Intelligent Survey Software using Decision Board Analysis Technique for Recruitment Process in UK

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Abstract: - In 2004 it was reported that up to half a million elderly people may be victims of abuse at any one time. Studies have shown that elder abuse can have devastating effects upon service users and can often lead to long-term health problems. It is vital that health care service providers acknowledge the importance of recruitment decision-making when employing carers for work involving vulnerable adults. In 2002 the Criminal Records Bureau (CRB) was established in the UK to ensure safer recruitment decisions could be made. The CRB check is utilised to facilitate safer recruitment decisions by providing employers with wider access to an applicant's criminal record information through a Disclosure service. However, how these changes are impacting upon recruitment decisions and its implications for the protection of vulnerable adults is yet to be examined. In order to collect sufficient research to investigate how recruitment decisions are being made by individual decision-makers using CRB Disclosure information, a unique, tailor made software package was designed and created. This was entitled Survey Software Version 5. This allowed the administration of a series of vignettes, whilst recording and sorting the inputted information. This software is in the form of an electronic questionnaire based upon a decision board design. By utilising the DBA technique, the decision-maker is permitted to make a recruitment decision based upon as little or as many pieces of information that they feel is necessary to make an appropriate recruitment decision. For the purposes of the present study, the DBA technique will be utilised to: present a series of vignettes based on actual CRB Disclosures, assess what impact the knowledge of convictions has upon perceived suitability for employment, examine whether or not decision-makers are aware of the meaning of offences, identify which pieces of information found on a CRB Disclosure are used to make recruitment decisions, and asses the order in which information is selected. Organisations from the National Health Service, Social Services, Higher Education, Further Education and Care Home sectors whose employees have contact with vulnerable persons were recruited to take part in this research.

Key-Words: - Software Development, Survey Techniques, Decision-Making, Pattern Recognition, and Recruitment Process.

1 Introduction

In March 2002 the CRB, an Executive Agency of the Home Office in the UK developed under Part V of the Police Act 1997, was launched to enable organisations in the public, private and voluntary sectors to make safer recruitment decisions. Specifically, this system is used to identify candidates who may be unsuitable for certain work involving vulnerable persons. This policy helps to prevent potential perpetrators from gaining work through criminal record searches [1].

At present, the CRB provides two types of criminal record checks; known as Standard and Enhanced disclosures. Both are available in cases where an employer is entitled to ask questions under the Exceptions Order to the Rehabilitation of Offenders Act [2], a ruling which permits employers to request details of an applicant's criminal record information whether spent [3] or not. The most accessible check to employers is the Standard Disclosure, available primarily to anyone involved in working with children or vulnerable adults. This check is available to certain other occupations and entry into professions as specified in the Exceptions Order to the ROA 1974. This disclosure shows applicants current and spent convictions, reprimands, cautions and warnings held on the Police National. Computer (PNC) [4]. Additionally, this disclosure shows any information held on the Protection of Children's Act (POCA) list at Department of Health [5] the Protection of Vulnerable Adults (POVA) list at Department of Health [6] and any information that is held under Section 142 of the Education Act 2002 [7].

Mistakes made within and between organisations led to series of failures in the original criminal record checking system. For example, information surrounding with offender may not be shared between police forces and so, the location of where the offence had been committed in part determined whether or not the information was seen by the recruitment decision-maker. Consequently, vulnerable persons were being put at risk on a national basis. Organisations, identified as being in some part responsible for such failures in the system included social service departments and local police forces. Specifically, inadequate systems of sharing, transferring and storing non-conviction information within and between organisations led to the majority of critical errors [8]. In addition, Bichard (2004) reported that training given to employees in relation to the use and management of non-conviction information was insufficient. For example, failures in the way police forces managed intelligent systems.

1.1 Failure in the system
Despite the policies created to make recruitment decision-making more informed, recent reports suggest that we are still failing vulnerable adults. For example, care groups estimate that up to half a million vulnerable adults are victims of abuse at any one time. This could take the form of sexual, physical and financial abuse, neglect and over-medication [9].

