Title Research & development in computer-assisted career guidance: The Job Orientation Backup System experience
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RESEARCH & DEVELOPMENT IN COMPUTER-ASSISTED CAREER GUIDANCE:
THE JOB ORIENTATION BACKUP SYSTEM EXPERIENCE

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RESEARCH & DEVELOPMENT IN COMPUTER-ASSISTED CAREER GUIDANCE: THE JOB ORIENTATION BACKUP SYSTEM EXPERIENCE

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BACKGROUND INFORMATION

The Need for Career Guidance in Singapore Schools

In the 80's there was an increasing realization amongst educationists in Singapore of the lack of career guidance in schools. Every year, thousands of young people leave the school system and drift into the labour market ignorant of their own vocational aptitudes and ill-prepared for the world of work. The result is poor person-job match and, in many instances, job-hopping and poor productivity.

As concern grew, the National Productivity Council formed a task force in 1984 to "focus attention on the issue of career guidance in schools with the view to develop better match between the future work force and jobs and ultimately improve productivity." (Sim, 1985, p.3). The first project initiated by this task force was a survey on a random sample of 438 secondary four students from 71 schools to identify career guidance needs amongst the students population. The findings of this survey were startling:

1. Among the student population, those who needed career guidance most were the least catered for. High achievers who enrolled for tertiary education could receive some form of career guidance in the various institutions but the majority who left school at various stages to seek employment or vocational training received little assistance in career planning.

2. Although two-third of the school personnel surveyed recognized the urgent need for career guidance for their pupils, this service was sadly lacking in the schools due to insufficient human and material resources.

3. Interviews with company personnel (potential employers of school leavers) revealed that young job seekers were generally ignorant in occupational information, had unrealistic expectations and lacked job hunting skills.
4. Among the students surveyed, only 40% indicated that they had given some thought to their future careers but few knew what was involved in preparing for the job they wanted. Many showed ignorance in occupational knowledge and had unrealistically high salary expectations. More than 80% of the pupils surveyed expressed an urgent need for career guidance.

When asked to identify specific career guidance needs, the students requested help in the following areas (Sim, 1985):

- 82.7% to know more about specific jobs they were interested in
- 80.6% to find out their vocational aptitudes
- 74.6% to be taught job hunting skills
- 65.2% to find out more about jobs and the world of work
- 61.2% to know how to prepare for job interviews.
- 37.1% to be taught how to write application letters and curriculum vitae

This initial survey was followed by another national survey conducted on 1380 secondary and junior college students (Tan, 1988) which revealed that -

1. There was no systematic career guidance in most schools. At their best career guidance activities comprised mainly career talks and occasional field visits organized on an ad hoc basis.

2. Majority of the students surveyed had neither seriously thought about career plans nor actively engaged in any career exploration or career planning.

3. They were also found to be lacking in career self-knowledge, ignorant in occupational information and weak in career decision-making skills.

These two national surveys drew much attention to the lack of career guidance in the schools. In February 1987 the Minister of Education endorsed the recommendation made by 12 principals in their report entitled "Towards Excellence in Schools" (MOE, 1987) to formally introduce career guidance into Singapore schools through a pilot scheme. This timely and welcome move, however, brought with it some pressing issues to be addressed - what kind of career guidance would be viable for Singapore schools and what kind of resource materials will be needed?

A Viable Career Guidance Model for Singapore Schools
Super defines career guidance as "the process of helping a person to develop and accept an integrated and adequate picture of himself of his role in the world of work, to test this concept against reality and to convert it into a reality with satisfaction to himself and benefit to society". (Super 1957)

This definition highlights two very important foci in career planning, that of self-understanding and an adequate knowledge of the world of work. More important, however, is the linking of the two leading to informed career decision-making and realistic career planning. Watts suggests that career self-awareness and career opportunity awareness can be linked by well-planned transition learning and decision learning which may in turn lead to realistic career choices (Watts, 1988). Basically, then, the role of the teacher in career guidance is three-fold: 1). to facilitate the students' self-understanding in terms of vocational interests and abilities, work values and aptitudes 2). to enhance the students' understanding of the world of work and 3). to lend guidance and support to the students in the on-going process of career exploration and career planning. After much deliberation, the career guidance model suggested by Khor (1987) was adopted as a viable career guidance model for Singapore schools. (Fig. 1)

