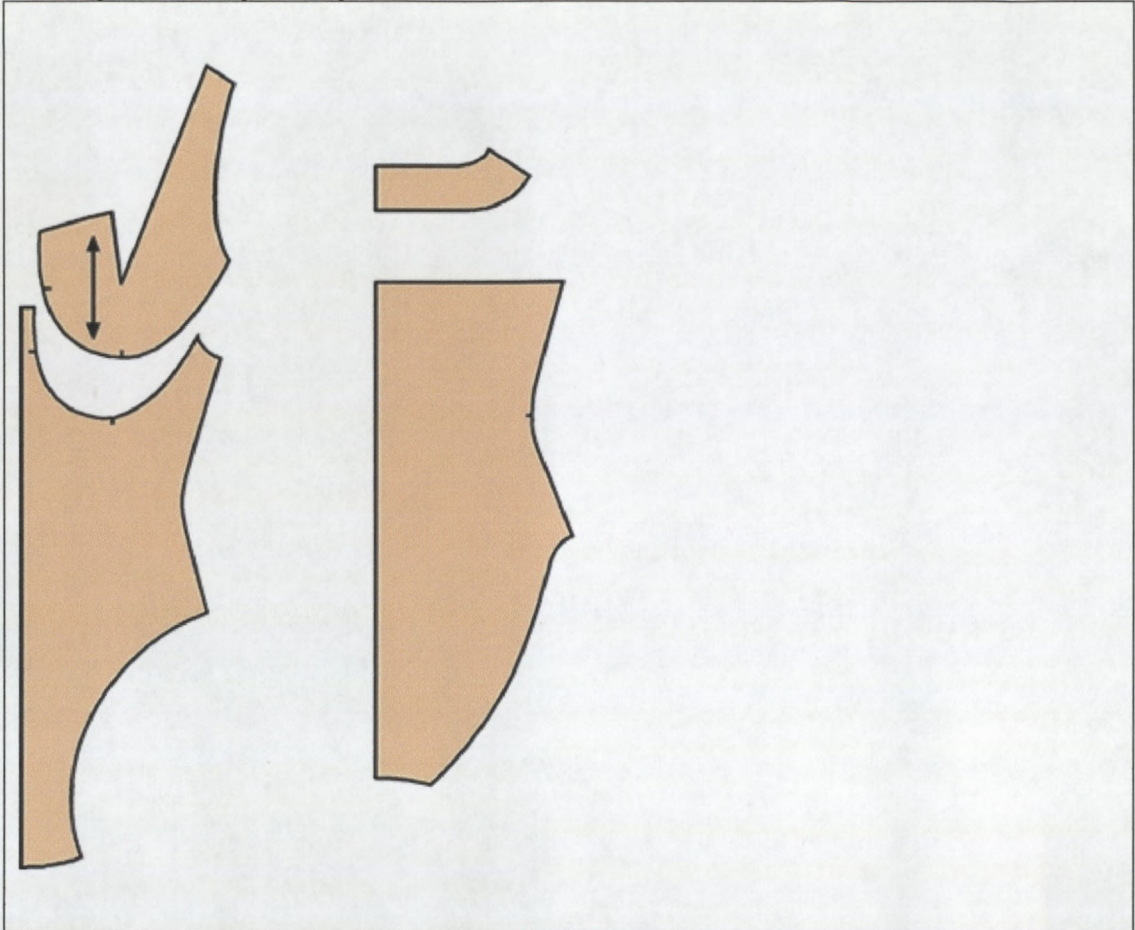
the cup seam lengths must be equal  $A - B = C - D$  (See illustration shown.)

### Back section

Square across from H - I to style the back for the bra top swimsuit.

The upper section of the back has been cut off and the back now needs to be tightened at the side seam to give a good fit. Mark a point 1.5 cm in along the H - I line and redraw back side-seam.

### Bra top swimsuit pattern pieces

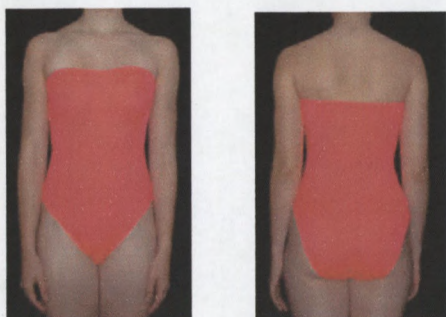


Styling below can be developed from the blocks above



**NOTE** This block is drafted for maximum stretch fabrics such as Lycra. More ease would be required for partial stretch fabrics.

## STRAPLESS SWIMSUIT



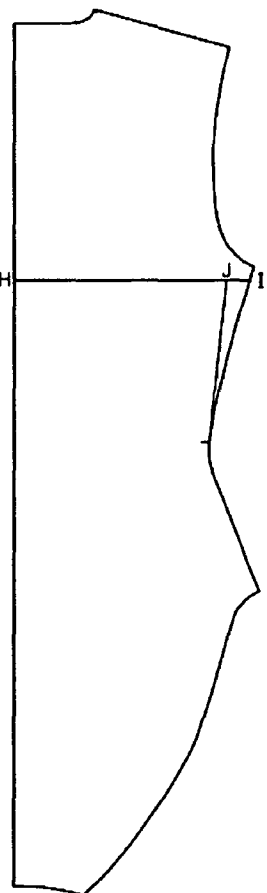
### Draft measurements required - example size 10

