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Competence in Question: The Relevance of the Design and Technology Association Minimum Competences to Initial Teacher Education

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Abstract
The development of subject knowledge by student teachers has been a key part of initial teacher education courses for design and technology. Since 1995 there have been subject specific competences which students have been expected to address. With a changing curriculum in secondary schools it was felt timely to reflect on their relevance. This paper explores the background to the competences, undertakes a brief critical review of their content and reviews employer requirements in relation to fields of knowledge. The paper concludes by highlighting a number of issues to be addressed and possible consequences of dropping the design and technology association competences as a guiding document and the need for future research.

Introduction
The majority of design and technology teachers entering the profession do so through one-year PGCE courses. As such they tend to be individuals with a wide variety of backgrounds. Whilst this is a positive aspect of recruitment to the subject it means that many students do not have all the skills, knowledge and understanding that the subject requires. Consequently the development of subject knowledge for student teachers of design and technology is a key part of their experience whilst in training.

Currently the educational context that student teachers work within is in a process of change with a new Secondary Curriculum (QCA 2007) due to commence in September 2008 along with significant changes to the 14-19 curriculum. These changes are likely to place different demands on students pedagogical and subject knowledge. It was for these reasons, along with anecdotal evidence from students and mentors, that it was decided to review the relevance of the subject specific competences used by those involved in design and technology.

In order to explore the relevance of the Design and Technology Association’s Competences a small-scale research study was undertaken that involved analysing terminology, exploring the work involved and attitudes of students, employer requirements and students perceptions of employer requirements.

Subject Construct
In becoming a teacher of design and technology in secondary schools there are a number of pedagogical and practical elements that must be developed at the same time. A clear explanation is given by Banks and Barlex (1999) who, building on work done by Schulman (1986), identify three interrelated strands: school knowledge, subject knowledge and pedagogical knowledge. This is best illustrated diagrammatically (Figure 1).

Figure 1: The Three Interrelated Strands

It is clear from their research that the development of subject knowledge is crucial for the development of competent design and technology teachers. This comes as no surprise and has been the focus of a number of papers by those involved in the subject, notably Price and Reid (1993), Lewis (1996), Rutland...
(2001) and Zanker (2005). All of these highlight the significance of the development of appropriate subject knowledge along with the recognition that there is limited time available to do so. Clearly without sufficient knowledge of materials and processes it becomes impossible for students to teach the subject.

Competences for Design and Technology

Prior to the development of competences, the kind of subject knowledge that was developed depended on the individual teacher training institution with no national guidelines on what was expected.

The The Design and Technology Association’s Minimum Competences were developed at an important time for design and technology with a revised version of the National Curriculum for the subject following five years of considerable debate and development with curriculum documents being developed every year.

A significant impetus for design and technology competences was the development of teaching Standards by the TTA (Circular 9/92) which formed the basis of the document and were themselves competence based.

The principle aim of the original Design and Technology Association Competences was to ‘produce high quality newly qualified teachers who meet the expectations of future employers’ (The Design and Technology Association, 1995:7).

Initial teacher Education (ITE) institutions tended to use the Standards in auditing students subject knowledge and setting targets for development. Although the original document was a research paper, Ofsted have used the structure of the competences as a way of reporting on the subject knowledge was developed and rapidly the competences became the standard by which institutions would be judged. Reports refer to the extent to which students develop knowledge in different ‘fields’ at different key stages, very much anticipating that it’s developed according to the structure outlined in the document:

Trainees enter the PGCE course with a good grounding in the subject knowledge associated with their main field of D&T, having studied aspects such as home economics, fashion and textiles, design, design for industry, and mechanical or electrical engineering. Several have higher degrees in a relevant specialism. During the course, they develop their specialism further and acquire the knowledge, skills and understanding to teach their second field of D&T.

Ofsted (2006)

Content

The original 1995 and 2003 update versions of the design and technology association competences document both divide design and technology into four fields: Food Technology; Resistant Materials (Materials Technology in the update); Systems and Control (ECT in the update) and Textiles Technology (Figure 2).

![Diagram of the fields of the Design and Technology Association Competences Document](image)

**Figure 2: The Fields of The Design and Technology Association Competences Document**

Whilst there is are no specific combinations made between the ‘fields’ in the document, providers usually work on the basis of resistant materials together with control and systems and food technology together with textiles technology. This is evident on the course information available on the GTTR website (GTTR 2008).

A consequence of the The Design and Technology Association competences following on from those developed for QTS by the TDA was that tightly defined competences were developed. This number was not significantly reduced in the revised version and if assessed comprehensively, students would need to provide evidence for around 100 competences (98 for a student specialising in Materials with Control and Systems as a second field or 118 for a student specialising in Food with Textiles as a second field).

In addition to this seemingly fragmented assessment of design and technology capability with all it’s associated difficulties (Kimbell 1997:20), the competences use a mixture of
terminology and it's not always clear what is required in terms of knowledge, skills or attitudes. In such a document about subject knowledge, the acquisition of factual knowledge (e.g., competences C13 and MK3.2) would be expected along with the development and mastery of craft skills (e.g., competence MM 3.3). In addition, the document gives examples of developing procedural knowledge (e.g., competence MD 3.3) along the lines suggested by McCormick (1999).

More interestingly the competences include statements that are about the application of knowledge in learning and teaching contexts (e.g., competence C8) as well as the development of attitudes (e.g., competence MD 3.14). These duplicate the generic QTS Standards that all student teachers need to meet and may not really be necessary in a subject specific document.