It is also estimated that tens of thousands of staff working within the National Health Service (NHS) UK who have direct contact with vulnerable persons have not been subjected to CRB checks, as they were recruited prior to the year 2002 [10]. This indicates that certain existing employees working with vulnerable persons may be unsuitable for such work.

1.2 Recruitment decision-making
Previous research surrounding recruitment decision-making has found that organisations vary in terms of; recruitment policies, procedures and the characteristics of the recruitment decision-maker within an organisation. Although research surrounding recruitment decision-making is scarce, the phenomenon of decision-making has been explored extensively [11, 12, 13, 14 & 15].

Grier and Thomas (2001) [16] suggest that the questions that are being asked by employers may be in breach of the European Convention on Human Rights Article (the right to privacy, Human Rights Act, 1998) [17]. However, not surprisingly the public's confidence in employment of ex-offenders

has been damaged by incidents reported in the media of ex-offenders re-offending [18 & 19] and therefore, such recruitment questions continue to be asked.

2 Decision board
The present study aims to improve and maintain the protection of vulnerable adults through examining and comparing how individual decisions are made and qualified within the broader agency framework. In order to examine recruitment processes and procedures, several key characteristics of the decision-making process will be identified and explored in order to determine how recruitment decisions are made by within and between organisations. In order to collect the data an electronically administered questionnaire in the form of a decision board was administered.

2.1 Origins of the decision board
Studies of decision-making suggest that information is of central importance in human decision-making. Specifically, Wilkins (1964) [20] identified that both the quality and quantity of information, alongside the manner in which it is processed is crucial to the act of decision-making, and consequently behaviour patterns. An early form of detection of how decisions are made was exhibited by Wilkins and Chandler (1965) [21]. They developed a tool which enabled the researcher to detect the: "Methods of using information and to relate the type and quantity of information used to the types of decisions made and to the degrees of confidence expressed in the decisions the type and quantity of information used in the decision-making process in relation to specific decisions" [21].

This data collection tool was entitled an Information Board (IB). The IB involved presenting decision-makers with category headings of information in which they were required to reveal different pieces of information that would potentially aid their decision-making process. In order to reveal this information participant's had to actively retrieve it themselves through a simple file system of choosing specific tabs labelled with the information headings. With the aim of identifying which factors were the most dominant in the decision-making process, participants were told that they may choose the information in any order they wished and the purpose of the exercise was to identify how quickly, using as little information as possible, they were able to make a decision. After each decision had been made, participants were

requested to rate how easy or difficult they felt the decision was to make, and the degree of confidence they had in the decision they had just made on an option rating scale.

In order to make a tool that was replicable to participant's real-life situations in which they would have to make decisions in the work place, Wilkins and Chandler in 1965 [21] used 'real life' information from actual case histories. These were taken from reports presented the participant's colleague. By doing this they were able to ensure that the information used for the purposes of the study could have in fact taken place in participants 'real-life' work setting. Participants were asked to make a series of decisions based on the information that they were given. These decisions were of "exactly the same kind as those normally and frequently made in the ordinary work routines" (pg. 1) of the participants [21].

The IB was later used to develop the Decision Board Analysis tool (DBA) [22]. The DBA technique was used to analyse decision-making in terms of the weighting factors involved in decision processes and to "elicit more than an analysable stream of consciousness" [23]. The DBA involves presenting the reader with a series of category headings from which to choose from, in order to reveal information so that they are able to make a decision based on the information that they have selected [23].

By utilising the DBA technique, the decision-maker is permitted to make a recruitment decision based upon as little or as many pieces of information that they feel is necessary to make an appropriate recruitment decision. Specifically, the decision-maker is required to: select any number of information headings, in order of relevance, until they believe that they are able to make a decision, based on the information provided. In addition, the DBA allows both the identification of information used in the decision-making process by each individual decision-maker, and the differences between the decisions made. Subsequently, comparisons may be made between the choices made by different decision-makers and the types of information that are taken into account to make the same decision.

2.2 Support and against of the decision board

The DBA method may be applied to a range of scenarios in cases where decision-making is being investigated [21, 23, 24, 25]. Smith (1999) has found that users of the decision board have reported that it is a user friendly method.