bust - 88 cm    armhole depth - 21 cm    shoulder width - 12.5 cm

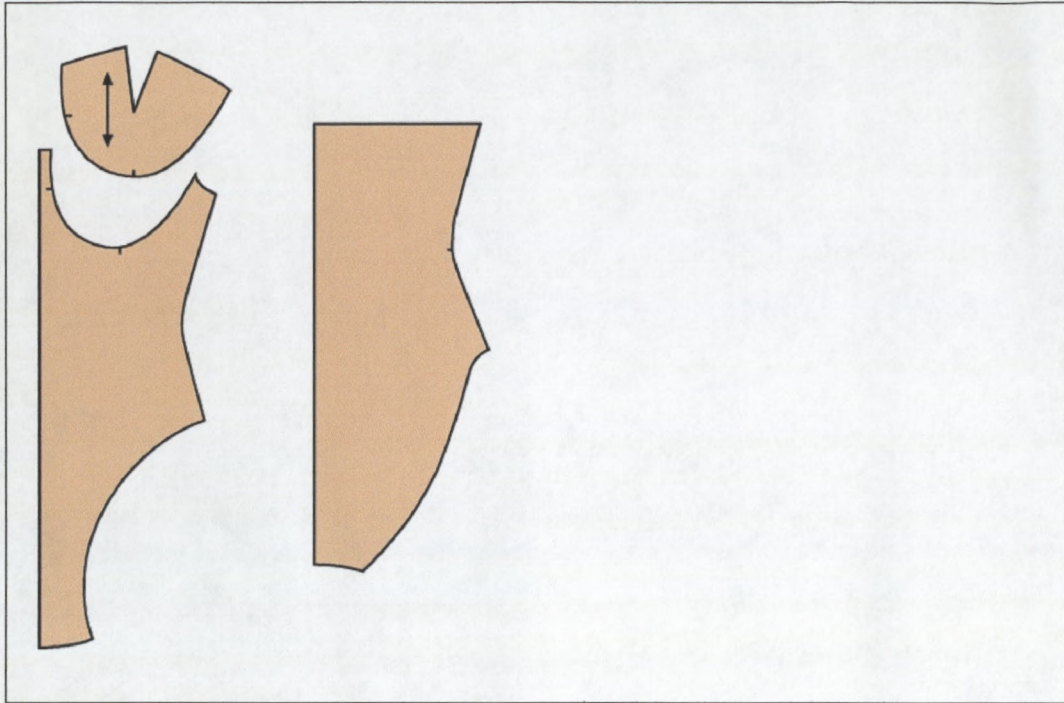
### Bra-top strapless swimsuit front draft

	<p><b>Trace off the front bra top swimsuit block</b></p> <p><b>A - B</b> equals 6.5 cm  <b>B - C</b> equals 6.5 cm  <b>C - D</b> draw a line from C - D.</p> <p>Cut away the strap to form a strapless top. Cut along the dotted line to separate the bra piece from the swimsuit front. The bust control dart can be cut, closed and re-opened at any point on the bra piece to create new dart positions for different styling, as long as the bust point is maintained. The gusset piece is marked with a dotted line.</p> <p><b>How to create a larger cup size for the top and lower sections of the bra</b></p> <p><b>Top Section</b> Open the dart line at the lower edge the required amount (example shows 1.5 cm) Raise the curve of the top edge 0.5 cm.</p> <p><b>Lower Section</b> Draw a vertical line through the lower cup from the bust point; open the lower edge the required amount. (example shows 1.5 cm) Raise the curve of the top edge 0.5 cm. The cup seam lengths must be equal A - B = C - D (See illustration shown.)</p>
--	--

### Bra-top strapless swimsuit back draft

	<p><b>Back Section</b></p> <p>To style the back for the bra top swimsuit.</p> <p>Square across from H – I.</p> <p>Because the back is strapless, the back needs to be tightened at the side seam to give a good fit.</p> <p>J is positioned 1.5 cm in along the H - I line</p> <p>Redraw back side-seam position.</p>
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### Strapless swimsuit pattern pieces



Styling below can be developed from the block above



**BASIC SWIMSUIT WITH LOW BACK**  
ADAPTED FROM THE BASIC LEOTARD BLOCK

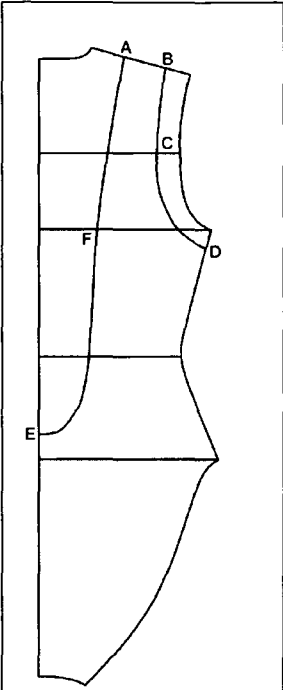


Suggested fabrics: moderate to super-stretch cotton lycra or 100% lycra.  
Out-line the Basic Leotard Block, include chest, underarm, and leg-height.  
Mark bust-point (BP). Trace the gusset reinforcement level.