It is clear from this that the purpose of the document is mixed and open to interpretation. To explore how students felt about the content and clarity of the document, the 2007/2008 PGCE cohort at Liverpool John Moores University were asked to respond to the following:

What are your views on the content and relevance of the Design and Technology Association’s Competences?

Of the 42 in the cohort, email replies were gathered from only six students. Whilst not being a significant sample it was nevertheless interesting to see their thoughts. Two students commented on the helpfulness of the Competences but all but one made negative comments, examples of which are given below:

“I felt a lot of the information was duplicated and at times ambiguous”.  
Student A

“I still don’t feel I understand the relevance of the competences and feel that the wording of them is sometime complicated”.  
Student B

“In my opinion the data competences were at times difficult to fill in”.  
Student C

Such comments support the review of the language used and indicate, at the least, that the statements could be improved.

Changing expectations

The current Standards for the award of QTS (TDA 2006) have a quite different structure than those used at the time that the Design and Technology Association’s Competences were being developed in that they are less in number and grouped. Students providing evidence against the Standards now do so under three interrelated sections: professional values and practice; knowledge and understanding; teaching.

Along with other institutions, Liverpool John Moores have clustered the generic Standards and students are now required to provide less quantity but richer evidence.

Employers

In trying to get a better picture of the requirements of those employing students from ITE courses, two strategies were used to collect a small amount of indicative data from one initial teacher education provider. Firstly to look at adverts then secondly to question students about requirements in applications and at interview.

<table>
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<td>Graphics</td>
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<td>2</td>
<td>1</td>
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<td>0</td>
<td>1</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>6</td>
<td>2</td>
<td>10</td>
<td>7</td>
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<tr>
<td>Graphics and textiles</td>
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<td>0</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>Resistant materials and graphics</td>
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<td>3</td>
<td>10</td>
<td>19</td>
<td>13</td>
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<tr>
<td>Textiles and food</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>53</td>
<td>38</td>
<td>55</td>
<td>146</td>
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</tbody>
</table>

Figure 3: Job adverts from the TES over a three week period
Job adverts in the Times Educational Supplement (TES) were analysed over a three week period. In particular, subject knowledge requirements were identified. Categories were added to include all keyword combinations used in the adverts. From the above figures it can be seen that 64% of adverts asked for one specialist area (26%) or no specialist area (38%) with only 11% requiring the traditional combinations of both Food with Textiles (10%) or Resistant Materials with Control and Systems (1%). Whilst this a very small sample of the total jobs offered each year it gives an indication of what schools require and raises significant questions over the development of subject knowledge in traditional combinations.

Of particular interest was the number of adverts for teachers of Resistant Materials and Graphics, some 13% of the total number of adverts. The significance of this is the fact that Graphics is not one of the fields of knowledge, despite the high number of pupils taking graphic products at GCSE level.

In addition to looking at adverts, students were questioned on their experience of applying for jobs and being interviewed. The following short tick-box questionnaire was used to provide further information on the need for additional knowledge in related material areas.

A total of 22 students out of 42 on the one-year PGCE course completed the questionnaire and the results are illustrated below:

Figure 5: PGCE Students Questionnaire Results

<table>
<thead>
<tr>
<th></th>
<th>R5</th>
<th>R4</th>
<th>R3</th>
<th>R2</th>
<th>R1</th>
<th>N</th>
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<tr>
<td>Specialist Knowledge</td>
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<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Teaching KS3 specialist</td>
<td>17</td>
<td>3</td>
<td>2</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Teaching KS4 specialist</td>
<td>14</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SK in traditional areas</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Teaching in traditional areas</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>SK in several other materials</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Teaching exp in several</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SK in all</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Teaching in all</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

R5 to R1 indicates the rating given and N indicates the number of responses to the question that were blank.

It can be seen that students’ teaching experience in their specialist field was felt to be significant and teaching in the traditionally related fields less significant. The responses in relation to teaching in traditional areas and teaching experience in several areas was very similar.

Whilst the data presented is small in quantity it reinforces comments by students that employers are looking firstly for a strong specialism, then for any additional experience of teaching across design and technology.

Conclusions

From the short study undertaken, it would appear that the Design and Technology Association’s Competences are out of step with the current move towards more wholistic assessment. In addition they are, at times, ambiguous and mixed in what they are trying to assess. It would also seem that the requirement to develop expertise in two related fields is not as significant with employers as it used to be.

The place of graphics needs some consideration given the number of vacancies requiring those skills. Whilst core competencies do provide a level of skill, much more competent student teachers would be prepared if they were allowed to specialise in the area.
Overall, when trying to answer the initial research question it would seem that the Design and Technology Association’s Competences have limited relevance to initial teacher education now. Alternative mechanisms to support the development of students’ subject knowledge need to be explored and institutions left to use their own systems, monitored by external examiners to ensure quality. The use of (electronic) portfolios to enable students to demonstrate their expanding skills and knowledge seems appropriate with examples of work done in school being included. It is the application of subject knowledge in a learning and teaching context that is essential for student teachers.

The consequences of dropping the Design and Technology Association’s Competencies are difficult to assess but given the popularity of resistant materials and food technology it is likely that the development of skills in electronics and textiles will be reduced as a whole. Further study is clearly needed in this area to provide further guidance of those supporting students in developing the skills and knowledge to teach contemporary design and technology.

References


