

JOANNA:
A WOMAN IN SCIENCE
ONE LIFE HISTORY
IN DIALOGUE WITH THE LITERATURE
by
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ABSTRACT

Few women choose careers in the physical sciences. Of the Bachelor's degrees awarded nationally in Mathematics and Physical Sciences only 29% were awarded to females (Statistics Canada, 1986). Using a biographical approach, this study sought to identify factors which may have facilitated the success of women in these areas. Joanna, a female university student majoring in chemistry, was interviewed. Tapes were transcribed and factors which possibly directed her success in the sciences were identified by both authors and validated by Joanna. A literature review on psycho-social influences as they affect the science achievement and interest of girls was integrated with the themes emerging from Joanna's life history.

The dialogue between the literature and Joanna revealed a common profile which appears to characterize most female scientists. Joanna, herself, overlapped with 26 of the 33 factors that were identified by the literature. The profile was split into seven categories: Personality, Sex Role Identity, Motivational Style, Family Influence, Childhood/Adolescence, Role Models, and Influence of Schooling.

Factors which Joanna identified with strongly included: logical/analytical, high math and spatial ability, enjoys competition, not afraid to take risks, strong self-concept, confident, non-traditional sex role expectations, androgynous, unaffected by sex role stereotypes, family and career not seen as mutually exclusive, positive attitude towards science, encouraging parents, oldest child, non-traditional parents as role models, voracious reader, active childhood, able to act independently in adolescence, influential high school science teacher, and received encouragement and praise from teachers throughout schooling. Judging from both Joanna's profile and the literature review, the role of encouragement for women in the sciences cannot be underestimated.

Implications for science education were made. A paradigm shift from emphasizing facts to encouraging open exploration was suggested in order to broaden this profile. The proposed Alberta curriculum with its focus on science as it relates to technology and society was considered a step in the right direction.

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INTRODUCTIONTHE STRUGGLE:

ID: Twenty-one years old, in fourth year chemistry and accepted for graduate school. Impressed?

EGO: So...she's bright?

ID: Yes, no doubt about it - a grade 12 average of 85% and a cumulative university GPA of 3.4 on a 4 point scale attests to her ability. But... there's more to this story...

EGO: What more?? - she's bright and she happens to like chemistry.

ID: Yes.....but I can't help wanting to dig deeper - to discover what has given her the resolve to study in a male-dominated field - and it is male-dominated. According to Statistics Canada (1986), of the Bachelor's degrees awarded nationally in Mathematics and Physical sciences, which includes chemistry, only 29% were awarded to females. This is in contrast to 63% receiving Bachelor's degrees in the Health sciences and 53% in the Agricultural and Biological Sciences (Statistics Canada, Science and Technology Indicators' 1985, Table 21, p. 196). Women appear to be reluctant to pursue a career in the physical sciences.

EGO: There are always exceptions - individuals who are able to break out of the mold. Joanna is simply an exception to the rule. She didn't hesitate to study in the sciences because being a member of a minority just doesn't bother her.

ID: Clearly that is the case, but how did this come about? Do you see my point? What is it about Joanna that has enabled her to break through the gender barrier that so effectively deters other females from entering the physical sciences?

EGO: Why call it a gender barrier, perhaps it's just interest or in the majority of cases, lack of it. The fact is that many individuals, both males and females, just don't like chemistry and therefore don't choose to study it beyond high school. Of the total students awarded a B.Sc. degree in the

1985/86 year at the three Alberta universities only 2.3% were chemistry majors.

ID: But gender is an issue or those thirty-five chemistry majors would be represented by 50% females and 50% males and this just isn't the case. My question still stands - Why did Joanna choose to study in this field?

EGO: It's the old nature versus nurture controversy - how can it be resolved? There are so many variables.

ID: I realize that, but it would be fun to hear Joanna's story and see what develops. We have already done a review of the literature on girls, women, and science and have emerged with a universal picture of these women who succeed in the sciences. There seem to be common factors which in various combinations contribute to the success of women in the sciences - persistently they appear and reappear through the research. By interviewing Joanna and organizing the interview findings we might come to some understanding of how she was able to "break from the mold" as you say. Agreed?

EGO: O.K.

Thus united in their convictions, the study is undertaken.

* * * * *

RATIONALE

Understanding the disparity in participation of women in the sciences through socio-cultural and psychological theories in contrast to biological theories, is of great interest from a pedagogical standpoint as these influences hold the promise of change. Much empirical evidence, collected since the 1970's, demonstrates the impact of psycho-social influences on the sexes. The landmark work by Maccoby and Jacklin (1974) is most noteworthy in this respect. These influences are expressed in many ways, through the choices made by boys and girls in play, dress, and other behaviors, but one of the most harmful effects has been the limiting of career choices through sex stereotyping. The sciences have not escaped such stereotyping and have been overwhelmingly considered a male domain (Handley & Morse, 1984; Hanson Frieze & Hatman Hanusa, 1984).

The school system could be taken to task for failing to offset some of these influences. One might even suggest that there needs to be a role shift in today's schools from passively reflecting societal values to actively filtering its messages. As Delamont (1980) states, "...schools are important agents of

socialization....those who wish to change society frequently suggest that education will be their vehicle." (p. 3) In order to point our "vehicle" in the right direction we need to gain a thorough understanding of the psycho-social influences that are at play in our culture. Hearing a personal account of a young woman in the sciences will contribute to this understanding.

METHODOLOGY

The purpose of this study is to reveal the major influences which impact the life of Joanna, a young female scientist, particularly those influences that facilitated her study of the sciences. The study is composed of the woman's self-reflections and insights progressing from childhood through adolescence to adulthood. In order to provide a context into which Joanna's story can be placed a comprehensive literature review of psycho-social influences as they affect both the science achievement and interest of girls is integrated with the study. Such a review serves as a backdrop to Joanna's life story - affording the reader the opportunity to see the connections between the set and the woman on centre stage.

The life history approach will shed light from a slightly different angle. Rather than using empirical data, a life history will provide insights into the subjective world of the young female science student. On this approach Max van Manen (1986) states, "Pedagogical theory has to be theory of the unique, of the particular case. Theory of the unique starts with and from the single case, searches for the universal qualities and returns to the single case" (p. 90).

Tuchman (1979) as cited by Butt, Raymond and Ray (1986), builds on this theme by stating that through biographical inquiry the universal is encompassed within the particular. "We can use one person's life, then, as a prism through which to see how others in the same or similar situations think, act, feel and intend" (R. Butt, personal communication, June 8, 1987).

The methodology used in this study has been derived from biography and phenomenology. The rationale behind this lies in the appeal of the following quote by Watson and Watson-Franke (1985) -

"the phenomenological approach, which is concerned with 'meaning' and subjective 'truth', restores some much-needed balance to the runaway tendency in the social sciences to reduce people to categories and abstractions in the service of model building and model testing.....the individual will eventually be lost in the maze of scientific generalities" (p. 27).

To maintain the integrity of the life history, then, it is critical to apply the principles of phenomenology; the reason being as Spiegelberg (1969) states, "(to) give the phenomena a fuller and fairer hearing than traditional empiricism has accorded them...(and)...to protest against a simplification which claims to supply the only legitimate and the full picture of reality" (p. 656). To honor this philosophy, initial interviews emphasized introspection and self-reflection on behalf of the co-investigator. Questions evolved from the discussion at hand, rather than from a rigid agenda. Such an emphasis provided the opportunity for the investigator to explore themes identified as significant by Joanna.

As the interviews progressed, new questions emerged from reading the anecdotes of previous transcripts and were explored for clarification in following taping sessions - the past, being used to shed light on the present. It is this constant linking of the past to the present that characterizes biography as a research methodology. Butt and Raymond (1987) state, "Biography emphasizes revealing the potential and actual influence, both conscious and unconscious, of the past on the present" (p. 76).

Through constant dialogue, in a collaborative spirit both investigators were involved in a cycle of theme identification and validity checking. Transcripts were read and the co-investigator indicated with an asterisk those themes that were most critical in her life. Such a self-monitoring cycle is essential in the translation of the interview if the advice of Watson and Watson-Franke (1985) is to be followed -

"The life history that we wish to interpret is something whose meaning is revealed, not by imposing massive external constructs, but by 'making room' (listening) to accommodate the foreign frame of reference that brought it into being...Rather than being concerned with fitting the model to the individual, then, the investigator must be open to adjusting the model to adapt to unique developments as the life history unfolds." (p. 58)

RESEARCH DESIGN

Ethnographic interview techniques were adopted as described in Spradley (1979). Using this style, the interviews operated like a series of friendly conversations with the overriding purpose to understand the co-investigator's world. Appropriate questions to the life history text were asked - its answers and questions listened to throughout the dialogue. Ethnographic questions include descriptive questions ("Could you tell me...? Could you describe...?"),

structural questions ("What is...?"), and contrast questions ("What's the difference between...?").

Ethics of the interview process, outlined by Spradley (1979), were followed - consider informants (co-investigators) first; safeguard their rights, interests and feelings; communicate research objectives; protect their privacy; and make the reports accessible for input.

An attempt was made to adhere to the elements of the ethnographic interview to encourage conversation flow. Besides the questioning techniques these include - "asymmetrical turn taking, expressing interest,...repeating, restating informant's terms, incorporating informant's terms, creating hypothetical situations, asking friendly questions" (Spradley, 1979, Figure 2.1, p. 67).

Research outlining the impact of psycho-social influences on the science achievement of girls provided the background from which descriptive questions were constructed for use in the interviews. The questions designed to explore Joanna's personality and life influences were developed under the three categories of "self", "childhood and adolescence" and "schooling" and are cited below:

"SELF"

1. How would you describe your personality?
2. Could you tell me what would be considered your greatest strength?/weakness?
3. Would you consider yourself a liberated woman and how would you describe such a person?
4. Do you enjoy competition?
5. Could you describe how you feel upon achieving a successful grade? Are you surprised?
6. What has been the most difficult time for you? In what way?

"CHILDHOOD AND ADOLESCENCE"

7. Could you tell me about your family life? What is your placing in the family? What was your socio-economic status?
8. Did your parents encourage you? In what way?
9. What were their occupations?
10. Could you describe your personality as a child?
11. What were your favorite free-time activities? Were you a risk taker?
12. Could you describe your teen-age years? What kind of group did you associate with?

"SCHOOLING"

13. What types of things did you do for extra-curricular involvement?
14. What high school courses did you take?
15. What course was most impacting? Why?
16. Would you describe yourself as an independent learner. What was your attitude towards school work?

17. What did you like about the sciences say as compared to English or Social studies? What made you decide to go into chemistry in particular?
18. What were your favorite class activities?
19. Did your friends influence your school work in any way?
20. Did you ever view science as a male subject? Describe how you felt when you were in classes where there were few girls.
21. How did you feel about competing with boys?
22. Were your teachers encouraging? Does anyone in particular stand out?
23. Could you tell me about the counselling support you had?

These questions formed an a priori framework for the initial interview only. Questions for subsequent interviews arose from the transcripts themselves. Such an approach ensured that the emerging themes were constructed solely by the co-investigator and weren't the result of leading questions asked by the investigator.

In actuality, the dialogue steered itself - only a few questions were posed from the outline to initiate conversation during the first interview and to fill the gaps of later interviews. It was also impossible to maintain the clear separation of questions from "Self" through "Schooling" as the conversation often flowed

naturally from one to another. Frequently the questions were touched upon by the co-researcher herself and prompting from the investigator was unnecessary.

At the completion of each interview, a pattern emerged in which the transcript would be read and questions arising from it would form the basis of the following interview. For example, after reading the first interview transcript the following questions emerged:

1. When you were in high school did it bother you that some kids were getting cars - did it make you want to do well in school so you could afford such luxuries?
2. Was your family very well off?
3. Tell me about your decision to go to university?
4. When did your husband come into the picture? Could you tell me about your relationship.
5. Did you find the subjects in school challenging or fairly easy? Describe your favorite subjects. Why are they your favorite?
6. Do you consider yourself a perfectionist?
7. What has influenced you to take good care of yourself, dress nicely, etc.? Could you tell me why this is important to you?
8. Tell me about your ambition to go into a PhD. program.
9. Have you found the professors quite approachable?

10. Are you quite independent of other people's opinions Joanna?
11. What influenced your moral standard?
12. Describe how you like people to perceive you.
13. Are you comfortable in a leadership role?

A. IDENTIFICATION OF THE CO-INVESTIGATOR

The recommendation by professors in the Department of Chemistry was instrumental in selecting a serious Chemistry student intent on graduate school. As a result of their recommendation, a fourth year student who was proceeding to graduate school was identified. She agreed to take part in the study and is called **Joanna** in this life history.

B. INTERVIEW STYLE

1. Joanna, as the "co-investigator", was assured that her privacy would be respected if she wished not to reveal her true identity and that reports, interview transcripts, interpretations, and manuscripts would be made available to her for validation and further elaboration. She was given the choice to be a co-author of the study - anonymous or not- and has chosen to anonymously co-author this study. A consent form was made available to this effect. Joanna was assured in

the consent form that my advisor, Dr. Richard Butt, and myself were the only other individuals who would have access to the tapes and the transcripts (see Appendix A).

2. Four, 1-hour interviews were taped. The interviews were transcribed verbatim. Having access to an outline ensured that no critical phases in the co-investigator's life would be omitted and formal questions were occasionally used when we had drawn a discussion point to its conclusion and a new stimulus for discussion was needed.
3. Joanna had an opportunity to review the transcript after each session, as did I, in order to re-examine the notes from which relevant themes could emerge. Questions and comments arising from each interview were jotted in the margins and read by Joanna. In this way the written notes were constantly validated and clarified through a dialogue with the co-investigator ensuring that her life experiences and personality traits were represented accurately.

ANALYSIS

1. From Joanna's transcripts emerged a story - her life story. The need to preserve its integrity was recognized. Therefore, prior to undertaking an analysis, Joanna presents her life story in its entirety. She speaks to the reader through words chosen by the writer but validated by herself. Such a collaborative autobiography explores Joanna's personality and life influences through the narrative, allowing the reader to capture the essence of her life prior to the intrusion of literature findings. Butt (1983), using such an approach in his work with teacher biographies, states - "...the best way to get in touch with a teacher's perspective...is through the use of a teacher's voice in an autobiographical manner...I have tried to become part of a teacher's consciousness and speak with his/her voice to try to illuminate his/her classroom reality" (p. 3). Joanna validated her 'soliloquy' and considered it a true representation of her thoughts, feelings and life influences.
2. A personality and life influence profile was developed from Joanna's life story and follows the

soliloquy. It is organized in headings which include: Personality, Sex-Role Identity, Motivational Style, Family Influence, Childhood/Adolescence Influences, Role Models, and Influence of Schooling. The organization of her biography under these headings facilitates the process of identifying the factors in Joanna's life which contributed to her success in the sciences.

3. Information from the literature follows Joanna's profile and was organized under similar headings. Within this section the literature is in dialogue with Joanna - it presents research findings followed by Joanna's comments which are direct quotes from the printed transcripts.
4. A profile of a "universal woman in science" emerged from the review of the literature - a woman with clearly defined personality traits who has experienced environmental influences, at home and at school, which have facilitated her success in the sciences. This profile follows the dialogue. At times the profile was directly extracted from the literature as with the research by Kerr (1985), Baker (1985), Gornick (1983), Hanson Frieze & Hartman Harnusa (1984), in which personality and life influences were determined from actual

biographies of men and women scientists. With most of the literature, however, the profile was extrapolated from the research. From this information it was possible to identify criteria which might optimize the success of girls in their study of the sciences. The life history profile of the "universal woman in science", then, is mainly hypothetical although it does have a research base. Her profile includes a composite of the personality traits and life influences of successful scientists, independent of gender, but overwhelmingly is represented by those characteristics implied by the researchers as being helpful to girls in their study within the sciences. It is therefore assumed by the writer that a girl with these characteristics will be more inclined to be successful in her science studies.

5. Joanna's profile was then compared with the literature profile.

THE RESULTSJOANNA'S THEMES - A SOLILOQUYINTRODUCTION

NARRATOR:

She is the oldest member of her family, the only girl, having two younger brothers. Joanna's parents were originally from Holland. They emigrated independently, marrying after their arrival in Canada. They were divorced when Joanna was 17 years old.

Joanna was married last summer and is very happy in her relationship. At 21 years of age, she is currently completing her fourth year of chemistry and will be attending graduate school next year.

Upon spotting her in a crowd one would note an attractive girl with a definite flair for style but not to the point of being loud and flamboyant. She takes pride in maintaining her health and in looking "neat" (II, p. 13). The latter was something her mother always insisted upon, she confided with warmth in her voice.

She was your typical teenager - loved dances, football games, being with her friends and of course talking on the phone. But as we chat together her unique qualities emerge, qualities that defy anyone to see her as ordinary. She is well organized, has a strong sense of her own ability, enjoys leadership roles, sticks doggedly to commitments, is emphatically "not a procrastinator" (I, p. 8), effectively balances work and play, and to top it all off maintains an optimistic outlook and a sense of excitement, loving a challenge. She has high moral standards and exemplifies them, being genuinely shocked by others who choose not to live by the same standards.

Her maturity extends beyond her years. She states, "...I find it easier to relate to people older than my own age...I don't know why, I guess I have a lot of older friends....I get along almost better with them than with my own age a lot of the time...(I, p. 1).

I am struck by her honesty and sincerity throughout the interviews. She doesn't hesitate to reveal what she considers to be shortcomings in her personality - she confides in being quite judgemental, at times, stating that "sometimes... I think mean things, but I never say them and I think to myself I'm

such a horrible person for thinking these things."(I, p. 3) Joanna's willingness to reveal both sides of her personality was greatly appreciated for this exploration. It is often the self-perceived dark side of our nature, the "thorny" side, that in fact reveals our strengths - our leadership qualities.

* * * * *

(The curtain rises, a young woman stands alone)

Acquaint yourself with Joanna, take note of her words. Listen to her story.

JOANNA:

"I'm here to tell you my life story. Not an easy task in a short time. First, perhaps I'll share a little of my personality with you. It's difficult to speak about my personality strengths because it seems like bragging and I would hate to be considered a bragger. But...if that's what you want..um...let's see...perhaps I'll start by sharing with you the traits that I like in myself and that I hope are conveyed to others. I consider myself level headed, intelligent, logical,... mature and competent. I would like to think that people respect me for those traits.