**Draft instructions for swimsuit with low back: front**

<p>The diagram shows a front view of a swimsuit draft pattern. It includes a high neckline, armholes, a bust line, and a leg opening. Points A and B are at the top of the front and back necklines. Points C and D are at the armholes. Point E is on the side seam. Point F is on the underarm line. A dashed line indicates the gusset reinforcement level.</p>	<p><b>A</b> Mark in from the front and back neckline a measure of 4 cm.</p> <p><b>B</b> Mark in from front and back armhole/shoulder points a measure of 3 cm.</p> <p><b>C</b> Mark in from the front armhole a measure of 2.5 cm along the chest line and from the back armhole a measure of 3 cm along the chest line.</p> <p><b>D</b> Drop the side seam by 2 cm both back and front.</p> <p><b>E</b> Mark 7 cm above the bust-line and curve for the front neckline.</p> <p><b>F</b> Mark a point 6.8 cm in along underarm line from CB line.</p>
--	---

### Draft instructions for swimsuit with low back: back

	<p><b>A</b> Mark in from the back neckline a measure of 4 cm.</p> <p><b>B</b> Mark in from the back armhole/shoulder points a measure of 3 cm.</p> <p><b>C</b> Mark in from the armhole a measure of 2.5 cm along the chest line.</p> <p><b>D</b> Drop the side seam by 2 cm.</p> <p><b>F</b> Mark a point 6.8 cm in from the CB along underarm line.</p> <p><b>G</b> Mark 3 cm above hip-line on the CB line and curve for the back neckline.</p>
--	--

**NOTE** All stretch blocks have their seam allowances already included.

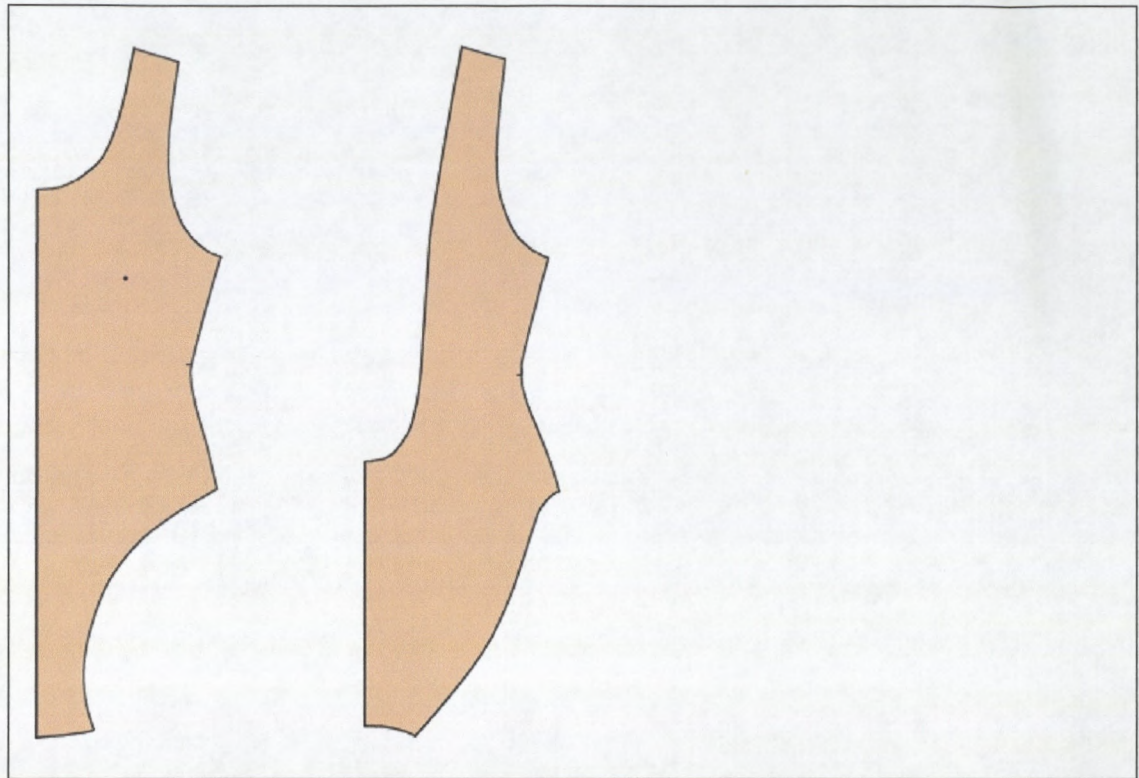
**NOTE** The **back neckline** may gape as it has a long, low line. This may need adjusting, complete a mock-up to see how much needs to be suppressed in the waist area. Square across at the waist and suppress 2.5 cm at the neck-line edge to nothing at the side seam. (This adjustment will put some tension into the back neck line).

### Adaptation to low back for closer fit

Mark a position 3 cm above the hip-line and 1.5 cm in from the CB line.

Mark a point 6 mm out from the crutch/gusset position. Connect these two points and find the midway position. At the midway position, go out for 1 cm. Curve for new CB line, from gusset through midway point to waist point. (Refer to illustration to reflect a good curve.) The CB line now reflects the curve of the body, which gives a better fit for a low back style. The CB line is now no longer a straight line and the pattern now has to be cut in two parts with a CB seam.

### Low back swimsuit pattern pieces

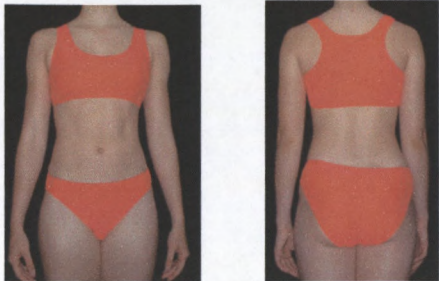


Styling below can be developed from the block above



**TWO-PIECE SWIMSUIT**

ADAPTED FROM THE BASIC STRETCH LEOTARD BLOCK

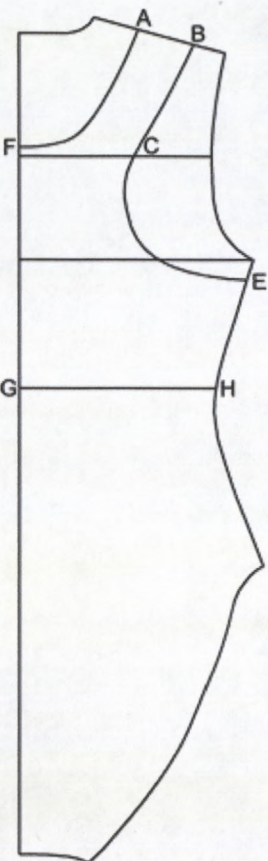


Suggested fabrics: super-stretch cotton lycra or 100% lycra.  
Out-line the Basic leotard block, include chest, underarm, bust, leg-height and hip lines.  
Mark bust-point (BP). Trace the gusset reinforcement level.