The Search for a Comprehensive and Effective Career Guidance Tool

With the current emphasis on high technology in Singapore and the availability of sophisticated computer facilities, we in the Institute of Education were convinced that the computer has much to offer to both teachers and students in the area of career guidance. As pointed out by Watts (1988), computer assisted career guidance has two distinct advantages over traditional information-delivery systems. Firstly, it requires career information to be collected in a much more systematic and rigorous way and is therefore much more comprehensive. Secondly, the use of computer enables students to address their personal needs by identifying rapidly the information that is specifically related to their needs. Finally, though rather expensive to develop initially, computer assisted career guidance saves cost in the long run by gathering a comprehensive range of occupational information in a neat package and thus freeing the guidance teacher to concentrate on the more personal facets of career decision-making -helping students to express and explore their feelings and concerns, to reflect on the information they have collected and to work on the emotional difficulties which many experience in making career decisions.

According to Clyde (1979) there are three categories of
Computer Assisted Career Guidance Systems (CACGS): batch-process systems, on-line career information systems and on-line career guidance systems. Batch-process systems normally consist of a large central processing unit in one location that stores data files of occupational characteristics, colleges, test responses and other guidance information. The users would complete questionnaire forms which are then sent to the central unit to be fed into the computer for processing. After some time the user will receive a computer printout which states the occupational patterns that match his/her characteristics and other relevant information. The obvious limitation of these systems are the lack of direct access and the delay in response. On-line career information systems are those which store large data files in the computer with interactive dialogue to provide communication between the computer and the user. The third type, the on-line career guidance systems, are capable of doing more than information giving and person-job matching. They can also engage the user in career guidance activities such as clarifying values and abilities, assessing self, learning decision making skills and assessing the world of work etc.

These three types of CACGS reflect an information-guidance continuum. On the information side of the continuum are strictly the access and retrieval of information type systems while on the guidance side are the interactive guidance systems. Nevertheless, as Pierce-Price (1987) has observed, the current trend in developing CACGS is towards learning/guidance systems.

Promptly after the decision was taken to use computer technology in the development of resource materials, a research team was formed to survey existing computer assisted career guidance systems (CACGS). We realized that much of the pioneering work on developing such systems had been done in North America and the United Kingdom. In the late 1960s and 1970s several CACGS were developed in the U.S., of which SIGI (System of Interactive Guidance and Information) and DISCOVER are best known. CHOICES (computerized Heuristic Occupational Information and Career Exploration System), a Canadian system, is another good example of such systems while in the U.K. PROSPECT is a well established system.

Having surveyed major CACGS available in the market and consulted experts in the field, the research team came to the decision that since none of the systems could be used en bloc, it might be more feasible to develop our own system rather than adapting any of the existing ones. The idea of adaptation was not favoured because of the need to incorporate completely different databases and also because of the educational and cultural differences between Singapore and countries where CACGS are prominently used. Besides, adaption has attending issues such as copyright and distribution rights etc. It also restricts the freedom to make changes or further refinement needed to update...
the database. Thus, in November 1988, the idea was mooted to develop an indigenous computer-assisted career guidance programme for use in Singapore schools to be called "JOBS".

Theoretical Basis of JOBS

As the name suggests, JOBS is a backup system for teachers in schools to provide career guidance for their pupils, not something to replace the teachers themselves. The theoretical framework for its development is based on the work and research of two prominent American vocational psychologists, Donald Super and John Holland.

Super postulates that an individual's career development is part of the overall personality development that takes place over a long span of time in a series of stages. Each stage is characterized by certain appropriate developmental tasks, the successful mastery of which leads to the next stage of development and the mastery of further developmental tasks. This is an on-going process through which the individual develops his/her self-concept and seeks to achieve self-actualization through the pursuit of a career.