I suppose I'm somewhat reserved with people, like I don't often smile at people if I don't know them or

strike up a superficial conversation but really my friends and family wouldn't consider me an introvert. I'm usually quite optimistic - I always think things will turn out for the best. I am confident in my own ability to achieve as I have always done well academically. If I find I'm having difficulty with a problem I'll convince myself that I can do it by working step by step through the problem following a logical progression. I'm usually pretty adept at sifting through questions - separating the pertinent from the extraneous. Remembering the times I've been successful before and keeping a rational, calm approach really helps. Most of the time I feel I can be successful if I work at it because I know I have the ability. If I really can't do something, though, I don't hesitate to ask. I don't feel badly about it because I know I've done my best to figure it out on my own.

Umm...I greatly dislike clutter - I try to keep things neat and orderly both at home and at work. Luckily my husband too, feels that same way.....did I mention that I was married? I was married last summer - definitely one of the best decisions I've made....I'm very happy and he is so supportive. I had some doubts about going to graduate school and he's the one who

encouraged it. He's a university grad so he knows what kind of pressure I'm under - especially to maintain a high standard for acceptance to grad school- so he's been doing all the cooking and cleaning while I've been finishing off this year....I just couldn't have more support. He understands when I have to study but I try my best not to bring my work home too often. I like to maintain a balance in my life between work and play. I try to get things done during the day so my evenings are free. I get really frustrated with inefficient and incompetent people in the lab, as a result - especially if it slows me down. A lot of times I won't even work weekends if I don't have to. Some of my friends live and breathe chemistry but I don't....when I get home that's it. I just don't understand people who try to be martyrs and run themselves ragged working all the time. My social time with my husband is just as important to me. I just love to dress up and go out to a movie or out for dinner so I plan the time for it. Also, I have to take time for shopping - I just love shopping! The job I had working in the university lab in the maritimes two summers ago was wonderful - not only because the professor I worked for was great but because the shopping was fantastic!

Don't think that this means I slough off, I take my responsibilities really seriously, when I make a commitment I stick to it. It's just that I try to work efficiently when I'm at work - I arrive early to the lab, around 8:00 a.m., usually work through lunch to about 4:00 - 4:30 p.m. My marks are still good, so....I think the thing is that I organize my time. I mentioned I thrive on being organized didn't I?....sometimes I'll even pack 3 or 4 days before going on a trip and make lists and all that - pretty bad, eh? (laughs).

This planning ahead is something I've done for a long time. I think about what will be happening down the road - whether we will be getting a house or when we might plan a family. I remember planning to be a doctor in Grade 6 and actually I stayed with those plans right to first year university. I changed my mind though, I didn't like the idea of all the blood...right now I'd like to continue in chemistry and try for a Ph.D. Most people might think that's a pretty high aspiration but I'm pretty sure I can do it - and if you're shooting for something you might as well go for the top, right? I mean, if you don't set your sights high you'll never know your full potential

will you? I like the idea of being top of my field - of being the best. That really appeals to me.

It's pretty strange how I landed in chemistry. I was a little directionless after deciding against medicine - it seemed such a time commitment too - especially when I looked ahead through pre-Med, medicine and interning. It seems funny to think that way doesn't it - especially considering I'm now going the same amount of time for a PhD. A girlfriend of mine was going to university at the same time and had put down chemistry as her major and I thought that sounded pretty good so I did it too. Sounds pretty crazy doesn't it - but I thought it would leave my options open for medicine just in case I changed my mind, as so much chemistry is needed in pre-Med. Also I always did well in chemistry and I really liked it. My high school experience in chemistry was a factor here. My chem teacher was a bit of an odd-ball - pretty hilarious actually. I really worked for him though, as he used to put us on the spot in class, and ask us questions about homework and I never wanted to stand out by not having it done. Besides, I also found that by doing my homework I did well on the tests and I always liked to get marks in the 80's so that was a good reason for doing it. I remember, the chem

teacher teasing us girls a lot - he said things like, "Let's see what the girls think about this" which bugged me at first - he sort of baited us but it made you want to do it just to show him. Besides, it was a great motivator to get high marks just to receive that special teasing he would dole out to the students that worked hard for him. I liked getting those high marks - I loved the praise and special relationship with the teachers that accompanied them. I really liked and respected most of my teachers and wanted to deserve their respect. They were a big influence on me especially in senior high. Getting bad marks was just devastating - it just wasn't worth it. I'm luckier than a lot of students, however, as school came easily to me, I even enjoyed writing tests. I actually preferred the sciences, though, all through school, much more than the arts courses - like Social Studies - it's just too subjective for me and I hate writing papers. I always liked the problem solving and mathematical aspects of chemistry - I enjoyed the challenge of trying to work out the problems.

I guess I'm a rare case considering my gender but I never really thought about it then. I noticed that fewer girls were in the physics and chem classes but it didn't really register - it just didn't matter. I

never felt held back or intimidated about competing with them because of my sex - it wasn't a factor at all. Beside, I got along really well with the guys in the class - I always have. Although I had a best girlfriend through junior high and high school, I always had a lot male friends. In Junior High for example if one of them didn't have a date for a dance they would always ask me - they knew I wouldn't think anything of it. We got along really well - laughed and joked together - I guess I never really went through that spinny, boy crazy time because they were always my friends - I've never found it hard to relate to them. Maybe what helped was that they always knew where they stood with me - there were no surprises. They knew my value system and they respected it. Probably the fact that I've always found it easy to communicate with males has been a help to me in chemistry now because there certainly are a lot of men in the department. I probably wouldn't feel comfortable at all if I couldn't talk to them. I must admit, though that sometimes I wish there was another female chem prof available to chat to - someone I could share concerns with about how they found graduate school being married and everything. Also, sometimes at lunchtime, the guys in the lab will go for lunch without thinking of asking me. It's not done spitefully, though, as I do often

eat my lunch at my desk and they know that - it's just that sometimes I'm aware of it and I guess I'd like to be included.

Generally I get along well with the guys in the lab - I can really say they are my friends. Probably, the reason I never found males to be intimidating could be attributed to the fact that I grew up with two younger brothers and because I was the oldest I could boss them around (Laughs). My childhood was great fun when I think about it. I remember reading hours away - I think I read Anne of Green Gables about three times. But the fondest memories has to be the farm. Friends of my parents lived on a farm and we used to go out there lots as kids. It was a kids' paradise - there were horses to ride, straw stacks to build, kittens to dress up. I was the oldest of all the kids so I was sort of the leader - we had lots of fun. I was lucky that Mum didn't mind her only daughter mucking around in mud pies and straw stacks instead of playing with dolls. She always dressed me up nicely but never insisted that I be a stereotyped image of a little girl. Good thing - because I certainly wasn't naturally inclined that way! I say, my Mum, because although Mum and Dad weren't divorced at this time my father didn't have much time for me - he was pretty

chauvinistic - and favored my brothers, especially the youngest one. Oh well...it didn't matter so much because Mum was always there. She was so encouraging all the time and really impressed upon me the importance of a good education. Although she didn't go too far in formal schooling herself she saw the value in it, never giving me the feeling that because I was a girl it wasn't necessary. Probably because she worked for awhile as a nurse before she emigrated from Holland and got married and also her sister was a doctor.

I'm not sorry I've chosen chemistry, I really enjoy it. I like the idea of being different. It's fun seeing people's reactions when I tell them I'm a chemistry major and they say, "Yuch!", you know - I like that! Some guys were intimidated by it when I was single but I say, that's fine ...then they don't have to pursue it. You wouldn't want to go out with someone who couldn't handle that, who couldn't talk to you at your own level...like it would be difficult. I guess, it's probably true of my husband too. If he hadn't been so supportive of me going to university, I suppose he wouldn't have become my husband, I don't know.

Once in a while, though, I wonder about other careers I had considered, such as physio for example. However my high school counsellor put the kibosh to

that idea. He really discouraged me, suggesting that I would find it really hard. When I look back on it now, here I am going for a master's in chemistry - I'm sure physiotherapy is no harder. High school counsellors are really the most influential person when you are applying to university and if they aren't encouraging...well look what happened to me. And physiotherapy doesn't involve much cutting, or blood or anything, just, you know, the people side...I probably would go that direction if I had that decision to make again.....

I really do enjoy chemistry though, don't get me wrong, and my chemistry profs have been great - really encouraging. I probably wouldn't be going into graduate school now if one of them hadn't asked me at the end of my first year if I would like to work in the lab for the summer. I couldn't believe it and it was a great experience. I really enjoy the challenge of the lab - it's a great feeling when you get good results. I really like to try the approach on my own but it's nice knowing the profs I work with are so approachable in case I get stuck. They really have been great, it was with their encouragement that I applied to the maritimes for that summer lab job - and then I got it.

I was really excited to be going somewhere different like that.

Yes, I feel I have found my field. And a PhD. will give me some flexibility especially when it comes time to plan a family because I should have some input into the hours I work. I'd also like to work in chemistry that has some industrial application - that's not really theoretical where it can help people or help people's lives improve by what we do. I'd like that - I'd like to think I have something to contribute to society..."

* * * * *

A personality and life influence profile developed from Joanna's soliloquy is outlined below:

PROFILE SUMMARY - JOANNA

PERSONALITY

PROFILE

Mature (I, p. 1)

Optimistic (I, p. 2)

Reserved (I, p. 19)

Competent, responsible (III, p. 2)

Strong commitment to school (III, p. 1)

Level-headed (I, p. 1)

Systematic, logical (Problem solving ability) (I, p. 4)

Organized - dislikes clutter (I, p. 5), organizes time

Self-confident, sense of her own ability (III, p. 14; I, p. 14))

Shows initiative (I, p. 12)

Takes pride in herself - work ethics and appearance (I, p. 10; II, p. 13)

High ability (I, p. 19; IV, p. 1)

Strong values (II, p. 28, 30)

Plans ahead, ambitious (I, p. 9, 11)

Low tolerance for inefficiency and incompetency (I, p. 4)

Enjoys leadership role (I, p. 21; II, p. 33)

Likes a challenge (III, p. 5)

Strong willed (II, p. 27)

Likes to express feelings not let them build up (III, p. 10)

Attributes success to ability and effort not luck (III, p. 15)

SEX ROLE IDENTITY

ANDROGYNY:

(Masculine side)

Plans ahead, ambitious (I, p. 9, 11)

Enjoys leadership role (I, p. 21; II, p. 33)

Systematic, logical (Problem solving ability) (I, p. 4)

No sense of being disadvantaged or having limitations on her because of her sex (IV, p. 7)

Easy to communicate with males (II, p. 30)

Lots of male friends through Jr. High and High school (I, p. 16)

Enjoys some competition, not serious competition (III, p. 4; IV, p. 22)

(Feminine side)

Likes to see connections between her job and helping society (II, p. 6)

Appreciates kind people (II, p. 19)

Likes to express feelings not let them build up (III, p. 10)

Enjoys shopping (III, p. 6)

MOTIVATIONAL STYLE

Enjoys academic challenge as much as working and interacting with people (likes to see good results for herself) (I, p. 11; IV, p. 12)

Tackles work independently, self-talks her way through problems (I, p. 3)

Attending university was her own decision, not dependent on peers (comment to co-author)

Enjoys some competition, not serious competition (III, p. 4)

Balanced social and work life is critical (I, p. 10)

Responded well to encouraging teachers - worked for self satisfaction and their approval (III, p. 12-13).

Likes idea of being the best (II, p. 16)

FAMILY INFLUENCE

Lower middle class

Encouraging mother (II, p. 10, 26)

Non-traditional mother - independent and strong
(II, p. 9)

Little encouragement from father (II, p. 10)

Parents divorced

CHILDHOOD/ADOLESCENCE

CHILDHOOD

Active childhood - horses, climbing, skateboarding (I,
p. 23, 24)

Oldest child with two younger brothers (leadership
experience) (I, p. 25)

Loved reading (II, p. 26)

ADOLESCENCE

Few girlfriends - more independent of peer pressure as
a result (I, p. 15)

Felt restricted by "cool" thing to do socially
(II, p. 22)

Followed a girlfriend's decision to major in chemistry
at university (II, p. 5)

ROLE MODELS

None (other than mother)

INFLUENCE OF SCHOOLING

Encouraging teachers - praise made her work harder (IV,
p. 2; III, p. 13). Also enjoyed the special
student/teacher relationship experienced by high
ability students

Negative counselling experience had dramatic impact on
life course (II, p. 4)

Never enjoyed arts courses - too subjective (Interested
in sciences from Jr. High) (III, p. 12)

Encouraging professors - major influence for keeping her in chemistry (II, p. 6)

OTHER

Husband - encouraging, supportive, shares household duties (II, p.7; III, p. 2)

Wishes there was a female chemistry professor available to chat with. Feels a man's experience is different than a woman's in chemistry - would like someone she could share concerns with eg. to know how other people balanced family and graduate school (III, p. 7)

•
Appreciates autonomy but feels more secure with people available to interact with (IV, p. 12)

Has reasonable expectations of herself - won't feel badly to ask questions. Accepts shortcomings (recent!) (IV, p. 14)

Likes to see connections between her job and helping society (II, p. 6)

Likes idea of career with flexibility to balance career and family (II, p. 15)

* * * * *

Overall, Joanna portrays the image of a self-confident, level-headed individual. She likes to plan ahead, setting her sights high. She takes pride in her appearance and in her work but recognizes her own limitations and is not deterred by them. Her value system is strongly developed.

From where do these traits come? Many are inherent, no doubt, but if we look to Joanna's past we see an environment that has contributed to their

development. Being the oldest sibling, having an active childhood, and receiving encouragement along the way, from her mother, teachers and now her husband - all have contributed to her self-confidence. To discuss these environmental influences and to more fully understand their significance it is imperative to turn to the research that has been done in the area of gender and science achievement.

Compare the literature findings to Joanna's story. Through dialogue with the literature Joanna allows us to explore the universal and the unique in her own emerging profile. At times, Joanna's voice rings out singularly but overwhelmingly it is joined by others - voices from the literature. On these occasions it is impossible to separate the individual sounds as the literature and Joanna meld into one.

JOANNA IN DIALOGUE WITH THE LITERATURE

The dialogue takes place in seven separate scenes. Each scene contains factors which have been identified by the literature as facilitating the success of girls in science. These factors are listed in the literature profile which is developed at the end of each scene.

The scenes are drawn from the headings in Joanna's profile and are identified below:

- Scene 1: Personality Traits
- Scene 2: Sex-Role Identity
- Scene 3: Motivational Style
- Scene 4: Family Influence
- Scene 5: Childhood and Adolescence
- Scene 6: Role Models
- Scene 7: Influence of Schooling

Comments from Joanna will follow the literature in each scene.

(Due to the length of many of the scenes the voices from the literature and Joanna's alternate within the scene. For example, in the introduction of SCENE 1, Joanna responds to Baker (1985) and his personality profile of successful scientists. Joanna continues throughout the scene to comment alternately with the literature on competition, level of confidence and self-concept as they relate to girls in science. This pattern repeats itself throughout all lengthy scenes in order to portray a sense of dialogue between the research and Joanna).

SCENE 1: PERSONALITY TRAITS

THE LITERATURE

In his review of the literature on successful scientists, Baker (1985) summarized the traits which typified many of the individuals. The personality

profile which emerged included - more interested in ideas than in people; generally introverted, creative and intuitive; logical (likes order) and analytical; possess highly developed math and spatial abilities; have an aesthetic appreciation of the world; and a positive attitude towards science.

JOANNA

Logical and analytical?

Of the traits described by Baker, it is the logical and analytical side of Joanna which is most apparent.

Well...he (husband) thinks I'm very level-headed..I don't jump to decisions...things like that. (I, p. 4)

...I find I do get a lot done because I organize my time...I come in every morning early, I usually do homework at lunch hour...when I'm at school I work...(I, p. 7)

...I'm definitely not a procrastinator...I don't leave assignments or anything until the last minute..(I, p. 6)

...I'm the kind that would pack 4 days ahead instead of one day ahead, make lists and all that...(I, p. 8)

When attacking chemistry problems, she has the knack of being able to logically sift through the problem separating the pertinent from the extraneous.

...I look at things and I think, well, how should I approach this, and not just rush off and try it....I find it very easy. These things just fell out for me whereas other people just couldn't see it (III, p.24).

Introverted?

Joanna is somewhat reserved but does not describe herself as introverted. She is inhibited with strangers but once she gets to know someone her inhibitions are lowered and her natural warmth is revealed.

...my friends probably think I'm fairly outgoing but that's towards them and not towards people in general...like I wouldn't strike up a conversation about something not very important...I'm not outgoing that way. (I, p. 1)

Math ability?

Her math marks were always over 80%, she didn't find math intimidating and has a well-developed spatial ability.

Well, I had straight A's pretty well all through school, not high high A's but I always had A's and I had honors all through school (II, p. 3).

...I didn't enjoy, say a class like Social Studies because of the writing involved..it was sort of abstract whereas chemistry and physics

were math oriented, problem solving and I really enjoy that kind of work...(III, p. 11-12)

I'm fairly good at stereochemistry in Organic chemistry which required 3D perception on 2D molecules on paper (IV, p. 12 (comments))

Creative?

Joanna does not consider herself a creative person. She isn't artistic and has never been inclined towards the designing field. However, she does enjoy the challenge of planning the set-up for chemistry experiments and in this way expresses her creative side.

...we (her supervisor at Dalhousie) made a broad topic and then just saw how it developed and then went that way. I think that's what you have to do with a project, you know, you have to design something and see how it goes (IV, p. 13).

(the challenge of setting up an experiment on her own)

Yeah, I think I would really like that. Like how to start, what the best way to set it up would be. Things like that, especially when ...you have enough time (IV, p. 12).

Likes the sciences?

Joanna has always enjoyed the sciences, directing herself in that direction due to an aspiration in

elementary school to be a medical doctor. She didn't like the subjectivity of the arts, preferring the more objective sciences.

(Coming out of Junior High)

...I ended up taking more sciences because I didn't want to take social, I didn't want to take drama, things like that so I ended up taking more sciences...I was more interested in those than the other choices I had (IV, p. 6).

...at that point I wanted to be a doctor and I knew you had to have a science background and that was what I was interested in...(IV, p. 6).

THE LITERATURE

A common trait of the women scientists interviewed by Gornick (1983) was the sense of wonder they had of the world - "I wanted to learn everything there is to learn in biology and chemistry. I had to learn everything."(Gornick, 1983, p. 41)

JOANNA

Although Joanna enjoys learning she doesn't have a burning desire to know all. She enjoys all aspects of life and considers it important to maintain a balance between social life and school work.