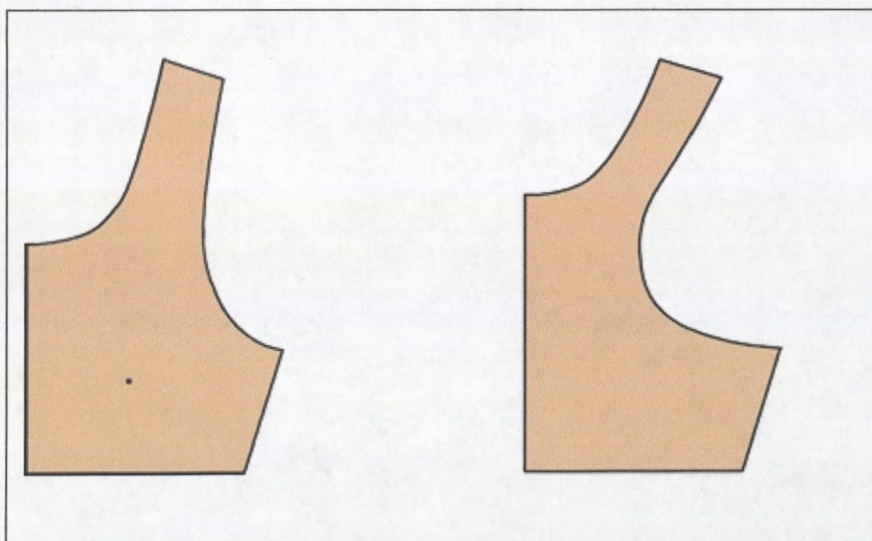
**Two-piece illustrations and draft instructions**

A technical line drawing of the front bodice piece for a two-piece swimsuit. The drawing shows the neckline, armholes, bust area, and side seam. Several points are labeled with letters: A is at the center of the neckline; B is at the shoulder/armhole; C is on the chest line; D is on the neckline curve; E is at the side seam; F is on the underarm line; G is on the side seam; and H is at the hemline. A bust point (BP) is marked on the chest line.	<p><b>Two – piece swimsuit front (top)</b></p> <p><b>A</b> Mark in from the front neckline a measure of 4 cm (this can vary depending on the styling)</p> <p><b>B</b> Mark in from the front armhole/shoulder points a measure of 3 cm. (this can vary depending on the styling).</p> <p><b>C</b> Mark a point 3 cm in along chest-line from the armhole side.</p> <p><b>D</b> Mark a point 8 cm in along chest-line from the CF line.</p> <p><b>E</b> Drop the side seam by 2 cm from the block position</p> <p><b>F</b> Mark 2 cm above the underarm line on the CF line and curve towards the shoulder through <b>D</b> for the front neckline. (Refer to illustration to reflect a good curve).</p> <p><b>G</b> Square across 12 cm down from the under-arm line to <b>H</b> to form the hemline of the two-piece top.</p> <p><b>NOTE</b> <b>BP</b> = Bust Prominence</p>
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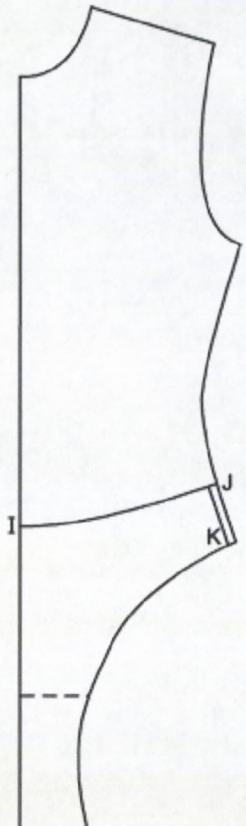
## Two-piece swimsuit illustration and draft instruction

