Social and cultural relevance in approaches to developing designerly well-being: the potential and challenges when learners call the shots on design projects

Kay Stables
Goldsmiths, University of London
k.stables@gold.ac.uk

Abstract
This paper builds on a position paper presented previously that outlined the concept of designerly well-being and, through reviewing critiques of Design and Technology (D&T) curriculum activities, proposed approaches that would support the concept. This paper describes a pilot study that explored designerly well-being in a situation where learners undertook design challenges in contexts that they saw as having socio-cultural relevance to their own lives. The pilot study explored how teachers structured a D&T 'enrichment day' based around the design contexts that 14 year olds express interests in. The interests were identified through a survey based on one used to identify topics of social and cultural relevance for learning in mathematics (the ROSME project). Having identified the interest areas, the teachers planned and enacted the enrichment activity with a cohort of 46 learners. Based on learner evaluation questionnaires and a teacher evaluation interview, the study illustrates how positively the learners responded to taking on 'big design' challenges in future-facing scenarios. The study also indicates challenges faced by teachers in planning and managing such activities and the transformative impact the day had on the teachers' views of approaches to D&T project work.

Key words
Designerly well-being; design challenges; socio-cultural relevance; emotional response to designing

Context
This paper takes as its starting point a position paper presented at PATT26 in 2012 that explored the idea of developing designerly well-being as the basis for the development of a Design and Technology (D&T) curriculum. The position paper made explicit the belief, "that society is a better place when young people have experienced design and technological learning - that the designerly well-being of the individual makes for the designerly well-being of society." In addition, the concept of designerly well-being was characterised as the "satisfaction, pride, confidence and competence of being able to engage designerly thinking and action with criticality and capability" (Stables, 2012, p.426). The paper drew on review documents that, collectively, suggested that where D&T was successful, learners were engaged in relevant contexts and ambitious 'Big Design' challenges – those with social and cultural relevance that would make a difference to people's lives. This new paper presents the findings of a pilot study that explored the impact on learning and teaching when design project briefs are derived from socio-cultural issues that the learners have identified as being of interest to them. The pilot study draws, in part, on previous research into socially and culturally relevant mathematics

education - the multi-country ROSME project (Relevance of School Mathematics Education, Julie and Holtman, 2008) and more specifically a single country study undertaken in Malawi (Kazima, 2013). These studies explore the idea that learning is more effective when learners find the context of their learning relevant to their own lives. Kazima highlights the extent to which educational policies increasingly include the need to bring relevance into the curriculum, while rarely is the student voice heard when learning activities are being designed. Well-intentioned teachers spend considerable time planning activities that they think will be relevant to learners. But how often are the learners consulted?

In conjunction with issues of relevance, the pilot also explored the development of agency, criticality, pride in achievements and confidence, drawing on the concept of capability in the context of D&T (Kimbell & Stables, 2008; Stables, 2012, 2013) and more broadly through the ideas of others such as Sen (1992) and Nussbaum (2000).   In focusing on the designerly well-being of humans (rather than professional designers) the research had in mind the democratizing of the process of designing as a counter to the disenfranchisement of the general public, as described by Shannon (1990).

Allowing learners to take on challenges that they see as relevant, potentially creates the conditions for well-being expressed by Princen (2010) when he states that
>"Humans are at their best when
>1. they are faced with a genuine challenge;
>2. they are creative and productive;
>3. they find meaning in their own problem-solving and impacts larger than themselves;
>4. they help themselves and help others;
>5. they self-organize and self-govern;" (Princen, 2010, p.175)

The Pilot study
The pilot explored the impact on learners of undertaking team-based, socio-cultural, 'Big Design' challenges through D&T. It also explored the impact on teachers' planning and evaluating such D&T activities and how this impacted their future thinking related to implementing D&T learning and teaching. An undertaking of this nature presents both opportunities and challenges and the pilot school was chosen as one that would be open to these and to the inevitable exploratory approach that was taken. While it might have been more realistic to explore the approach within regular, timetabled D&T lessons, for pragmatic reasons the main design activity of the pilot was conducted as a one-day enrichment activity. The school involved was a small, independent school. To maintain some consistency with the Malawi Maths survey, the learner group focused was Year 9 (14 year olds). The whole year group (46 learners) were involved. The structure of the pilot was:
*   Survey learners to establish priority interests for D&T projects;
*   Feed back survey results to teachers to enable planning;
*   Observe the enrichment day;
*   Evaluatory post activity questionnaire with learners;
*   De-briefing interview with teachers.