(commenting on the boy in high school who always got the top marks)

...I saw what it cost him. He was on the basketball team and I drove up to Cardston one day and watched and he was studying Shakespeare on the bench before the game. I'm not prepared to do that (I, p. 20).

(the present)

...I think I sort of categorize this is school and this is play and I really define it...like a lot of my friends, they are chemistry majors, they talk chemistry, they just live and breathe chemistry...I don't...like when I go home, that's it.....I really enjoy other things...I try to get things done during the day so my evenings are free...a lot of times I don't work weekends if I don't have to...(I, p. 6).

(speaking on the future and wanting a PhD.)

...I think of flexibility, I'm hoping that if I do get a PhD. and eventually have children I'll be able to sort of work around the children rather than having to put them in daycare all day everyday... (II, p. 15).

THE LITERATURE

Maehr (1983) states that scientists enjoy social competition, are self-confident, and are intrinsically motivated, that is, they have an orientation to life and work in which neither social support nor extrinsic rewards guide their behavior.

On Social Competition

Overwhelmingly girls do not achieve as well in a competitive setting as in one of cooperation. In a study involving 36 fourth-grade mathematics classes

Fennema & Peterson (1986) observed "...2-1/2 times as much competitive activity in the boy-gain classes than in the girl-gain classes" (p. 10) The boys on the other hand, achieved the highest in a competitive spirit.

On Self Confidence

Hart Reyes & Padilla (1985) have found the confidence level of girls in science to be generally low and have found it to decrease from 6th grade to 12th grade. This lack of confidence expresses itself in decreased risk taking - girls are hesitant to "guess" when they are not sure of the answers. This surfaces when males and females are asked to tackle an unfamiliar task. Males will often overestimate how they will do on an unfamiliar task while females usually underestimate their ability. In a study involving 8th and 9th graders, boys reported no shift in confidence whether they were asked to perform in a traditionally male role or a traditionally female role, whereas girls reported a lack of confidence in performing nontraditional roles (Post-Kammer & Smith (1985).

Perceived competence and self-perception of ability (sense of self-efficacy) has been identified by

researchers to be of primary significance for success in the sciences (DeBoer, 1986; Maehr, 1983; McNeill Kavrell & Petersen, 1984; Hanson Frieze & Hartman Hanusa, 1984; Post-Kammer & Smith, 1985). The attribution individuals assign to their successes or their failures has a definite influence on continued success in science. Females are much more likely to attribute failure to lack of ability and success to luck (Hanson Frieze & Hartman Hanusa, 1984; McNeill Kavrell & Petersen, 1984).

An exceptionally subversive duo which will undermine longterm science achievement has been cited as the lack of self-confidence together with underestimating ability - traits which overwhelmingly characterize the attitude of adolescent girls in science (Hanson Frieze & Hartman Hanusa, 1984).

PROFILE: ENJOYS SOCIAL COMPETITION

: NOT AFRAID TO TAKE RISKS

: SELF-PERCEPTION OF COMPETENCE AND ABILITY

: ATTRIBUTE SUCCESS TO ABILITY AND EFFORT NOT

LUCK

JOANNA

If level of self-confidence alone is used to measure the potential to study in the sciences then it would not be surprising to find Joanna excelling in this field. Joanna has a strong sense of self, which has given her the strength to set her sights high and the confidence to take chances in life.

...sometimes I don't have a lot of self-confidence but most of the time I think that I'll get it done, that I'll be able to do it. Sometimes I'll start doubting and I think, well, if I can't do it...because you know, I did well in school and I do well in university now,...and if I can't do it...well, who's going to do it? That's what I sometimes have to tell myself (I, p. 2).

...for example, assignments or something, I think, well, it seems impossible, but they wouldn't give it to us if it was...and so then I think - well, I'm just not doing it right, or I'm not approaching it right or not reading the right books...I just think, it's got to be 'do-able'..... (and) if I can't get it the first time then I stop and let myself rest (laughs) and then I try again. (I, p. 3).

...I like the idea of being different...'cause when people ask me what you do.."I'm a chemistry major" and they say,"Yuch!"...and I like that (I, p. 13).

...I want to go for a Ph.D....if I don't aim high enough I won't get my potential (I, p. 11)

(on becoming a Ph.D.)...it's the top of chemistry, it's the best you can do... and that's really what I want. For me, a master's...it's good but I really want a Ph.D. because I want to be the...(best) (II, p. 16)

Part of this self-confidence could possibly have resulted from the leadership roles she often adopted with her friends through childhood and to some extent with her best friend as a teenager. As a child she spent a lot of time with three families who were all very close and visited each other frequently.

...with these three families, the kids were younger than me ...I was the oldest but not by much, they all had older daughters but I was the oldest, sort of I was the leader (I, p. 25).

(re: best friend)

...she was really quiet and shy...and it ended up that I sort of became the leader, you know, like I had to talk to people...it's changed now...she's got a lot more self confident but then she was really quiet (I, p. 21).

(re: whether she enjoys a leadership role now)

Oh definitely, I enjoy it... I mean it's hard...I'm so used to telling people what to do that it's hard not to...even my husband says my Mum listens (laughs). If I tell her something she'll listen, eh, and I was so used to that (II, p. 33).

Joanna overwhelmingly attributes her successes to ability and effort, not merely to luck. Any failures she attributes to lack of effort not to lack of ability.

don't" but in other areas I can remember things better or.. I think maybe I am a little more problem oriented than memorization and that can make a difference too....sometimes I don't remember as much but I understand more (IV, p. 16).

END - SCENE 1

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SCENE 2: SEX-ROLE IDENTITY

THE LITERATURE

Sex-role identity can range from the traditional to the liberated. If a girl has a high femininity rating she will generally opt for a stereotypic feminine career (Glaze, 1980; Hanson Frieze & Hartman Hanusa, 1984). Hanson Frieze & Hartman Hanusa (1984) state that, "...having nontraditional sex role expectations appears to be highly diagnostic of having high career aspirations for women (p. 146). As previously mentioned, those individuals who are not strongly sex-typed as masculine or feminine but who demonstrate both masculine and feminine traits depending on the situation are termed "androgynous" (Bem, 1975). In her study, Bem (1975) found androgynous females to be more independent of social

pressure than women who scored high on her femininity rating.

Beginning with the sex-appropriate pink or blue blankets at birth even babies receive differential treatment by their sex (Skolnick, Langbort & Day, 1982). Steinkamp & Maehr (1983) state that as early as second grade, reading and art are considered feminine endeavors and mathematics, sports and spatial-mechanical pursuits are labelled masculine. Science itself is definitely perceived as a male domain (Handley & Morse, 1984; Hanson Frieze & Hartman Hanusa, 1984). Matyas (1985) cites Chambers (1983) in a study where 4,807 children ranging from kindergarten to grade five were asked to draw a picture of a scientist and only 28 drew a female. Overwhelmingly, scientists are seen as male in our culture (Hanson Frieze & Hartman Hanusa, 1984)

Deptuck, Whelan, & Leuthy (1985) provide an example of a situation presented in the First Annual Conference for Women in Science and Technology where teachers were to draw a profile of two students named Dennis and Denise, who were high achievers in science. The results were that traditional male/female occupations were assigned respectively because of the names.

Also, the relationship between gender role perceptions and self-concept has been correlated with science attitude. (Handley & Morse, 1984). In the two years from Grade 7 to Grade 8 researchers found an increased acceptance of the stereotyped view of male dominance in science.

Ironically, it seems that for a woman to get ahead in science she must acquire traits which when acquired are appraised negatively - a situation that has been defined as the "double bind" by Martin (1981). Skolnick et al (1982) adds a third dimension, the "triple bind", represented by the guilt complex often felt by a career woman who is both working and maintaining a family. The guilt results from the conflict between her self perceived role and the traditional role of wife and mother. The struggle appears to not diminish for career women even upon achieving their career aspiration.

PROFILE: NON-TRADITIONAL SEX ROLE EXPECTATIONS

- : ANDROGYNOUS
- : UNAFFECTED BY SEX ROLE STEREOTYPES
- : INDEPENDENT OF SOCIAL PRESSURE
- : FAMILY AND CAREER NOT SEEN AS MUTUALLY EXCLUSIVE

JOANNA

On sex-role identity

Joanna perceives herself as a liberated woman, which to her implies an individual free to make whatever choices she wants, independent of any societal pressure to do otherwise.

(Definition of a liberated woman)

...someone who is free to make the choice of what she wants to be and not be worried about what people think whether she stays at home with the family - that's just as liberating as working in nuclear physics or something. Just deciding that that's what you're going to do...
(I, p. 18)

Whether Joanna will be capable of remaining independent of social pressure throughout her career will depend greatly on her confidence level and on the continuing emotional support of her husband. Perhaps through his support she may escape the undermining guilt created by the "triple bind".

She has never been intimidated by the lack of girls in her science classes. She didn't feel any peer pressure to not take Physics or Chemistry because of the small numbers of girls in those classes. In this reaction Joanna shares a trait common to most eminent women - that is, such facts are not perceived as

barriers - they are able to carry on oblivious to factors which prevent many other women from advancing (M. Greene, personal communication, June 26, 1987).

...I've never really thought about it really. Now that I think back on it, it didn't make any difference that there weren't many girls in physics class (IV, p. 8).

It never actually registered that there were fewer girls. It just wasn't important...I didn't think it was as much of a gender thing as just girls weren't as interested in physics...it wasn't that girls don't take physics. I guess that's what I thought at that time (IV, p. 9).

Throughout school Joanna had many male friends. This experience combined with having two younger brothers has enabled her to relate easily to men.

...when I was in high school it was my friend and I and we went around with a whole group of guys and these were my friends....even when we got married and I invited my friends from high school there were more guys there than girls (I, p. 16).

...they were such great friends it was just like having a girlfriend, you know, they'd phone me up and we would do stuff. Like, in Junior High they'd ask me to go to the dance if they didn't have a girlfriend at the time because they knew I wouldn't think anything of it (I, p. 17).

This ease of communication with males is a great asset for anyone intending to enter a male-dominated profession.

...if I hadn't been like that before I had started university I would've probably not chosen it now because there's just no way around it - they are all male and you have to learn how to talk to them. But I think it gave me an advantage at the beginning because it was easy for me and it still is (II, p. 30).

Androgynous?

Most definitely Joanna fits the Bem inventory definition of androgyny. She flows easily between the feminine traits, identified by Bem (1975) as "affectionate, gentle, understanding", and Gilligan (1982) as viewing the world in terms of its connections and the masculine traits of "ambitious, dominant, self-reliant" (Bem, 1975, p. 635).

Feminine Side

"...the kind of chemistry I want to go into isn't a real theoretical, I'd rather go into an industrial application where I'm going to be helping some...where it can help people or help people's lives improve by what we do (II, p. 7).

(on conflict)

...I'm used to having that kind of interaction where you get it out and then it's over... like I can forgive in 15 minutes - it's really easy

for me to feel sorry for what I said...(III, p. 10).

(on science)

...it's hard to get through it you know if you're struggling all the time....I admire people who can stick with it when they're having that hard of a time...(III, p. 21).

Joanna also enjoys dressing nicely and loves clothes shopping, traits which are often attributed to femininity by our culture -

...I've really got to the point where I don't wear a lot of just blue jeans and a sweatshirt. Not very often anymore. It's just more comfortable for me to be dressed up a little more feminine, I guess...like I wear skirts a lot, I just find that a little more comfortable (II, p. 13).

...I always dress if we go out for supper 'cause I just enjoy it...(III, p. 6).

Masculine Side

Joanna takes a challenge easily. She is ambitious and has a strong self-concept. She is not easily swayed by social pressure. Also her future orientation has often been associated with masculinity more than with femininity (Butt, personal communication, April 10, 1986).

(on the idea that her profession may be intimidating to people)

...you wouldn't want to go out with... someone who couldn't handle that, who couldn't talk to you at your own level...if it intimidated them (men), well that's fine...then they don't have to pursue it (I, p. 14).

...I like the idea of being different... (I, p. 13)

(on lab work)

...I get really annoyed when people don't catch on really quick like I do...you know, especially if I'm with the lab with someone and they do things slowly ...I just get very annoyed (I, p. 4)

(on future planning and ambition)

...I want to go for a PhD...if I don't aim high I won't get my potential (I, p. 11)

...if it was just me I would decide early but then I try to say, well - what do you think we'll be doing in 5 years? where do you think we will live? do you want to buy a house, things like this...you know me... (I, p. 9).

(re: summer job)

...it was difficult because I had applied and heard back in December and I met my husband in January so I had to leave again in May. And, oh boy that was really difficult because I kept saying, "I don't want to go", but I said, "I have to, I can't stay because of the relationship" (II, p. 20).

END - SCENE 2

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JOANNA

On compliancy -

Encouragement from significant adults - mother, teachers, husband - has had a great influence on Joanna's life. As a child she wanted to make her mother proud of her and later through adolescence she added teachers to the list - including professors at the university. She indicates that if the chemistry professors had been aloof it could have negatively influenced her decision to remain in chemistry.

(Mother)

My Mum has always encouraged us going as far in school as we could...(II, p. 8)

It was the positive from my Mum that made the difference...(II, p. 10)

(Teachers)

I didn't want them to think I was a slouch; that I wasn't doing the homework or I didn't care (IV, p. 4).

(Husband)

...he has encouraged me....I wasn't too sure about graduate school and he encouraged it (II, p. 7).

(Professors)

...I definitely got a great deal of encouragement from the professors (II, p. 18).

Such a reliance on extrinsic rewards could have easily made her vulnerable to the whims of her peers but the opposite has occurred. Through the positive influences of home and school she strengthened her own value system and in spite of being a compliant student, she did not extend this compliancy to her peers - at least not as far as school was concerned. She takes her responsibilities seriously and has clearly defined values that are not easily compromised.

(re: high school boyfriend)

...when I went to university it became really difficult because he was going to college... he just thought I was so silly to be going for four years in chemistry...I think that's what ended up causing me to stop going out with him...I had enough....it was a very hard decision (II, p. 27).

...if my husband hadn't agreed with me being in chemistry he wouldn't be my husband right now and it was the same with this guy I guess (II, p. 28).

Her supportive upbringing and positive school experience caused her to internalize a value for education which could not be swayed by her friends. I would say she is now more self-reliant and is motivated intrinsically rather than extrinsically. Through earlier compliance Joanna has achieved self-actualization.

END - SCENE 3

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SCENE 4: FAMILY INFLUENCE**THE LITERATURE**

In their research of successful women in science Hanson Frieze & Hartman Hanusa (1984) discovered that a common family background for most of these women includes - upper middle class, educated family, many from immigrant families, typically oldest child with a strong identification with their father.

Peterson (1986) discovered that parents are more keyed into looking for ability information in sons than in daughters in order to help them plan careers. She also adds that they often attribute the success of daughters in science to effort but to the success of sons to ability. Such an attitude by parents has been attributed to a decrease in the confidence level of their daughters a year later.

Fathers are often a strong influence on girls who succeed in the sciences (Hanson Frieze & Hartman Hanusa, 1984; Highman & Navarre, 1984;). Also, if the parents' roles are traditional, daughters are less likely to see the relevance of math and science (McNeill & Kavrell, 1984). Not surprisingly, a secure emotional base with warm nurturing parents is related

to a high level of achievement for both boys and girls (Highman & Navarre, 1984).

PROFILE: ENCOURAGING PARENTS - CRITICAL!

- : FATHER INFLUENCE
- : OLDEST CHILD
- : UPPER MIDDLE CLASS
- : NON-TRADITIONAL PARENTS AS ROLE MODELS
- : SECURE EMOTIONAL BASE FOR FAMILY

JOANNA

Joanna's father was not very encouraging. He was more interested in his sons' futures, especially the younger son, than his daughter's.

...he really favored my younger brother and my Dad was quite chauvinistic. It was fine until I was 9 or 10, then...for a while I had a horse. My brothers were scared to ride it so I had the horse but as I got older, like...you know,...he'd rather talk to my husband than to me...I know more really about what they're talking about actually...but my Mum was always very encouraging (I, p. 24).

It's possible to detect a deep hurt in Joanna about her father's lack of interest. I wondered if this resentment could have manifested itself into an "I'll show you!" attitude causing her to excel in school.

Joanna concedes that possibly on occasion this was the case but she goes on to state -

...it sort of got to the point where I didn't care anymore, like if...what he thought really didn't matter anymore ...He probably knows I'm in chemistry and that's about it. He doesn't know very much and he doesn't want to know, I don't think...he's so much more interested in what my brother's taking, so...why bother? (II, p. 10).

The praise and encouragement coming from her mother had a much greater impact on her attitude towards school.

...it was more the positive from my Mum that made the difference (II, p. 10).

Joanna's mother was far from traditional herself. She is a strong and independent woman. She came from a well educated family and had a great sense of adventure resulting in her emigration to Canada when she was still single.

...my Mum, her family was all very well educated..., she has a sister who's a doctor, a brother who is a lawyer and another brother who is an official in the KLM Airline (II, p. 9).

(on her mother's schooling)

She always had trouble in school...she got a nursing degree or whatever in Holland and so she went as far as she personally could but she was always very independent....I think she was the second youngest of seven children and she was the first to move out and then she came to Canada by herself (II, p. 9).

I think probably because her sister was a doctor too, she didn't feel there was any need for women not to get an education...(II, p. 9).

Her mother did not perceive any limitations on the basis of gender. She always encouraged Joanna to prepare for a career, never limiting her solely to the role of wife and mother. Joanna is very proud of her mother's achievements - this fact has clearly contributed to her desire to respect her mother's wishes as far as her own education was concerned.

END - SCENE 4

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SCENE 5: CHILDHOOD/ADOLESCENCE

THE LITERATURE

CHILDHOOD

In her biographies of eminent female scientists Kerr (1985) found commonalities in the childhood of the women. Overwhelmingly their childhood was characterized by - spending much time alone, by either choice or necessity; reading voraciously; unconcerned with conforming; having an early adult mentor; and learning a great deal by individualized instruction or tutoring.

On Play

The active nature of boys' games such as casting a fishing line and tossing a football offers them experience in the manipulation of objects and in understanding such abstract concepts as trajectory and vectors, giving them a distinct advantage in the understanding of spatial tasks in later science and math classes (Shapiro, Kramer & Hunerberg, 1981; Steinkamp & Maehr, 1983). The different nature of boys' play, also allows more meaningful experiences to occur for them in science classes than for the girls (Ridley & Novak, 1983).

