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Integration of Performance Materials into the Clothing Curriculum

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Abstract

Traditionally modules within Higher Education are taught as discrete subjects. This has advantages since it enables students to develop knowledge and skills specific to each individual elements of the subject discipline. The expectation is that students will integrate and make sense of all the discrete elements. Whilst this is the ideal scenario, in practice often the first opportunity to integrate the various elements with a project occurs at final year. The purpose of the model presented was to integrate sections of the curriculum previously taught as separate entities into a single element at second year, using a blended learning approach to combine theory and practice. Thus, providing the opportunity for student to synthesize the knowledge obtained in various elements of their studies and develop an understanding of emerging/new technologies much earlier within their studies. The model differs from others: firstly by utilising fully integrated team teaching, engaging a diverse range of subject experts to enable network beyond the programme team, reinforcing research informed teaching and the teaching/learning nexus. Secondly active learning was employed as a means of challenging the learner, thus developing life/subject skills through establishing systematic connections of the different elements of their learning. Finally, through peer-support and networking, knowledge was exchanged (knowledge transfer) between students as they progressed through the development stages. This paper presents a successful model of blended learning which integrates research, technology, design and practical skills underpinned by the advanced study of textiles which is essential to any clothing curriculum.

Keywords: curriculum design, performance materials, product development, active learning

Introduction

This paper presents a model for integrating the study of advanced product development using performance materials into the curriculum for clothing technology students. The model presented has been delivered successfully at level 5 (National Framework for Higher Education Qualifications) over a period of four consecutive years as part of the wider Clothing Design and Technology curriculum. It has demonstrated that it is a sustainable method for integrating knowledge from different disciplines including material science, design, pattern construction, seam engineering and garment technology into a single unit for learning. This paper presents a case study for the first year of implementation which is based upon tutor reflection from observations, formative feedback from the learners (questionnaires) and discussion of the product development from one action set (team of students). The discussion presented provides strong arguments to support the model's value in terms of academic learning, teaching and the wider skill development. The results of the study present a strong case for utilising this model to facilitate an integrated approach to learning within advanced product development and the study of performance materials for undergraduate mainstream clothing students, which may have wider applications in the HE sector.

Performance clothing

The global market for performance clothing in particular the category which focuses on sports applications has increased dramatically in the last decade, recent predictions expect this market to reach $126.30 billion by 2015[1]. The growth in this market is largely driven by sociological factors including: participation in active sports and outdoor pursuits as individuals aspire to healthier lifestyles and increase leisure time to pursue these activities [1,2,3,4]. Numerous reports have identified women's sport/outdoor apparel as an emerging sector of importance [1,2,3,4]. This has led to a demand for stylish, versatile and functional sports

apparel with a blurring of the traditional boundaries of fashion, sports, functional and performance apparel. Functional and performance materials are now mainstream in this category of apparel and therefore it is essential for clothing students to have both a detailed understanding of the performance characteristics of the materials and knowledge regarding how to utilise them within clothing applications to maximise aesthetics without losing functionality.

Methodology

The model presented (Fig. 1) is based the principle of action learning which supports the development of learner's academic and generic learning skills. This is achieved through the development of technical competencies (knowledge and understanding); the expansion of life skills (key and professional skills); the advancement of high order cognitive skills (analysis, synthesis and evaluate); and, the appreciation of metacognitive strategies (learning how to learn and reflection) [5,6]. It includes a strong element of teamwork to enable the learners to co-construct knowledge, through both application (through an integrated approach to advanced product development) and reflection (peer support). The unit was delivered over a period of 24 weeks for 48 hours. It was split into two parts, firstly knowledge acquisition (12 weeks of research), and secondly knowledge application (12 weeks). Initially students were split into teams of 8/9 students (n=66). A brief was presented which involved designing a high-tech range of clothing for a specific outdoor pursuit. During the initial 12 weeks the student groups were supported through a series of guest lectures which focused broadly around four core areas, design, market analysis, technology, and clothing realisation. Each student researched into an individual element of the range which when consolidated would represent the most cutting edge selection of garments for the selected outdoor pursuit, the research report was individual and specific to each individual garment/product design, however, the data collection was a team effort. The second part of the project enabled the student to discuss, debate and decide on one garment to further develop. A vast range of high-tech material were available to the students, four specialists lecturers (supported by a technical team) were available for second block of 12 weeks to enable the group to construct seams, test materials, develop patterns and engineer specific elements of the garments. Each student team was further sub-divided into 4 to enable all the testing to be completed simultaneously. Every third week the teams would re-form to share their results, thus impacting and refining their decisions on a regularly basis to ensure the garment/concept they developed/produced was fit-for-purpose.

