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Maintaining the quality and relevance of industrial resource materials for technology education

The technology in context national support programme

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Abstract

A large number of companies are involved in the development and publication of resources for technology education. Whilst carrying information to teachers and pupils about technology in business and industrial context it is essential that the resources are of sound educational value and relate to the relevant attainment targets and programmes of study.

This paper outlines a collaborative process for the development of a series of national curriculum technology resources with a number of different industrial sponsors. The clarification of process, content and the evolution of suitable pupil activities which can be resourced from the pack is discussed in terms of the industrial context and the programmes of study for Technology and EIU.

From a number of potential start points the exemplar activities chosen offer strategies for progression and coherence in a number of different aspects of technology activity. The work of professional designers, architects and research and development engineers is seen in the context of investigating the needs of client and customer groups. Factors such as managing engineering and architectural projects to maximise energy efficiency and minimise environmental impact are discussed and illustrated. For example, interactive and managed technological systems are used in the context of travel and leisure to introduce pupils to data handling and a variety of automated and controlled systems for information display and baggage handling.

A large number of companies has been involved in the development and publication of resources for schools for many years. This has long been the case for secondary schools Science and Technology subjects. The National Curriculum for Technology, specifying business and industry as one of its five contextual areas, has ensured a market for such material, especially in primary schools where less appropriate material has been available.

As with any educational material, there is variation in quality and content. This paper investigates the methods involved in maintaining the quality and relevance of industry/business based material to Technology education.

1. What constitutes a good industrial resource?

1.1. Whilst carrying information to teachers and pupils about technology in a business/industrial context it is essential that resources are of sound educational value. One way of doing this is to audit the resource against the relevant attainment targets (attainment outcomes for Scotland) and programmes of study.

1.2. Collaboration and negotiation are key practices when developing educational material relating to business and industrial practice. The industrial input is necessary to ensure that data provided is factually correct whilst the educational input is necessary to ensure that the resource is educationally valid and appropriate. Inappropriate use of jargon, and information written for a higher reading level than required, are common problems and occur when the purpose and intended use of the resource have not been properly researched by the development group.

1.3. Background information about business or industry for its own sake does not usually serve a useful purpose. For the technology curriculum - whether for England and Wales, Northern Ireland or Scotland - what is required is information which can provide a context or situation which will work as a classroom activity. Factual information which helps answer the questions 'why are we doing this?' or "what is the relevance to Technology education?" "how will this improve the quality of the learning experience?" should be included and related to specific activities.

1.4. Work cards and fact sheets have limited value. Work cards can provide a framework but often are no more than mechanistic devices. Fact sheets are useful only if the information given would be difficult to find elsewhere. Wherever possible, (time allowing) it is obviously better to allow the pupils to

research the relevant information for themselves to help build an understanding of the design situation.

1.5. Information about industry which leads to designing and making activity is obviously most valuable and helps to bring the outside world into the classroom.

1.6. Educational material is not the place for propaganda. This is not to say that controversial issues shouldn't be raised, or that industries involved in what could be called controversial areas of business, such as Nuclear Waste Disposal, should not produce or be represented in educational material. What is important is that the material encourages debate of the controversial issues and that various sides of the argument be put forward or, at the very least, materials or sources of opposing views be provided in the material. The Technology in Context materials aim to balance the needs of both educational and industrial interests in presenting information at face value.

1.7. There is no single form of media that can be said to be the right or best way of presenting materials to pupils. The range includes videos, software, wallcharts, photographs, text and slides. All have value; however, too much use of any of the above can become tedious. The format is normally the last thing which should be decided, as the content, context, age group and subject material can all affect the decision as to which would be the most appropriate format.

1.8. Activities need to follow an appropriate educational philosophy which for technology will be student centred, encouraging 'ownership' of tasks and setting activities within a broad context before concentrating on a theme or specific series of tasks and outcomes.

1.9. Variety within a resource allows teachers to interpret and use the material to suite their own teaching situation. Contextual, referenced to specific activities, using various materials/skills/knowledge are examples of this. Activities can also provide a range of disciplines such as food technology, textiles, business, materials technology, information technology, craft and design, which mirror practice in the industry concerned.