Initial questionnaire
The pilot utlised a customized version of the ROSME survey – a Likert-style questionnaire with a 4-point response scale ('not at all interested' to 'very interested'). Table 1 shows a sample of questions.

TABLE 1 COMPARISON OF QUESTIONS FROM MATHS AND D&T SURVEYS		
Things I'd like to learn about in Mathematics	**Things I'd like to learn about in Design & Technology**	**Category (from Kazima's**

Things I'd like to learn about in Mathematics	Things I'd like to learn about in Design & Technology	Category (from Kazima's analysis)
Mathematics involved in making computer games, cell phone games & TV games	D&T involved in designing computer games, mobile phone games and Apps	Modern technology
Mathematics linked to weaving baskets & mats such as *mikeka*	D&T involved in producing hand-crafted products	ethnomathematics
Mathematics involved in studying issues of climate change & the environment	D&T involved in addressing issues of climate change and the environment	environment
Mathematics involved for deciding the number of cattle, goats or sheep to graze in a field of a certain size	D&T that help farmers get the best productivity from their farms	agriculture
Mathematics used in making airplanes &	D&T for designing transportation systems	technology

The learners completed the survey during a D&T lesson. They were informed about the nature of the research, the parallel survey in maths teaching in Malawi, and that the results would form the basis of design projects on the enrichment day.

Planning
The survey results were fed back to the teachers who held three planning meetings to prepare. The researcher was present at two of these and all were recorded. The researcher also introduced strategies from previous research that might be helpful. It was made clear that the teachers were free to accept, adapt or reject these. The first presented the concept of generality and specificity within any contextual setting (described as three levels - broad *context*, *referenced* focus and *specific* brief (Kimbell et al. 1991; Kimbell et al. 1996) and the value of learners understanding the general and specific. The second was choreographing the activities to support an iteration of action and reflection (Kimbell et al, 2004). The third was the sustainable design strategy of creating future scenarios, and then 'back-casting' from these to bring designing into a future context with a sense of reality. (See, e.g. Quist and Jaco, 2006) They were also provided with the original position paper (Stables, 2012).

The enrichment day
Following the planning sessions, learners were grouped by their responses to the initial survey. Teachers presented an overarching context of 'empathy' and, within this, two areas of reference – 'lifestyle' and 'future systems' that covered the areas learners had shown most interest in. Each group was given an A2 image board to spark ideas and a briefing sheet that raised questions about future living (Figure 1). Each group's aim was to develop a scenario and brief and design a prototype to address these. The groups worked with one of three teachers in a base room and had access to studio and workshop facilities. The teachers facilitated the learners as needs arose. During the day groups presented their developing ideas to others in their base room. At the end of the day each base room voted for the best idea in their room and the three resulting groups went 'head-to-head', presenting to the whole year group who then voted for the best overall idea from the day.

Figure 1: Image boards for the overarching themes.

Using emoticons to capture personal feelings
Understanding designerly well-being includes understanding the emotions an individual experiences when designing. As an initial exploration in this territory, the learners were asked, periodically, to reflect on how they were feeling, to capture this by circling one or more 'emoticons' and explaining why. The exemplar section of the emoticon capture sheet is shown in Figure 2.

Figure 2: emoticons to record emotions whilst designing

The evaluation questionnaire
At the end of the enrichment day each learner completed an evaluation questionnaire, structured into five sections. The first four sections contained Likert-style response statements (strongly agree to strongly disagree) about the challenge set, the structure of the day, their team's project and their own contribution. The fifth section asked them to list three things that were better than 'normal' D&T and three things that were worse.