In one of his earlier works Super (1963) outlined five vocational life stages in the career development of an individual, namely, (a) Growth Stage in childhood; (b) Exploration Stage in adolescence; (c) Establishment Stage in adulthood; (d) Maintenance Stage in middle age and (e) Decline Age leading to retirement. Super also identifies career exploration and crystallization of a vocational preference as two main developmental tasks associated with adolescence.

The acquisition of work values is another integral aspect of career development as research has shown that an individual's choice of career is often influenced by his work values. Most researchers classify work values into two categories - extrinsic and intrinsic work values though some have added a third dimension - concomitant work values which deal with qualities of the work environment.

Holland's theory of "vocational personalities and work environments" focuses on the potential for an individual to gain satisfaction from working in an occupation suited to his or her "personality type". He postulates that people can be categorized as predominantly one of six major personality types - (1) the Realistic type who are good with their hands and prefer working with tools or machines; (2) the Investigative type who have questioning minds and enjoy working with ideas in problem-solving; (3) the Artistic type who enjoy work that allows
them to express their creativity; (4) the Social type who have social skills and enjoy working with people; (5) the Enterprising type who are self-confident and good at leading and influencing people and (6) the Conventional type who are precise and organized and enjoy working with data.

Holland further proposes that there are six major types of work environments which can be assessed in the same RIASEC terms, since people tend to congregate in environments where their own interests, abilities and attitudes are shared by others. Convinced that "vocational choice is an expression of personality", Holland theorizes that in making career-related decisions, people tend to search for environments where they use their abilities and find satisfaction in terms of their interests, aspirations and values. The more closely his type of work environment matches his vocational personality, the more stable his career choice will be and the greater his achievement and job satisfaction. Both Super's and Holland's theory have been validated in the Singapore context through research projects carried out by I. E. staff in 1985 and 1988, leading to the decision to develop a local instrument based on the two theories.

Functions and Target Users of JOBS

As a backup system for guidance counsellors and career teachers in schools, JOBS is designed to help secondary and junior college students at various stages of career development. For students who have absolutely no idea of what kind of work they would like to do, JOBS takes them through a series of self-assessment exercises to gain some insight into their own vocational interests, abilities and work values and to explore the world of work. For students who have done some thinking on their future career but are still unsure of their choice, JOBS helps them to check out on their preferred job as well as broaden their horizon by directing their attention to other occupations related to their interest. For students who have a fairly definite career choice, JOBS helps them to check out how realistic and suitable their choice is by comparing their own vocational profile with that of workers in the preferred occupation.

For all three categories of target users, JOBS also functions as an information system that provides comprehensive data about various occupations as well as educational information regarding study programmes and training courses to prepare for their preferred occupations.

Modules of JOBS
When completed, the full-blown version of JOBS will have six modules. The Introduction Module explains to the student the purpose of JOBS and what it can do for the user. It will also ask the student if he has any preferred occupation in mind. JOBS will put his ambition on file and return later to discuss with the user the suitability of his career choice.

The Self-Awareness Module takes the student through a self-assessment of his vocational interests, abilities and work values and gives him feedback in the form of a career profile describing his vocational personality. The system will then match his profile with that of occupational groups possessing similar interests, abilities and work values etc. to enhance his career self-awareness.

In cases where the student's preferred job is not in the list of occupations suggested by the system, the Profile-Discrepancy Consultation Module will explain how the discrepancy has come about by pointing out the areas where the student's profile differs with that of his preferred occupation.

The Occupational Information Retrieval Module provides detailed occupational information of about 200 jobs in terms of nature of work; working conditions; entry requirements; potential employers; remuneration; employment prospects; related occupations and sources for further information. The student can access to this information either by alphabetical order or according to occupational category.

The Educational Guidance Module contains information concerning academic studies and training courses available in the various institutions in Singapore as well as course guidance at secondary school or junior college level.

