

# CAREERS IN CONSTRUCTION: CHILDREN HAVE THEIR SAY!

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## ABSTRACT

The construction industry employs one in every fourteen people in the UK and offers a wide choice of careers in craft, technical, professional and management fields (CITB, 2003). However, there is increasing concern that the future performance of the industry may be compromised by a shortage of skilled people. Egan's influential strategic vision, *Accelerating Change*, sets out ambitious recruitment targets for the construction industry. Namely, to recruit and retain 300,000 qualified people by the end of 2006. Whether such targets can be met remains in doubt, as the report *Rethinking Construction Education* (2002) concludes, that construction degrees face extinction in ten years if the decline in student applications continues.

This paper seeks to add to existing careers-related research, by identify factors that influence career choice in the construction industry. Focus groups comprising Year 9 children from six schools were conducted and their views regarding the perceived career opportunities offered by the construction industry were recorded. A novel computer-based data collection tool was developed and, drawing upon a list of 20 careers statements, the research sought the response of children in the Yorkshire and Humber region.

Analysis adopts 'R' factor analysis to identify variables that influence career choice in construction. Despite the small sample used in this pilot study, initial findings suggest that school subjects and children's performance in these subjects are important factors in career choice together with the nature of careers advice. Consistent with earlier research it also appears that factor weightings attributed to individual variables are influenced by gender. Whilst tentatively recommending that construction-related promotional campaigns should explicitly link school studies e.g. design technology and resistant materials, to the various careers the industry has to offer, a large-scale longitudinal study is essential.

Keywords: Key Stage 4, factor analysis, Authorware.

## INTRODUCTION

The construction industry employs one in every fourteen people in the United Kingdom (UK) and offers a wide choice of careers in craft, technical, professional and management fields (CITB, 2003). As such, it makes a major contribution to the UK economy and society - the Construction Industry Council, for example, states that the work of engineers, surveyors, architects and other consultants contributes 1.4% of the UK's gross domestic product. However, a draft report compiled by the University of Central England, *Rethinking Construction Education* (2002), concludes that construction degrees face extinction in ten years if the decline in student applications continues i.e. a 45% reduction from 1994 to 2000, and with it the "inevitable" collapse of the industry. Not surprisingly these issues appear in Egan's influential strategic vision for the construction industry, *Accelerating Change* (2002), which sets out ambitious recruitment targets i.e. to recruit and retain 300,000 qualified people by the end of 2006, requiring a 50% increase in suitable applications to built environment higher and further education courses by 2007. However, the CIOB report *Constructing our Future* (Wilkie and Giddings, 2004) makes grim reading as it states that many courses are no longer viable as the number of applications are so low. These concerns also surface in Egan's most recent report, *Skills for Sustainable Communities* (2004), which highlights the need for increased numbers in core occupations. Without these built environment professionals, Egan states, the government's concept of the "Sustainable Community" may falter.

Dainty and Edwards (2003) argue that there is urgent need for a sustained promotional campaign if recruitment difficulties are to be avoided in the future. It is a view shared by industry (CITB, 2003; CIC, 2004), Higher Education (Wilkie and Giddings, 2004) and the professions. The Royal Institution of Chartered Surveyors (RICS), for example, has placed recruitment and retention as a key construction priority within its five-point plan for action (Berry, 2003). However, there is little evidence of close collaboration, which Dainty and Edwards also believe is vital if initiatives are to have a marked effect on the skills shortage.

Agapiou's (2002) exploration of the attitudes of school-age girls, their parents and educators to career prospects in the construction industry provides a valuable foundation for the work. This qualitative study, based upon 15 semi-structured interviews, found that reservations tended to focus on the physical nature of the work, the social dynamics of working in a male-dominated environment and the availability of career paths on completion of apprenticeship training. Moreover, the study also concluded that parents, teachers and careers advisers lacked the necessary information to be able to direct children towards the construction industry. This paper attempts to identify key factors that influence career choice in order to target more effectively construction-related careers resources for schools. Unlike Agapiou's research, however, factor analysis is used to identify any broad categories in the attitudes of children to a career in construction, collected during a series of focus groups at CITB facilitated careers events in the Yorkshire and Humber Region.