CHILDHOOD PROFILE: SPENDS MUCH TIME ALONE

- : READS VORACIOUSLY
- : UNCONCERNED WITH CONFORMING
- : EARLY ADULT MENTOR
- : INDIVIDUALIZED INSTRUCTION
- : ACTIVE CHILDHOOD

JOANNA

Kerr's (1985) description conjures up the image of a child who is a loner and somewhat of a social misfit. Joanna doesn't fit this picture, but then again, she is

Joanna does not mention another significant adult in her upbringing besides her mother - she was her adult mentor. In her progression through university, however, she has missed the presence of other women, both as mentors and as a support group.

...especially now that I'm going to graduate school to find out what it's like....I've asked some people, some of the professors and that how they feel about going to graduate school and being married and all these kinds of things, but it's difficult because often they had wives who stayed home at that time, and so they didn't have nearly the pressure or the same situation that I'm going to have because, you know, my husband will be working...it would be nice to talk to a woman who has done it or even just a woman who has done graduate school and not even be married (III, p. 7-8).

(and socially...)

I get along with them (men in her department) all right but ...it's sometimes difficult because they're a little cliché...sometimes they don't invite me for lunch, you know...usually it doesn't bother me, I'm sure part of it is that I bring my own lunch but sometimes I'm a little lonely...occasionally because I know a lot of my friends who have gone to university...they have a lot of girlfriends and I don't, I really don't have a lot of girlfriends...(I, p. 15).

Joanna's childhood is full of happy memories. As a family they regularly visited close friends on a farm and it was here that she has the fondest memories. She was an outgoing little girl who enjoyed playing active games. Joanna didn't lack spatial experiences in her

adolescence (Erickson & Erickson, 1984; Handley & Morse, 1984; Hart Reyes & Padilla, 1985; Kremer, 1984; Steinkamp & Maehr, 1983). In studies investigating science attitude, a definite correlation has been found between peer attitude science and the attitude of the individual with the strongest relationship occurring in Grade 9. As peer influence increases so do the girls' attitudes to science decrease (Matyas, 1985; Talton and Simpson, 1985).

The female scientists in Kerr's study (1985) generally found adolescence to be a difficult time as they experienced conflicts with achievement and social acceptance. This was usually resolved by intensifying their commitment to work.

Because young adolescents adhere closely to sex role stereotypes, achievement in the maths and sciences is often used by young male adolescents as an assertion of their masculinity (Steinkamp & Maehr, 1983). The acceptance by adolescent boys of these subjects as a male domain can have a devastating psychological impact on the girls (Fennema & Sherman, 1977; Matyas, 1985; Steinkamp & Maehr, 1983). Girls who are most sensitive to the boys' reactions will take fewer science courses and have a lower achievement (McNeill Kavrell & Petersen, 1984). The literature suggests that the

notes back and forth - possibly a contributing factor to her success in the subject!?)

Throughout her adolescence Joanna kept in touch with her family's friends - this had a stabilizing influence on her through this time in her life as it served to offset the values of her schoolfriends.

...I had this group but I also had other friends but not in school...I wasn't entirely dependent on this group...I wasn't so scared to do things...in university it changed a lot because most of those people didn't go to university (II, p. 25)

Kerr (1985) mentions that the female scientists in her study experienced a difficult time in adolescence. For Joanna, this really didn't materialize until she attended university. Reacting to a slower social life she tended to bury herself in work.

When my social life wasn't great I tended to spend more time at the university. Thinking that doing well was the only important thing. Ironically, all this extra work didn't seem to help my marks as much as it could have. Work can't replace everything and everyone. (personal comments, July 30, 1987)

END - SCENE 5

* * * * *

chemistry teacher who brought out the best in her through his teasing manner.

He was just hilarious and he used to pick on the girls...it was a little irritating how he'd always say, well let's see what the girls think. At first I thought, "Oh no...he really doesn't like girls." By the time I got to Grade 12, I sort of realized he wasn't being favorite towards the boys, he just, you know, liked teasing and it wasn't malicious (III, p. 13).

...I never did consider him to be chauvenistic and I've talked to him since and he has been very positive, like when I told him I was going to graduate school, he said, "Well, that's good, you can't do too much with a B.Sc. and that's good for you"...(III, p. 14-15)

(also)

...I was scared of him and I made sure I knew everything because he'd ask you questions and if you didn't know them you were in trouble. And I think I tried to do well and I did well in his courses and that made the difference because I could do it for him...(III, p. 14)

It was because she did well in chemistry that she knew she could major in it at university. Joanna didn't go into chemistry due to any special prodding from this teacher, however. She really was planning pre-med at the time and chose chemistry for a major because a girlfriend was going that route.

...I didn't know what to major in...and I thought well, I should put a major down and...I couldn't decide. And a friend of mine, she was going into chemistry and I thought, Gee, that

sounds like a good major, you know, I'm interested in it and even going into medicine or whatever that would have been a lot of chemistry and I thought that's a good way to start out because I've got a lot of options...(II, p. 5)

END - SCENE 6

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SCENE 7: INFLUENCE OF SCHOOLING

THE LITERATURE

The attitude of the teachers play a critical role in influencing student achievement. Skolnick, Langbort and Day (1982) cites a study by Rosenthal and Jacobson (1968) in which teachers were told students were high achievers, when in fact they weren't and the children did better.

The usefulness of math and science in careers must be pointed out to girls (Fennema & Sherman, 1977; Hanson Frieze & Hartman Hanusa, 1984; Steinkamp, 1984). Fennema and Sherman (1977) view math as the "critical filter" to a science career. Girls should be encouraged to take a wide range of math courses in high school. Support and encouragement from parents and the school counsellor provide critical emotional support

for career aspirations (Fennema & Sherman, 1977; Hanson Frieze & Hartman Hanusa, 1984; McNeill Kavrell & Petersen, 1984; Peterson, 1986).

Within the classroom teachers interact more with boys than with girls (Fennema, 1983; Matyas, 1985; Sadker & Sadker, 1985). In one study teachers attempted to spread their interactions evenly between the boys and girls, and by increasing their interaction with the girls to 34% the boys protested, accusing the teacher of favoring the girls (Houston, 1985). Teacher praise has also been found to be a powerful motivator for girls (Fennema & Peterson, 1986; Skolnick et al, 1982).

**PROFILE: RECEIVED ENCOURAGEMENT AND PRAISE
FROM TEACHERS AND SCHOOL COUNSELLORS
(CRITICAL!)**

JOANNA

Within this section, it's "praise" and "encouragement" from teachers or in some instances, lack of it, that have had such a major influence in shaping her destiny. A negative experience with a school guidance counsellor still creates bitter feelings in Joanna.

...I don't think I got enough encouragement from my guidance counsellor...like I wasn't

really encouraged in school to go as far as I could...I was also thinking about going into Physio-therapy and he was just...he kept harping on how hard it was and how difficult....I thought, you know, I can't do that....the counsellor...at the time was really the most influential person when you were applying to university, you went through him...and so that made it bad (II, p. 4).

(re: Physio-therapy)

I think I would have enjoyed it too...that's why I wanted initially to be a doctor and then a physiotherapist would have been good for me, not as much cutting or blood or anything, just you know, the people side...and if I had that decision to make again, I probably would go into physiotherapy, because it was closer to what I wanted to be all along...(II, p. 4)

Oh, the power wielded by the guidance counsellor!

At this impressionable age, positive experiences with other teachers in school definitely stand out in her mind.

...let's see, my physics teacher, he was very good and he was very encouraging...and I really got along good (III, p. 13)

...I enjoyed English, I really liked the teacher, she liked the way I wrote... (III, p. 13)

(re: math teacher)

..I really liked him I got along with him quite well. (III, p. 19).

It was important to Joanna that the teacher liked and appreciated her work. It's possible to pick this

up by her comments. She responded well to encouraging teachers. This trend has continued into the university environment as well. As has already been noted, she has been influenced to remain in chemistry and continue into graduate school due to the positive influence of her professors. The difference is that as she grew older she has strengthened her own resolve to continue her education and does not rely as heavily on this encouragement.

END - SCENE 7

* * * * *

Many common threads that weave their way through Joanna's life story can be discovered in the profile of the hypothetical woman in science. The bold type in her profile are those which correspond significantly with Joanna's characteristics and life influences.

PROFILE SUMMARY - THE "UNIVERSAL WOMAN IN SCIENCE"

(See Appendix B for profile with research match)

PERSONALITY

PROFILE: MORE INTERESTED IN IDEAS THAN PEOPLE
 : INTROVERTED, CREATIVE AND INTUITIVE
 : **LOGICAL/ANALYTICAL**
 : **HIGH MATH AND SPATIAL ABILITY**
 : AESTHETIC APPRECIATION OF WORLD
 : **LIKES SCIENCE**
 : **ENJOYS SOCIAL COMPETITION**

- : NOT AFRAID TO TAKE RISKS
- : SELF-PERCEPTION OF COMPETENCE AND ABILITY
- : ATTRIBUTE SUCCESS TO ABILITY AND EFFORT
NOT LUCK

SEX ROLE IDENTITY

- PROFILE: NON-TRADITIONAL SEX ROLE EXPECTATIONS
- : ANDROGYNOUS
 - : UNAFFECTED BY SEX ROLE STEREOTYPES
 - : INDEPENDENT OF SOCIAL PRESSURE
 - : FAMILY AND CAREER NOT SEEN AS MUTUALLY EXCLUSIVE

MOTIVATIONAL STYLE

- PROFILE: EXPLORATORY NATURE MORE THAN COMPLIANT
- : POSITIVE ATTITUDE TOWARDS SCIENCE

FAMILY INFLUENCE

- PROFILE: ENCOURAGING PARENTS - CRITICAL!
- : FATHER INFLUENCE
 - : OLDEST CHILD
 - : UPPER MIDDLE CLASS
 - : NON-TRADITIONAL PARENTS AS ROLE MODELS
 - : IMMIGRANT PARENTS
 - : SECURE EMOTIONAL BASE FOR FAMILY

CHILDHOOD/ADOLESCENCE

- CHILDHOOD PROFILE: SPENDS MUCH TIME ALONE
- : READS VORACIOUSLY
 - : UNCONCERNED WITH CONFORMING
 - : EARLY ADULT MENTOR
 - : INDIVIDUALIZED INSTRUCTION
 - : ACTIVE CHILDHOOD

- ADOLESCENT PROFILE: DIFFICULT TIME/ BURIED IN WORK
- : ABLE TO ACT INDEPENDENTLY - NOT VULNERABLE TO PEER PRESSURE

ROLE MODELS

PROFILE: PRESENCE OF ENCOURAGING FEMALE ROLE MODELS
: INFLUENTIAL HIGH SCHOOL SCIENCE TEACHER (MALE
OR FEMALE)

INFLUENCE OF SCHOOLING

PROFILE: RECEIVED ENCOURAGEMENT AND PRAISE
FROM TEACHERS AND SCHOOL COUNSELLORS
(CRITICAL!)

* * * * *

PROFILE DISCUSSION

The twenty bolded factors speak for themselves as the relationship to Joanna's life is very direct. Of the remaining thirteen factors, seven have little or no relationship to her life experience. These include:

PERSONALITY**Introverted, creative and intuitive**

Joanna is not strongly introverted but is reserved with strangers. Her creative and intuitive sides are not strongly developed.

FAMILY INFLUENCE**Father influence**

If Joanna's father had any influence it was negative and was far outweighed by her mother's encouragement.

Upper middle class

Joanna's family was more lower middle class than upper middle class.

CHILDHOOD

Spends much time alone

As a child, Joanna associated a lot with her friends. She was not a loner.

Early adult mentor

Her mother was Joanna's mentor. She really had no other special supportive adult, other than her teachers.

Individualized instruction

Joanna went through the separate school system and as such was never exposed to a one-to-one learning situation.

ADOLESCENCE

Difficult time/buried in work

Joanna had a happy adolescence. She had a stable circle of friends, attended social functions regularly and was not left out of the dating scene.

ROLE MODELS

Presence of encouraging female role models

There were no females in chemistry for Joanna to emulate. She wishes a female chemistry professor was available to chat with, as she feels a man's experience in chemistry is different than a woman's. Joanna expresses the desire to share concerns on how other women balanced family and graduate school.

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The remaining six factors require elaboration for the relationship to Joanna's reality to be drawn. A discussion of each factor follows:

PERSONALITY

More interested in ideas than people

The fact that Joanna seeks relevancy in her work to benefit society is an indication that people are as important to her as ideas. She has also mentioned that although she appreciates autonomy she feels more secure when people are available to interact with (IV, p. 9) These statements would indicate a "people person" more than an "idea person". However, she has indicated that the challenge of working on chemistry problems is as interesting as working with people. For Joanna one does not outweigh the other, her interests are equally divided.

Aesthetic appreciation of the world

Although this was not touched upon directly in the interviews. Joanna has since indicated that she does indeed have a natural curiosity of the world. She likes to know a little about a lot of things - to know how things work. She enjoys learning; as a university undergraduate she wanted to take more option courses than she could fit into her program.

SEX ROLE IDENTITY

Independent of social pressure

Joanna was not totally independent of social pressure. As you will recall, the influence of her friends inhibited her from becoming involved in student activities - from students' union involvement to cheerleading. She was independent enough, however, to not allow either her schoolwork or her ambition to attend university to be affected.

MOTIVATIONAL STYLE

Exploratory nature more than compliant

Joanna is really a combination of both. The desire to please her mother and teachers definitely has played a major role in her life. Yet, her exploratory side has allowed her to take on challenges such as working in an eastern university one summer, despite the fact that she

it is most helpful to her and might possibly be one of the strongest facilitators in her career successes. Everyone is well familiar with the time-worn cliché, "Behind every famous man is a good woman", a woman who has been supportive throughout his career. Joanna concedes that for her the reverse of this cliché is true - behind her success has been a good man. It seems that if the woman's male partner is not willing to participate in the give and take that is often demanded of working couples, she may find herself facing the difficult decision of choosing between a career or her relationship. In many cases the career oriented woman must choose to go on alone. In the case of those career women who remain in a relationship I would surmise that the androgyny of their male partner is a major factor. That is, the woman feels she can "go for it" in her career without fearing repercussions from an insecure male partner who feels his manhood is threatened by either her success or the fact that she is not being a homemaker 100% of the time.

Joanna clearly does not view career and family as mutually exclusive. How rare is this viewpoint? Could this view of life as being a balance between career and family have facilitated Joanna in her

pursuit of a career? In a study by Glaze (1980), more than 75% of secondary school girls involved in the study believed, erroneously, that "40% of women college graduates never marry" (p. 22). With such an entrenched belief system it is clear that many of these young women view marriage and career as an either/or situation. As marriage was considered by most to be desirable, this belief in itself, will limit many girls from pursuing a serious career.

Joanna also has reasonable expectations of herself. She won't hesitate to ask questions. This willingness to approach others indicates she doesn't worry about what others may think. She has a strong sense of her own ability and quite matter-of-factly accepts that a person can't know everything. She has enough self-confidence to recognize that when she needs help it's because she has pursued every possible resource and can't find the answer, not because she hasn't the ability. She recognizes her own strengths and is able to accept her weaknesses as a fact, not as a fault. Working with professors who quite openly expressed their own failings has helped her in this regard.

* * * * *

EPILOGUE

The objective of this study was to explore the factors which may have facilitated Joanna in her study of the sciences. In so doing we have been granted the opportunity to explore many other dimensions of this gifted young woman's life. Dimensions which create more questions than answers. Questions such as -

1. What role does personality play versus environment?
2. How important is encouragement to females seeking a science career?
3. Is this profile common to all successful women in male-dominated professions?
4. Which component of Joanna's profile is most responsible for her success in the sciences?

Despite the flurry of questions that emerge from the study, we have been provided with one clear answer - for a woman to succeed in science she appears to have to carry certain core traits. The obvious parallel between the life experiences of Joanna and the research profile of the "universal woman in science" indicates this to be the case. Joanna has stated that for a woman to succeed in science she needs to possess a sense of determination, a strong belief in one's ability, an independent nature and a logical and analytical approach to problem-solving. She has also

mentioned that it is critical for women in science to see beyond the chauvinistic attitude which pervades the field. Being androgynous, then, is an **essential** characteristic if one is to minimize the frustration which could result from working within a male-dominated profession. Judging from Joanna's own experience, the role of encouragement for women in the sciences cannot be underestimated. The encouragement of Joanna's mother, teachers, and husband have been instrumental in her continued educational development.

IMPLICATIONS OF THE STUDY

Apparently core characteristics must be in place for females to succeed in the sciences. This has far reaching implications for science education. It implies that a self-selection process is underway in the teaching and learning of science. This process appears to allow only those students that fit a prescribed mold to succeed in the subject area. The set of criteria which make up the mold happen to be predominantly masculine. With few exceptions, Joanna fulfills the pre-requisites. She is a rarity, not only because she is female. Yager (1985) states that, "at least 98% of all high school graduates...will not further study science after completing high

school....(and) worse, yet, most will never use or even see a use for the science they experience in school" (p. 21). It is obvious that students of both sexes are becoming disenchanted with the sciences.

The time has come to scrutinize the profile which excludes so many students and question its limiting nature. It has evolved from an antiquated paradigm of science - a result of the post-Sputnik era in which a paranoid Western World poured millions of dollars into science education, insisting upon a discipline orientation. The emphasis was on learning facts and developing skills designed solely to prepare students for advanced study in the universities and colleges. The profile which exists is a direct result of such an emphasis.

If we believe the introductory quote by Delamont (1980), stating that education is the vehicle by which to change society, then it is time to point the vehicle in a new direction - one which will broaden our definition of science. It is time to integrate the sciences with philosophy, ethics and the arts. The movement is underway. It is not by coincidence that the last speaker at the 1986 meeting of the AASC (the Association for the Advancement of Science In Canada)

was a philosopher. As educators, we must ensure the movement continues - it is only by broadening the definition of science that we can succeed in enticing more young women and young men into the subject area. In the meantime, science educators must make a concerted effort to encourage their female students, especially, to continue in the sciences. It is essential to teach the subject in such a manner to ensure that girls' interests are maintained (Smith, 1987). Only by changing our teaching approach - by shifting from dogma to open exploration can we hope to offset the negative image of the discipline.

