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THE SCIENCE CAREER INVENTORY (SCI): A NEW TOOL TO ASSESS CAREER CHOICE MOTIVATIONAL DRIVERS IN THE ENERGY AND MINERALS SECTOR

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This paper reports the primarily qualitative outcomes from a study of career sustainability in the global resources industry and how science teachers and university academics may contribute to sustainable growth of career succession in mining and minerals industries in particular. The study has implications for other industry groups and vocations and is now embarking on a more substantial quantitative data collection to examine career path decisions of people that have contributed to this initial study.

Purpose of the Study

Sustainability in the mineral resource sector is dependent upon skilled people solving problems and adding value to Australia's common wealth. The downturn in school students enrolling in STEM (science, technology, engineering and mathematics) courses has caused a dearth of students choosing research careers in the minerals and energy sector and thus confront Australia (and arguably other developed countries) with an unsustainable shortfall of scientists and researchers (Bartier, Tuckwell, & Way, 2003). It is hoped that the development of a new tool aimed at determining the motivational factors that may influence an individual to make career choices leading to a research vocation will offer greater insight to solving the impending skill shortage. This paper reports on the process of developing this tool. In the final analysis, the biggest sustainability factor facing technical industries (e.g., mineral resources) today is a lack of bright, young researchers and scientists.

Significance of Research

At the same time that more than a third of Australia's export income is earned by the country's mineral resource and energy industry, the supply of young science graduates gaining the academic credentials and experiences in the technical areas needed to maintain a high level of scientific research and development continues to dwindle. The problem is well-documented both in Australia (Hipkins & Bolstad 2005; Nicol & Woffenden, 2002) as well as throughout the western world (Eaglesham, 2006; National Science Board, 2006; Fensham, 2004) but no easy solution has become apparent. More, where students do select to pursue degrees in the 'hard sciences', many university science and engineering departments trend towards the more 'glamorous areas at the cutting edge of technology'. This shift causes more long-established areas of study (e.g., mineral processing, mining, power engineering) to decline and leads to shortages of trained professionals in these traditional areas (Radcliffe, 2006). These 'skill gaps' show up in many key industries and have had an adverse effect in Australia within the mining and mineral processing sector. Even considering the generational factors influence on career selection, it is hypothesized that by understanding what motivations have led current scientists and researchers to pursue their passion, a concerted effort can be made to encourage more young people to choose similar career paths into scientific research.

Theoretical Underpinnings

Careers

Does one work to live or live to work? No doubt this may appear to be a silly question, but it is one more and more people ask in the 21st century. In western societies unhappy career choices lead to unsustainable life situations. No doubt this quandary presents itself to children from the earliest of ages. Even a child of 4 or 5 years of age will answer the age-old question of 'What do you want to be when you grow up?' The question of why an individual chooses one occupation over another has interested researchers throughout the past century.

Pioneering work in the area of career choice was done by Parsons (1909) when he classified people as either career-decided (i.e., certain) and career-undecided (i.e., uncertain). Williamson (1937) followed on several decades later with work offering evidence that contradicted the then prevailing belief that one's career choice predicted academic achievement. His research went beyond Parsons' work by categorizing peoples' vocational choices as very certain, certain, or uncertain. Still, this rather simplistic, either-or dichotomous model of career choice fitting all respondents into decided and undecided categories produced mixed and inconsistent results (Slaney, 1988). The human decision making mechanism seemed to be much more intricate and involved than that described by merely either-or forced choices.

The idea that career choices were much more dynamic processes was introduced in the 1950s when Ginzberg, Ginsburg, Axelrad and Herma (1951) interviewed a wide array of people from varying backgrounds and concluded that most do not make a once-only decision concerning career choices. They argue that people generally tend to experience a developmental process that over a period of time progresses through six stages beginning with fantasy (as pre-adolescence) through interest, capacity, values, tentative choices and finally to a final, realistic stage (crystallization).