## METHOD

Factor analysis is a multivariate statistical method which is used to identify what (if any) are the chief underlying dimensions of a set of variables, attributes, responses or observations (Oppenheim, 1992). Whilst it is not without its detractors, if correctly used, it can yield much useful information (Norman and Streiner, 2003). Hair et al's (1998) decision process is helpful in this respect, articulating a three stage design approach to factor analysis:

- calculation of the input data to meet the specified objectives of grouping variables or respondents;
- the design of the study in terms of number of variables, measurement properties of variables and the types of allowable variables; and
- the sample size.

R-type, the most common type of factor analysis, lends itself to this study as it seeks to analyse a set of variables to identify dimensions that are not easily observed (*ibid*). The variables, based on a series of statements, sought to identify underlying factors that influence the perception of construction as a career opportunity. In general researchers would not factor analyse a sample fewer than 50 observations and Hair states that as a general rule the minimum is to have at least five times as many observations as there are variables to be analysed. Twenty statements were collected during a CITB facilitated careers exercise and these factors rephrased for inclusion in the data collection program.

In total 89 children in Key Stage 4 ranked the statements using a 9 point scale (-4 Strongly Disagree to +4 Strongly Agree). As such, the sample is marginally below that recommended (*ibid*). Some schools that had previously agreed to take part in the study had to withdraw from the research due to imminent examinations. However, the sample was deemed to be of sufficient size to "test" the Authorware application and the chosen analytical tool and to offer tentative observations on the underlying factors.

Fraenkel and Wallen (1996) state that in planning an educational study a careful evaluation of its ethical acceptability is necessary and that stringent safeguards should be put in place to protect the rights of participants. Cormack (1996) outlines the key considerations of the researcher:

- Personal integrity and informed consent;
- The identity of the researcher;
- Confidentiality and anonymity; and
- Ethics Committee approval

Accordingly, the research study adhered to the University's ethics procedures. The University protocol comprised health and safety issues, insurance, professional responsibility of the researchers and context for the research study. It was also agreed that the anonymity of the schools, their staff and their children should be preserved.

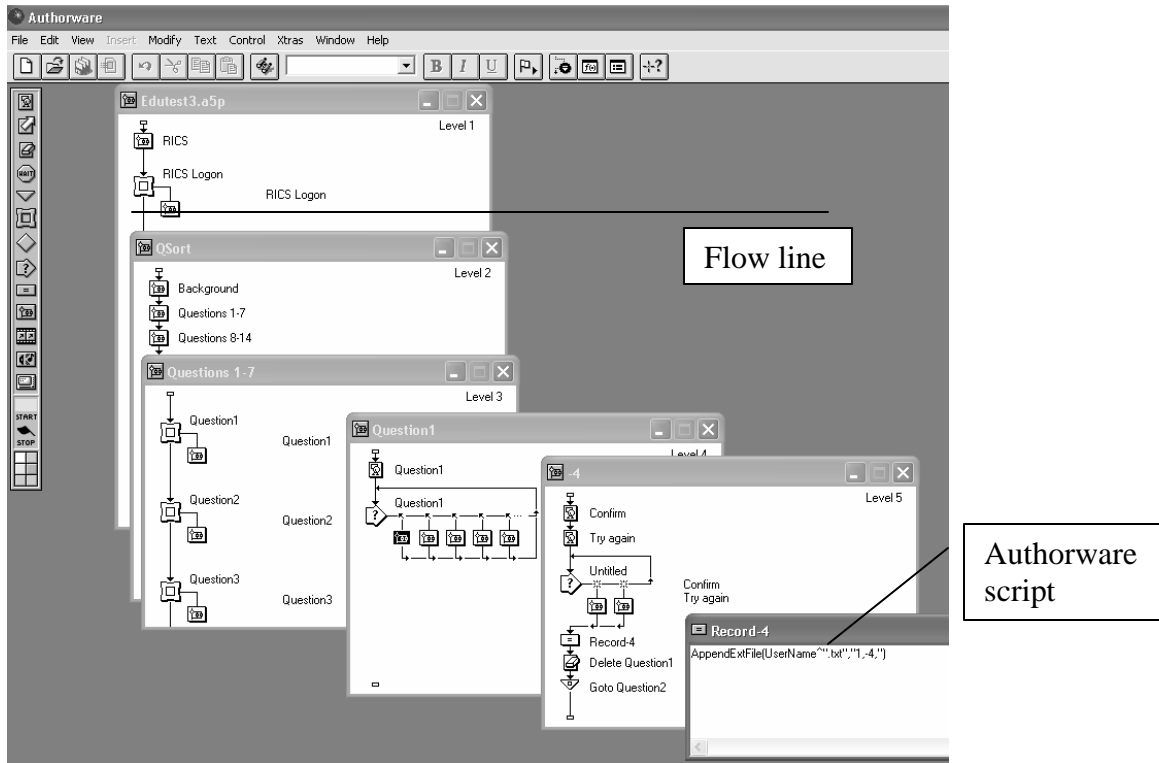
Children were encouraged to participate in the research, however, there was little intrinsic benefit to be gained by taking part in the study. Oppenheim (1992) suggests that an extrinsic reward may be of help, therefore children received an RICS gift i.e. CD case, calculator or pen, for taking part in the survey. Children were briefed on the purpose of the study prior to consent being requested and they were able to withdraw from the exercise at any time during data collection process.