It is encouraging to note that progress is being made in the direction of a paradigm shift. The loss of potential in the sciences has not gone unnoticed. Since 1980, concerns have surfaced internationally on re-orienting science education in order to enable students to become functional members of the highly technological world in which they live. In 1982, the "Second International Symposium on World Trends in Science Education" selected the Science, Technology, Society (S/T/S) interface as its main theme as indicated in its title, "Technical Application and Social Relevance of the Science We Teach." On our domestic scene, the Science Council of Canada initiated

an investigation into Canadian science education in May, 1980. The results were published in April, 1984, as a document entitled, "Science for Every Student - Educating Canadians for Tomorrow's World." It found that the science education taught in Canadian schools was inadequate for the '80's and suggests stressing relevance, with an emphasis on the integration of science, technology and society. The Science Council's suggestions have been adopted by Alberta Education, and by the early 1990's a new science program reflecting the S/T/S emphasis will be implemented throughout the province.

This trend is welcome in that science will be viewed within the broader context of life itself and as such will attract much more interest than it does today. The new focus, with its emphasis on social relations and relevancy to life will undoubtedly appeal to girls (Manthorpe, 1987), but should also serve to increase the interest in science of all students, independent of gender. I asked Joanna whether she thought more people would be interested in studying science if an S/T/S connection was emphasized. She responded excitedly saying, "Oh yes, and there are so many things that could be talked about in the schools, for example, in chemistry, polymers could be

discussed...such information as - the use of polymers in car bodies will increase by 50% in the next 5 years, and that everyday breadbags as well as contact lenses are made of polymers. Students would be interested in that" (Joanna, personal communication, July 11, 1987).

Joanna had the strength of character and the necessary support to succeed in spite of the system. Statistics prove that she is by far the exception, not the rule. By working with students rather than against them, by using a variety of teaching strategies in science, a majority rather than a minority could be motivated to pursue a career in a subject area which is too often dismissed as "boring". Such a common descriptor for science classes expressed by adolescents is a sad commentary on the inadequacy of the current science curriculum especially in light of the reality that the most exciting advances in our modern society stem from a science base. By linking the sciences with technology and society and emphasizing activities and experiential learning, science educators can convey this excitement in their pedagogy.

It is time to add new molds to the old - to spark the imagination and interest of all bright students for which the previous definition of science held no appeal. Not everyone will choose to pursue a science

career but, without doubt, all will be affected by the new technology which inevitably emerges from scientific research. If society is to make wise decisions in the application of science, it is critical to provide males and females with an equal opportunity to become scientifically literate. By failing to make this provision society is essentially muzzling the scientific input from a large sector of humanity. To deny such input is a waste of intellect for which society could conceivably pay the highest price.

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APPENDICES

APPENDIX A: CONSENT FORM

APPENDIX B: LITERATURE PROFILE

APPENDIX C: TRANSCRIPTS

APPENDIX A

CONSENT FORM

I, _____, have read a description of the prepared research project and have been able to discuss with the researcher the full implications as to what is required of me, what role the researcher and her advisor will play, and how the data will be gathered and analysed. Any questions I have had regarding the study have been clarified. I have had the opportunity to make requests for extra safeguards regarding privacy and confidentiality. I understand that interviews will be typed and presented by the research and that only myself and the researcher's advisor will have access to this data. I also understand that I have the right to veto descriptions, interpretations and analyses that the researcher makes as well as the final report. I understand that I have the right as a co-investigator to suggest and negotiate change to the report and veto any material that I do not want made public.

- A. I have chosen to - remain anonymous in the report
- not remain anonymous in the report
- B. I have chosen - to be a co-author
- not to be a co-author

(Date)

(Signature)

(Address)

(Phone Number)

APPENDIX B: LITERATURE PROFILE

SCENE 1: PERSONALITY TRAITS

Characteristics of Scientists (male and female)
(Baker, 1985)

- interested in ideas more than in people
- generally introverted, creative, intuitive
- logical, analytical
- highly developed math and spatial abilities
- aesthetic appreciation of world
- positive attitude towards science

Women scientists- biographies

- sense of wonder in the world, devoted to the "experiencing self characterized by work" (Gornick, 1983)

Enjoy social competition, *self-confident (perceived competence and self-perception of ability - primary researchers to be of primary significance for success in the sciences/ not dependent on extrinsic rewards or social support (DeBoer, 1986; Maehr, 1983; McNeill Kavrell & Petersen, 1984; Hanson Frieze & Hartman Hanusa, 1984; Post-Kammer & Smith, 1985).

SELF-CONCEPT (girls)

- not risk takers, underestimate their ability (Hart Reyes & Padilla, 1985)
- lack confidence in performing nontraditional roles (Post-Kammer & Smith, 1985)
- attribution assigned to successes or failures - females are much more likely to attribute failure to lack of ability and success to luck (Hanson Frieze & Hartman Hanusa, 1984; McNeill Kavrell & Petersen, 1984)
- subversive combination of lack of self-confidence and underestimating ability (Hanson Frieze & Hartman Hanusa, 1984)

SCENE 2: SEX-ROLE IDENTITY

- High femininity rating - stereotypic feminine career (Glaze, 1980; Hanson Frieze & Hartman Hanusa, 1984)
- Androgynous females more independent of social pressure than women who scored high in feminine rating (Bem, 1975).
- Idea of science being perceived as a male domain (Handley & Morse, 1984, Hanson Frieze & Hartman Hanusa, 1984) / relationship between self-concept and gender role - affects science attitude more than achievement - from Gr. 7 -8 science is viewed as male dominated (Handley & Morse, 1984)
- Scientist as male (Hanson Frieze & Hartman Hanusa, 1984; Matyas, 1985)

SCENE 3: MOTIVATIONAL STYLE

- Girls often choose compliance over self-actualization - reduces their science achievement (Steinkamp, 1984)
- Attitude of boys from Gr 6-10 - more positive than girls but girls were more motivated to achieve (Simpson & Oliver, 1985)

SCENE 4: FAMILY INFLUENCES

- Parents more inclined to look for ability information in sons, also attribute success of daughters in science to effort - decreases their confidence level (Petersen, 1986)
- Fathers - strong influence on girls who succeed in science (Hanson Frieze & Hartman Hanusa, 1984; Highman & Navarre, 1984).
- Traditional occupations for parents - less likely to see relevance of math and science (McNeill & Kavrell, 1984).

SCENE 5: CHILDHOOD/ADOLESCENCE

Childhood

- Spend time alone, read voraciously, unconcerned with conforming, early adult mentor, learn a great deal by individualized instrn (Kerr, 1985)

Adolescence

- Greatest difference in science achievement by gender at this stage (Erickson & Erickson, 1984; Handley & Morse, 1984; Hart Reyes & Padilla, 1985; Kremer, 1984; Steinkamp & Maehr, 1983)
- Correlation between peer attitude & individual attitude - Gr. 9 is strongest (Talton & Simpson, 1985)
- Adolescence most difficult time for girls due to conflict with achievement and social acceptance - (Kerr, 1985).
- Boys seeing science & math as a male domain - devastating psychological impact on girls (Fennema & Sherman, 1977; Matyas, 1985; Steinkamp & Maehr, 1983) /Girls most sensitive to boys' reaction will take fewer science courses and lower achievement (McNeill Kavrell & Petersen, 1984).
- As peer influence increases - girls' attitudes to science decreases (Matyas, 1985). Career goals become lower in status, salary and prestige with age (Gr 5, 8, 12) - (Kerr, 1985).

SCENE 6 - ROLE MODELS

- female role models in sciences - encouraging to girls (Highman & Navarre, 1984; Matyas, 1985; Hanson Frieze & Hartman Hanusa, 1984; Shamonoff, 1985).
- (Matyas, 1985) - hasn't noted achievement change but found encouragement of teachers is influential in determining a science career choice - highest career commitments resulting from experiences with same sex teacher contacts.

SCENE 7 - INFLUENCE OF SCHOOLING

- teacher attitude (Skolnick et al 1982)
- usefulness of math & science to careers should be pointed out (Fennema & Sherman, 1977; Hanson Frieze & Hartman Hanusa, 1984; Steinkamp, 1984). - math critical filter (Fennema & Sherman, 1977)
- Support and encouragement from parents and the school counsellor provide critical emotional support - (Fennema & Sherman, 1977; Hanson Frieze & Hartman Hanusa, 1984; McNeill Kavrell & Petersen, 1984; Peterson, 1986).
- teachers interact more with boys than with girls (Fennema, 1983; Matyas, 1985; Sadker & Sadker, 1985). / In one study teachers attempted to spread their interactions evenly between the boys and girls, and by increasing their interaction with the girls to 34% the boys protested accusing the teacher of favoring the girls (Houston, 1985).
- Teacher praise has also been found to be a powerful motivator for girls (Fennema & Peterson, 1986; Skolnick et al, 1982).

APPENDIX C: TRANSCRIPTS

TRANSCRIPT I

"PERSONALITY"

(Joanna - 21 years old, 4th year chemistry student)

I - INTERVIEWER
R - RESPONDENT

COMMENTS

I

JOANNA

I: First of all, we'll take some time to describe just your personality. Can you describe to me what kind of person you are ... how would you describe yourself if someone didn't know you.... say you were one of your friends describing who you are?

R: I guess, I think if I know people, such as my friends or my husband's friends I can be very outgoing towards them but then if I'm around people that I don't know or let's say in the hallway or something I don't often smile at people just... if I don't know them...and.. So, I guess, you know, my friends probably think I'm fairly outgoing but that's towards them and not towards people in general...like I wouldn't strike up a conversation about something not very important... or something like that - I'm not that outgoing that way..

I: So, would you say...If you were to look at a continuum with introverts on one side and extroverts on the other side, where would you put yourself?

R: More towards extroverted, I think.. ah..I find it easier to relate to people older than my own age... I don't know why, I guess I have a lot of older friends - not old, old.. but you know like in the 40's, 30's you know around there. I get along almost better with them than with my own age a lot of the time.. you know

I: So, do you consider yourself a little more mature - do you feel?

Appears more introv. than extrov. by this statement (?)

Introverted with people I don't know at all + who don't know me.

Mature

COMMENTS

R: Yeah, yeah, I think so... Yeah, I think so.. like my husband comments that I'm fairly mature for my age... (?) ..a lot more mature than a lot of girls at University, 'cause, I don't think I was ever really spinny or anything (laugh) ... you know like that? I don't know sometimes I think it would be nice to be a little more carefree, like, not care so much about what people think...

I: (Interrupt) Spontaneous or something do you feel?

R: Yeah... but I'm not like that....I don't like making a scene of myself in front of people, you know attract attention to myself.

(Pause)

I: O.K. ...let's say...what would you consider the greatest strength of your personality, what can you really draw on? What would your husband say if he was here?

R: I...I think I am very optimistic, like...I don't think anything bad is going to happen to me I think things will always work out towards, like better things....I think that's one of the main things is that I sort of half-think that things are going to be better (Laugh)...you know...I don't think about the bad things that are going to happen, I mean sometimes I do, sometimes I don't have a lot of self-confidence but most of the time I think that I'll get it done, that I'll be able to do it....Sometimes I'll start doubting and I think, well, if I can't do it...because you know I did well in school and I do well in university now.. and if I can't do it well who's going to do it? You know, that's what I sometimes have to tell myself.

I: Good technique...and... so do you generally feel fairly competent that

I

JOANNA

*Never was "spinny"
In control of actions
most of the time
Unwilling to let go*

*Doesn't like to attract
attention*

*Optimistic, positive
outlook on life* ✓

*Talks herself into
being more self-
confident
(Like a coaching
model - only it's
self coaching)*

- you can do it...generally...is that what drives you to keep persevering?..
- R: Yeah, I think well the way we get, for example assignments or something, I think, well, it seems impossible, but they wouldn't give it to us if it wasn't...you know... and so then I think well I'm just not doing it right, or I'm not approaching it right or not reading the right books...I just think, it's gotta be do-able (?)..You know
- I: So you don't generally... if you hit an obstacle in an assignment you don't throw up your arms in despair...
- R: No
- I:...unless you pursue it..
- R: Right... usually what I do if I hit an obstacle, I'll stop for awhile and sort of like maybe for a day and often it seems that my subconscious works on the problem without me thinking about it... and so I think, I sort of I believe that.. ?...if I can't get it the first time then I stop and let myself rest (Laugh) and then I try again.
- I: Let your brain power build up (Laugh)
- R: (Laugh)... Yeah, yeah that's right... because your subconscious does more than you think.
- I: What about your personality, outside of school... where is your strength there...say, your husband, what would he say??
- R: (Laugh)....
- I: Be kind to yourself... what would he say if I asked him why did he fall in love with you? (Laugh)
- R: (Laugh)

I

JOANNA

Self-confident
Belief in her own
ability
Perseverance
Able to work indep.

Self-talk

I

JOANNA

I: What were the traits that he really appreciated?

R: Well...I think he thinks I'm very level-headed. I don't...jump to decisions...things like that...

logical, level-headed

I: How about just yourself?

R: Well...I think people perceive me sort of as nicer than I am like sometimes I have to sort of you know I think mean things, but I never say them (both laugh)...you know and I think to myself Oh God, I'm such a horrible person, you know (both laugh) for thinking these things...but people don't realize I'm thinking these things and when others are so moral, like and I'm so upset by them... like I have a friend I work with and she's so nice to everyone, I just don't think she ever thinks badly of anyone,...oh, I wish I could be like that...but I'm not ...I don't know..

An observer, reserves opinions

I: Could it be because you have high standards of yourself, do you expect others ...do you get disappointed in them and say like "How could you do that?"

R: Yeah, yeah...exactly like for example when my brothers at home, I think "How could you say that to Mum" whereas I would "Never" say that to her for things like that really upset me.

High moral standards

I: Generally is it actions that upset you...

R: Yeah, I get really annoyed when people don't catch on really quick like I do...you know especially if I'm with the lab with someone and they do things slowly and I want to get out of there quick...I just get very annoyed...it's hard to keep my mouth shut (Laugh) you know but I feel bad about that, you know I've had a lot of lab experience, working in labs in the summer..you know

*Efficient
Low tolerance for
inefficiency and
incompetency*

*especially if
it slows
me down.*

I

JOANNA

I can't expect everybody to just catch on and I get annoyed that way...

I: Tell me, do you feel you are a very proficient person and therefore it's incompetence in other people that is annoying... is that it?

R: Yeah, yeah....

I: Especially if they could have put more effort in it, is that it?

R: Yeah,

I: Would you still find it frustrating if they were lacking ability or would you still find it frustrating? (Laugh)

R: No, then..then it's sort of like...I've tutored a couple of times, it's hard when you can't...you're trying to explain something and they just can't grasp it and that's because of a lack of ability in just that direction, you know...chemistry is math oriented...you've got to be able to manipulate numbers and that... some people just don't have that you know and I think I'm more patient that way, but I just when they're stupidly not prepared or not thinking that's when they annoy me.

I: So, tell me about your personality a bit more. Outside of school, what other traits do your friends or your husband appreciate about you? What would he say if he was here?

R: Well, he thinks I'm sort of like I'm fun like sometimes I'm crazy around him, not anybody else, you know things like that..

I: Like your friends too would they pick up on that?

R: Yeah, I think so...We were talking about it before...it's sort of like we don't annoy each other, you know like

Aware of difficulty of *
subject for people
lacking math ability

Definitely
aware of this.
Admire others
who have
other talents

Will act "crazy" only
when very sure people
accept her

Likes order

greatly
dislike clutter

with some people they just do things that would really bother you. We like things relatively neat, and you know I like having fun, going you know to shows...

I: Have you similar personalities would you say??

R: Yeah...yeah...He says he can talk to me, he says he wouldn't like to have, you know, if I wasn't as smart as him...you know

I: What does he do again?

R: He's got a management degree.

I: O.K. so let's look at the other side...what would be a weakness, something that you would like to overcome. Would you like to expand upon anymore or would it be that mainly?

R: Um (pause)

I: Like being more spontaneous, would that be??.. would you want to be like that?

R: No...I think sometimes I wish I was, I don't know if it's good or bad...I think I sort of categorize this is school and this is play and I really define it..like a lot of my friends they are chemistry majors, they talk chemistry, they just live and breathe chemistry...I don't...Like when I go home, that's it. I really enjoy other things and that's why, you know...I try to get things done during the day so my evenings are free...a lot of times I don't work weekends if I don't have to, I feel if I take the weekend off...but sometimes I think I wish I could work a little harder or concentrate a little better, you know sometimes I give in a little too easily...I wish I could be just a little more

I: (interrupt)..Well being married you're probably torn...you must find it

I

JOANNA

*Husband - ego
booster*

*Fairly regimented
Organizes time for work
and play/ enjoys a
balanced life* ✓

I

JOANNA

necessary to really organize your time so you can devote time to your relationship.

R: Yes, that's right, I'm really (?) but I just can't very well say I'm going to bed at 9 o'clock. You know, he's been nice all week, I can study all night and didn't watch TV, you know, so I have to...you know...but I find I do get a lot done because I organize my time...I come in every morning early, I don't usually go out for lunch, I usually do homework at lunch hour...I just try to..like, when I'm at school I work...you know let's say I work 8:00 to 4:00 - 4:30 and I get a lot done...like my results, yeah my marks are good and that is enough for me except you know when exams come along...you have to study but...

*Uses time effectively
Purposeful/not side-tracked easily*

I: A lot of people would be there physically, but not put in nearly that time..

R: Exactly. So that's what I've been doing this last year or so...

I: Prior to your marriage did you operate similarly to that?

R: Similarly. Like, I'm not a night person and so I had to be done before 10:00. But, uhm, ? I would work all day, go home for supper, come back and be there from 7 to 10 p.m. But it didn't really make a difference in my marks because I'd end up talking and so... I'm not finding the time...and you know and in my fourth I still have enough time. So, you know...I do use the time(?) but I wish I could do that better, because I find I have 1/2 hour and I would go, "Oh forget it", you know...

Prior to marriage work habits were similar, but she did come back in the evenings

Wasn't able to focus as well, concentrate

I: You can't...all you can do is the best you can...So, would you say then you really plan your day out..

I

JOANNA

R: I don't, not really but I just..I just started last week. I said to my husband..Oh, I have so much to do. He said well why don't you just make a schedule and so I did and I feel a lot better about it. But usually I don't I sort of do a little bit here, and a little bit there...you know but I'm definitely not a procrastinator...like I don't leave assignments or anything until the last minute...no they're pretty well always handed in on time.

