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THE DEVELOPMENT OF A COMPUTER-ASSISTED CAREER GUIDANCE SYSTEM: SOME PRELIMINARY FINDINGS

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INTRODUCTION

Teacher's Roles in Career Guidance

Super (1957) 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".

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.

The Use of Computer in Career Guidance

With the current emphasis on high technology in Singapore and the availability of sophisticated computer facilities, we in the National 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.

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** (Jobs Orientation Backup System).

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 help them prepare for their preferred occupations.

Modules of JOBS

When completed, the full-blown version of **JOBS** will have five modules. The **Introduction Module** explains to the student the purpose of **JOBS** and what it can do for the user.

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.

The **Occupational Information 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 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 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.

THE 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 John Holland (1985), an American vocational psychologist.

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 as follows:

The Realistic Type (R): This type tend to be rugged, practical and physically strong. They enjoy creating things with their hands and would rather work with objects, such as tools or large machines, than with people or ideas. They also like to work outdoor.

The Investigative Type (I): This group tend to centre around scientific activities. They have questioning minds and enjoy problem-solving by working with ideas, words or symbols.

The Artistic Type (A): They are creative people and artistically inclined. They like to work in settings that allow them to express themselves creatively through activities related to art, music, drama or literary pursuits.

The Social Type (S): This type are sociable, responsible and concerned with the welfare of others. They usually express themselves well with words, get along well with others and enjoy being the centre of attention in a group.

The Enterprising Type (E): Enterprising people are enthusiastic, self-confident and adventurous. They prefer social situations where they can lead and direct others. They are often in sales or in management positions because they are good at leading and convincing people.

The Conventional Type (C): They are conforming, organized, precise and dependable. They prefer solving problems using verbal and numerical skills rather than physical skills. They like jobs where they know exactly what is expected of them. They respond well to authority and normally do not seek leadership.

Holland believes that each type is a product of a characteristic interaction among a variety of cultural and personal forces including peers, biological heredity, parents, social class, culture and the physical environment. Out of these experiences, a person first learns to prefer some activities as opposed to others. Later, these activities become strong interests which lead to the development of a special group of competencies. Finally, a person's interests and competencies create a particular disposition or personality type.

Holland further proposes that there are six major types of work environments which can be assessed in the same R I A S E C 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 choice will be and the greater his achievement and job satisfaction.

Several well-known assessment instruments have arisen from Holland's theory of which *Self-Directed Search* (1974) has been widely used in the U.S. and Canada to investigate the applicability of the R I A S E C category system and the relationships among the categories. This instrument was adapted for use in Taiwan where Holland's theory has been borne out by research findings (Lokan, 1987).

Checking Out the Validity of Holland's Theory

To check out the validity of Holland's theory, the research team administered the *Self Directed Search* to a sample of 1,500 secondary school students in 1988. On the whole, the research findings yielded empirical support for Holland's typology theory as indicated by the following:

1. Item-subscale correlation of the SDS showed that most items have high correlations. This indicated that most of the items contributed to the respective subscale.
2. Factor analysis of the Activity items showed distinctively six factors corresponding to the six personality types. In the Competencies Section, however, the R I A C types came out clearly although some Social items loaded on the Enterprise scale and vice versa.

Convinced that Holland's theory has construct validity in the Singapore context, a research team at NIE went on to develop an indigenous assessment instrument based on his

theory. This instrument, to be called **Career Profile Inventory (CPI)**, is to be the main instrument to collect the data base for **JOBS**. It is designed to yield vocational personality profiles of individuals in terms of Holland's **R I A S E C** codes.

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 three secondary schools and two junior colleges to check out its usefulness and its impact on the pupils' 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.

SOME PRELIMINARY FINDINGS

Development of the CPI

Ground work for the development of the **Career Profile Inventory** commenced in August, 1988 when the research team took about four months to develop the first draft of the **CPI**. The instrument was then subjected to three rounds of pilot testing and revision until it reached its final form in September 1990.

In the first pilot test dated September 1989, the **CPI** was administered to 513 secondary school pupils. The second pilot test was conducted on 278 teachers (both Primary and Secondary) and 100 professionals from 20 occupations in December 1989. The third pilot test, conducted in March 1990, involved 284 school teachers.

At each pilot test the data collected was subjected to factor analysis. Weak items with low factor loading were either eliminated or replaced and the revised version was again subjected

to another round of pilot testing on a different sample. We started off with 154 items initially but after three rounds of pilot testing and factor analysis, the final form of the CPI has 60 items in 12 subscales.