Super (1953) presented his developmental theory in five stages: growth (childhood), exploration (adolescence), establishment (early adulthood), maintenance (middle adulthood) and decline (later adulthood). Additionally he put forward the view that "career" encompasses the sum total of all the roles one plays during a lifetime and presented the concept as the Life Career Rainbow. It was here that some argue Super made his greatest contribution – the idea that one's self-concept has a great deal of impact on career choices and that this self concept constantly is shaped by and in turn shapes the individual's life experiences. Over the next half-century the work of Ginzberg, et al., and Super have been challenged, modified, refined and adopted by dozens of researchers, but the main contribution they all made was to put forth the idea that careers involved a great deal more than just what occupation one chose in order to earn a living. More, they all supported the notion that career selection was an ongoing process that was continually affected by the dynamics of one's life experience and constantly changing as one progressed through life.

Holland (1959, 1995) introduced his hexagonal model that proposed one's workplace milieu consisted of six distinct environments and that individuals fell into one of six corresponding personality types. He labeled both the personality types and the environments as realistic, investigative, artistic, social, enterprising and conventional. His model suggests an ongoing interaction between the individual and the environment in which certain personality types are attracted to certain environments while at the same time each environment is created to specifically attract the proper personality type.

The last few decades of the 20th century has seen much of the research into career choice focus on designing tools to better assess the direction in which the individual's vocational preference develops. In light of this, Hartung (1995) suggests that there have been two great movements in this area of measurement and refers to them as first-generation and second-generation measures. He describes the first-generation measures of career choice status as those that produce total indecision scores. By design, these instruments are not multi-dimensional and for that reason have engendered a great deal of controversy. As an example of this type of questionnaire, Hartung points to the "Career Decision Scale" (Osipow, Carney, Winer, Yanico, & Koschier, 1976), which was used to identify a variety of subtypes of undecided people and postulated differing forms of interventions for each type of person. Hartung describes a second-generation of measures that characterizes vocational indecision as a multidimensional construct. A representative example of a second-generation measure can be found in the work of Jones (1989) whose revision of the Vocational Decision Scale, the Career Decision Profile takes into account the complexity of career choices and assesses respondents along three different dimensions. The CDP attempts to measure the individual along three dimensions:

- decidedness − how certain one is concerning their choice
- comfort − how comfortable one is concerning the status of her or his decision
- reasons − the underlying factors for being decided or undecided about the career choice

The above cited work looks into career choice as a whole − why do people choose a vocation in any area of interest. Research into how and why students choose careers specifically involved with science-oriented vocations has just begun to rise the fore as fewer and fewer secondary students opt to enroll in science classes leading to technical fields of study at the university level. Osborne (2003) maintains that declining student interest in pursuing scientific careers is a direct result of young peoples' declining attitude towards science and that far too many pupils are alienated to school science courses. Cleaves (2005) work delves into just how students select or reject enrollment in upper secondary science courses. Her study rejects the old stereotypical notion that students who become science majors are committed to being a scientist from birth and supports the notion that these choices hinge on far more dynamic considerations than are obvious at first glance. DeHart Hurd (1998) argues that traditional secondary science teaching has been aimed specifically at preparing students for university-level courses and has somehow disconnected from the workplace. He asserts "The need to link education and work is essential for the welfare of people and the quality of life" (p. 334).

In light of these previous studies into factors affecting career choice and the grave drop in the number of qualified young researchers willing to pursue technical research careers, it is desirable to consider just what motivates career selection within scientific disciplines. The authors of this paper hypothesize that a retrospective study of why (the reasons) people have already chosen an occupation path (e.g., a career as a researcher in the energy and mineral resources industry) could offer a valuable insight into the problem of declining academic enrolments leading to careers in these areas.