The debriefing interview with teachers.

The de-briefing teacher interview was undertaken collectively, taped and transcribed. It was structured around the teachers' expectations for the day, their overall reactions, the learning that took place, the challenges of planning and managing the day and the anticipated impact on future projects.

Findings

The Survey of interests
The learners responded enthusiastically to the initial survey. Certain areas showed up as being very popular, the highest being "design transportation systems of the future" with other quite diverse areas also being highlighted, from "designing computer games and mobile phone Apps" to "design that could help achieve world peace" and "designing that helps people have a healthy lifestyle". There were some noticeable gender differences – boys being keen to "design equipment for sports competitions and events" and girls to engage in "designing involved in the clothing and accessories industry". A set of illustratively distinctive responses (based on mean average) is shown in Chart 1.
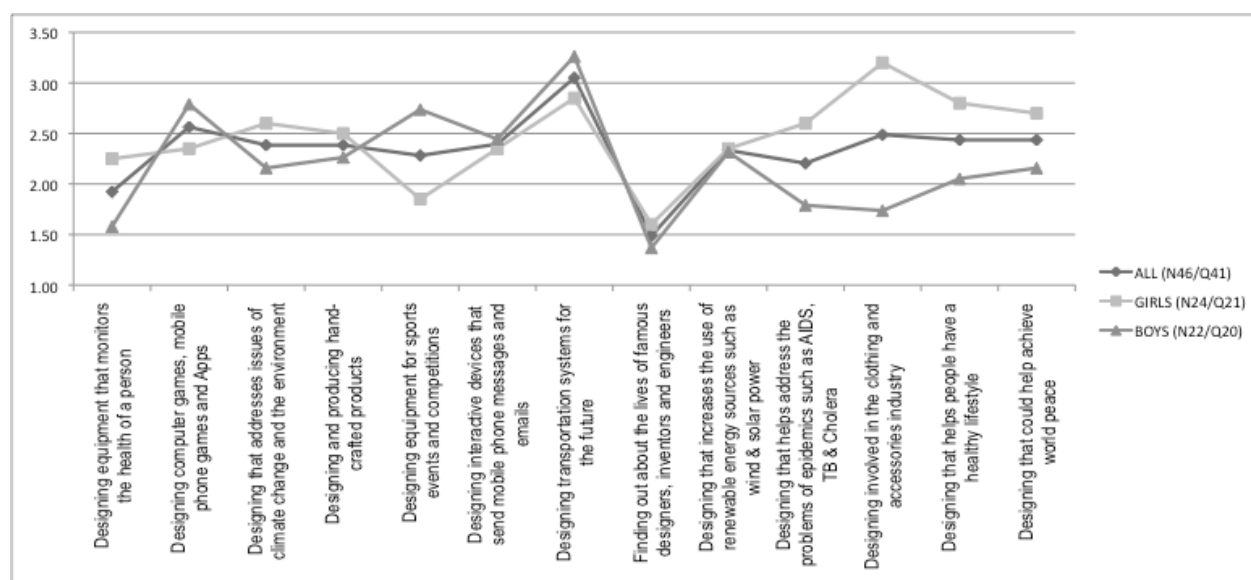

Chart 1: Survey of interests

However, the averages hide the varied number of areas ranked highly by different learners, some ranking up to nine topics as 'very interested', some ranking only one topic. With some learners a trend could be seen, e.g. being "very interested" in designing for health, the environment and world peace, or "very interested" in designing for sports events, computer games and apps and transportation systems.

Teacher's reaction to the survey and subsequent planning
The teachers were intrigued by the results of the survey. They recognized the complexity of creating groups based on learners' interests and saw the idea of working from a broad context, through more defined references as a way of managing this. Throughout the planning sessions certain topics dominated their discussions: the practicalities of organizing groups, facilities etc; meaningful ways to contextualise and resource learners' projects; structuring the day; and managing learner expectations. The latter was a major pre-occupation as several learners had already expressed fixed ideas of what they wanted to design and make on the day and a small group who were characterized as learners disinterested in anything other than 'making' had prioritized a very limited range of interests.