Concurrent Validity of the CPI

In order to test out the concurrent validity of the CPI with Holland's Self Directed Search (SDS), 38 teachers from the first sample were randomly chosen and given the SDS as well. A comparison of their results for both instruments in terms of the RIASEC letter codes showed that 50% of the respondents had the same letter codes for both tests, though not necessarily in the same ranking. Twelve teachers (31.6%) had the first two letter codes identical while 4 teachers (10.5%) had all three letters in their codes identical for both instruments. More than half (61%) had their first letter of their codes identical. Such results seemed to indicate that both Holland's Self Directed Search and the Career Profile Inventory were measuring similar constructs. In other words, there was sufficient evidence to establish the concurrent validity of the CPI.

Reliability of the CPI

To check out the reliability of the CPI, the Alpha Reliability Coefficient of the subscales and the total scale were computed at each round of pilot testing. The results seemed promising as can be seen in Table 1 which shows a comparison of the Reliability Coefficients of the CPI obtained in the three pilot tests.

Table 1: Alpha Reliability of the Career Profile Inventory

Date of Test	Sample Size	Alpha Reliability Coefficients		
		Activities	Competencies	CPI
Sep '89	513	0.78	0.82	0.81
Dec '89	378	0.85	0.84	0.86
Mar '90	284	0.86	0.84	0.91

Comparison of the CPI and SDS Codes

Since September 1990 the Career Profile Inventory has been administered to more than 6,000 workers from about 100 occupations. In this paper only the vocational interests codes of 30 occupational groups will be presented and comparisons made with Holland's codes.

3) *Artistic Occupations*

We were confronted with unexpected results where artistic occupations are concerned. In all the cases, the "social" personality trait turned out to be stronger for most of the subjects as can be seen in the following Table.

Table 4: Artistic Occupations - Comparison of CPI and SDS Letter Codes

N = 73

Occupational Group	N	CPI Code	SDS Code
Dancer	13	SEA	AER
Musician	18	SAE	AER
Music Teacher	19	SAC	AES
Art Teacher	23	SAC	AES

4) *Social Occupations*

Where "Social" occupations are concerned, the findings seem to indicate that Singaporean journalists are more social than enterprising while their American counterparts are the other way round. Secretaries in both countries have same letter codes but in different rank order while social workers, cabin crew and pre-school teachers have identical codes.

Table 5: Social Occupations - Comparison of CPI and SDS Letter Codes

N = 968

Occupational Group	N	CPI Code	SDS Code
Cabin Crew	76	SEC	SEC*
Journalists	43	SEC	EAS
Secretary	99	SCE	CSE
Social Workers	53	SEC	SEC*
Teacher (Pri)	643	SCE	SEC
Teacher (Pre-school)	54	SEC	SEC*

5) *Enterprising Occupations*

Table 6: Enterprising Occupations - Comparison of CPI and SDS Letter Codes

N = 404

Occupational Group	N	CPI Code	SDS Code
Lawyer	134	ESC	ESA
Market Manager	48	ESC	ESC*
Architect	95	ESI	IES
Radio/TV Producer	27	ESA	ESA*
Town Planner	16	ESC	ESR
Sales Representative	51	ESC	ESC*
Systems Analyst	33	EIS	IER

Three of the "Enterprising" occupations listed have identical letter codes while two are in a completely different category according to Holland's classification (i.e. Systems Analysts and Architects).

6) *Conventional Occupations*

Table 7: Conventional Occupations - Comparison of CPI and SDS Letter Codes

N = 349

Occupational Group	N	CPI Code	SDS Code
Accountant	185	CES	RCS
Bank Clerk	94	CSE	CSE*
Executive Officer	15	CSE	ESC
Librarian	39	CSE	SEC
Postmaster	16	CSE	ESR

Except for Bank Clerks who have identical codes, the rest of the conventional occupations have quite different letter codes in the American context. Some examples of Conventional

occupations according to Holland's classification are Book Keeper (CRS), Carpenter (CRS), Audit Clerk (CRE), Bank Teller (CES) and Financial Analyst (CSI).

CONCLUSION

Presently we are about two third way through the Research and Development project. So far we have collected enough evidence to draw two important conclusions. Firstly, there is enough empirical data to show that Holland's Vocational Personality theory has validity in the Singapore context. Secondly, we can be fairly sure that our indigenous instrument is both valid and reliable.

Data collection is still on-going. We hope to complete the project by June 1992. We are looking forward to the day when JOBS will be a useful career guidance tool in Singapore schools.

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APPENDIX**PROJECT TEAM MEMBERS**

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