Support for the use of a decision board for the study of decision processes has been prevalent [26]. Mintz and colleagues (1997) [26] argue that the decision board can be used to trace the processes of decision-making, identifying the decision-makers choices and strategies involved in the decision-making process. Specifically, they assert that: "The core structure of a decision board platform is a matrix of decision alternatives and decision dimensions. The decision maker's task is to choose an alternative from a set of alternatives on the basis of information s/he can access from the computer. The subject sits in front of a computer terminal, and the board records key features of the decision-making process. These features are then used to identify the processing characteristics of decision makers. A major category of these features relates to the sequence in which the information is accessed by the decision maker" [26].

Alternatively, Huber and colleagues (1997) [27] argue that the decision board is not sufficient to examine 'real-world' problems. Instead they developed an alternative data collection tool entitled 'active information search' technique for the study of pre-decision information seeking. This method involves the face-to-face meeting of a researcher and decision-maker. Instead of presenting written information, the researcher is required to provide the information orally in an informal way. However, this method may be restrictive and problematic. For example; participants are not presented with a series of attributes but are instead required to ask their own questions related to any aspect of information they feel necessary to make a decision [28]. Further, in order to be able to anticipate the vast array of questions that may be asked by any number of participants, extensive pilot testing and time is needed so that these questions can be pre-empted and the answers for them determined and learned [28]. In addition, there may be no guarantee that a question not prepared by the researcher will be asked. In this case any answer that is given by the researcher may have a significant impact upon results. If responses are not consistent, slight changes may also impact upon the findings as standardisation of researcher responses, their tone of voice or their body language may have an effect. Therefore this method was rejected in favour of the decision board technique.

3 Present research

For the purposes of the present research, the DBA technique will be utilised to:

- Present a series of vignettes based on actual CRB Disclosures.
- Assess what impact the knowledge of convictions has upon perceived suitability for employment.
- Examine whether or not decision-makers are aware of the meaning of offences.
- Identify which pieces of information found on a CRB Disclosure are used to make recruitment decisions.
- Asses the order in which information is selected.

The software was designed by a psychology researcher and created by an information technology consultant. All the data obtained was inputted directly by participants. Even though the data entry process may have been subjected to data entry error, this was done by the participant as opposed to the researcher. By utilising electronic software specifically designed for the study purposes, the researcher was able to successfully transfer data from the Survey Software to SPSS (SPSS Inc, 2008, via both Microsoft Access and Excel) saving a great amount of time and cost. Once again, this data was not subjected to separate human data inputting processes (as it was done through electronic transfer), so data entry[1] and data reduction[2] error was avoided. The total number of individual statistical information that was acquired by the program incorporated 18,000 cells. The estimated time for inputting this data could have potentially been in excess of a six month period, thus by utilising the software time and costs were successfully minimised.

The software development strategy was to identify how recruitment decisions are being made as well as to examine how efficient the software was in fulfilling its purpose for research.

In order to design and create software that would retrieve user behaviour information, an appropriate user interface was an essential but complex task. The planning and development of the software included:

- Identification that there will be two types of users for the software – (researcher/administrator, who has access to reports and other secure information and survey participants who enter information into the software)
- The recording and storing of participant information - both manually inputted information and additional information captured as part of the survey process (behaviours e.g. timing, sequence selection, information accessed by the user)
- The ability to change questions and materials presented to the user at any time
- The capacity to increase or alter the type and amount of information stored via the software
- Having the option to randomise questions given to users on order to identify any order effects
- Allowing the user to answer specific questions or to be given specific information based on previous answers (linked questions that only appear as a result of previous selections)

Reports and several databases were designed and created to store all the inputted information. The design of the data collection stores permitted the researcher to make specific selections or extractions from the data based on individual queries of the data.

4 Survey software version 5

In total, there has been in excess of 100 modifications to the software but 5 major versions of the software, the final version being version 5.

Researcher for the Centre for Ageing and Mental Health at Staffordshire University, Kamran Ahsan has successfully developed a software package which allows the administration of a series of questionnaires and surveys whilst recording, sorting, processing the inputted information and compiling reports.