1.10. Advice, guidance and support for the teacher and pupil, giving suggestions as to how the material could be used to their best advantage.

2. The process of developing an industrial resource

2.1. Meaningful collaboration and negotiation between education and industry is to be encouraged as it builds towards better understanding.

2.2. Financial and other support from industry should be welcomed but delivered at an appropriate level of educational need. When producing educational material this may lead to material being provided free to school or at a subsidised price. With the Technology in Context programme, industry and the DTI cover resource development costs allowing TIC to provide resources at a price which covers reprint, marketing and future revision costs only.

2.3. Just as important is the benefit gained from working together throughout the development of the material. Both sides can benefit from a greater understanding of the other sector. One of the main problems can be in the actual organisation and coordination of the various parties involved. This is where link organisations such as TIC, SCSST/ SATRO, SCIP and others can contribute valuable expertise.

2.4. Various methods are used to generate resource material. In different situations one may be more appropriate than others but the essential element is to involve teachers throughout the process to ensure the coherence and appropriateness of the resulting material. For example:

a) Teacher(s) work in industry for a limited period of time (perhaps one or two weeks) to develop broad ideas in a new context. This may be organised as work experience or work shadowing. It gives the teacher the opportunity to identify potential situations around which to base technology activities.

b) Meetings with industry and educational representatives will be necessary to identifying the focus and content of the pack.

3. What is a good resource?

3.1. Use
Rarely is a resource taken and used in school exactly as it is laid out. The expectation should be that many resources are used in a very different way from what is anticipated when they were written. No single resource will function successfully in every teaching situation. Only when a teacher adapts the resource to his/her pupils' needs and circumstances can it become a good resource.

3.2. Software
Software can become a difficulty when developed to support a range of general activities within the resource pack. There is considerable variation across the country in the number and types of

computer systems in use. BBC, Nimbus and Archimedes are standard for most schools but this sometimes means working to a lower common denominator in terms of what the programme can do. Where a dedicated format is used, higher levels of capability can be realised.