Generational Change

Looking at why one generation of people (e.g., the Baby Boomers) made career choices the way they did may not necessarily translate into how another generation does so (e.g., Generation X or Generation Y). This "generational effect" can be of tremendous consequence

to the process of career selection and must be considered. “Occasionally in history massive demographic change combines with relentless technological change and within a generation society altogether changes. Today we are living in such an era.” (McCrindle, 2006)

Factors affecting career choice must take into account particular generational characteristics impacting on the decision-making process on a cohort of people whose emotional and cognitive development has been shaped over a particular period of time. A great deal of work has been done in this area and the authors of this paper wish to acknowledge that these factors play a role in career decisions. As the first wave of Baby Boomers transitions out of the workforce during the next few years, a better understanding of the Generation X and Generation Y replacements is needed. Table 1 reports Australian statistics, but based on early anecdotal evidence from research participants in pilot trials for this study similar percentages would be found in North America and the European Union.

Table 1: Australia’s Generations - The Definitive Classification

Description	Born	Age	Population (million)	(% of Population)
Builders	Before 1946	61+	3.5m	17%
Boomers	1946 –1964	42 – 60	5.3m	26%
Generation X	1965 –1979	27 – 41	4.4m	21.5%
Generation Y	1980 –1994	12 - 26	4.2m	20.5%
Generation Z	1995 – 2009	Under 12	3.1m	15%

Source: ABS Yearbook and www.abs.gov.au - 2005 figures

Considering Generation Y values systems that must shape recruitment strategies, workplace culture, succession and career planning, Armour (2005) asserts:

> “Work-life balance isn't just a buzz word [for Generation Y-ers]. Unlike boomers who tend to put a high priority on career, today's youngest workers are more interested in making their jobs accommodate their family and personal lives. They want jobs with flexibility, telecommuting options and the ability to go part time or leave the workforce temporarily when children are in the picture.”

Prensky (2001) talks of this generational change as not being merely “incremental”, but rather argues that a discontinuity has taken place between generations. In his words, this generational change has been so fundamental that today’s young people (at least into university level) think and process information differently from their predecessors. Though some may refer to this cohort as the N-[for Net]-gen or D-[for digital]-gen, Prensky simply calls them Digital Natives. And for those born before the digital age, Prensky declares Digital Immigrants. He goes on to underline the importance of the distinction in that Digital Immigrants learn – as all immigrants learn – but some learn much better than others. Still, Digital Immigrants will always retain their “accent” meaning one foot will always be in a non-digital world.

As stated previously, the problem is not trivial in that as the Boomer Generation of researchers within the energy and mineral sector retires, there is an inadequate supply of qualified Generation X and Y recruits to allow for a succession plan within an industry that provides nearly half of Australia's net wealth. Coupled with this are new driving forces for career choice at the Generation Y front. Namely, Generation Y seeks to have an employer of choice and seeks to exploit the opportunity for personal and promotional opportunities (Sheehan, 2005). Career choices are being made more frequently, with a more tactical approach in mind and in a way that thinks "car not career" (Sheehan, 2005, p128). These tangible outcomes for Generation Y employees and the need for more instant gratification and a shorter term view of working life make retention of quality employees a challenge for smaller less diverse organizations. A quick look at the popular press reveals anecdotal evidence of a rise in the number of advertisements that emphasize the lifestyle of the company rather than the particular career path that the advertised position may offer. These weekly position announcements also encourage participation in the "community life" that is located on mine sites and remote operations to enhance life choices and daily opportunities for an interactive life "outside work" when people choose not to fly-in-fly-out. Work rosters are another issue that has been identified in the industry as require flexibility to enhance longevity of service by providing choice and diversity of experience that suits many including Generation Y. In short, the "selling" of industry to younger people today seems to offer more lifestyle arguments that long term benefits.

This paper reports on the progress of a study employing a career choice inventory, the Science Career Inventory (SCI), trialed on a sample that cuts across generational lines. It is hoped that one result of this pioneering work exploring the motivational factors leading to these career choices will be a wealth of data useful to educators, industrialists and the community at large.