Specifically, the programme was based upon the framework of the DBA technique [22] and in partial replication of the computer assisted data collection tool created by Margaret Irvine of The University of Manchester as reported by Smith (1999) [23]. The software is called Survey Software Version 5 and incorporates a series of; databases, files, reports and forms. In conjunction with these features, the software has a security system which enables all questionnaire responses to be kept confidential through a password protected interface. This function permits only the password keeper to access all information through an ID and password security gate. In addition, this software can be manipulated for use in any situation where decision-making is involved.

For the purposes of the present study, the Survey Software Version 5 was utilised to present the decision-maker with a series of information headings (as part of a vignette), including those that would be found on an enhanced CRB disclosure. The decision-maker was then required to make a

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[1] Manually inputting participants responses

[2] The transformation of raw data into measurable data

recruitment decision based upon the information that they had chosen to reveal. Specifically, the software was utilised to:

- Identify the type and quantity of information,
- Used in the decision-making process,
- Report types of decisions made,
- Obtain the reasons for making a decision,
- Record and store all information received,
- Create a situation as realistic to actual,
- Circumstances as possible,
- Present the user with a series of tasks in one,
- Instance.

The computer program was devised into six main parts, which are as follows.

4.1 Screen 1

The first screen (see Figure 1 for screen 1) that participants were shown consisted of initial instructions, advice on the freedom to withdraw from the research at anytime and options to select in terms of their status of using the software.
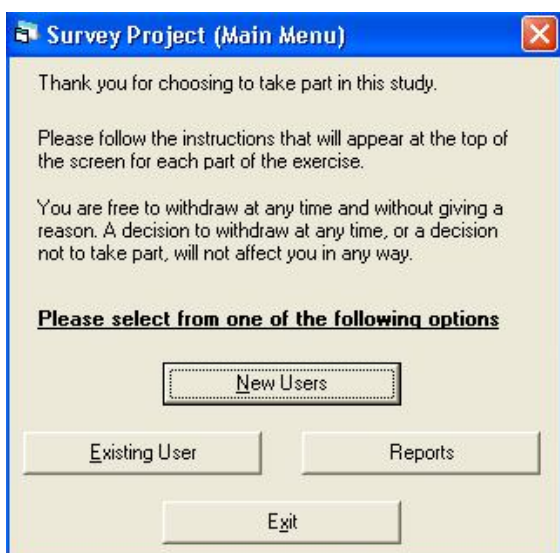
Fig. 1. Survey Software – Screen 1.

All participants were required to select the option of a 'new user' except in instances where they were continuing a sequence from a previous time (including if they had accidently exited the program).

4.2 Screen 2

The second screen (see Figure 2 for screen 2) shown by the computer program requires participants to input a series of information relating to computer administration including: username and password. This gives individual participants exclusive access to their particular report and allows them to re-enter the program at the point in which they left it. In addition, the screen requests information about the

participants job role, how they make decisions, from which type of organisation they are from and how many decisions specifically related to the CRB, they make in one month. Information that is requested combines both typed and selection sequences.

Fig. 2. Survey Software – Screen 2.

4.3 Screen 3

The third screen (see Figure 3 for screen 3) is primarily used to give instructions for the completion of the subsequent stages of the computer program. This is accompanied by a selection tab which requires participants to confirm whether or not they have understood the instructions.
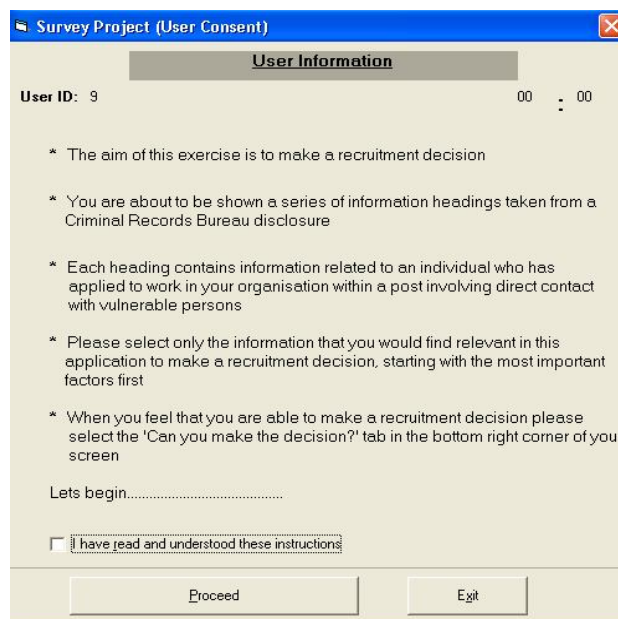