3.3. Stereotyping

It is important to challenge stereotypes - especially when working in an business/industry context - possibly influencing pupils' views of career prospects in a given industry. If however there is an imbalance in the numbers of women or members of ethnic groups working in the business concerned a biase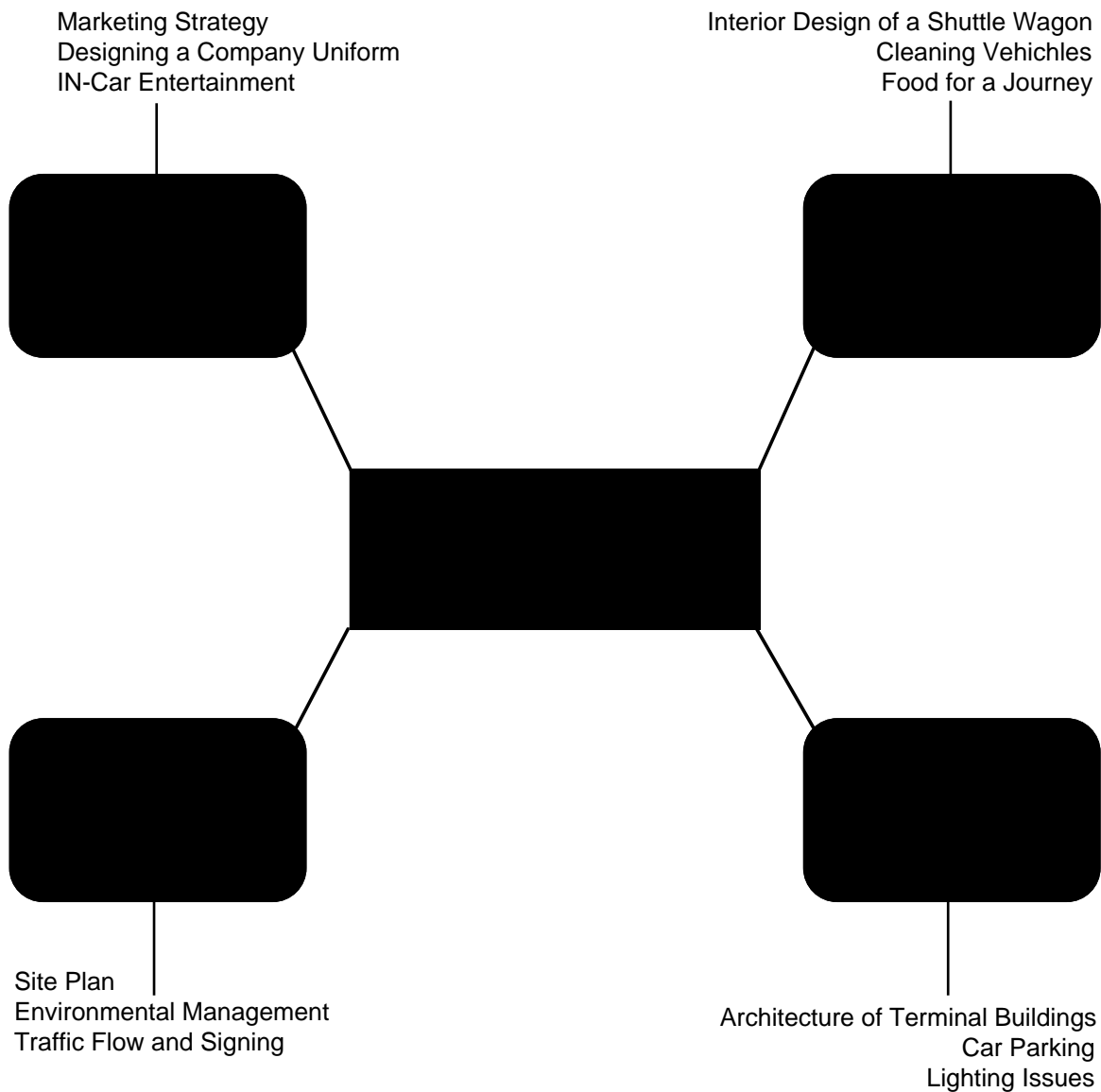d view may result. Should someone be 'planted' to present a better 'balanced' video? This problem is one which will need to be addressed by the individual resource developers and their particular circumstances. Where women, ethnic groups and people with disabilities are not equitably represented, there should be an attempt to do so if it is professional and practicable.

Conclusion

The experience gained in the development of the TIC resource series has supported the value and the relevance of industrially sourced activities for technology. Examples of topic webs and resulting activities follow to illustrate the potential which exists in a number of the projects undertaken.

Appendix 1

Activities Web

Marketing Strategy
Designing a Company Uniform
IN-Car Entertainment

Interior Design of a Shuttle Wagon
Cleaning Vehichles
Food for a Journey

Site Plan
Environmental Management
Traffic Flow and Signing

Architecture of Terminal Buildings
Car Parking
Lighting Issues

IN-CAR ENTERTAINMENT

Introduction

Many people find it difficult to occupy themselves on a long journey. Word puzzles and small-scale travel games are popular ways of passing the time.

The journey through the tunnel will be less than 30 minutes, but with boarding time added to this many passengers will be on the trains for approximately 40 minutes.

Car passengers will be encouraged to remain in their vehicles for the duration of the journey and are likely to have already spent some time on the road travelling to Folkestone or Calais. People can, however, stop at the terminal buildings to use a range of facilities such as toilets, restaurants, and shops.

This project concerns the application of the design process to the production of in-car entertainment for the duration of the boarding process and cross-Channel passage. This may take the form of anything from a paper quiz to a cassette programme to play in the car.