Design and Procedure

Development of a tool aimed at assessing the motivational factors affecting career choices has progressed in stages. The researchers have focused their research on what leads an individual to become a science researcher in general and into the energy and mineral resources industry in particular specifically because the need for these researchers is great in Australia. The initial phase in developing this instrument required a great deal of input from those currently working within the industry. The authors conducted numerous interviews and had many conversations with professionals who have already made a science-based career choice in chemical engineering, energy production, geological exploration, mining and/or extractive metallurgy. This process of consultation resulted in the identification of six general dimensions that could possibly offer strong motivation to someone making a career choice within the energy and mineral resources industry. These six dimensions are: Financial, Academic, Relationship, Lifestyle, Altruistic and Personal Esteem and are described in Table 2.

The process of designing a questionnaire to assess the importance of each of these concept areas sought to develop clusters of summated questions ─ a series of questions aimed to tap a particular motivational concept. Each item is designed as a statement which the respondent is asked to answer on a 5-point Likert Scale ("strongly disagree" to strongly agree"). Summated questions allowed for a numerical score to be computed for each participant by totaling all the responses within a given cluster (scale). The decisions about what to include and directions for investigation was informed regularly by industry participants at many levels. The primary questionnaire consists of 36 questions with each of the six motivational areas comprising six different items. An additional 14 questions that are assessed using a Likert Scale were

Table 2: Description of Scales and Sample Items for each Scale of the SCI

Scale Name	Description of Scale	Sample Item
	The extent to which the respondent perceives that their career is motivated by…	
Financial	…financial rewards and the amount of economic security the career offers.	My career assures me of a more sound financial position in the future
Academic	…having a outlet for lifelong teaching and learning within their scientific field of interest	I enjoy finding answers to questions that no one else has found before.
Relationship	…the relationships formed within their place of work and with colleagues of similar background and interests.	My work allows me to feel as though I am a valued member of a team.
Lifestyle	…the general working conditions, geographical location and day-to-day demands of the workplace.	I believe my career allows me to live the kind of lifestyle that I want to live.
Altruistic	…the desire to use their abilities and talents for the betterment of the general community.	The best way I can help others is through the work I am now doing.
Personal Esteem	…a need to be recognized and respected among their peers as well as the community at large.	My career/industrial position entitles me to respect within the general community.

included along with three open-ended questions in an attempt to learn more about specific issues relating to career selection. Background and demographic data was collected at the beginning of the instrument.

When considering the sample for this study, it was noted that there are differences in the motivations for people to enter the career of their choice and that these may be different at various stages of their life. In addition, generational influences and personal expectations have been determined to play a large part in influencing personal choices. Remuneration is also a factor, particularly in later generations who are "ambitious, verging on obsession with progression" (Sheehan, 2005; p84).

Table 3. Rotated Component Matrix (a) for the SCI.

Rotated Component Matrix

	Component					
	1	2	3	4	5	6
Q1	.802					
Q2	.769					
Q3	.796					
Q4	.842					
Q5	.833					
Q6	.666					
Q7		.512				
Q8		.721				
Q9		.655				
Q10		.733				
Q11		.575				
Q12		.386				
Q13			.569			
Q14			.599			
Q15			.683			
Q16			.765			
Q17			.773			
Q18			.613			
Q19				.608		
Q20				.632		
Q21				.597		
Q22				.412		
Q23				.728		
Q24				.392		
Q25					.656	
Q26					.819	
Q27					.653	
Q28					.743	
Q29					.609	
Q30				.383		(.315)*
Q31						.511
Q32						.623
Q33			.381			.536
Q34						.580
Q35						.738
Q36						.556

Extraction Method: Principal Component Analysis with Listwise deletion. n = 244

Rotation Method: Varimax with Kaiser Normalization that converged in 7 iterations.