Teachers were using their existing model of D&T lessons to try to envisage a whole day's activity, anticipating the morning broadly focused on designing and the afternoon on making. However, they were keen to give the learners as much space as possible and to be flexible as learners' ideas emerged. In the event, the preparation undertaken and this latter attitude enabled the learners to progress effectively through the day, having established clear scenarios and briefs such as:

- Group A: in the future, new technologies may result in people becoming less healthy and more isolated - resulting in the design of a website for bringing communities together for social sporting activities;
- Group B: Army dogs used in bomb disposal are often killed in action because of inadequate protection, leaving their soldier companions distraught - resulting in designing comfortable, flexible, protective armour for bomb disposal dogs;
- Group C: In the future young people will be less pressurized to follow fashion and more able to develop their own personal style - resulting in creating ways of using augmented reality to see how well an item of clothing suits an individual;
- Group D. In the future geo-energy could be used more to reduce climate change, - resulting in concept development of ideas such as launching millions of tiny mirrors into space to reflect sunlight and creating artificial trees that suck carbon out of the air and store it underground.

The Evaluation Questionnaire
The learners were very positive about the enrichment day. Of particular interest is the highest rated statement "Letting the pupils chose the design topics works well". It is also notable how proud learners were of their achievements, how they achieved more than expected and how they felt that the learners were the ones making the decisions.
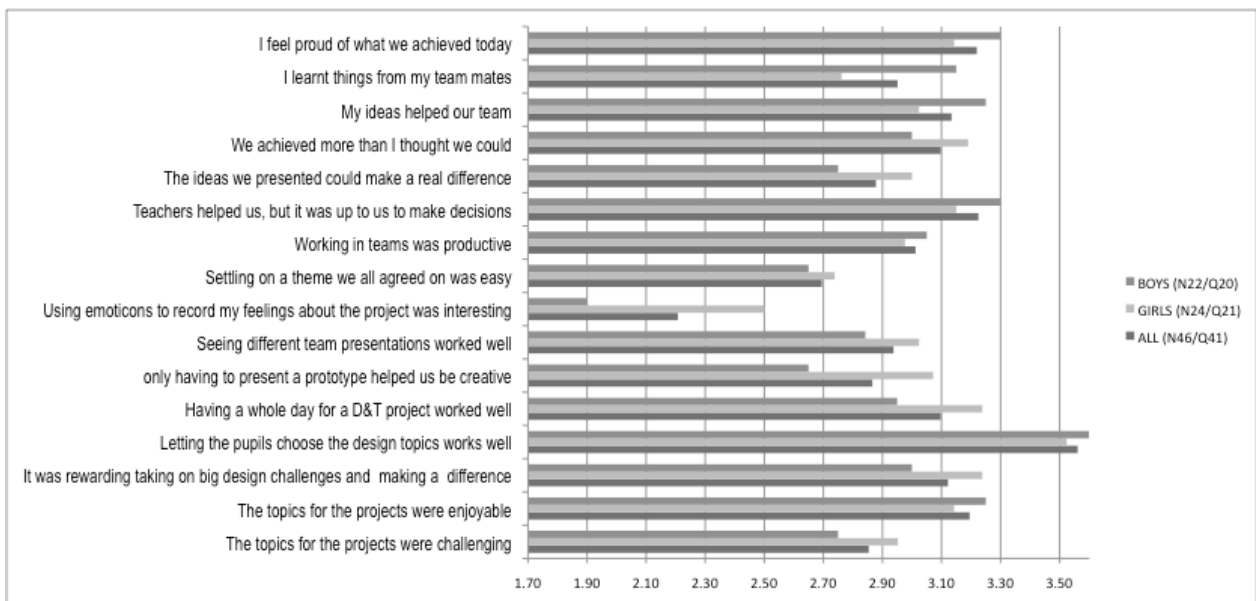

Chart 2: Learners' evaluation of the enrichment day

Within the results there were some gender differences. For example boys felt more proud of their achievements and felt they had learnt from their team-mates, while girls felt the reward of take on big design challenges and felt that their ideas could make a real difference. The biggest gender difference was in relation to the emoticons, which will be returned to later.