Case study – Results and Discussion

The case presented in the paper constitutes one team's product development portfolio. The selected outdoor pursuit was hill walking and the garment for further development was a waterproof outer shell lady's jacket. The team selected a series of waterproof, breathable materials (from their research during the first term) to test the material physical properties and sewability (advanced joining methods). Two areas of the garment concept were selected for further development (Fig 2), the hood (shape, visibility, fit), and the pit-vent. The group worked together to progress through the stages of development, at time receiving conflicting information: material that performed well in the textile testing did not necessary join together with ease. Therefore, the team had to negotiate whether to use a material that had a lower performance to allow the desired fit/aesthetics to be achieve or whether to modify the design to optimise the desired performance material. Over a series of 16 hours in the labs and cutting room the selected team was able to develop aspects of the garment and confidently conduct a presentation to articulate their results and justify their decisions, all teams kept a reflective log of activities.

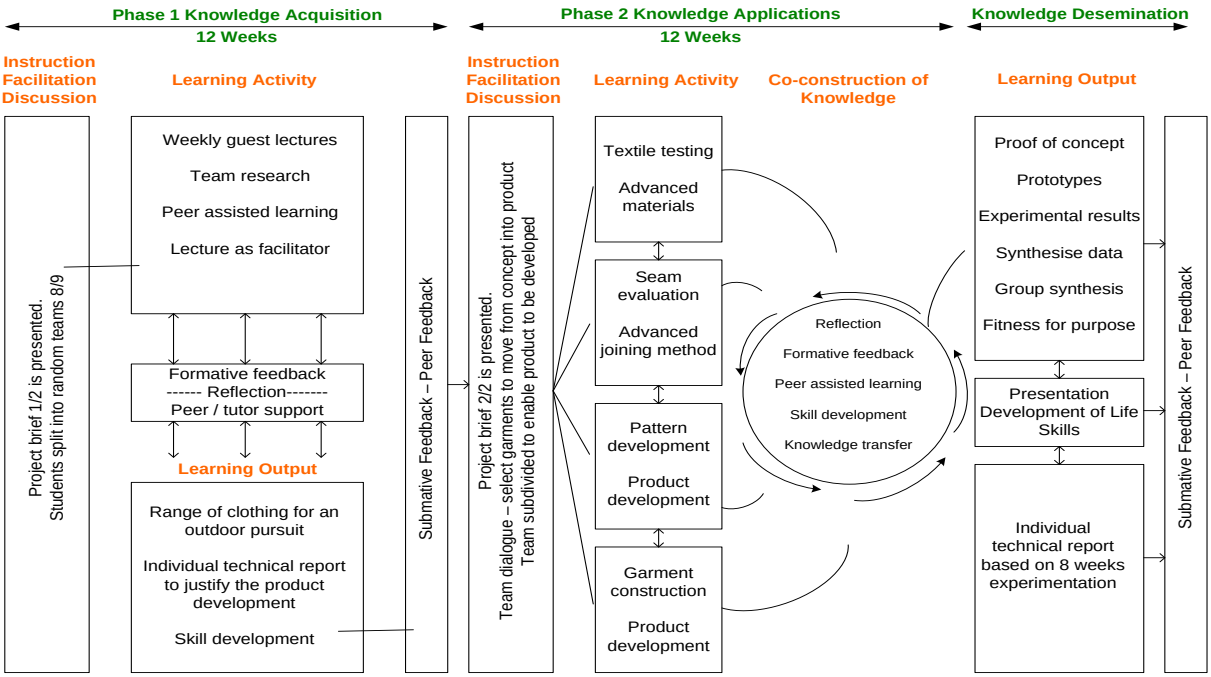

Fig. 1: Active learning model for integrating learning advanced materials

Fig. 2: Case study level 5 (2007-2008)