Willing to accept suggestions

Not a procrastinator

Works on assignments immediately

I: When you're in a relationship you have to be organized because.. otherwise it adds a lot of pressure I'm sure...

R: Yeah...uh-huh

I: O.K. Anything else would you say other than work oriented...is there anything in yourself that you would like to change at all? Anything in your personality?

R: Um..

I: How about time?

R: Oh, no I'm very punctual...maybe overly so...One thing I think is sometimes, I think I'm too worried about things...like I want things done now and right now...you know..I want things done now...and right now.. you know....I tend to organize things so far ahead that I can't relax about things you know and I think that's one thing I'd really like to do (?)...Like I'm the kind that would pack 4 days ahead instead of one day ahead, make lists and all that, you know and I think I worry about the thing too much

Punctual

Well organized

A perfectionist

*Takes responsibilities seriously **

(Being organized helps her in chemistry/ also concern for details)

I: (Interrupts) But do you think it's that worry that has probably made you so successful in something like Chemistry

R: Yeah..

I

JOANNA

I: ...where you have to be concerned about details?

Looks ahead
- likes to plan ahead

*

R: Yeah, yeah...

I: Where whole experiments have to worked out when you're weighing things to the decimal place...to the nearest significant figure?

R: Right, well I'm sure it does. Like..?

I: So it might be a weakness?

R: (together) (Laughs) in personal life it is a little bit.

I: O.K. So tell me you're attitude towards life generally how would you descibe yourself....quite optimistic?? Anything else...do you tend to plan ahead in your life do you find?

R: I try to (Laughs)...it's really hard because it doesn't work...you know...especially (?)... I'm sure later I could plan...but right now it's so difficult.

I: But you applied to graduate school

R: Right, right

I: And yet that calls for planning, how about scholarships?

R: Yeah, yeah...(pause)...yeah, I guess I do but sometimes I can't decide until right before I have to do that...but it makes a big difference having two people to decide for...if it was just me I would decide early but then I try to say well - what so you think we'll be doing in 5 years?...where do you think we will live?... do you want to buy a house?...things like this...you know me...I would try to plan all these things which you really can't and you know he says, "Well, I don't know, you know" you can't decide...

I: Is that because you are planning for graduate school and so you have to plan in that respect

R: Yeah...and I just started thinking long range so..

I: (interrupts) How old are you right now?

R: I'm 21

I: Oh you've got lots of time for a family (Laugh together) These days with people keeping themselves healthy and everything...the biological clock isn't as critical (Pause)..Do you exercise regularly?

R: (Laughs) No, I don't

I: But you watch... you obviously do... you must watch what you eat.

R: Yeah, healthwise...

I: Do you think about the biological clock?

R: No, I think I've got a lot of time for that... it's just I'm thinking along the terms that I'd like to have children while I'm young...like so we're not so set in our ways...say like if being married for say 10 years that we can be so set in our ways without children and all of a sudden have children....and also umh ...just having them when I'm older like I think what I'd like ideally - it would be nice to have kids younger and be still young when they move out so we can do things...so that's why ??...

I: Are you trying to balance right now plans of having a career and children.

R: Yeah, yeah...because I definitely want children .?.....I'd like to establish myself a little bit at least so it's pretty far down the road

I

JOANNA

Keeps healthy mainly through eating properly

Her physical appearance is important to her

Planning children in her future

Would like a balance between career and children

because I chose to go to Graduate School.

I: How many years are involved in Graduate School?

R: Well, I want to go for a PhD - so that's many years...

*Ambitious,
"shoots high"*

I: ?

R: That's what I'm going for, to shoot for the stars...if I don't aim high enough I won't get my potential

I: (Interrupts) You can always lower those sights but boy it's hard to raise them...

R: That's right...so I thought well, you know 'cause if I'm doing well in Graduate school Guelph allows you to switch to a PhD...and so, I have the choice..

??

I: That's great....Interesting....did you find that...what made you shoot for Graduate school rather than going to work in a lab? What was it that was the guiding force there?

R: Because, I couldn't get a job that I really enjoyed...

I: You worked in labs in the summer didn't you?

R: Yeah, well actually I worked in the University Research lab and I really liked the atmosphere there...It was very easy going, very open, they encourage you to learn, you know... they don't say just do your work...

(Why Grad School?)

→ stimulating working in Univ. lab

I: (interrupts) And "Shut Up"! (laugh)...And your peers aren't saying, "Gee, don't be so keen you know we're just here from 9 to 5".

R: That's right and if you wanted to not work 9 to 5 every day and get your work done...like it was just..I found all the time..I worked three summers in the university and it was a great learning experience because you know they really encourage to do that..?...they spent money on me for my advanced education..

Enjoyed encouragement and confidence in her displayed by profs

I: Yeah, You sure wouldn't get that in a government lab..

R: No, you wouldn't and that's why from what I've heard...most jobs you'll get will be technical...if I had wanted that I wouldn't have gone to University.

I: So, you like the challenge...do you like the idea of being creative? Do you usually question as you're doing things, do you find?

R: Yeah..like if they're doing something that I think could be done a little faster, I'll say look, can I try something? Whereas you know some friends of mine that have worked in a lab, if they suggest something they say No..

Shows initiative/not afraid to make suggestions

I: (interrupt) do your job!

R: Yeah and I just don't like it you know...?

I: Actually you're much better off.... So you really like the idea of a stimulating environment, mental challenges..do you sort of thrive on that?

R: Yeah...I really enjoy going to work...it's just great like this summer I worked in the psychology department and it was just great...?... I was working on a HPLC which is a chromatography experiment and it was on rats you know so...

Enjoys mental challenges, stimulating env't

I: (interrupts) a different media (Laugh)]

COMMENTS

I

JOANNA

R: Well exactly and I was in a room where they were doing operations on rats and I think I got to really see, like it sure widened my horizons

Enjoys variety

I: It probably broadened the application of chemistry for you..

R: Yeah, yeah..

I: The idea of the chemist working in solitary confinement in the lab is not really the case is it?

R: No, No..

I: Would you like it if it was like that?

R: No...I don't think so

I: Do you enjoy the..that interpersonal contact but you like the stimulation but yet you enjoy working on your project..

R: I mean, that's what's going to be the different thing about graduate school too because you'll be with all these students doing all different projects...I think you learn a lot just by talking to other people about what their projects are...

Likes working with people and ideas

(Enjoys sharing ideas with other people)

I: Sounds like you'll thrive in it.. sounds great...Let's say that.. that in life generally (Laugh) do you consider yourself somewhat sensitive to social pressure, can you step out of what society expects of you or do you find...I get a feeling from what you've been saying you don't want to stand out too much...so you like to be a part of what is going on...do you...tell me what you would think, in some respects maybe but not in others??

R: Hmm hmmm..Well, I think like in Chemistry for example I like the idea of being different, you know, cause when people ask me what you do? I'm a

*Independent
Doesn't mind being different
Proud of being different*

I

JOANNA

chemistry major. And they say, "Yuch!", you know, and I like that...

I: (Laugh) You like it because it makes them stand back..

R: Yeah, yeah and think "Wow!" and I like that...

I: Does it bother you...It doesn't make you want to muffle it in a lounge say or something

R: No, No it makes me want to say..yeah.. I'm a chemistry major and I'm going to graduate school...you know...I like that

I: Oh...I used to find that in biology...if I said I was a high school biology teacher...but it's funny when you're single you could find it more intimidating in some respects... I wonder before you were married did you think differently...

R: No...

I: If you met guys singly in a bar or a lounge did you find ever the urge to say you were a secretary or something

R: No

I: You never felt this ...good for you. Cause I know that sometimes I'm vulnerable to it...some guys find the fact that we're in professional careers almost intimidating..

R: Yeah...well but I think on the other hand you wouldn't want to go out with or something...someone who couldn't handle that, who couldn't talk to you at your own level...like it would be very difficult

I: That's true but what about if you just want to dance with him...

*Strong sense of self
Idea that people can
take me or leave me
(implies independence)*

I

JOANNA

R: No...I didn't care...if it intimidated them well that's fine (I: laughs)...then they don't have to pursue it...

I: That's right...it's a good screening process isn't it...well then that guy obviously..

R: (interrupts) and I don't know if it ever intimidated anyone, I don't know, maybe it did.

I: Did you ever get a reaction, like "Oh.."

R: Well, it was always either you're in drugs or you're going to blow up the world...

I: (Laugh) So, how did you handle that, did you get sick of it.

R: No, I just laughed and said, "Neither"... or whatever..

I: So you like the idea of being the only girl, do you enjoy working mainly with guys?

R: Well I get along with them all right...but sometimes I miss...well like right now L. (another female student).. just got a desk...so there really haven't been many girls around at all and it's sometimes difficult because they're a little cliché...sometimes they don't invite me for lunch, you know.... usually it doesn't bother me, I'm sure part of it is that I bring my own lunch but sometimes I'm a little lonely...occasionally because I know a lot of my friends who have gone to university they have a lot of girlfriends and I don't, I really don't have a lot of girlfriends...

I: Did you before you were married?

Re: Men

*Able to get along with men
Sometimes senses isolation*

Doesn't have a lot of girlfriends

Prior to marriage - lack of support gp, did it make you more independent?

I think it did. I didn't have that influence girls often have on each other. Girls often tend to be most concerned about what their girlfriends.

R: No, no I didn't, I never did...because when I was in high school and junior high I had the same friend all the time...

I: a girlfriend?

R: Yeah, one girlfriend...so we were always friends...like we never really had a group...like we.. our high school wasn't very clichy so that was fine...we had other friends but I never went out with these other girls or anything like that.?.. But when I was in high it was my friend and I and we went around with a whole group of guys and these were my friends....so it always has been..

I: (Interrupts) So you were used to interacting with guys (Yeah) so you didn't go through that giddy stage when you can't talk to guys (No, No I never had).

R: Like always I would say my best friend was a girl but my other friends were always guys...like even when we got married and I invited my friends from high school there were more guys there than girls..?...there was two or three guys and my best friend otherwise I didn't have a lot of close friends all through junior high and...

I: And platonic good buddies. Tell me was it through sports...

R: No, it was just sitting in class. It would be just like a girlfriend like writing notes....

I: (interrupts) What is it then that perhaps ...why did you go that way? Why did you go that way and other girls didn't?

R: I think maybe it's because..I guess maybe it's because I was very clear just by the way I acted that this was going to be a friendship. So they knew

I

JOANNA

*One close girl-
friend*

*Didn't associate
with one particular
cliche*

*Found it easy to
communicate with boys*

Lots of male friends

*Didn't pass through
giddy"boy crazy"period*

*High morals - felt
free to communicate
them freely
(strong self concept)*

where they stood and it was really easy for them....

I: When did you start having male friends was it from elementary or junior high.

R: No, not so much elementary it started like, you know, later in junior high - Grade 8 or Grade 9 - Grade 7 definitely not I was still "OOOH" with guys...

I: What made that transition, was it because of the dating season. Did you have your own standards? What enabled you to break through that barrier with guys? Right now you have friends that just see guys in a physical and sexual way and can't make that transition? What would it help to ...would it be your sense of fun (unsure?)?

R: I think that has a lot to do with it. You know cause if you think a girl might like you and want to go around with you then you are a lot shyer, right?

I: Did you joke with them (HMM!HMMM!), like what did you do to ? (break this barrier)

R: Well, I guess I just talked to them a lot you know, I didn't treat them any differently...

Didn't treat guys any differently than girls

I: Did you feel any differently?

R: No, No... they were such great friends it was just like having a girlfriend, you know they'd phone me up and we could do stuff. Like, in Junior High they'd ask me, if they didn't have a girlfriend at the time, to go to the dance because you know they knew I wouldn't think anything of it?

I: Did you have a boyfriend?

R: No

I: So it was a real open friendship...so as I understand it you see yourself as a person as they are...you're not hung up on being the way a girl should be...(Hmmm Hmm). You were able to break through that. Do you see yourself as a liberated woman, so what do you see as a liberated woman.

I | *JOANNA*
 Not worried about
 fitting a stereotype

R: Well, I think someone who is free to make the choice of what she wants to be and not be worried about what people think whether she stays at home with the family - that's just as liberating as working in nuclear physics or something. Just deciding that that's what you're going to do and I think like treating men as friends not as enemies or something...

Sees herself as a
 liberated woman as
 she has made a choice
 of what she wants to
 be

I: So you think that open communication, just being open and honest, telling things how they are

R: Yeah, like saying, Look that's not what I want...

I: I feel like you were pretty self-confident even as a little girl say in grade seven and eight, how did you feel ...did you ever feel pulled to the fringe groups or how did you fit in with the groups?

R: I sort of mixed...yeah because I was like, I was a score keeper for basketball but I was never on the team but I had time or whatever so I'd do all that...and our high school wasn't that big that there wasn't...I went to CCH...I didn't find people said, " Oh why did you talk to that nerd?" It was never like that so I never felt any peer pressure that way.

I: Do you think if you were in a larger high school you would? You wouldn't get to know everyone? What crowd would you have stuck with?

I

JOANNA

R: I would have gone with the one..not the ones who smoke drugs... I wasn't on teams, I played badminton that was about it, I wasn't a real sports person. I was never like a students union that kind of think, I just sort of dabbled a little bit here and there...

Shy about being demonstrative



Not really

I: You pretty well did your own thing, would you say?

R: Yeah, I think so.. cause I never really identified with anyone..

I: the academic world?

R: No..no..I don't know, it wasn't very cliché, the smart group were also the jocks the smart group and jock group intermixed because with 150 kids there's not many clichés. There was definitely a group of drug users and they were definitely sort of apart and that was as I say sort of the only group that was really identified.

I: Umm....so when the classes got competitive, and did you rise to the occasion quite well. Did you ever get uptight or did you enjoy the competition? Did you compete with the top marks with other people or how did you fit in with that...

R: Well, when I was in high school there was a guy in my class..or a guy in high school..who consistently had his average around 95. So it was sort of I would compete but not with him because he always got the top marks. In high school there were two people who always got the top marks, but then there was another group who had marks around the 80's...(pause).... but I never found it hard, all through school I never found it very difficult. But I was the same in high school, I really very rarely had homework at night cause I always did my homework in class

*Finds tests quite easy
Fun to see positive results*

High ability

Didn't need to work really hard

*Never uptight about marks.
Enjoyed taking tests.*

I: You really utilized your spare time

R: Yeah, and so I guess that's when I started not bringing work home from school at night but I never, I didn't really try, really hard..

Organized

I: You didn't want to get those marks that that top guy was getting?

R: No, because I saw what it cost him. He was on the basketball team and I drove up to Cardston one day and watched and he was studying Shakespeare on the bench before the game. I'm not prepared to do that.

I: So you wanted to keep a balance in life...you've really stuck with that. You live that now don't you with your husband and even then you would take time with your friend.

R: Right... Yeah

Enjoys a balanced life

I: Would you go to dances and to all the social things

R: Yeah and to all the football games you know...

Enjoys social events

I: You wouldn't collect tickets at the door or would you just go.

R: No, more or less just go

I: So, you were more supportive, going to all these things, participating in them. So you didn't ignore them

R: No, no

I: But you didn't get right in there or dress up as a clown

(Both laugh)

R: Yeah, yeah...and like I wasn't a cheerleader.

I: You wouldn't have been interested in that?

R: I thought about it...and then I thought... well...in one way it was a little bit of peer pressure....at that time our cheerleaders were pretty bad and I thought well I don't really want to do that.

I: If they were good what would you have done?

R: (Pause) I don't know...see because when I was in Junior High Wilson had the best cheerleaders all the popular girls were on it and I thought well if I was going to Wilson, I would probably want to be a cheerleader so in that way I didn't. I think the major influence at that time was my best friend she was so shy, she just thought it would be horrible. So, I didn't want to do it if she thinks it horrible.

I: What was she like, what did you like about her?

R: Well, I think, we never fought, we just never got catty - I would do anything for her and I still would and she would do anything for me...it was just a really close friendship and ...we had just been through so much together we'd always sort of like people who were friends. If I liked one guy she'd like his friend.

(Both laugh)

R: But what happened, like, she was really quiet and shy...and...um...it ended up that I sort of became the leader, you know, like I had to talk to people...it's changed now... she's got a lot more self confident but then she was really quiet.

I: What was it about her that you liked? How did your friendship start?

*Likes to be associated
with successes
(main reason?)*

** Also, didn't
want to
make a spectacle
of self. 'Wasn't
'cool' thing to do
People might
think I was
conceited or
something.*

*-Strong loyalties
Not fickle
Sticks to her
commitments (friends,
work, etc.)*

*Often put into
leadership role*

R: I guess we were in Grade 6 when we started to be friends. At that time it was like best friends and you can't be anyone else's friend..

(Both laugh)

I: Oh yeah

I: Was your friend also academic?

R: Yeah, we both pretty well achieved the same marks through school. We both grew up in the same kind of family I think that has a lot to do with it. Her parents were from Poland and my parents were from Holland, so we both sort of had immigrant parents...and... sort of the same not really well off which was...when we got to Grade 7 and that ... all of a sudden there were kids from different schools with really well-off parents and it was a shock to us it really was...I don't know whether our school was in the older part of town...it was a real shock because in in, elementary well, I guess I never really thought about it, like how well off kids were...and then we saw who was going to get the car for the 16th birthday and who wasn't. So that was another thing that we really had in common, our parents kept in contact...

*Immigrant parents
(perhaps wanted children
to do well?)*

*Seeing rich kids/
wanting to be successful
too*

*Not at that
point in
time.*

I: Oh, I see did your parents know each other first?

R: No, no

I: They got to know each other as a result of your friendship?

R: Right...so even now we have a lot in common. We live a different lifestyle and we can't understand people just because we were brought up that way. And also we grew up with the same values...

*Feels most comfortable
with people with similar
values*

I: O.K. Let's talk about those values, let's look for a second at your

I

JOANNA

upbringing, O.K? If you were to describe your childhood. Let's say your parents, what kind of parents were they to you as a little girl growing up? Encouraging, was it a loving family?

R: When I was younger it wasn't, "you're a little girl so you can't do that". ...?.....

I: How big is your family?