Eurotunnel Radio will be a specially provided service operating within a 48 kilometre (30 mile) radius of the Folkestone Terminal, and on the shuttle trains where car radios will still be able to receive it during the journey.
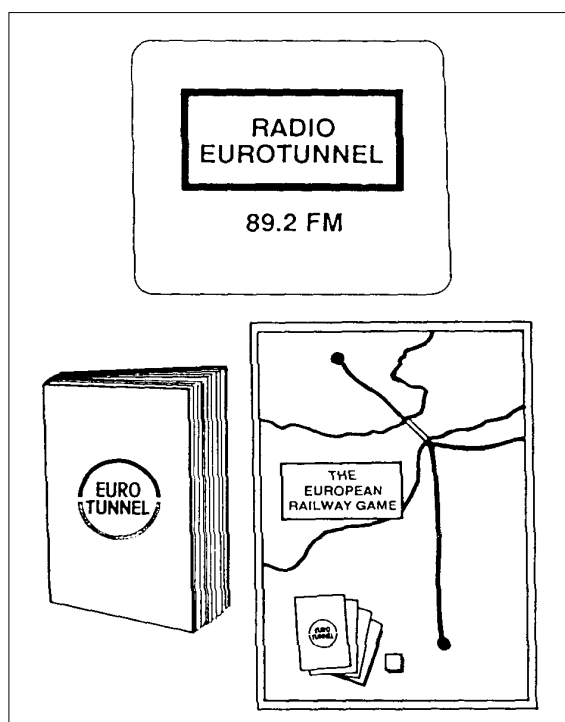
The aim of Eurotunnel Radio is to provide customers approaching the terminal with up-to-the-minute information on journey times, frontier procedures, and weather reports. The broadcasts will be mainly in English, but will include reports in French and other European languages. A similar facility will be available in France.

This activity may be introduced through discussions about recent journeys children have undertaken, their means of transport and how they occupied their time; or about their pastime activities and favourite games.

This is a good point at which to introduce the opportunity to combine education with entertainment. Many travellers, especially families, would appreciate an exciting presentation of educational information during their journeys, particularly relating to another language and culture.

Activity

Investigate and generate a design for the production of an educational, in-car entertainment pack suitable for children or the family.

Resources

The following resources may be useful: paper, card, adhesives, audio-cassette tapes, counters, dice, paint, felt pens, hardboard, acrylic, wood, metal, and fabrics.

Organisation

The children's experience will determine the level of assistance needed from the teacher for the design and research stage of this project.

It may be profitable to limit the exercise to, for example, designing a word search quiz to help children understand the Channel Tunnel operation. Equally, groups within a class could explore each type of media presentation.

This project may relate to any journey, especially by train, ferry, or aeroplane. It could also be widened to include adult information, education, or entertainment.

Identifying Needs and Opportunities

Pupils should be encouraged to think about what they do to entertain themselves and to look at travel games on the market such as travel chess or Scrabble. They may be encouraged to brainstorm and record the different ways of presenting (educational) information in an exciting fashion - word games, puzzles, quizzes, word searches, illustrated

information for children, audio-cassette tapes, radio, teletext presentations, newspapers, and comics.

Next, the theme and necessary information should be identified. This project requires a good understanding of whichever theme is chosen. For example, if the Channel Tunnel is the chosen theme, then the pupils' understanding of the terminals in terms of buildings, structures, and facilities, must be confirmed.

Discussion may be started with questions such as - What are they? How was the tunnel made? This may be supported by background information about the tunnel and the two terminal towns. Alternative themes are France or Transport.