Fig. 3. Survey Software – Screen 3.

4.4 Screen 4

Stage 4 of the computer program was used to administer the computerised DBA (see Figure 4 for screen 4) and displays a replication of an Enhanced Disclosure. Information headings on this screen include:

- Date of issue
- Surname
- Forename
- Other names
- Date of birth
- Place of birth
- Gender
- Position applied for
- Name of employer
- Registered person/body
- Countersignatory
- Reprimands/final warnings
- Cautions
- Convictions
- Date of incident
- Sentence
- Information from the list held under Section 142 of the Education Act 2002
- Protection of Children Act List information
- Protection of Vulnerable adults List information
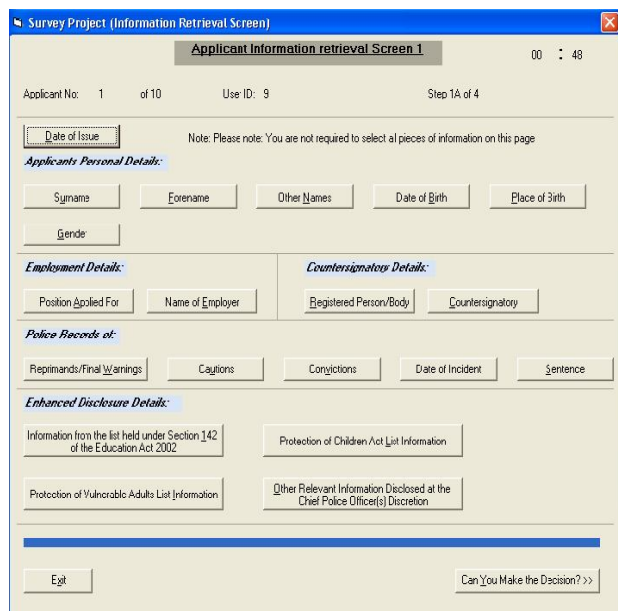- Other relevant information disclosed at the Chief Police Officer discretion

Fig. 4. Survey Software – Screen 4.

In total, ten vignettes for employment in posts where they would have access to vulnerable persons were created and presented to decision-makers in the form of a vignette through the DBA method. Nine out of ten vignettes were applicants who had criminal records. Details that informed vignettes were developed with the experience of a CRB

decision-maker within the supervision team. Vignettes were created in this way to replicate real CRB information as closely as possible, in terms of the offence typologies, their age, gender and sentences they may have received for certain offences.

4.5 Screen 5

The fifth screen (see Figure 5 for screen 5) of the program is divided into two sections. The first requires participants to make a decision of whether or not they would offer employment to the applicant whose information they have seen by selecting one of three options (yes, no and I don't know). The second part asks recruitment decision-makers to give a reason for the decision that they have made. They are required to do this by typing their reasons in a text box provided.

Fig. 5. Survey Software – Screen 5.