 <p>The diagram shows a side view of a two-piece swimsuit back pattern piece. It is a vertical rectangle with a curved neckline at the top and a curved hemline at the bottom. Points are labeled as follows: A and B are on the top neckline; C is on the upper chest line; E is on the right side seam; F is on the left side seam; G is on the lower chest line; and H is on the right side seam, aligned with G.</p>	<p><b>Two – piece swimsuit back (top)</b></p> <p><b>A</b> Mark in from the back neckline a measure of 4 cm (this can vary depending on the styling)</p> <p><b>B</b> Mark in from the back armhole/shoulder points a measure of 3 cm. (this can vary depending on the styling).</p> <p><b>C</b> Mark a point 7 cm in along chest-line from the armhole side.</p> <p><b>D</b> (point D for front only)</p> <p><b>E</b> Drop the side seam by 2 cm from the block position</p> <p><b>F</b> Mark 10 cm above the underarm line on the CF line and curve towards the shoulder for the back neckline. (Refer to illustration to reflect a good curve).</p> <p><b>G</b> Square across 12 cm down from the under-arm line to H to form the hemline of the two-piece top.</p>
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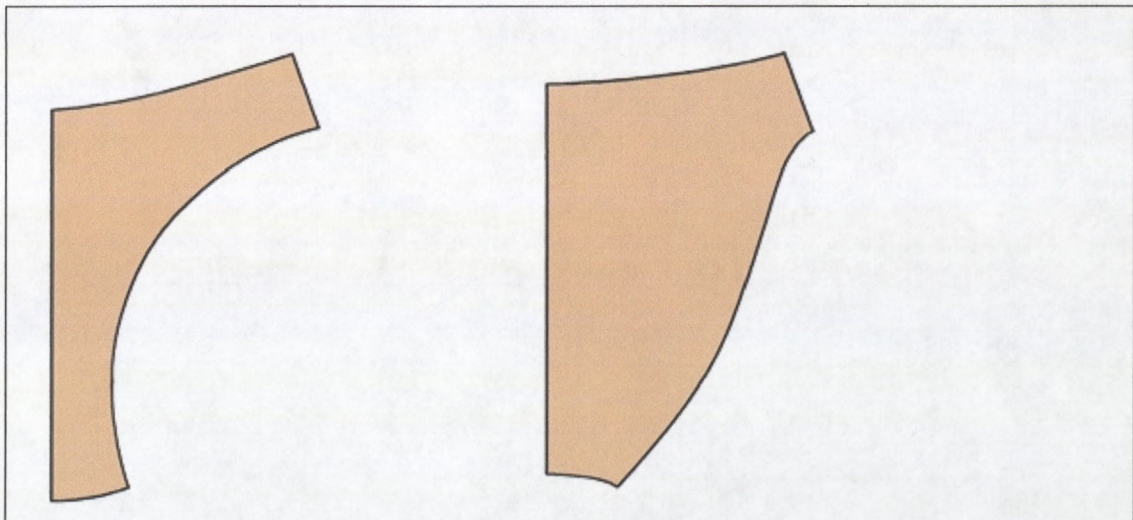
## Two-piece swimsuit pattern pieces (top front / top back)



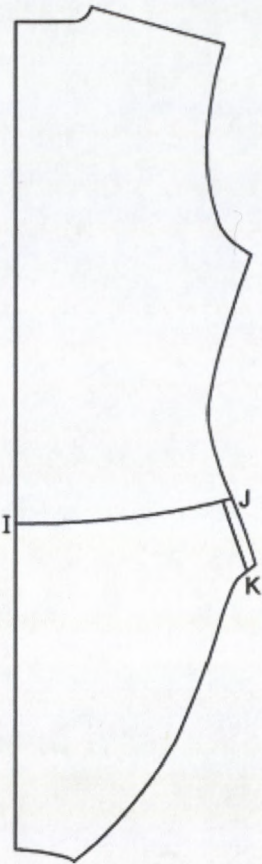
### Two-piece swimsuit illustration and draft instruction

	<p><b>Two - piece swimsuit front (bottom)</b></p> <p><b>H</b> Mark a point 1 cm above the leg-height line on the CF line.</p> <p><b>I</b> Mark a point 5 cm above the leg-height line on the side-seams. Connect these points to form the top edge of the two-piece pant.</p> <p><b>J</b> Reduce pant width by 2 cm at side seams.</p> <p><b>K</b> Mark in gusset position using a dotted line along gusset line.</p>
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### Two-piece swimsuit pattern pieces (pant front / pant back)



## Two-piece swimsuit illustration and draft instruction

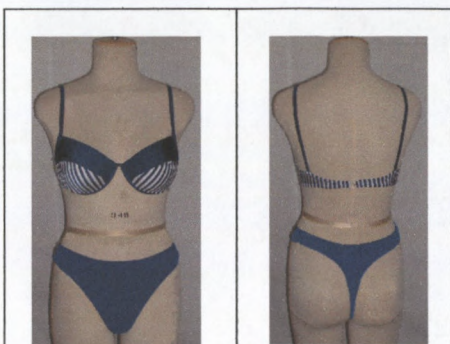
	<p><b>Two - piece swimsuit back (bottom)</b></p> <p><b>H</b> Mark a point 1 cm above the leg-height line on the CF line.</p> <p><b>I</b> Mark a point 5 cm above the leg-height line on the side-seams. Connect these points to form the top edge of the two-piece pant.</p> <p><b>J</b> Reduce pant width by 2 cm at side seams.</p> <p><b>NOTE</b> All stretch blocks have their seam allowances already included in the blocks.</p>
--	--

Styling below can be developed from the blocks above



## BIKINI PANT: THONG

ADAPTED FROM THE BASIC STRETCH LEOTARD BLOCK



Out-line the Basic Leotard Block, include leg-height and hip lines. Mark bust-point (BP)

### Bikini pant (front) - thong style

	<p><b>A</b> Mark a point at the CF on the leg-height line.</p> <p><b>B</b> To locate B move up the side-seam/leg-line position for 4 cm and square in for 4 cm to find point B, reducing the block width by 4 cm at side seams. Connect a - b to form the bikini top edge.</p> <p><b>C</b> Reduce block width by 4 cm at side seams. BC line parallel to side seam.</p> <p><b>D</b> Where the gusset line crosses the CF line.</p> <p><b>E</b> 5 cm from point D.</p> <p><b>F</b> 11.5 cm below D (<math>\frac{1}{2}</math> body rise measure minus 2.5 cm)</p> <p><b>G</b> Squared 3.5 cm across from F.</p> <p>Connect points G - E - C to form the line for the front thong</p> <p>Mark in gusset position using a dotted line along gusset line.</p>
--	--