Looking at group reactions opened up further subtleties. The four projects above illustrate these, for example a lack of consensus about the sense of reward and the difference their ideas could make, in contrast to considerable consensus about the value of learners choosing the projects and the pride felt in achievements.
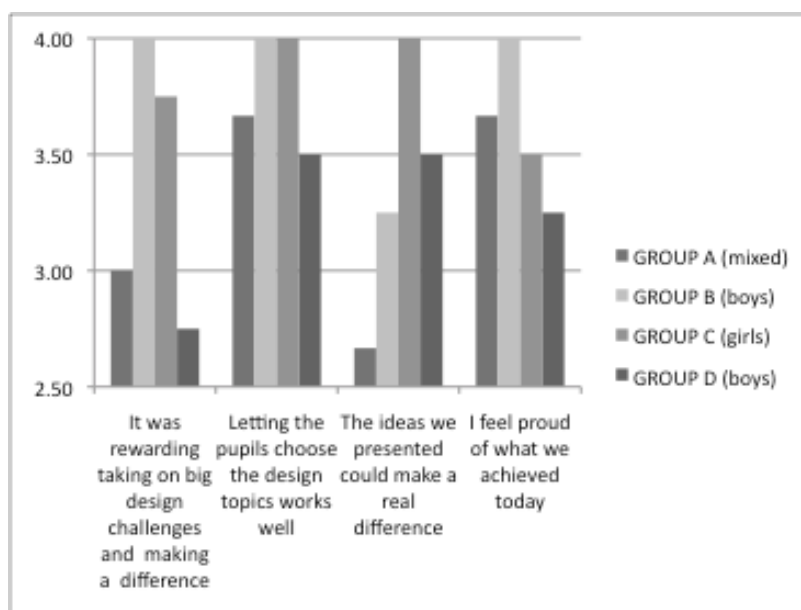

Chart 3: Group effect on the challenge

The Emoticons

The use of the emoticons in the pilot was its most speculative aspect. Whilst there is a growing body of research in the use of pictorial capturing of emotions in relation to user-centred design (see e.g. Desmet et al., 2012; Laurans & Desmet, 2012) there has been less focus on pictorial capture of emotion whilst designing. In overall terms, the emoticons received the least positive response in the evaluation. But there was a gender split, girls being far more positive than boys. Chart 4 illustrates further subtleties, for example that Group A, a mixed gender group, is the most positive. However, the value of using the emoticons does not appear to be related to learners expressing overall pride in their achievements, as can be seen by Group D.
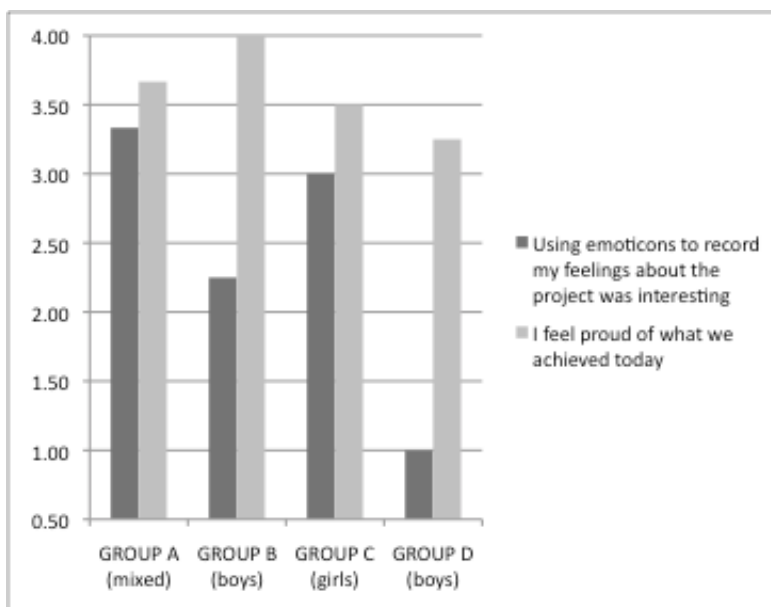
Chart 4: variations in responses to the emoticons, illustrated by groups