4.6 Screen 6

The final stage of the software asks participants to rank their decision in terms of how easy or difficult they found the decision was to make via a four-point Likert scale (see Figure 6 for screen 6).
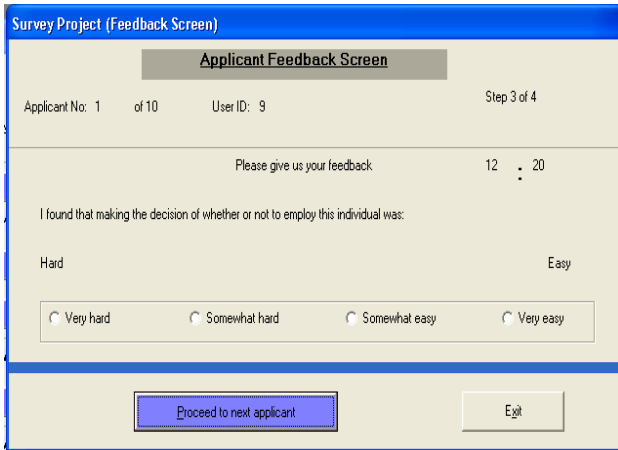
Fig. 6. Survey Software – Screen 6.

Reports that are held by the software included; details the main contents of information presented to the user (see figure 7), information inputted by the user (see figures 8 and 10) and users selection information (see figure 9).
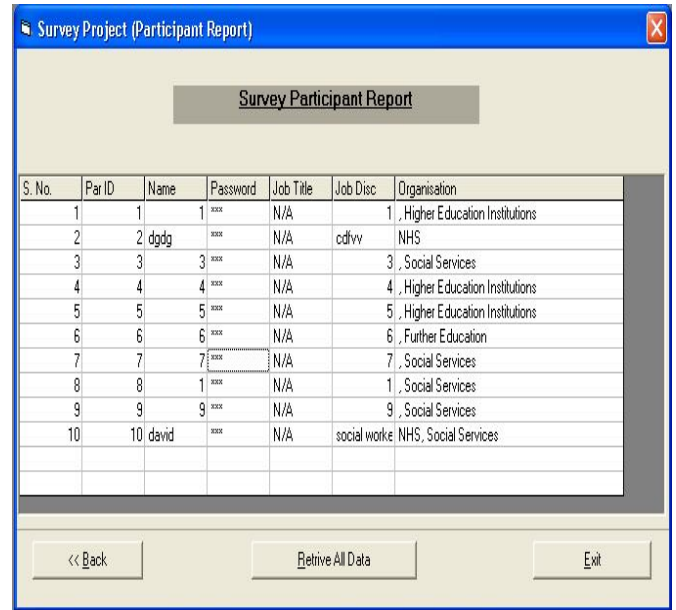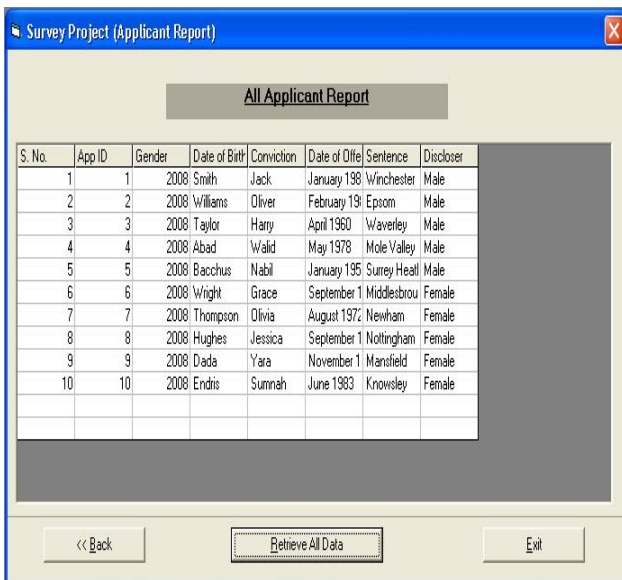