The diagram illustrates the construction of a bikini pattern piece. It shows a side seam and a center front line. Key points and dimensions are labeled as follows:

- A**: Mark a point at the CF on the leg-height line.
- B**: to locate B move up the side-seam/leg-line position for 4 cm and square in for 4 cm to find point B, reducing the block width by 4 cm at side seams. Connect A - B to form the bikini top edge.
- C**: Reduce block width by 4 cm at side seams. BC line parallel to side seam.
- D**: Where the gusset line crosses the CF line.
- E**: 2 cm from point D.
- F**: 11.5 cm below D ( $\frac{1}{2}$  body rise measure minus 2.5 cm)
- G**: Squared 3.5 cm across from F.
- H**: To locate H draw a straight line from E to C. Measure  $\frac{1}{3}$ rd of the E - C length and square up to H.

Connect points G - E - H - C to form the line for the back thong. Mark in gusset position using a dotted line along gusset line.

**NOTE** Suggested fabrics: super-stretch cotton lycra or 100% lycra.

## Appendix C

**Analysis of Questionnaire to 2<sup>nd</sup> Year students**  
**Manual method of teaching Pattern Cutting**  
**Module on the swimwear**

1. How have you found this module?
  - a) essential to building the skills required for pattern constructing.
  - b) enjoyable
  - c) challenging
  - d) too difficult
  - e) a waste of time
2. Did you find this background information :
  - a) useful
  - b) interesting
  - c) useful and interesting
  - d) not necessary
3. Are the notes and illustrations on the stretch blocks clear and easy to follow?
  - a) yes
  - b) no
  - c) maybe
4. Does it help to have the teacher demonstrate the draft before doing it oneself ?
  - a) yes
  - b) no
  - c) maybe
5. If the whole module were taught through the medium of notes and illustrations without a teacher present how would you manage?
  - a) with ease
  - b) with difficulty
  - c) a waste of time
6. Have you understood how to construct basic blocks for stretch fabrics?
  - a) yes
  - b) no
  - c) maybe
7. How important do you think it is to have a set of stretch blocks?
  - a) essential
  - b) helpful
  - c) a waste of time.
8. Do you think that you could interpret basic swimwear designs after having completed the stretch module and brief?
  - a) yes
  - b) no
  - c) maybe

9. Have you read the notes given on the history of swimwear and stretch fabrics.
  - a) yes
  - b) no
  - c) some of it.
10. If yes, have you understood all the information given in the notes?
  - a) yes
  - b) no
  - c) not applicable
11. Did the explanation given by the lecturer preceding the start of the module help in being able to complete the module?
  - a) yes
  - b) no
  - c) made no difference
12. How did you find the history quiz?
  - a) could answer all
  - b) could answer a few
  - c) could not answer any
13. How did you find the pattern technology quiz?
  - a) could answer all
  - b) could answer a few
  - c) could not answer any
14. How did you find the stretch quiz?
  - a) could answer all
  - b) could answer a few
  - c) could not answer any
15. The brief has been designed to give you a chance at problem solving on your own, you are therefore required to try the style analysis on your own initially. Naturally if you are stuck and can't continue you must get help from the lecturer. How have you found the brief?
  - a) essential in learning how to interpret designs
  - b) enjoyable
  - c) challenging
  - d) too difficult
  - e) a waste of time

## Appendix D

**Questionnaire to 2<sup>nd</sup> Year students**  
**Computer Based Method of Teaching Pattern Cutting**  
**Module on Swimwear**

The CD has provided you with background information, such as the history of pattern cutting, swimwear and the bra, terms and definitions of swimwear and pattern cutting and other very necessary information about fabrics for swimwear and stretch that pertain to this module.

1. How have you found this module?
  - a) enjoyable
  - b) too difficult
  - c) challenging
  - d) a waste of time
  - e) essential to building the skills required for pattern constructing.
2. Did you find the background information:-
  - a) useful
  - b) interesting
  - c) useful and interesting
  - d) not necessary
3. How would you rate your computer literacy?
  - a) fully computer literate
  - b) partially computer literate
  - c) not computer literate
4. Does it help to have certain text hyperlinked?
  - a) useful
  - b) not necessary
5. Did you use the links provided?
  - a) often
  - b) a few times
  - c) seldom
  - d) never
6. Do you think it is desirable to have a teacher present to help while completing the swimwear drafts?
  - a) essential
  - b) useful
  - c) not necessary
7. Do you think it is desirable to have a teacher present while reading the notes?
  - a) essential
  - b) useful
  - c) not necessary

8. Is the module easy to follow on CD Rom with regard to the draft instructions and illustrations and without a teacher present. How did you manage?
  - a) with ease
  - b) with difficulty
  - c) a waste of time
9. Do you think that working on this module has improved your computer literacy skills?
  - a) yes
  - b) no
10. Have you read the notes given on the history of the bra, background information etc?
  - a) yes
  - b) no
11. If yes, have you understood all the information given in the notes?
  - a) yes
  - b) no
  - c) not applicable
12. Did the explanation given by the lecturer preceding the start of the module help in being able to complete the module?
  - a) yes
  - b) no
  - c) made no difference
13. Do you have a computer that could run the CD Rom at home?
  - a) yes
  - b) no
14. Would it be beneficial to work on the module in your own time?
  - a) yes
  - b) no
15. If yes, would you find it beneficial to work at your own pace at home or at the technikon?
  - a) home
  - b) technikon
16. Do you have access to the Internet?
  - a) yes
  - b) no
17. Do you think that you could interpret simple swimwear designs now that you have completed this module?
  - a) yes
  - b) no

18. How did you find the history quiz?
- a) could answer all
  - b) could answer a few
  - c) could not answer any
19. How did you find the pattern technology quiz?
- a) could answer all
  - b) could answer a few
  - c) could not answer any
20. How did you find the stretch quiz?
- a) could answer all
  - b) could answer a few
  - c) could not answer any
21. Do you have any suggestions for improving the module? If so please give suggestions.
22. Other comments

## Appendix E

## Appendix F

## **CONVERGING TECHNOLOGIES**

### **Research Questionnaire**

**The purpose of this questionnaire is to investigate the integration of manual skills and computer based skills in design and pattern technology in the fashion industry.**

Date .....