In the sixth and final module JOBS will conclude the consultation with a Parting Message of encouragement and a list of suggestion of what the student can do to further develop his career plans. It also offers practical advice as to how the student should use the data already obtained and encourages him to consult his parents as well as his guidance teacher in further career exploration.

Research Methodology

The time frame of this research project is from April 1989 to June 1992, a period of slightly over three years. The project is being carried out in four phases:

Phase One: Instrumentation
Three tasks were identified for the first phase of the research project, namely, the development, validation and refinement of the **Career Profile Inventory (CPI)** which is the main instrument used for data collection to develop the data base of JOBS.

**Phase Two : Data collection**

A three-pronged approach is adopted to collect data for JOBS. Firstly, career profiles of occupational groups are created through surveying workers in the various fields. Secondly, occupational information is collated through correspondence with professional associations and interviews with experts in the fields. Thirdly, educational write-ups are compiled from resource materials gathered from institutions of higher learning, industries and firms regarding training and preparation for various occupations.

**Phase Three : Field Trials**

Before introducing JOBS to the schools, it will be tested out in 5 field centres. Three secondary schools and two junior colleges will be selected as field centres and a random sample of students from these centres will be allowed to interact with JOBS to check out its usefulness and its impact on their career self-awareness using a pre-post test research design and control groups for comparison.

**Phase Four : Wrap-up of Project**

This final stage of the project involves data analysis of the pre-tests and post-tests, production of test manuals as well as the writing of research reports.

**Progress of the Project (January 1989 - January 1991)**

Since January 1989, four working groups of the research team have been meeting separately to work on different aspects of JOBS. Team A took almost a year (Sep 89 to August '90) to develop, validate and refine the **Career Profile Inventory (CPI)**. Having subjected the CPI to a series of pilot tests with samples of students, teachers and professional groups, the team has collected sufficient empirical data to conclude that a) Holland's theory has validity in the Singapore context;
b) the CPI is both a valid and reliable instrument to assess career personality of individuals and c) the CPI has concurrent validity with Holland's Self Directed Search (SDS) but has the advantage of being a locally developed instrument. To date Team A has collected responses from more than 5,000 workers covering 85 occupations. It has also collected sufficient data to develop career profiles for 35 professions. The final target will be 12,000 workers from 200 occupations.

To facilitate data collation, Team B has developed a job classification system which is pegged to Holland's six personality categories of RIASEC for easy cross referencing as well as an Interview Schedule and an outline for occupational write-ups. Collection of occupational information is done through corresponding with professional associations and interviewing "experts" in the various fields. To date 42 occupational write-ups have been completed and 35 experts have been interviewed.

To develop the data base for the Educational Module of JOBS, Team C has been sourcing and collecting information related to academic courses and training programmes related to the occupations identified for inclusion in JOBS. To date 65 educational write-ups have been completed.

Team D is responsible for sourcing of hardware and software as well as the development and refinement of the computer system. Team members have been working on a demonstration package featuring 50 occupations that will make its debut in the coming Regional Workshop on Career Guidance to be held in March 1991.

**Plans for Future Actions**

By now we have completed Phase One of the project and are half way through Phase Two. Our plans for the future are:

**1991**

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<th>Jan-March</th>
<th>Complete computerization of 50 occupations</th>
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<tr>
<td>March</td>
<td>JOBS to be featured in Careers '91</td>
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<tr>
<td>April - July</td>
<td>Complete computerization of 100 occupations</td>
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<tr>
<td>Aug - December</td>
<td>Complete computerization of 150 occupations</td>
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**1992**
Jan-Mar  Pre-test, field trials and post-test of the system in 5 field centres while data collection continues.

Jan - March  Complete computerization of 200 occupations.

April - June  Reporting of results, preparation of test manuals and writing of research reports.

Conclusion

This research project has been going on for about two years. Because of the magnitude of the scope in terms of sample size and extent of data collection, we expect to take at least another year to complete the system. The demonstration package that has been developed has been well received. We are confident that when completed, JOBS will contribute to career guidance in Singapore schools. We look forward to the many exciting challenges ahead of us and the completion of the project.

REFERENCES