## **DATA COLLECTION**

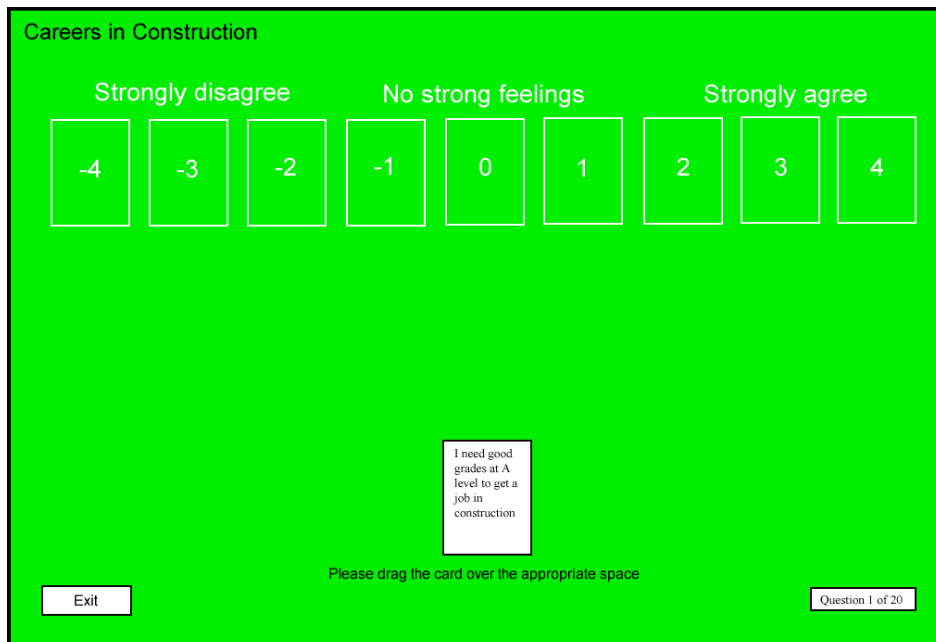
Whilst educational technologists are recognised as having an abundance of authoring software from which to choose when designing computer-based training packages (Hughes, 2000), these programs also offer considerable potential for researchers who require bespoke data collection tools. For example, Macromedia Authorware is a popular high level authoring system which can be used either for the creation of simple presentations or complex data handling applications. Ellis (2003) acknowledges the versatility of packages such as Authorware, but also cautions developers that the creation of highly interactivity pieces have significant resource implications. Applications must be carefully targeted for their audience and deliver tangible benefits. Authorware's functionality is determined by a series of icons placed on a flow-line (see Fig.1). The type of icons used e.g. navigate, framework, interaction and decision icons, determine both the sequence and functionality of the piece. However, a greater level of control can be achieved by combining Authorware's variables and functions in a series of expressions, which enable the developer to collect and manipulate data (Authorware, 1998).

Authorware was used to create a data collection tool, which enabled users to rank 20 careers statements and to record user responses. Scripts within the application incorporated WriteExtFile and AppendExtFile system functions in Authorware (see Fig. 2) to generate a .txt file, using comma delimited variables. Each line within the .txt file, therefore, represented a new case and the data on gender and careers statement ratings was transferred to SPSS. SPSS templates enabled the txt files generated by the program to be imported directly into the statistical analysis package as a data source without the need for modification. Accordingly the data collection and analysis process was both effective and efficient.