The detail of how different learners approached the use of emoticons shows distinct variations. Table 2 shows examples from the illustrative groups. While some simply indicated the project's progress, others expressed more complex thoughts, including mixed emotions, for example Learner 4 in group C who is happy with the group but confused by what they are supposed to do. She hints later at some conflict in her group "2 girls taken the idea – what do other 2 do …?!). Learner 5 in Group B illustrates the shift in emotions across the project – from his early Confused/Back Off "Don't know what we are doing, bad mood" to his Happy, Relieved " Our project went well, its over" at the end, followed by a self-initiated comment added after the winner was announced.

	After introduction	Before break	Mid morning	Before lunch	Mid afternoon	End	After voting (learner initiated)
GROUP B Learner 5 (boy) (emoticon score = 2)	**Confused, Back Off**: *Don't know what we are doing, bad mood.*	**Back Off**: *Bad mood.*	**Happy, Motoring, Relieved**: *Good mood, going well, good idea.*	**Happy, Motoring, Relieved**, *Success: Everyone good.*	No comment	**Happy, Relieved**: *Our project went well, its over.*	**Happy, Relieved, Success:** *We won.*
GROUP C Learner 4 (girl) (emoticon score 4)	**Confused**: *Not very sure how it's going to go. Or exactly what to do.* **Happy**: *I like the topic our group has.*	**Happy**: *Getting good ideas and thoughts.* **Relieved**: *Getting somewhere - designing what we are making.*	**Happy**: *Doing well starting designs.*	**Happy**: *Designing on computer.* **Motoring**: *Moving forward.* **Confused**: *2 girls taken the idea - what do other 2 do …?!*	**Happy**: *Going really well, finished a lot.* **Motoring**: *Done a lot - moving forward fast.*	**Happy, Motoring 'half Success'**: *Really complete - only to present.*	
GROUP D Learner 1 (boy) (emoticon score = 1)	**Motoring**: *Ready to start!*	**Motoring**: *Continuing.*	**Motoring**: *We've gotten the ball rolling.*	**Back Off**: *Project building is slowing down.*	No comment	No comment	

Table 2: illustrations of the variety in use of emoticons

The Teacher's reaction to enrichment day.
Teacher reactions expressed in the de-briefing interview were quite stark - their overall response summed up by their phrase "shell shocked". They made clear that, in advance, they had major anxieties – about learner engagement, learners sustaining interest, being disappointed in the topics. The extent to which their anxieties were groundless amazed them, no more so than in the case of the group of 'maker' learners they had been most worried about.

> "I have known some of them since they were in year three. They have always wanted to just make things and the fact that they really had these deep conversations and developed an emotional attachment to the project really surprised me."

The teachers were surprised by the seriousness and level of debate that was evident, and the way the teams dealt with challenges. Several comments related to the learners' growing recognition that they were being asked to act in a mature way, and that they saw this as a positive challenge. As one teacher put it

"They came in expecting Design and Technology the subject. That is what they experienced normally. They didn't get Design and Technology, they got life."

The teachers were surprised at how comfortable 14 year olds were with dealing with abstract ideas and how, at times, they felt they were working with older students. They were unequivocal about how much learning had taken place: learners learning about themselves; how to work in groups; how to communicate; and how to learn independently.

In terms of the future, the teachers were clear that the day had caused them to question their current approach. The extended time the enrichment day provided was seen as an opportunity that could be used to kickstart to a project.

"I don't know how we'd fit this in, but … it might be nice to have a whole day as a lead into the project. … I'm brainstorming here, you could almost start a project with a whole day and then work on it in term so that you've got three projects a year."