Name of interviewee .....

Company name .....

Address .....

**1(a) Does you company use computers in the grading/marker making and layout process?**

Yes

No

**(b) If yes, when?**

1970 – 1975

1975 – 1980

1980 – 1985

1985 – 990

1990 – 1995

1995 – 2000

2000 – 2003

**(c) What software do you use for grading?**

Lectra

Polygon

Other

**(d) How many computers does your company have for grading?**

1

2

none

**2(a) Does you company use computers in the design process?**

Yes

No

**(b) If yes, when?**

1975 –1980

1980 –1985

1985 –1990

1990 –1995

1995 – 2000

2000 – 2003

**(c) What software programs do you favour for design?**

Adobe Photoshop 6.0

Corel Draw

Microsoft Photo Draw

Other, name them

**(d) How many computers does your company have for the design process?**

nil

2

4

6

more

**3(a) Does you company use computers in the pattern-cutting process?**

Yes

No

**(b) If yes, when?**

1975 –1980

1980 –1985

1985 –1990

1990 –1995

1995 – 2000

2000 – 2003

**(c) What software does your company use for pattern cutting?**

Lectra

Polygon

Investrronica

Gerber

Other

**(d) How many computers does your company have for the pattern-making process?**

nil

1

2

3

more

**4(a) Are these systems integrated in your design/manufacture process?**

Yes

No

**(b) If yes, how are they integrated? (c) If no, how are these processes separate?**

.....

.....

**5 How does computer aided design (CAD) effect production time?**

Slower

Faster

No difference

Other

**6 How does computer aided manufacture (CAM) effect production time?**

Slower

Faster

No difference

Other

**7 What computer systems are favoured in your company ?**

Apple Mac

IBM

Other

## **QUALIFICATIONS**

**8 What qualifications do the designers have?**

National Diploma in Fashion

Bachelors Degree of Technology

Other

- 9      **What qualifications do pattern cutters have?**  
National Diploma in Production Management  
National Diploma in Fashion  
CITB training/diploma  
Other
- 10     **What qualifications do graders have?**  
National Diploma in Production Management  
National Diploma in Fashion  
CITB training/diploma  
Other
- 11     **In the case of no formal education, how did you learn the skill of pattern-cutting?**  
Self taught  
Master trainer/teacher  
Father/ family trade  
CITB training  
Other
- 12     **In the case of no formal education, how did you learn the skill of grading?**  
Self taught  
Master trainer/teacher  
Father/ family trade  
CITB training  
Other
- 13     **Are the designers working solely within a computer-based framework or is the design process integrated with manual skills?**  
Only working on computer  
Working on both  
Other
- 14     **What is the role of hand crafted design skills in an increasingly digitalized Fashion Industry?**  
Still important  
Not so important  
Imperative  
Remarks:-

.....

.....

- 15      What are the quality implications for design and the design industry in the shift from a predominantly hand based process to computer based methods of application?**  
More complex  
Improved  
Not improved  
Remarks :-  
  
.....  
  
.....
- 16      Would it be beneficial for fashion design students to be computer competent in the area of design?**  
Yes  
No  
Other  
Remarks :-  
  
.....
- 17      Would it be beneficial for fashion design students to be computer competent in the area of pattern design?**  
Yes  
No  
Other  
Remarks:-  
  
.....  
  
.....
- 18      Are manual design skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-  
  
.....  
  
.....

- 19**     **Are manual pattern-cutting skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-  
  
.....  
  
.....
- 20**     **Are manual grading/layout skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-  
  
.....  
  
.....
- 21**     **How does the fashion industry see the total inclusion of computers into the process of pattern-cutting in the future?**  
Too expensive  
Problematic  
Adapt or die  
Remarks:-  
  
.....  
  
.....
- 22**     **What are the designers/ pattern-designers attitude towards computerization?**  
Positive  
Negative  
Other
- 23**     **How does the South African Fashion industry see the long-term trends towards made to measure techniques. (i.e. whole body scanning systems to create 3D image sent to a manufacturers factory by telephone line or internet?)**  
Something in the far distant future  
Something only the European market can afford  
The only way to stay ahead and survive

- 24**     **How does the internet have an impact in the design workplace with regard to:-**  
stimulation of ideas  
interacting globally  
problem solving through discussion groups  
no relevance to design in the workplace
- 25**     **Is your company size**  
Small sized? (less than 25 employees)  
Small to medium sized? (more than 50 employees)  
Medium to large in size? (more than 200 employees)  
Large? ( more than 200 employees)

## CONVERGING TECHNOLOGIES

Please answer the following questions and give a tick where appropriate.

### Research Questionnaire

The purpose of this questionnaire is to investigate the integration of manual skills and computer based skills in design and pattern technology in the fashion schools in Technikons.

Date .....

Name of interviewee .....