Successful multimedia applications rely on good design. As Rimar (1996) states, screen based programs are more sensitive to "message design quality" than their paper-based counterparts. Hence a well-known metaphor or game was needed, which would immediately be familiar to school children. A pilot application based upon Microsoft Solitaire, regularly used by IT teachers in order to develop beginners' use of the mouse, proved successful and conveniently offered an appropriate metaphor which was consistent with the research process. Each careers statement was written within a virtual playing card and users were invited to drag and drop the card onto one of a series of identifiable zones (see Figure 2). Misplaced cards were returned to the original "dealer" space and users were asked to confirm the accuracy of their selection prior to the next deal.



**Figure 1: Script within Authorware’s calculation icon exports data to external file**



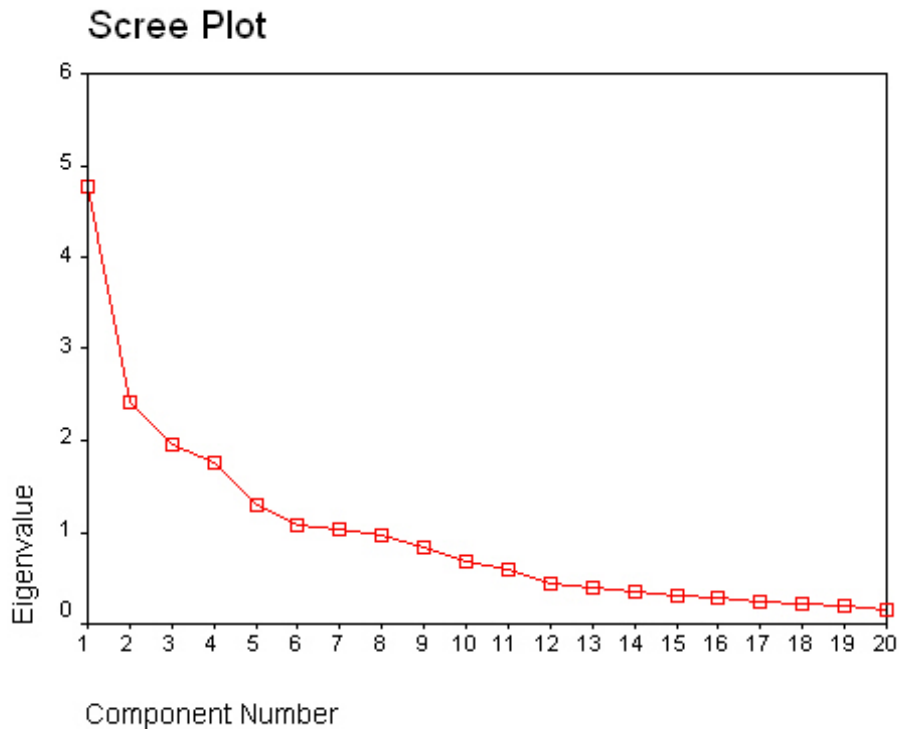
**Figure 2: Authorware’s Presentation Window provides the data collection interface**

## RESULTS

An exploratory approach was initially adopted, using the complete sample, to search for structure among the 20 variables (Hair et al, 1998). The measure of statistical adequacy (MSA) i.e. the Kaiser-Meyer-Olkin (KMO) statistic (0.662 – see Table 1), reveals that the research lends itself to factor analysis. The scree plot (see Fig. 3) indicates that a maximum of six factors could be extracted i.e. the point at which the slope evens out. Other widely used criterion, whereby any factor with an eigenvalue of less than 1.0 is thrown out (Norman & Streiner, 2003), supports this observation.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.662
Bartlett's Test of Sphericity	Approx. Chi-Square	354.959
	df	190
	Sig.	.000

**Table 1: KMO and Bartlett's Test**



**Figure 3: Eigenvalue Plot for Scree Test Criterion (SPSS)**

Applying an orthogonal rotation (i.e. Varimax) to the solution assists further in simplifying the factor structure. Rotated factor loadings are shown in Table 2, from which it is noted that items 1,2,3,4 and 5 have loadings above 0.5<sup>1</sup>. Four of these items emphasise the importance of school subjects in career choice, whilst the remaining factor “Construction would give me a job for life” is concerned with the importance of job security. Factor 2 focuses on careers advice and remuneration (i.e. items 6,7 and 8). Later factors are more confused as there appears to be little cohesion between the variables.