R: Three - two younger brothers, one 15 months younger than me and one 6 months and it was never, I mean my Mum dressed me up in little dresses and that, but I was never stopped from playing with worms or making mudpies. I never played with dolls, I had a couple of dolls but they were gifts - occasionally, but I would rather dress-up little kittens than dress up little dolls (Laugh) When I was younger Barbie dolls were the rage but I never had them, whereas we had Lego and Meccano sets and all this kind of stuff

I: So would you say your environment was really stimulating? (yes) Did you feel you were lacking anything?

R: No, No...what I also had that was different, though I didn't realise it was different until just recently, like I have not relatives but close friends that I call Aunt and Uncle and they live out at the farm - there's two families that live out at the farm. For a while my Dad owns a meat packing plant and he had cows up there and horses and I sort of was brought up not in a farm environment but a lot more than most people in the city...and my Dad also worked at the Research Station so I was around a lot of animals so I've seen calves being born and I had a horse for a while, you know...things like that I just didn't realise, until now like building

(CHILDHOOD)

Tended toward being a "Tomboy"

Played active games

Farm experience

Didn't feel restricted to feminine role ("androgynous")

straw stacks things like that that most kids don't have this experience.

R: So you didn't mind that rough play, you enjoyed that? What a lot of people would consider boys play, would you say you played more boys types of things?

I: Yeah, like I had two brothers, I didn't have a sister and that made a difference... I played with them a lot. You know...even when I was in Grade 8 and skateboards were in, there were three girls across the street and we taped all kinds of lines and obstacles all over the road with masking tape and we skateboarded like crazy and most girls didn't skateboard very much. I just, I don't think I had a really girl's upbringing.

R: Were your parents quite accepting of you being however you are?

I: Yes, I was never pressured to be anyone different

R: Was it warm and loving, what would you say, what was it like did they encourage you in school?

I: My Mum really wanted me to get good marks, we didn't get money for them or anything but they, she was so proud of us and she really encouraged us. My Dad I don't think...he really favored my younger brother and my Dad was quite chauvenistic ...It was fine until you know, til I was 9 or 10, then ..?.. for a while I had a horse. My brothers were scared to ride it so I had the horse but as I got older, like... you know, he'd rather talk to my husband than to me... you know, I know more really about what they're talking about actually, But my Mum was always very encouraging.

R: Did you find that you wanted to show your Dad you could do it? Would that be any part of you wanting to...

I

JOANNA

I: I don't really remember, not when I was young. Well, I did before but not so much anymore.

(Pause)

R: But I think what you say about my childhood...with these three families, the kids were younger than me like, I was the oldest but not by much, they all had older daughters but I was the oldest, sort of I was the leader. But so of course playing with them and their younger brothers and sisters, I can remember when I was still 15 we were still making straw stacks. Like, that's pretty old you know! (Laughs)

I: Yeah, I know ... (Laughs)...you saw the fun in life (Yeah), you didn't ever feel, that "oh gee I shouldn't really be doing this"...

R: No, no...I didn't, I was working on staff...??... and I had just been crawling around in these straw stacks, you know, straw in my hair and straw in my coat. "What were you doing?", you know?

(Both laugh)

I: Oh, that's great, O.K. Thanks Joanna we'll stop there.

* * * * *

END OF TRANSCRIPT ONE

Feelings - Joanna has a strong sense of self.

TRANSCRIPT II

"SCHOOL INFLUENCE, PROFESSORS, PEERS, FAMILY, HUSBAND"

I: INTERVIEWER

R: RESPONDENT

COMMENTS

I: O.K. When I read through Interview 1 - our first interview in which I concentrated just on yourself actually. But a lot of other things came from it that I would like to perhaps discuss with you, so I'm just going sort of in chronological order when I hit it on the transcript - so it's skipping around from school to home.

R: O.K.

I: O.K. One thing, Joanna I was wondering. When you were in high school you were aware you were saying...you really valued your friend because you had a very similar upbringing and when you went to a bigger school, in Junior High, when kids were getting cars at 16, what I was wondering was... did that...did that really register with you. Did it have any effect on you wanting to do well?

R: I don't think at that point it bothered me or I saw a big difference. I just sort of noticed it but I never thought. Oh, that would be nice. Like I guess I did but not to the effect where I was jealous

I: O.K.

R: You know, I noticed and I thought that would be nice but I never, you know Kids were going to Hawaii for Xmas, you know, I thought, well..but I didn't think too much about that I would like it...

I	JOANNA
	<p data-bbox="940 1602 1154 1665"><i>Not one to be envious</i></p>

I

JOANNA

I: O.K. So, O.K. so that's good, that clarifies that...but I was going to ask you about your own family....was it very well off, do you mind telling me...were you middle class, how well off were you...did you feel like you were lacking thing in material things...

R: Well....I guess we weren't that well off but I didn't realizee it until very...like I don't think I really realized how much until in the university.

I: Oh, not in high school even

R: No...because at my high school there were richer people but there weren't as many as now I've seen now that I've been going to university and things like that where I've really noticed a real disparity between them.. So, I didn't ever miss it, I noticed the difference. And we were, I don't think we were nearly as bad off other people.

I: But there were people poorer as well

R: Yeah...I suppose there were, I just didn't think about it too much.

I: O.K. And what made you make the decision to go to university then it wasn't because you were saying, because you wanted to do real well because these other kids got these things so you wanted to get a job that pays well

R: No, no that wasn't it..

I: O.K. What was the big factor

R: Well, two things. Well first of all I wanted to be, initially, all through when I was growing up I wanted to be a doctor...and I only finally..I only changed my mind when I was in Grade 12 which was a bad time, you know, that's when I had to start deciding and I just

Doesn't dwell on material things - not important to her

I

JOANNA

changed my mind then...I didn't think that..like when I saw people with a cut..

I: (interrupts) Biology 30 must have done it..was it?

R: Well, no, I don't think so... it was more if I was taking care of kids and they got a cut it sort of, you know, I found maybe I wasn't (Laugh) immune to blood as I thought I was..

I: Oh...it bothered you?

R: Yeah, because, I had never really experienced it...and also I thought...at that point in time I thought medical school was such a time commitment, and I wasn't prepared to commit 7 to 8 years right, coming out of high school, wherea s now it's different because I've already done four years and it doesn't seem like such a big commitment but at that time it just seemed like such a long time. I also wasn't sure if I was good enough to be a doctor and I didn't know if I was smart enough or.. I think it was mostly the time commitment that really scared me.

*Not prepared to make
commitment for 7 to
8 yrs for medical
school*

*

I: And yet what average did you have coming out of high school.

R: Well, I had straight A's pretty well all through school not high high A's but I always had A's and I had honors all through school and things like that ..

"A" student

I:(interrupts) but you just still didn't think.

R: No I wasn't sure that I was ready to commit that..

I: Hmm! O.K. What about, what would you say now to a student. Now you're applying to graduate school..

I

JOANNA

R: Uh-huh..Well, I think what happened to me, was I don't think I got enough encouragement from my Guidance Counsellor, he sort of, I think people should be encouraged more. Like I wasn't really encouraged in school to go, you know, to go as far as I could and that made a big difference. Because, I was also thinking about going into Physio-therapy and he was just..he kept harping on how hard it was and how difficult...

Little encouragement from Guidance Counsellor - sees that as major factor to her not pursuing Physiotherapy

I: But you were an A student, what's the matter with him..

R: This is the thing, I thought, you know, I can't do that. So, that, that also made a difference, I don't think I was...really encouraged to, well I might blame the counsellor who at the time was really the most, you know, influential person when you were applying to university, you went through him...and so that made it bad...really difficult...for kids nowadays, really, they should be encouraged as far as possible because as I said before, if they don't make it as far as they should at least they make it farther than if they just said, oh I can't do that.. so I think that's definitely a factor.

Kids need encouragement

I: Do you feel, do you wish you could make that decision over then...sometimes?

R: Sometimes I do, yeah, I have a friend who is a physiotherapist now and it was a hard program, but then I think well I got through chemistry and I'm going to graduate school so I could of probably made it and you know, I think I would have enjoyed it too...that's why I wanted initially to be a doctor and then a physiotherapist would have been good for me, not as much cutting or blood or anything, just you know the people side...and if I had that decision to make again, I probably would go into physiotherapy, because it

Joanna needed encouragement - gathers strength from outside than inside

was closer to what I had wanted to be all along...

I: But you wouldn't consider starting right now?

R: No, no...no..I...

I: Are you enjoying chemistry now?

R: Yeah..oh, I love it. I did like chemistry in high school and everything, it's just that I maybe would have chosen to go through the physiotherapy.

I: That counselling is so critical...

R: Yeah, it is... cause that's definitely what decided me.

I: So, what made you go into chemistry at university?

R: Actually, (Laugh)...it's a horrible way to go into it... but what happened...well I did well in chemistry, I really enjoyed it in high school...I got very good marks in high school and I was going to university, I applied at U. of L. and I didn't know what to major in...and I thought well I should put a major down and you know, I couldn't decide. And a friend of mine, she was going into chemistry and I thought Gee, that sounds like a good major, you know I'm interested in it and even going into medicine or whatever that would have been a lot of chemistry and I thought that's a good way to start out because I've got a lot of options if I start off in chemistry, I've got options to go into medicine if I decide to or other things. So, that's why I started off in chemistry, just because a friend was really.

I: What might you stick to it then?

R: Umm, when I took Chemistry 1000, which was the introductory, I did quite well

*Entered chem by
luck more than
planningbut
was geared on the
sciences*

I

JOANNA

in it and the second semester after I finished this course the professor, he approached me and said, "Well, would you like to work for me?" And I said, "Wow!", you know, "what made you ask me?" and he said, "Well you did really well in my class and I saw the Registrar's list and you were listed as a chemistry major so I thought I'd like to hire you", so the few kids that had done better than me were medical students, so therefore they didn't get the chance I did because he wanted to give a chemistry student a chance. And so I worked for him for the summer and that definitely decided it....

*Personal interest
by Professors is
important*

Enjoyed lab experience

I: Yeah, cause you enjoyed the lab you were saying..

R: Yeah, yeah and I just, well...

I: Well, which is you're strongest point, say if you looked at physio say vs. chemistry just out of interest or a job that deals more with people but, like...which would you...do you get enough satisfaction about having the academic challenge of working with chemicals, and measuring... do you find that you enjoy that too ...

*Enjoys academic
challenge as much
as working and
interacting with
people*

Yes

R: Ah..Yeah, I think so...

I: And you don't miss the interaction of people in a way because you've got that in the lab?..

R: Yeah, right HmmHm

I: Is there a part of you that would like to be in a helping, more of a helping profession? Is that what sometimes...

*Still likes to see
the connection of
her job to helping
people*

R: No...I yeah I think so, I think that's just the with helping people and doing...being in contact with all different people and just in a, well not a nursing setting, in a hospital where you are actually helping people

physically and doing something for them.

I: Do you think..chemistry does that in the longrun, more indirectly...Is that important to you Joanna?

R: Yes it is, the kind of chemistry I want to go into isn't a real theoretical, I'd rather go into an industrial application where I'm going to be helping some...

I: Where you can see relevancy?

R: Exactly, yeah...and where it can help people or help people's lives improve by what we do.

I: Yeah...O.K. So that's important you like to make that connection. O.K. (pause)...O.K., your husband... when did he come into the picture, that's what I was wondering when I was reading your transcript??

R: Oh, I met him half way through my second year of University. So...(Laugh)

I: So, you didn't go out in high school

R: No, I didn't know him.

I: So, when you were going out and so on did much change? Did your husband influence your decision making. What do you think about that...has marriage changed things?

R: I definitely think he has encouraged me. He's really...um.. I wasn't too sure about graduate school and he encouraged it. He jokes about it that he wants me to make lots of money so he can golf every day (Laughs). He's actually very proud of me... he thinks that I should go on, he definitely doesn't mind having me in school. Even now, like he's been not working since December so he's been on unemployment for the last few months and he's been

HUSBAND
Husband is encouraging
- important

Supportive

I

JOANNA

doing all the cooking and and all the cleaning and I just couldn't have more support...Like he turns the TV off if I have to study. He'll go out if I'm busy. You know, he's just been so supportive that its made a big difference...

*Husband (cont'd)
Understanding*

I: That's really nice!

R: Yeah, yeah...I've never had to fight you know, fight my way into that I want to go to school

I: (Interrupt) You have to study, I can't do this and can't do that...

R: No...Yeah...I'm amazed at how understanding he is. I just can't believe that, you know, that anybody could do that.

I: Oh, that's great. Do you need that type of encouragement...has that encouragement help you stick with it or would you have stuck with it on your own. Is he the main source for encouragement...or does it come from within a lot?

R: Uh..I think my Mum has a lot to do with it also. It's a lot of encouragement from them I don't deny, you know, sometimes I feel like I can't do it or maybe I'm not good enough and they really encourage the school. My Mum has always encouraged us going as far in school as we could and so that made a big difference too.

MOTHER

Encouraging

Very

I: And so, has that made a...that encouragement has that been very important to you would you say?

R: Yeah...definitely.

I: What if it wasn't there?

R: I don't think that I would be going to Graduate School, I really don't (Pause). I think my Mum has always treated me as if I was not a girl who

*She needs encouragement
- it helps to keep her
ideals high*

*Mum didn't hold Joanna
back by applying sex
role stereotypes*

I

JOANNA

should stay home to cook and clean because she always felt that I was, you know, smart enough to go somewhere and I should. She's always encouraged our education and it's I think that was the biggest influence...that was my Mum.

I: Did your Mum, does she have a job outside the home?

R: Yeah...well my parents are divorced....so, they have been for about four years, I think so when I was about 17 they split. But my Mum, her family was all very well educated....like she has a sister who's a doctor, a brother who is a lawyer and another brother who is an official in the KLM Airline. She always had trouble in school and she ended up and she got a nursing degree or whatever in Holland and so she went as far as she personally could but she was always very independent. Let's say I think she was the second youngest of seven children and she was the first to move out.. and then she came to Canada by herself...

Mother very liberated herself

I would say independent + strong too.

I: (interrupts) a spunky individual..

R: (Yeah) and she really knows the value of a good education and she's always...I think probably because her sister was a doctor too she didn't feel there was any need for women not to get an education or...

Mother values a good education

I: So she was very encouraging. And you said to me, it wasn't so much...that... the fact that your Dad wasn't as encouraging didn't make you want to do well though... it was more the encouragement from your that made you want to do well

R: Yeah, yeah

I: You weren't doing it as a reaction to your Dad

I

JOANNA

R: No, No...I don't think so

I: Did that actually effect you at all rather than feeling a little hurt that he favored your brothers. Did that effect anything to do with you through school or anything or do you think it was mainly the positive things from your mother?

R: I think it was more the positive from my Mum than the negative because I...maybe there was a little bit of that I want to show him.

I: Did you want to show him that you did really well sometimes?

R: Well, it sort of got to the point where I didn't care anymore, like if... what he thought really didn't matter anymore.

*Father not very
supportive -
Mother makes up for it*

I: If you're not getting the positive strokes then why bother..after awhile you just sort of...

R: Yeah, cause I think even now I don't know whether he even knows. He probably knows I'm in chemistry and that's about it. He doesn't know very much and he doesn't want to know I don't think...you know he's so much more interested in what my brother's taking so, I just sort of... why bother? I think my Mum really, it was more the positive from my Mum that made the difference.

I: O.K. (pause)...When you were working in school, did you find it challenging, was it too easy, or could you easily handle it, how did you find school itself.

R: This is high school?

I: Yeah, high school subjects.

R: Um...I found it pretty easy.

*Finds school easy
High ability*

I

JOANNA

I: O.K. So tell me when you do you work, do you really comb it over, are you somewhat of a perfectionist Joanna?

R: In university or?

I: Generally, would you say that...how would you feel when you got an exam back, for instance, when you did well but you didn't get 100%, you got 85%. How did you feel about it, how did you feel? Were you really upset with yourself over some questions or did you just...

R: It would depend on what I missed. If I missed stupid questions I would be upset but if it was something that I generally didn't understand or didn't look at, let's say I hadn't studied it then I don't feel too bad. So, it just depends. If I get a terrible mark though that really spurs me, you know, I sort of tend to be complacent and just do my work and generally I don't check it over or anything because usually I do all right that way. But then if something happens and I get a bad mark...all of a sudden I'm (takes a dramatic breath)...

Not really a perfectionist but is a high achiever. It's important for her to do well

I: I'll get the next one..

R: Yeah and the next one definitely improves and I work a lot harder...so you know it's easy to get complacent...I sort of do well on the first few so I think it's easy and maybe not spend as much time on the next one..

Has a strong self-concept - she knows that if she applies herself she will do O.K.

I: Do you find then that you really believe that by putting in the effort into studying you know you can do well then. You have no hesitation - you have faith in your own ability to study and then there will be a product at the end of this.

She attributes success to ability and effort - not luck and failure to lack of effort not lack of ability.

R: Yeah, I think so, yeah.

I

JOANNA

I: That's good...so you weren't a real perfectionist then. How about now?

R: No..

I: The reason I twigged on it ...you were saying with your lab partners that you were frustrated if they were incompetent....so that means sloppy ...

R: Slow and that...

I: But for yourself...how do you feel? Do you get frustrated with yourself?

R: Well yeah...when I make mistakes or if things aren't going well I tend to get upset. Sometimes even now, I'm fourth year chemistry and the results are really important and I weigh something out and I notice there is a little piece of dirt on there or something and that's going to wreck the results, right, it's not going to be an accurate weight. It takes me a minute to start weighing out again, I think..Oh, can I use it? And I think, Oh no I can't...you know (laughs) whereas if I was more of a perfectionist I would throw it out right away...

I: Oh, I see, that's true..

R: whereas I don't ..I have to sort of think yes you better because this is important, the results..and I sort of have to think well how important are the results and that's what drives me to that I would be more a perfectionist or not is how important the results would be.

I: So, you approach being a perfectionist, but you're not totally there (both laugh)... Joanna, this is a personal comment from myself. You take really good care of yourself and it's obvious you do, you dress nicely, you take pride in yourself. Where does that come..through your upbringing would you say.. How is it that you're

It's important for her to do things right...! she takes her work seriously (not "slap-happy")

like that say, you're like that and some people aren't? Would you say in that sense you're quite feminine?

I

JOANNA

R: I think again it was my Mum, like she was always really into being neat.. you know my hair had to be neat you know she's been just bugging me to get my hair cut short. She always wanted my hair short, because it just looks neat...and she's always quite...not that I had to be beautiful or anything, but just, like she didn't like it if I wear a lot of makeup or anything...just to be neat...