Technikon name .....

Address .....

Phone:..... Fax:..... E-mail:.....

The questionnaire covers 4 different areas in which computers may be used by your Technikon

1. Design
2. Drawing and illustration
3. Pattern-making
4. Grading/marker-making

### DESIGN

1a) Does your department use computers in the design process?

Yes

No

(b) If yes, when were they introduced?

1990 –1995

1995 – 2000

(c) What software programs do you favour for design?

Adobe Photoshop 6.0

Corel Draw

Microsoft Photo Draw

Lectra

Other

- (d) How many computers does your department have for the design process?  
 nil  
 5  
 10  
 15  
 20  
 more
- (e) At what stage in the fashion course are computers introduced to the students?  
 First year  
 Second year  
 Third year
- (f) Has the introduction of computers improved the students design work?  
 Yes  
 No
- (g) Are the students able to cover more work within the syllabus with the use of computers?  
 Yes  
 No  
 Comments:-.....  
 .....

## **DRAWING & ILLUSTRATION**

- 2a) Does your department use computers in the drawing and illustration process?  
 Yes  
 No
- (b) If yes, when were they introduced?  
 1990 –1995  
 1995 – 2000
- (c) What software programs do you favour for drawing and illustration?  
 Adobe Photoshop 6.0                      Freehand  
 Corel Draw                                      Quark xpress  
 Microsoft Photo Draw                      Other

- (d) **How many computers does your department have for drawing and illustration?**  
 nil  
 5  
 10  
 15  
 20  
 more
- (e) **At what stage in the fashion course are computers introduced to the students?**  
 First year  
 Second year  
 Third year
- (f) **Has the introduction of computers improved the students drawing and illustration?**  
 Yes  
 No  
 Comments:-.....  
 .....
- (g) **Are the students able to cover more work within the syllabus with the use of computers?**  
 Yes  
 No  
 Comments:-.....  
 .....

#### **PATTERN-MAKING**

- 3(a) **Does your department use computers in the pattern-making process?**  
 Yes  
 No  
**If yes, when?**  
 1990 - 1995  
 1995 - 2000  
 2000 - 2003

**(b) What software does your department use for pattern-making?**

Lectra

Polygon

Investronica

Gerber

Other

**(c) How many computers does your department have for the pattern-making process?**

nil

1

2

more

**(d) Has the introduction of computer pattern-making taught the students all the necessary skills for the subject**

Yes

No

Comments:-.....

.....

**(e) At what stage in the fashion course are computers introduced for pattern-making to the students?**

First year

Second year

Third year

**(f) Are manual pattern-making skills necessary at first year level?**

Yes

No

If yes why?

.....

If no why?

.....

**(g) Are manual pattern-making skills necessary at second year level?**

Yes

No

If yes why?

.....

If no why?

.....

**(h) Are manual pattern-making skills necessary at third year level?**

Yes

No

If yes why?

.....

If no why?

.....

#### **GRADING/MARKER-MAKING**

**4 (a) Does your fashion department use computers in the grading/marker-making and layout process?**

Yes

No

**(b) If yes, when?**

1990 - 1995

1995 - 2000

2000 - 2003

**(c) What software do you use for grading?**

Lectra

Polygon

Investronica

Other

**(d) Does your department have computers for grading?**

1

2

none

**4(a) Are these systems integrated in your design/technical drawing/pattern - making / grading / marker - making process?**

Yes

No

**(b) If yes, how are they integrated?**

.....

**(c) If no, how are these processes separate?**

.....

**5 How do computers effect time management for students?**

Slower

Faster

No difference

Other

**6 What computer systems are favoured in your fashion department?**

Apple Mac

IBM

Lectra

Other

**IN YOUR VIEW :-**

**7 What is the role of hand crafted design skills in an increasingly digitalized Fashion Industry?**

Still important

Not so important

Imperative

Remarks:-

.....

**8 What are the quality implications for design and the design industry in the shift from a predominantly hand based process to computer based methods of application?**

More complex

Improved

Not improved

Remarks :-

**9      Would it be beneficial for fashion design students to be computer competent in the area of design?**  
Yes  
No  
Other  
Remarks :-

.....

**10     Would it be beneficial for fashion design students to be computer competent in the area of pattern design?**  
Yes  
No  
Other  
Remarks:-

.....

.....

**11     Are manual design skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-

.....

.....

**12     Are manual pattern-making skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-

.....

.....

- 13 Are manual grading/layout skills still used to a greater extent than computer skills?**  
Yes  
No  
Remarks:-  
.....  
.....
- 14 How does your fashion department see the total inclusion of computers into the process of pattern-making in the future?**  
Too expensive  
Problematic  
Adapt or die  
Remarks:-  
.....  
.....
- 15 What is the student's attitude towards computerization?**  
Positive  
Negative  
Other
- 16 What is your staff's attitude towards computerization?**  
Positive  
Negative  
Other
- 17 Do any members of staff have specialist qualifications and or experience in computers?**  
Yes  
No  
Comments:-
- 18 How does your department see the long-term trends towards made to measure techniques. (i.e. whole body scanning systems to create 3D image sent to a manufacturers factory by telephone line or internet?)**  
Something in the far distant future  
Something only the European market can afford  
The only way to stay ahead and survive

- 19 Does your staff have access to the internet?**  
Yes  
No
- 20 Do your students have access to the internet?**  
Yes  
No
- 21 How does the internet have an impact on the students work with regard to:-**  
stimulation of ideas  
interacting globally  
problem solving through discussion groups  
no relevance to studying design

Thankyou for your time and help.