*included to show data for overlap between components when Eigenvalue reduced to 0.30

Based on earlier work by Churach & Rickards (2006) three different versions of the SCI have been developed: a Professional SCI form, an Undergraduate Student SCI form and a Post-Graduate Student SCI form. The purpose of the three versions of the SCI is to accommodate differences that may be evident in each sample. The hypothesis is that there will be differences in motivational factors that relate to level of experience and education. The Professional form of the SCI was administered to a geographically diverse sample of professionals in Australia, North America, Europe and Africa. The Postgraduate and Undergraduate forms of the SCI were completed by students in Australia and are compared and contrasted to the Professional results. Quantitative data were collected using the SCI and qualitative data were gathered using a combination of the SCI form and through semi-structured interviews.

Table 4. Chronbach Alpha Reliability for Scales of the SCI; composite of all three forms.

Scale Name	Reliability	Mean scale score
Financial	0.90	3.87
Academic	0.75	3.93
Relationship	0.81	4.02
Lifestyle	0.65	3.34
Altruistic	0.76	3.63
Personal Esteem	0.77	3.92

n = 244

Using these data a factor analysis was carried out and it was discovered that the lifestyle scale needed to be reworded in consultation with participants to better reflect their perceptions as they were not responding clearly to the items in that scale. This was evident from the separation of the data for the lifestyle scale over two factors with an approximately even loading. The items on the survey were modified and re-sampled with a new factor analysis rerun. The results for the factor analysis with a principle components analysis and using a varimax rotation and list wise deletion are presented in Table 3. As can bee seen in the table, only questions 30 and 33 did not fall into a single factor at an Eigenvalue greater than 0.35. This is to be expected with a statistically small sample, and though it represents a large proportion of the available people in these areas, may improve with an increase in the sample size as well as with continued feedback from participants.

Reliability data was not available for a large sample of participants in this field and it is hoped that this first presentation of the new data from a modified version of the SCI may serve as benchmark data for studies that may follow. The researchers have approached by other researchers interested in the study of careers in science in Australian and other international contexts already. The reliability for each of the scales used in this instrument is presented in Table 4. The mean scale scores are also presented (Table 4) as a means of comparison between the scales and also as an indicator of the responses that were scored (as a mean) for each of the scales. These means differ from average scores shown in Figure 1 in that all three versions of the SCI are included in Table 4. Consequently, this serves only as an indicator of where participants scored their responses on the scale and given the reliabilities, indicated a general good consensus of opinion in the sample. This was evidenced further by low scale

variance for items and a small standard deviation, which for clarity of the table has not been reported specifically. Variance for scale means typically ranged from 0.03 to 0.13 and the standard deviations from 0.53 to 0.74. As can be seen in the table, only questions 30 and 33 did not fall into a single factor at an Eigenvalue greater than 0.35 and items 14, 15 and 16 were below 0.35 and do not show up as a single factor at this time.

Analyses and Findings

This paper reports on the findings of a sample of several hundred respondents (n = 244 total responses), all of whom were either professional staff within the energy and mineral resource sector or students studying disciplines that would most likely lead to that career choice. Of those completing the Professional form of the SCI, nearly all had completed an undergraduate degree and more than half had earned postgraduate qualifications.