Activities Web
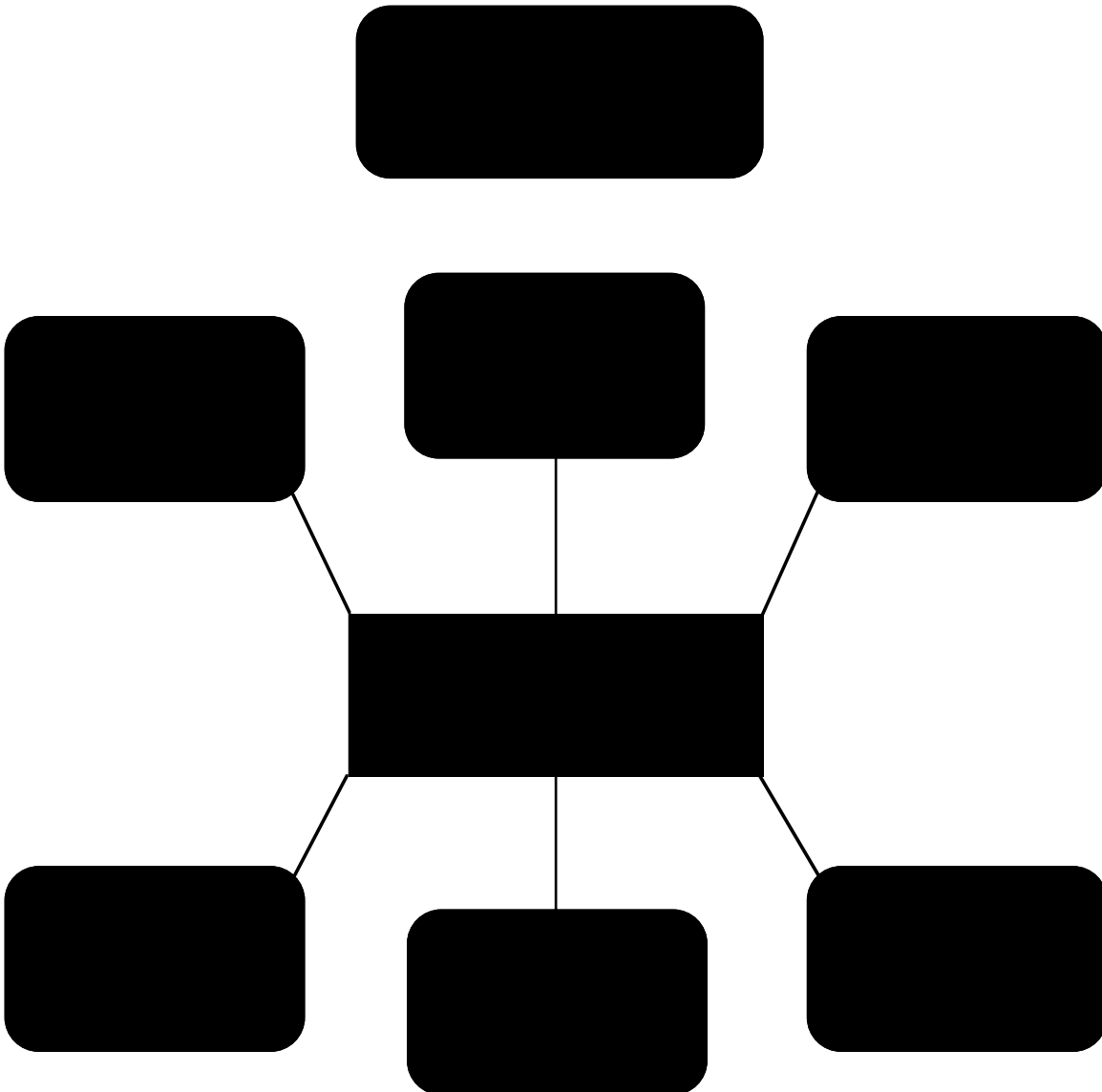
BAGGAGE HANDLING SYSTEMS

Activity

Generate designs for improving the handling of baggage and similar heavy loads. (Contextual task for Key Stage 3 or 4)

Identifying Needs and Opportunities

Ask pupils to consider baggage handling systems. What types of baggage do people have? Refer to the pupils' sheet which gives data on types of baggage and weights.

Consider how people move their own baggage from the terminal to the aircraft, with specific reference to those who are not strong and able-bodied, for example, people with disabilities, expectant mothers, and young children.

Generating a Design

Pupils could use the flow charts from the Passenger Flow section (pages 35-6), and for each stage of the movement of passengers through arrivals and departures, consider the decisions made by (a) the airport staff and (b) the owner of the baggage.

Reference should be made to familiar contexts, for example, carrying books to school and storing them until needed, or the movement of goods in and out of supermarkets (food or DIY).

Planning and Making

A specification (list of requirements) needs to be written for the system design including weights, sorting for different areas, sorting of types and sizes, reclaim, loading onto aircraft, staff using the systems. Proposals can then be made for new or improved baggage handling systems which will involve pupils in graphic display and three-dimensional modelling of their ideas and construction.

Evaluating

Modifications to existing systems such as supermarket trolleys could be tested in practice. Other ideas will have to be evaluated as concept models.

Activity

Design and make a model to show how trolleys could be circulated.
(Reference task for Key Stage 3 or 4)