Where next for designerly well-being?
Whilst small-scale, this pilot provided insights into how giving learners the opportunities and support to take on 'Big Design' challenges allows for the development of confidence and the sense of achievement and pride that illustrate aspects of the concept of designerly well-being. The ways that the learners responded to the day illustrates Princen's description of "humans at their best". The initial position paper made a point about the paradox of 'exciting stuff' being what happens outside of regular lessons. This enrichment day could be seen as further illustrating this point - the learning that took place certainly fits with Resnick's characterization of 'out of school learning' as involving "socially shared cognition", "contextualised reasoning" and "situation specific competence," (Resnick 1987, p.15). But having experienced the enrichment day, the teachers saw beyond this 'one-off' event to a way of integrating the approach into an entirely fresh manner of approaching D&T projects. How they develop this, and how the approach might be received in other schools must be seen as next steps in developing a more practice-based view of designerly well-being. Gaining insights into the impact on learners, beyond a one-day experience, must also be a future concern. Much still needs to be explored, including ways of understanding the emotional responses generated by the act of designing and the potential of developing the use of emoticons in this. All of this will be explored further as the project progresses.

References
Desmet, P., Vastenburg, M., Van Bel, D., & Romero, N. (2012). *PICK-A-MOOD: Development and application of a pictorial mood-reporting instrument*. Paper presented at the Out of Control: Proceedings of the 8th International Conference on Design and Emotion, London.
Julie, C., & Holtman, L. (2008). The Relevance of School Mathematics Education (ROSME). In L. Holtman, C. Julie, O. Mikalsen, D. Mtetwa & M. Ogunniyi (Eds.), *Some developments in research in science and mathematics in Sub-Saharan Africa: Access, relevance, learning and curriculum* (pp. 379-405). Somerset West, SA: African Minds.
Kazima, M. (2013). *Relevance and school mathematics*. Paper presented at the SAARMSTE 2013:Making Mathematics, Science and Technology Education, Socially and Culturally relevant in Africa, University of the Western Cape, Cape Town.
Kimbell, R., Miller, S., Bain, J., Wright, R., Wheeler, T., & Stables, K. (2004). Assessing Design Innovation: a research and development project for the Department for Education & Skills (DfES) and the Qualifications and Curriculum Authority (QCA. London: Goldsmiths University of London.
Kimbell, R., & Stables, K. (2008). *Researching design learning : issues and findings from two decades of research and development*. Berlin: Springer.

Kimbell, R., Stables, K., & Green, R. (1996). *Understanding practice in design and technology*. Buckingham UK: Open University Press.

Kimbell, R., Stables, K., Wheeler, T., Wozniak, A., & Kelly, A. V. (1991). *The assessment of performance in design and technology*. London: SEAC / HMSO.

Laurans, G., & Desmet, P. (2012). *Introducing PREMO2: New directions for the non-verbal measurement of emotion in design*. Paper presented at the Out of Control: Proceedings of the 8th International Conference on Design and Emotion, London.

Nussbaum, M. (2000). *Women and Human Development: The capabilities approach*. Cambridge UK: Cambridge University Press.

Quist, J., & Vergragt, P. (2006). Past and future of backcasting: The shift to stakeholder participation and a proposal for a methodological framework. *Futures, 38*, 1027 - 1045.

Resnick, L. B. (1987). Learning in school and out. *Educational Researcher, 16*(5), 8.

Sen, A. (1992). *Inequality reexamined*. New York: Russell Sage Foundation.

Stables, K. (2012). *Designerly well-being: Can mainstream schooling offer a curriculum that provides a foundation for developing the lifelong design and technological capability of individuals and societies?* Paper presented at the Technology Education in the 21st Century, KTH, Stockholm.

Stables, K. (2013). *Designerly well-being: implications for pedagogy that develops design capability*. Paper presented at the Design Learning for tomorrow: Design Education from Kindergarten to PhD, Oslo, Norway.