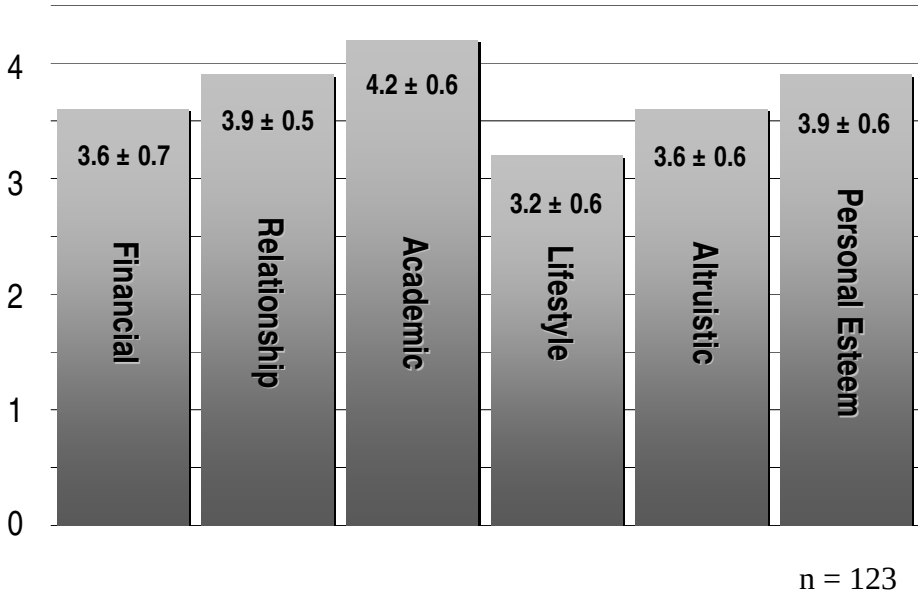
Qualitative data suggests that school and university teachers had the greatest influence on the career choices of those included in this sample population. Of these teachers, the overwhelming majority were high school science teachers, though quite a few mathematics people were mentioned. The value of informing secondary school science teachers about the energy and mineral resources sector is heightened by their direct contact with students who may want to consider these areas as a career choice. It is also of note that school teachers are usually the primary significant other that students in high school confer with during the two or so years before completion of secondary education, when vocational and educational decisions are being reinforced by the subjects chosen for those final two years of secondary education. In short, students are somewhat locked in and out of some alternatives based on these important subject choices and teachers have an influence on these choices.

School teacher professional development programs and experiential workshops are a positive way to enhance teacher comfort with the knowledge required to understand these careers better so that they are able to confidently inform students. There were also many university-level lecturers and professors mentioned as sources of inspiration. Interestingly enough, only one participant made a mention of a high school career counselor as having any impact on career decisions.

Certainly human interaction can be seen to have the greatest effect on career choice decisions and much work has been done in science education and teacher-student relationships. It is apparent that the “Relationship” scale is seen to be the biggest driving force in career selection in this study, but differences are noted between people currently working within the sector and students looking at a future career within the industry. It is also clear that nearly all participants had a strong interest in the general area of sciences and mathematics at least as early as high school. Additionally, it can be concluded that this sample population generally has a strong aptitude in these disciplines for the simple reason that nearly all have or are working towards degrees related to the profession.

Early quantitative data reported in Figure 1 includes only those who responded to the Professional Form of the SCI and some interesting results can be gleaned from these data. [Note that Figure 1 differs from Table 4 in that Table 4 is a composite of all three SCI forms, namely Undergraduate, Postgraduate and Professional.] The fact that the *academic* scale received the highest average response (4.2, standard deviation ± 0.6) can be easily explained by the fact that near 100% (122 of the 123 respondents) of the professionals in this sample had a bachelor’s degree and 56% had either masters or doctorates. Suffice it to say that in general, those who have pursued advanced degrees would be expected to have academic motivations. That the *financial reward* scale was not seen as so strong a motivational force as

Figure 1:
Average scale response on Professional Form of the SCI.



n = 123

relationships and *personal esteem* is enlightening in that these can be seen as internal motivations possibly aligned with people only now ready to enter the workforce. In light of the third bullet point above, it is interesting to note that Peter Sheehan (2005) reports similar findings in a book on Generation Y and described the need for Generation Y to have an altruistic element to a career as well as the more commonly reported factors of "need to have it all now" and the immediacy of reinforcement that comes with being "restlessly eager" (p81).

In general, the findings of this study seem to indicate that, at least in this sample population, career choice was greatly affected by the inter-workings of three key components:

- People choosing professional careers in the energy and mineral resources sector had a strong enough aptitude to gain entrance to and complete a technical degree in a tertiary institution
- People choosing professional careers in the energy and mineral resources sector had an initial interest in the academic areas of science and mathematics
- People choosing professional careers in the energy and mineral resources sector report a strong influence by relationship factors within their professional lives and that being involved with a team working towards a common goal and having personal friendships within the industry are important components of career satisfaction.

