

What keeps you warm in winter?

An integrated Science, Creativity, Design and Technology unit by Natasha Ubrihien - Deakin University

Developed and used during a Primary teaching practicum.

Design Brief: plan and make a 'mobile mattress' that a homeless person might use. It will be made of recycled/ found fabrics and as a group you will decide on three evaluation criteria that will ensure its usefulness.

Introducing the idea

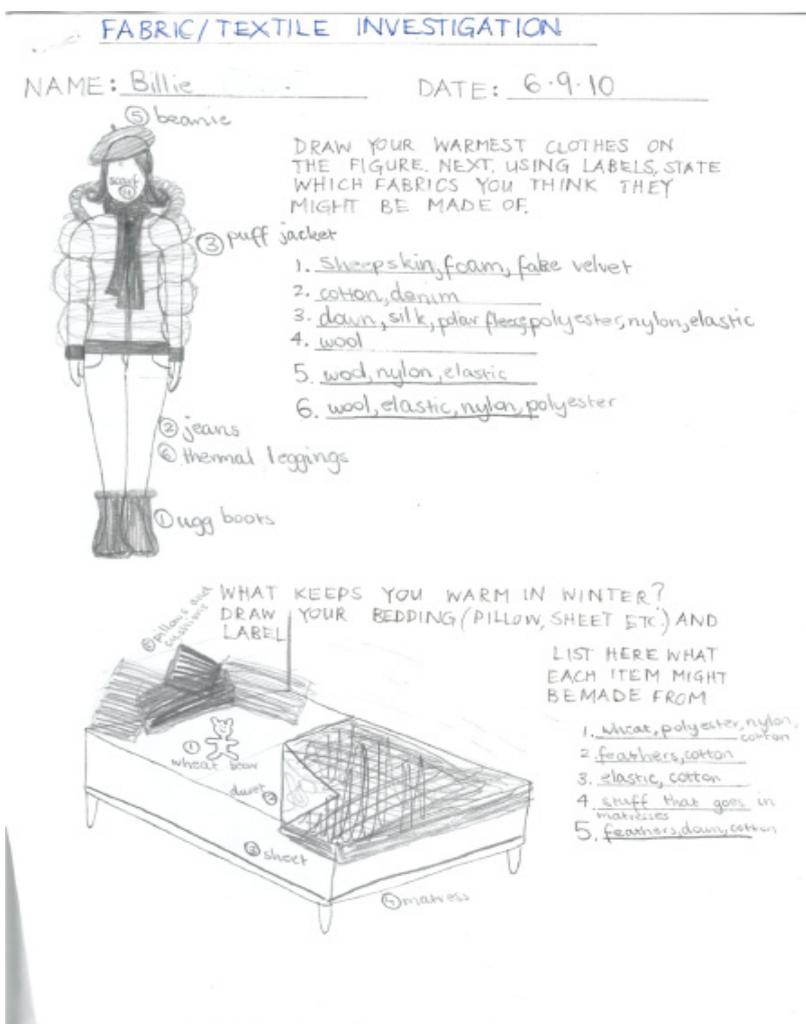
A considerable degree of intrigue had already been established as the students had never partaken in an integrated Science, Design, Creativity and Technology unit, and the constructivist focus on student autonomy appealed to them. The design brief was intended to connect the students with the social concept of homelessness as their school is located just metres from the St Kilda City Mission, "students practice framing and investigating questions that interest them and are drawn from locally based issues," Victorian Essential Learning Standards (VELS) Design, Creativity and Technology-Towards Level 4. Connecting the students with a meaningful social concept added to their growing awareness of themselves as important members of their community.

The science aspect of the unit was the mechanical properties of fabric based on the Materials unit that is recommended in the Victorian Science curriculum. In the first of 5 sessions we discussed the idea of creating a design brief around testing different materials with the aim of constructing a mobile mattress for a homeless person. Firstly, students' existing science understandings indicated a sound knowledge of the materials used in fabrics that are designed to keep them warm. The students completed a worksheet where they drew their warmest winter clothes on a body and also drew their winter bedding on a bed and attempted to label the fabric types on each diagram. The students then chose their evaluation criteria by imagining what they would want to sleep on. They chose warmth/comfort, water resistance and strength as the three criteria that their completed mobile mattress would be measured against.