Fig. 7. Application report.
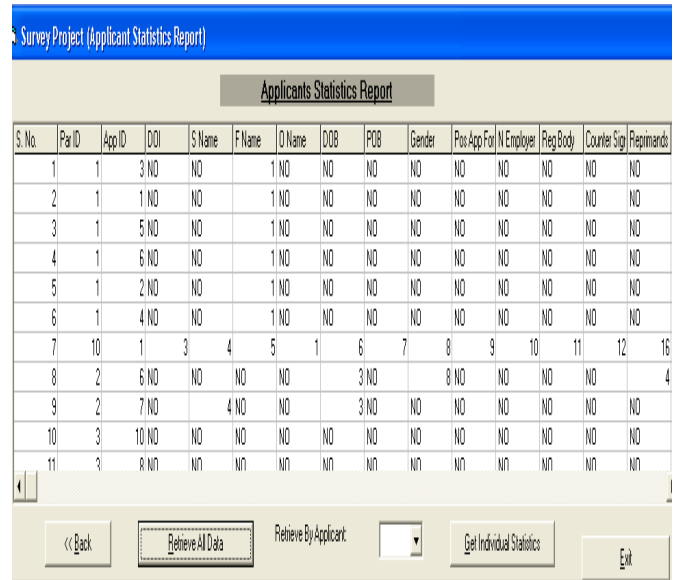

Fig. 8. Survey participant report.

Fig. 9. Application statistic report.

Fig. 10. Survey statistical report.

It should be noted that the software is password protected so that the only the researcher/administrator and those authorised to do so can access the information collected.

5 Usability of the software

Following the completion of the survey, participants were asked to complete a questionnaire surrounding its usability[3]. Initially, participants were asked to rate their skills as a technology user on a four point likert scale. Options included; advanced, average, basic and somewhat basic. Table 1 shows that the majority of participants rated their skills as average (64.0%), 30.0 per cent of participants rated their skills as advanced, 6.0 per cent as basic and no participants rated their skills as somewhat basic.

Table 1. Skills as a technology user

	Frequency	Percent	Valid Percent	Cumulative Percent
Advanced	15	30.0	30.0	30.0
Average	32	64.0	64.0	94.0
Basic	3	6.0	6.0	100.0
Total	50	100.0	100.0	

Secondly, recruitment decision-makers were asked to rate how easy or difficult it was to understand the

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[3] It should be noted that the completion of usability questionnaires were given to participants who took part in the pilot study version of this research as opposed to the main study

instructions and prompts presented via the software. Specifically, individuals were able to choose from; very easy, quite easy, difficult and very difficult. Results showed that participants rated software commands as either very easy (56.0%) or quite easy (44.0%). No participants suggested that the software was difficult or very difficult to understand (see table 2).

Table 2. How user find the software to understand

	Frequency	Percent	Valid Percent	Cumulative Percent
Very easy	28	56.0	56.0	56.0
Quite easy	22	44.0	44.0	100.0
Total	50	100.0	100.0	

Finally, participant's were required to rate how easy or difficult the usability of the software was. For a third time, options to make this decision were presented to participants via a four point Likert scale. Ratings incorporated on this scale included; very hard, somewhat hard, somewhat easy and very easy. Participants chose only that the software was either very easy (52.0%) or somewhat easy (48.0%) to use (see table 3).

Table 3. How did you find the software to use

	Frequency	Percent	Valid Percent	Cumulative Percent
Somewhat easy	24	48.0	48.0	48.0
Very easy	26	52.0	52.0	100.0
Total	50	100.0	100.0	

6 Conclusion

The majority of users of the software considered themselves to have average skills related to computer literacy. All participants rated the instructions given by the software as either very or quite easy to understand. The instructions were carefully created so that it would be straightforward enough for users to undertake the survey without the researcher/administrator to be present. Modifications to instructions were applied following comments made by testers during the initial stages of the creation of the software. Having instructions that were clear to understand is of particular importance as in order to try and avoid any potential

researcher bias; this allows the user to be in a separate location away from any researcher/administrator. In addition, if the researcher wanted to disseminate the software to participants electronically they may do so without having to be in close proximity to the user. Approximately half of all participants rated the software as being somewhat easy or very easy to use. No one who took part in using the software rated it as very hard or somewhat hard to use. This suggests that the Survey Software Version 5 can be used by people with a range of abilities. Furthermore, the ability to change the information presented to participants allows the software to be utilised for a range of purposes due to its ease of completion. A PhD thesis based upon the information obtained via Survey Software Version 5 was successfully completed. The ability to transfer the data from the software into a range of statistical analysis packages maintained the accuracy of the data and saved time as well as money. Overall, Survey Software Version 5 proved to be an efficient, professional and user friendly research tool, aiding data collection and analysis in a substantial investigative project.

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