Contribution

So how does this research impact on the resources sector in terms of environmental education and sustainability of the environment and hence the resources sector? Simply put, the world is at an ecological crossroads in terms of the societal demand for a high standard of living on one hand and the unsustainable nature of our industry on the other. Answers can only be found by bright, capable young people choosing science and research careers aimed at solving these problems. The authors hope some of the findings from their work with the SCI can have an impact on developing created interest in science and research careers.

Considering the interaction of forces highlighted in the three career choice components listed above, one might ask is there any way one could have a positive impact on trying to influence more people to consider careers within the science and mathematics area in general and the energy and mineral resources sector specifically? Of the three components cited, certainly little can be done to affect the innate scientific and mathematical aptitude possessed by potential newcomers to the sector. However, the authors hypothesize that the participants in this study were open and receptive to inputs concerning a general interest for and liking of technical areas their during formative, adolescent years and continue to be influenced by these interpersonal relationships throughout their careers. In context of the findings concerning the large impact that school teachers (particularly school science and mathematics teachers) have had on the career choices of those involved in this study, it seems likely that any initiative aimed at influencing these teachers in particular would likely have a positive impact on the career aspirations of their students. In short, science teachers are perceived as "heroes" and may offer a most likely key to a sustainable resource pool of young scientists and researchers.

Future Directions

Though the work completed with the SCI to date is particular to the energy and mineral resource sector, it is seems likely that other disciplines could be better understood using a similar analysis of career choice motivators. It is hoped that a better understanding of why young people do and do not choose careers in science and engineering will better prepare educators to attract more students in the future. In the final analysis, planet earth can only benefit from a sustained supply of young researchers dedicated to solving challenges presented by the clash of desired lifestyles and environmental realities.

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Appendix 1

Science Career Inventory (SCI): Professional Short Form

Contact researchers at:
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1. Name (optional): _____ 2. ☐ Male ☐ Female
3. Year of Birth _____ 4. E-mail Address (optional) _____
5. Years you have been employed in the minerals / energy sector? _____
6. Highest degree completed and in what discipline? _____
7. From what university or institution was this qualification earned? _____
8. Does any one subject teacher stand out in your mind at any level of school from primary through tertiary as a **POSITIVE** influence on your decision to follow a career in the mineral resource and energy sector? If so, briefly describe why he or she stands out in your memory?

   _____
   _____
9. Does any one subject teacher stand out in your mind at any level of school from primary through tertiary as a **NEGATIVE** influence on you? If so, why does he or she stand out in your memory?

   _____
   _____
10. In your opinion, what had the greatest effect on your decision to pursue your chosen career?

    _____
    _____

Directions

The following questionnaire asks for your views concerning mineral resource and energy sector as a career and the motivational forces that have influenced your decision to work in this area. Please think about how and why you have chosen this career as you respond to these statements. Consider each statement in context of your own experiences, personal motivations, opinions and attitudes and mark them accordingly.

Mark 1 if you *strongly disagree* with the statement.
Mark 2 if you *disagree* with the statement.
Mark 3 if you have *no opinion* concerning the statement.
Mark 4 if you *agree* with the statement.
Mark 5 if you *strongly agree* with the statement.

		Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	
1.	This career allows me to earn a high income.	1	2	3	4	5	Financial
2.	My career assures me of a more sound financial position in the future.	1	2	3	4	5	
3.	I am able to earn enough income to afford a lifestyle with which I am comfortable.	1	2	3	4	5	
4.	This career enables me to save towards my retirement.	1	2	3	4	5	
5.	In this industry, I am likely have a job that pays well throughout my career.	1	2	3	4	5	
6.	The financial rewards associated with this field career make all the work worthwhile.	1	2	3	4	5	