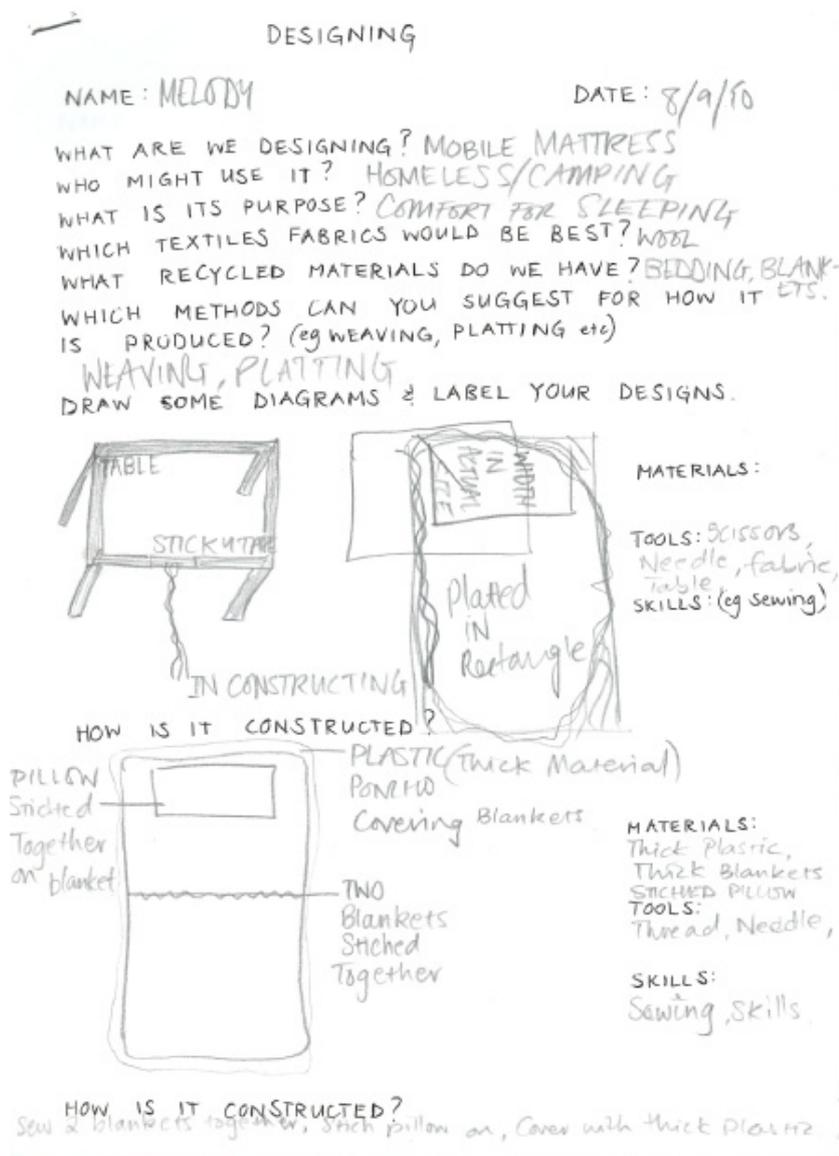
Due to the volume of questions that arose as to the origins of fabric, we explored the cotton process from growth of the

cotton plant to manufacture the following day. We discussed warp and weft in the design of fabric and its construction with relevance to other aspects of purpose and design. Contextual experience was also developed by examining the weave in our own clothing and identifying the importance of warp and weft to create strength. Skamp reiterates the importance of learning 'experiential concepts' as an essential tool to be used before, or in conjunction with explanatory concepts and models, (Lucas & Cohen in Skamp: 2008). One of the students coined the phrase "left" instead of "weft" to remind her that weft went from left to right.