		Factor 1	Factor 2
1	I need good grades at A level to get a job in construction	.896	
2	I'm looking for a job that uses my best school subjects	.729	
3	Construction would give me a job for life	.648	
4	I like the work we do in resistant materials	.516	
5	I like the work we do in design technology	.512	
6	I am expected to suggest my own career ideas		.757
7	It's interests first, then a career		.742
8	Construction careers are well paid		.694

**Table 2: Varimax rotated factor matrix (total sample)**

Whilst the majority of applications adopt an exploratory approach (Hair et al, 1998), factor analytic techniques may also be used to test hypotheses. Agapiou’s work, for example, suggests that gender influences career perceptions and therefore the grouping of variables. Unfortunately the sample size in this instance precludes formalised hypothesis testing, however, it is interesting to observe from the factor matrix in Table 3 that the underlying dimensions appear to differ.

## DISCUSSION

The novel use of multimedia authoring software to create bespoke data collection applications proved successful in a school environment. Children showed great interest in the technology and needed little guidance to rank the various statements used in this study. However, it is only natural that children will at times try to “fool” the computer and respond in a manner that might not be anticipated by the programmer. Accordingly, the design of such applications must be robust – time spent in development will be rewarded during the data collection stage. The data collection tool developed for this research has potential for wider application, with interest currently being expressed by teachers in clinical medicine and public health.

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<sup>1</sup> Norman and Streiner’s (2003) criterion provides guidance on the significance of factor loadings.

	GIRLS		BOYS	
	Factor 1	Factor 2	Factor 1	Factor 2
My parents give me careers advice	.821			-.786
Buildings are interesting	.687			
I would like the responsibility of managing a big construction project	.687			
Construction involves a lot of maths				.752
Construction would give me a job for life		.705		
I like the work we do in resistant materials			.817	
I like the work we do in design technology			.769	
Building things is boring			-.740	
I need good grades at A level to get a job in construction		.650		
Construction is cool			.641	
Buildings are interesting			.500	
I would like a company car				.787

**Table 3: Varimax rotated factor matrices (girls and boys)**

In seeking to promote the construction industry as an exciting career opportunity, there is an understandable tendency to focus promotional campaigns on innovative award-winning projects that are of national or international importance and the various roles undertaken by members of the project team. The findings in this pilot exercise suggest that a key consideration for children is the relationship between school subjects, such as design technology and resistant materials, and their respective career interests. Whilst this may seem a trite observation, it is clearly important to emphasise the link between school and career as opposed to including such information as an “aside” in the literature.

Careers resources, currently being developed by organisations such as the CITB, SETNET, the professional bodies and Higher Education Institutions, must ensure therefore that the school curriculum is appropriately reflected in their promotional material. Virtual<sup>site</sup>, a HEFCE funded careers resource, provides one such example. If this on-line resource is to successfully attract youngsters into the industry, then it must take cognisance of the factors that influence children’s career choice and make explicit the relationship between subjects such as design technology and construction. Moreover, it must recognise the differing attitudes to career choice amongst school-age boys and girls both in content and design.

RICS efforts to attract more women into the industry are to be commended. The ongoing “raising the ratio” initiative, for example, provides evidence of direct action being taken to attract more women into the surveying profession. Although the factors influencing career choice in this pilot exercise cannot be relied upon, it is suggested that there may be merit in pursuing further research to determine whether there are any underlying

dimensions that might inform future promotional campaigns. Certainly the work of Agapiou (*ibid*) provides some insight into the perceptions of school-age girls, their parents and teachers.

## CONCLUSIONS AND RECOMMENDATIONS

Dainty and Edwards (2003) call upon the industry to work together to address the recruitment crisis. Adhoc initiatives by various industry bodies are unlikely to achieve results. There are too many schools, too many children and much too little time for individual organisations to be able make a difference. Finding resonance with the current trends towards partnerships and strategic collaborations, project stakeholders must share the responsibility of working with schools to devise a planned approach to careers education.

Whilst this pilot research has sought to collect views of children who are soon to choose their GCSE options, it is recommended that a longitudinal study be conducted, to analyse the change (if any) in children's perceptions of construction throughout the Key Stages. Furthermore, the careers initiatives undertaken, whether this is simply the distribution of promotional materials, careers talks or school-based activities, should be subject to rigorous evaluation. Only then, will the industry be able to gauge the effectiveness of careers initiatives, improve their impact and achieve their principal aim: to find a lasting solution to the acute skills shortage faced within all sectors of the construction industry.

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## **ACKNOWLEDGEMENTS**

Thanks are extended to the schools and children in the Yorkshire and Humber region that agreed to take part in this study