		SD	D	NO	A	SA	
7.	I am able to get to know and to work with world-renowned experts within my field.	1	2	3	4	5	Relationship
8.	I enjoy the type of people I meet in this career/industry.	1	2	3	4	5	
9.	My work allows me to feel as though I am a valued member of a team.	1	2	3	4	5	
10.	I find it easy to develop friendships with other professionals and researchers in this career/industry.	1	2	3	4	5	
11.	Working with other people is an excellent way to go about solving a problem.	1	2	3	4	5	
12.	Some of my best friends are also interested/involved in this career/industry.	1	2	3	4	5	
13.	I am intellectually stimulated and challenged by the work that I am doing.	1	2	3	4	5	Academic
14.	I enjoy writing professional material (eg. reports, presentations, etc.).	1	2	3	4	5	
15.	I look forward to learning even more about this industry during my career.	1	2	3	4	5	
16.	I enjoy finding answers to questions that no one else has found before.	1	2	3	4	5	
17.	I look at myself as a lifelong learner.	1	2	3	4	5	
18.	I look forward to teaching others about what I have learned in this career/industry.	1	2	3	4	5	
19.	My current position allows me the day to day flexibility that I like.	1	2	3	4	5	Lifestyle
20.	Generally, my job allows me to work the schedule of hours I prefer to work.	1	2	3	4	5	
21.	I believe my career allows me to live the kind of lifestyle that I want to live.	1	2	3	4	5	
22.	My job provides enough income to pursue the leisure activities I enjoy.	1	2	3	4	5	
23.	I do not think my current position causes an unhealthy level of stress in my life.	1	2	3	4	5	
24.	My career allows me to balance work and family commitments fairly.	1	2	3	4	5	
25.	I am better able to benefit my community/country by the work I do in this area.	1	2	3	4	5	Altruistic
26.	My work contributes in some way to a better standard of living for all people.	1	2	3	4	5	
27.	In part, what I do in my career results in a cleaner environment.	1	2	3	4	5	
28.	Eventually, my contribution to the more efficient use of resources will be of benefit to all people.	1	2	3	4	5	
29.	The best way I can help others is through the work I am now doing.	1	2	3	4	5	
30.	A better world tomorrow must be based on the scientific research done today.	1	2	3	4	5	
31.	One result of my work is that other professionals value my opinions.	1	2	3	4	5	Personal Esteem
32.	I would be pleased to find my work referenced in another professional's study.	1	2	3	4	5	
33.	The work I do has allowed me to take on greater career responsibility.	1	2	3	4	5	
34.	My work in this area allows me to better work towards a personal advancement in the future.	1	2	3	4	5	
35.	I would get satisfaction in seeing my name on a professional paper I have published.	1	2	3	4	5	
36.	My career/industrial position entitles me to respect within the general community.	1	2	3	4	5	
37.	A former high school teacher of mine caused me to pursue this career.	1	2	3	4	5	General Questions
38.	I will in some way be in the minerals / energy sector five years from now.	1	2	3	4	5	
39.	I did *not* enjoy science classes in high school.	1	2	3	4	5	
40.	A friend of mine had a career in the minerals / energy sector.	1	2	3	4	5	
41.	A favourite class of mine in high school was Chemistry.	1	2	3	4	5	
42.	In the future, I will probably seek work in an industry other than mineral resource and energy sector.	1	2	3	4	5	
43.	A favourite class of mine in high school was Physics.	1	2	3	4	5	
44.	I always knew my career would be in the minerals / energy sector.	1	2	3	4	5	
45.	I enjoy solving mathematics-type problems.	1	2	3	4	5	
46.	I wanted to be a scientist or engineer when I was in high school.	1	2	3	4	5	
47.	A university instructor/professor caused me to pursue this career.	1	2	3	4	5	
48.	A family member of mine had a career in the minerals / energy sector.	1	2	3	4	5	
49.	My career ambition in high school had nothing to do with science or engineering.	1	2	3	4	5	
50.	A favourite class of mine in high school was Mathematics.	1	2	3	4	5	

Thank you for answering each item…