An understanding of 'fair testing' is expected by students heading towards VELS level 4 Science. Subsequently, the students discussed how they would test various textiles against their key selection criteria; strength, warmth and water resistance. The students then designed tests for each. It was decided that our first test would measure absorbency and we would achieve this by placing equal amounts of fabric into equal amounts of water and wringing the fabric to measure the absorbed amount in millilitres. Although some of the testing methods were



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then on went seamlessly, lengthy construction included. This can perhaps be attributed to the design situation cited by Williams (2000) who describes design as a non-linear process. A teacher may demand four designs to satisfy assessment criteria, when the student may be satisfied, and require the first one only. Consequently, even though the assignment stipulated that the students construct their own project, instead the students drew their own designs and chose at least one innovative aspect from each of their designs to add to the one mattress.

What I really enjoy about current constructivist principles in teaching is a move away from the teacher as authoritarian and controller of knowledge. On the other hand was my desire to value their experience and creativity and allow them to learn in a more memorable style that would build on where they were. I found that teaching with constructivist goals allowed me to teach intuitively, an uncommon concept in academic texts, but one that requires more airing. Each time tension arose between curriculum objectives and an authentic but unproscribed learning experience, I suspended judgement and allowed the non-linear process to occur.

Assessment

Constructivist principles also allow for a diversity of both formative

somewhat undeveloped, their tests were essentially still "fair tests" in that they were changing two variables and keeping one the same. I felt that better testing methods would come with time and would remain more memorable for them to build upon if initiated originally by the students.

By the beginning of session four, I was feeling the pressure of curriculum objectives and time constraints as we had neither begun construction nor planned it. I was also struggling with feeling as though I'd started pushing them and neglected to connect with them on a personal and individual level. With this in mind, I put curriculum expectations on the back-burner and together we discussed a plan of construction which I wrote down in point form (lay out fabric; cut to size; sew layers together with knots; sew pillow then attach; sew blanket at bottom and sides) and we began construction. Everything from

and summative assessment methods. Home-made worksheets allowed for summative assessment and were tailored to elicit student knowledge. It also enabled short term feedback so that I could identify obstacles to student learning and tackle them early (Moreland & Jones: 2000). Discussion within the group was by far the most valuable form of summative assessment as the students tended to evaluate and organise their thinking aloud, using peer feedback as a way to bounce ideas and formulate new opinions. The most invaluable summative assessment information came through student discussion. Being able to listen as an observer is imperative, especially if students are comfortable and conversation is natural and spontaneous. This method of enquiry is "consistent with social constructivist premises, which emphasises the importance of discussion as a means of rethinking existing conceptions," (Skamp: 2008: 353).

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Literacy, and Creativity, Design and Technology outcomes were met and assessed through various communicative, social and innovative student input. Student presentations happened spontaneously as the students wished to share what they had been doing with their peers. The students each spoke about the process which included: Learning about textile construction (Monique); that different textiles were designed for different purposes (Jada), some of which had been tested against special criteria suited to the design brief (Billie); that their design incorporated three important characteristics being water resistance, warmth and comfort (Pepper); and that their mattress should be able to be rolled up and carried (Melody) owing to the transient nature of many homeless people. The students also designed a brochure that could “sell” their idea to the manager of a homeless shelter that explained their understanding of the mattress’ purpose and its design criteria. Other assessment outlined student’s abilities to negotiate as a member of a team, leadership and consideration of others when planning and constructing a group project with time constraints. Measurement, tabling and comparing data also addressed mathematical opportunities for the students.

The Design Brief sought to connect students to a relevant social issue as well as fostering their interest in an integrated Science, Creativity, Design and Technology unit. The process also incorporated and supported many other domains like maths and literacy that the students were only vaguely aware of. This is poignant, because these domains were incorporated into an experience that promoted student control and autonomy. Understanding the process gives students the power to own an experience themselves. Subsequently, the students make changes and observations that reflect new growth in their current understandings and feel empowered by them to create newer ones.

References

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