Learner feedback

Formative learner feedback was gathered at two points during the 24 weeks delivery, at the end of the first and second terms. The response rates were generally low (however, this is not uncommon for 1st and 2nd year unit evaluations in HE) 22% for term 1 and 52% at term 2. 88.3% of the respondents agreed (A) or strongly agreed (SA) that the unit progressed at a pace they could cope with and the contents of the lectures/seminars were clearly explained (77% A/SA), they also acknowledged that they were clearly informed regarding how the unit would be assessed (76% A/SA). In terms of the teaching over 80% A/SA that the teaching team was well prepared, had good subject knowledge, easy to approach outside class, provided effective resources for learning and were effective teachers. Overall the learners were satisfied with the quality of the unit (73% A/SA). This is supported by the external examiner comments: it was reported that the students were very enthusiastic about the unit.

Discussion

During the first term it became apparent the value of a guest lecture programme, not only did this reinforce the research teaching nexus, it provided a wider network internally and externally for the students. The guest lecturers opened up research areas that had not previously been considered – clothing comfort, advanced materials, innovative joining methods, and functional design. The blended learning approach also had a number of benefits, there was a noticeable increase in research as the groups shared resources information, which enabled the students to have access to a wider range of information this had clear benefits in terms of raising attainment. Through combining theory and practice using an action learning model, the quality of the student's investigation skills increased dramatically. The average attainment for the unit at the end of term one was 62%, by the end of second term this had risen to 70% (excluding the five non-submissions) at level 5 this clearly demonstrated the impact on the students learning. Further to this knowledge transfer was demonstrated not only by the quality of the research, but the advancement of

professional skills including peer assisted learning, critical analysis, communication, negotiation and presentation skills. There was a strong sense of belonging as groups transpired into effective teams with a shared sense of vision and drive. Through extensive dialogue teams made informed choices regarding materials and seam engineering based on quantitative analysis, leading to a deeper understanding of performance materials generally and how they are used in advanced products, many teams furthered their learning by applying primary data techniques to obtain information from consumers, industry experts and commercial samples. The extent this model had on learning should not be underestimated, it brought together staff from different area to engage with students simultaneously in dialogue. There are a number of challenges which should be noted. The value of an academic lead to synthesise on a weekly level is required, this integrates the guest lectures seamlessly (which may otherwise have seemed somewhat independent), this however places demands on resources. During the second term the value of getting all the four experts together with the whole group had enormous benefits to learning and knowledge transfer, the excellent feedback received for teaching illustrated the value placed on this by the learners. Whilst it is acknowledged that some students experienced challenges in team working, it should be noted that this is an essential skill required for the global apparel industry; and as advances are made in material science and more technical innovations become available, students will be required to be able to transfer skills within multidisciplinary teams. The students co-constructed knowledge with their peers, lecturers, and technical staff, this project enabled all involved to challenge the boundaries of knowledge and understanding and thus presents a sustainable model for learning.

Conclusion

This project in no way suggests that in apparel based subjects we should abandon the current model of having discrete specialist units which provide the foundation for specific skill development. It is merely suggesting that opportunity should be created within the curriculum at all levels for some element of true integration which brings together not only the academic learning aspects, but the opportunity for wider skill development and the opportunity to network with staff from different areas simultaneously. This model of learning offers a true integrated approach to learning, embedding staff research and has the potential to open new research opportunities as students are working at the cutting edge of their field within advanced product development.

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