ON APPEARANCE

Mother stressed importance of taking care of yourself - this has been internalized

I: (interrupts) and well cared for...

R: Exactly, like she always, you know...take care of your nails and things like that that she just encouraged me to do. She's not glamorous or anything (Laughs) by any stretch of the imagination it's just, you know, just keeping yourself neat, like not nail polish or anything, just a well groomed appearance...

I: It's like when I go home I always straighten myself before I go to see my folks (Both laugh). O.K. In that respect would you say that you're quite feminine. Do you like to dress up for things.

R: Yes, I like having nice things..

I: Dressing nicely and sort of in style..not wearing just any old thing?

R: No, no that's...especially in the last few years, I've really got to the point where I don't wear a lot of just blue jeans and a sweatshirt. Not very often anymore. It's more comfortable for me to be dressed up a little more feminine, I guess...like I wear skirts a lot, I just find that a little more comfortable.

Enjoys dressing nicely - being "feminine"

I

JOANNA

I: (Pause) How do you think....would it have anything to do with that your working...well you're married now...is it just to look nice, just in life in general, not necessarily for the guys at work, right? It's not that type of thing is it? I'm just wondering...I don't pick that up or anything...

R: No, no it's for myself because I feel a lot better. I mean I don't, I always do when I get my haircut, I say, make it easy, I just have never been one to spend a lot of time on my hair or my make-up. I always had trouble putting on eye shadow, because you had to put on three or four colors and I just didn't have time, so I would just slop on one color and that would be it. Like I like to prepare myself but not to the point where it's going to take me more than half an hour, like total, like take a shower, make-up, hair...like I just don't have time. I don't feel that I have to spend time on that.

I: Do you set things out the night before...what you're wearing.

R: No (laughs)

I: I was just wondering how ordered you are in that respect. So in the morning you'll...

R: I just put on what I feel like... you know with the weather here it's hard to decide (both laugh)

I: You're right you can't plan the night before.

R: I used to do that when I was in high school, I'd sort of decide what I was going to wear for the week. But now it's more how I feel, you know, if I feel like wearing something really comfortable or something sort of comfortable, it depends how I feel.

Wants to appear neat but doesn't want to fuss...likes her morning preparation to be quick and easy ✓

Doesn't overly plan what she is wearing ...spur of the moment decision ✓

I

JOANNA

I: So you'll do that in the morning usually? O.K. let's see... What does a PhD. signify to you? What are you hoping, what are you wanting? I know you are shooting for a PhD. Why do you think?

R: Ah...I think part of it is that I'm hoping with a better education, with a PhD., I will be able to have some flexibility about how I want to work, where I want to work...I'll have a bit of a choice. Um..I think it represents some financial security for me.

*Enjoys the idea
of a career with
flexibility*

*

I: And that's important to you. Also being flexible and creative, so you can plan your own time, do you like that?

R: Yeah...Also I think flexibility in the sense that again it's not a 9 to 5 exactly, you can work late or you can work shorter hours and you can go to the dentist if you have to and things like that that you really can't do as sometimes like a lower trade worker, when you have to to...

*Plans to balance
career & family*

*

I: As a school teacher you're ruled by bells...

R: Yeah...and I think I'm looking forward to that...(pause) but and also I think of flexibility, I'm hoping that if I do get a PhD. and eventually have children I'll be able to sort of work around the children rather than having to put them in daycare all day everyday...because I think that if you've got a higher education you have a little more opportunity to have flexible work hours...

I: So when you do get to the point of having children you see it definitely still as a balance...I picked that up last time...you'd want to remain in your career but be there as well with them and strike a balance...

I

JOANNA

R: Yeah, cause what I think, what I think of now, whether that's possible or not I don't know but I sort of hope that by the time I do have children I'll be able to maybe work three days a week or that equivalent. Not a whole, like full full time so like the same thing there is a balance there. I don't know whether that's possible but I hope it will be..

I: Yeah...there's lots of part time positions at the university level. You probably you won't get the benefits and that's something that later on...well that's down the road, but right now you see it as a definite option (Pause) So the PhD signifies freedom from financial worries and creative freedom??

R: And also it's the top of chemistry, it's the best you can do as far as...and that's really what I want. For me, a master's...it's good but I really want a PhD. because I want to be the best.

Likes the idea of being top of her field

(Ambitious)

I: Yeah, I can see that....I noticed what you were saying last day about going to the lounges and being proud to say you were in Chemistry and you like to see people's reactions.(Yeah, Hmm Hmm) You would have perhaps joined the cheerleading squad if they had been good like they had been at Wilson.(Yeah) So you really want to try to be the best there is and also to be associated with what's considered one of the best (Yeah, uh huh). Is that right?

Enjoys associating and being associated with the "best"

R: Yeah, uh hmmm.

I: Oh, that'll be exciting too, the university environment is so stimulating too. O.K.(Pause)... Do you value autonomy...being able to work on your own, without people looking over your shoulder? Would you consider

I

JOANNA

yourself quite independent or what would you think about that?

R: It's nice having somebody helping you, like someone who knows what their doing, telling you to a point, but it's nice after you've learned and you've understood to try it yourself where they're not always around to be over your shoulder and tell you what you're doing wrong because often if I'm on my own I learn from my mistakes.

I: But do you feel scared sometimes when you're totally on your own with a project say...

R: Yeah, I think so. At first I think Oh boy, can I do this but often, once...it's usually when I haven't looked at it and haven't started yet that I'm scared but once I start I think well this isn't really as bad as I thought and it's usually better.

I: So do you need do you think it's important to have that time on your own with something. Does it help build up your confidence moreso.

R: Yeah, yeah but I like knowing there is someone I can go to if I'm having any trouble. But they don't sit there over my shoulder all the time saying we should do this and we should do that and why don't you try this...whereas they let me come to them and tell them what I think might be the logical next step or whatever.

I: These people that you work with...the professors are male, right....they are quite approachable though...you don't find a barrier to approach them?

R: No, No, not at all

I: Would that be an important factor to you at this stage to have someone help you who is approachable versus someone who is very distant. What if they were

*Enjoys autonomy
to a point*

*She appreciates
having relationships
with colleagues
that involve open
communication &
dialogue*

*(It's important
to have someone to
turn to for questions/
She is able to tackle
work independently
however)* ✓

I

JOANNA

very standoffish? Do you think it could it could have turned you right off chemistry?

R: I think so, I think so because I definitely got a great deal of encouragement from the professors here. Like when I applied for a job at Dalhousie University after my second year and so I had worked one summer in the lab here and then I sort of...I don't know I just wanted a change, I hadn't met my husband yet or anything and so I thought it would be kind of neat to go somewhere else.

*Encouragement
from professors
- important.*

Yes

*Has a streak of
independence and
sense of excitement
- likes trying new
things.*

I: Sure, sure...

R: Yeah, and so I talked to the professors I had worked for and one of them said, "Sure, why don't you try it..." and he gave me a reference, from when I'd worked with him the summer before and he helped me fill out all the forms and everything and I sent them away and they phoned from Dalhousie as soon as they got it...like the same day they phoned and they said, Yeah, we'd like to take her on. And later they said to me, well we were just sort of seeing, you were sort of an experiment...we didn't know that they would take on a second year student. But they didn't tell me before, they really encouraged me and didn't say, Oh I doubt you could get it you're only second year. They let me go for it, and then told me later and then told me later that they thought maybe I wouldn't get it...but...

*Encouraging Profs
- major influence
for sticking with
chemistry??*

I: Isn't that great!

R: Yeah

I: So what happened?

R: Well, I went...

I: Good!

I

JOANNA

R: Yeah, so I went there for four months.

I: So what was that lab like? Good too?

R: Yeah, I really enjoyed that work. I think it was probably my favorite summer.

I: Well you were somewhere new too, being in Nova Scotia. All that must have been good.

R: It was really exciting, yeah...and the professor I worked for again was very encouraging. Like he took me to a conference that was held in Potstam? New York which is just south of Cornwall, Ont in the northern part of New York state.

Enjoys the excitement that goes along with the academic world - attending conferences, etc.

I: And they were really good to you, nobody came on to you. You didn't have to fight with anything like that?

R: No, No,...not at all. I also worked with two Japanese professors working with him and I just got along with them so well. They were just so respectful and so nice...yeah...one was maybe 30's and the other was mid-40's and they were just wonderful to work with..

Appreciates people who are kind and respectful

I: And you like to be around people that are encouraging, that's important to you?

R: Yeah, he encouraged us also. There was another student also working for this professor at Dalhousie and he made us give presentations every month or so...we had to give presentations in front of the research group and things like that he really encouraged and I didn't feel there was any difference in how he treated us?

Enjoys working with people who have confidence in her ability - needs that ego-boosting

I: Do you think what held you in good stead was the background that you come from where you were able to interact with men very easily? Did you find it

quite easy to just go in and ask them a question?

R: Oh yeah, definitely.

I: You don't feel like you couldn't go in there?

R: No, No....I didn't have any trouble...I didn't know what I was going to when I went there, I just sort of flew out there. I didn't even have a place to live or anything I justwell I had applied to a place but I hadn't heard back so I just thought I'd fly out there and see and that was really good because I lived with two other girls in a house owned by the university and it just worked out great. But at the time it was pretty scary...

I: Oh sure (Laugh). So now that takes a lot of courage Joanna, you've got a part of you that's just like your Mum in that respect then, you thought, Oh, I'll go for it..

R: Yeah and it was difficult because I had applied and heard back in December and I met my husband in January and so I had to leave again in May. And, oh boy that was really difficult because I kept saying, "I don't want to go", but I said, "I have to I can't stay because of the relationship..."

I: If the relationship was meant to be it would continue in September is that what you decided?

R: Yeah, yeah...I don't think he would have let me stay anyway, he said you have to go.

I: He's been very encouraging all the time. Poor guy, he probably just about died when you were going to go (Both laugh)

R: Yeah, it was difficult.

I

JOANNA

Not afraid to take on a new challenge

*
✓

Strong sense of purpose - choice between a new relationship and a summer job - chose the job!

Husband Encouraging prior to marriage

(Would you have gone to Dalhousie had he been against it?) → yes

I

JOANNA

I: So, when it came to that choice between a dating relationship that was a really good one you took that gamble, that risk, right?

R: Hmm Hmm

I: Which felt like a big risk cause you never know in 4 months you could meet someone else, summer is a time when there is a lot of summer romance they talk about....so you were willing to take that risk for this experience?

R: Yeah, cause I didn't think it would be fair to myself if I didn't because I wouldn't have an opportunity like that again.

I: So let's set up something hypothetically for a second. Let's say your husband was locked into a position here and couldn't get away. Would you go to graduate school, would you be able to carry on a long distance relationship ...would you be willing to do that?

R: No, I think, we sort of talked about it. He graduated a year before I did so he sort of had a year where he was stuck here because I had to finish school...and it sort of came down to a choice you know whether we got married or not this past summer or get married later after I graduate or...we couldn't decide then he finally decided to stay here for me and get married. And he did apply for a couple of jobs..he applied for one as a manager of the Curling Club here and I said well if you really would like that job I would stay here for a couple of years cause he thought if he could stay here for a year or two being manager there it would really contribute to his experience. Then I would go on to graduate school in a year or two. If that would have worked out I would have maybe had a year off between my

*A career is very
impt to Joanna ...
experiences to strengthen
her background can't be
missed.*

*Committed to her marriage
too - she has no intention
of continuing her career
without her husband!*

*

I

JOANNA

undergraduate degree and going to graduate school. But I think we always planned that eventually we would go where I could get a job in Graduate School because actually ever since we decided that I was going to apply to Graduate School he hasn't been applying for jobs because we just didn't want anything to keep us here.

I: I was just thinking what you were saying about being stuck here. (Both laugh) It's amazing people often come back you never know, ...you'll be back here for your PhD. (pause) Um...ah, that's interesting...so you're going to go there and then he'll be digging for a position there. Like I say, I'm sure that there is a lot of activity in Ontario.

O.K. (pause)...when I was looking through the transcript I was wondering, because you didn't have many girlfriends. You had your one good friend, did that make you more independent, the fact that you weren't swayed too much by a group. Are you independent of other people's opinions Joanna, enough or do you think you also want to fit in to some extent?

R: Well...

I: A big group can influence you quite a bit?

R: Yeah, well... I think they do and I did have this one girlfriend but then I had a lot of friends that were boys that we hung around with so it sort of still was a group and I think they did influence me at that time.

I: Positively?

R: Uh...no

I: (interrupts) Oh, influenced you to not perhaps join some of these things. How you looked sometimes at the cheerleaders and wondered about that but they suppressed that in you...I see...

Was susceptible to peer pressure - she wasn't as involved in high school activities because of it.



R: And they also....they never influenced me with respect to school or anything like that I wouldn't let that be influenced. There were certain things I felt that were important and that was that. But I think in other ways what they thought was stupid I wouldn't do...

I: What would they say was stupid?

R: Pause

I: Cheerleading, I suppose

R: Cheerleading (pause)

I: Student Council stuff?

R: Probably, things like that yeah! or...yeah getting really involved in school. They were sort of like me. We were all the same, you know, we went to the things and everything but didn't really actually make them happen.

I: I know what you mean, but then that's an important crowd too, you've got to have people go. But you think that yourself if you hadn't had influence would you been more inclined to join the yearbook or done anything like that?

R: If, probably if I had had different friends. But that wouldn't...I don't know whether that would have been by choice either, that would have just been a different influence.

I: That's true ...that age is...

R: Yeah it is, it definitely is, it's just you choose one thing over another just because you're friends. You pick a group I guess because...

I: Yeah....what made you pick that group?
Sorry to interrupt.

I

JOANNA

R: Well, I did have a boyfriend in high school and they were a lot of his friends but I think they were my friends before then in classes and from...just certain groups all went out the same to the same place, you know...there was like you said, the support group who went to everything and that was that group, whereas the other ones - there were the ones who made things happen and then there were the other ones who didn't do anything. So, I guess that's how I fit in, that's how I met them...

I: So you did date in high school, you had a boyfriend. One of those guys that was in that group became a boyfriend. And your girlfriend? Did his friend become her boyfriend? (Both laugh)

*Dated in high school
but still maintained
male friends*

R: No, no that was later in high school and she had a boyfriend from a totally different...who didn't go school so for awhile we weren't, we didn't go out with the same group. That's probably why I sort of drifted in with all these because...

I: Because you had that one girlfriend and then when you went different directions through dating you were sort of left...

R: Yeah....so I was with these guys and a couple of other girls who went, you know....

I: who were their girlfriends probably...

R: Yeah, or friends yeah...

I: Well, O.K. So you felt bound to do what the group was doing. Umm (Pause).. The fact that you had younger brothers and you said the family friends that used to hang around on the farm, did that make you a little stronger make you want to do things such as Dalhousie for instance...there's something in your personality that's enabling you to

I

JOANNA

do that (Yeah). Now, you come by it honestly obviously with your Mum. (Both laugh) Do you think that that has made you a little independent? You've been able to strike out of the closed group by doing a few things..

R: Yeah...well I had this group but I also had other friends but not in school, you know, like these friends that lived in Picture Butte and that but I wasn't entirely dependent on this group. And so

I: That's healthy probably...

R: Yeah, cause I think I wasn't so scared to do things...see this was in high school and in university it changed a lot because most of those people didn't go to university.

I: Oh, they didn't?

R: No

I: You're group didn't go to university. So how did you feel were you sort of scared to be going there?

R: Well, my best friend went..

I: The girl that was going out with the guy that wasn't going to school...

R: Yeah, yeah. And so she went to university.

I: Is that why you went?

R: No, no..

I: What if she wouldn't go?

R: I would have gone...I would have there...

I: Cause your Mum's still there encouraging, you right? (Laugh) (Pause) How about yourself, did you want to just for yourself too?

Having a group of friends outside of school helped to balance her life - she didn't feel as restricted by peers - she was more willing to break out from group restrictions

Sets sight high

COMMENTS

I

JOANNA

R: Yeah...I couldn't see anything that I wanted to be that I wouldn't go to university for. There was nothing that I really wanted...I couldn't see myself being a secretary or something...

I: So you wouldn't have gone to SAIT or ...Nursing wasn't an option?

R: No... no

I: What extra-curricular activities or hobbies did you have - you went to the dances, you went to shows...do you play any instruments?

R: Not really..

I: How about reading?

R: Oh, I read a lot...

I: At home what was it like - were you able to read just sort of do things on your own? Did you have peace? What did you used to do when you came home say in Junior or High school?

R: I guess...

I: Play outside for awhile when you were younger?

R: Yeah, I did a lot when I was younger - probably Junior High. But once I got into Sr. High I didn't do that very much...I was probably reading or I would talk on the phone all the time (Laugh)..

I: Everybody went through that (Laugh). What did you read, what did you like to read? Just novels?

R: Yeah (thoughtfully)

I: Love stories, adventure stories, or just sort of a mix...

R: Yeah, just all a mix. I liked science fiction, I liked all different types, I

*Chose univ. from her own desire to go
Encouragement from mother and the fact that her friend chose to go were pos. influences but not main influence.
(Joanna?)*

confident in her own ability

Voracious reader?

Very social as a teenager. Enjoyed interacting with her friends (phone calls, attending games, etc.)



Voracious, but not so much now as I can't put a book down once I've started & that doesn't work well once school is in.

I

JOANNA

didn't read love stories very much, I didn't read a lot of adventure novels, more of girls novels....

I: Romantic and with a story as well?

R: Yeah...or...I just loved Anne of Green Gables I must have read that about three times while I was growing up.

I: Did you love to sit down quietly and just sort of read, would you go to your room?

R: Yeah...yeah...I also went to a lot of sports games, especially umm...in grade 10 and 11, around there I went to everything all the time. That was my sort of social life and I guess when I was in grade 12 I had a boyfriend for the whole year and so I spent a lot of time with him.

I: So when you were in grade 12 what change was there?

R: In Grade 12 it was like we had a group of friends and we liked the same things and it was all right. Then when I went to university it became really difficult because he was going to college, I was going to university and he just thought I was so silly to be going for four years in chemistry.. just very negative saying that university people think their so smart. I think that's what ended up causing me to stop going out with him.

I: So there is someone who was pretty intimidated about you doing that.

R: Yeah, yeah and I just couldn't take that anymore. I had enough.

I: Did he mean a lot to you? Was it a hard decision?

R: Yeah it was, it was a very hard decision.

*Strong willed -
won't give up easily
if she feels something
is important to her?* ✓

*Takes relationships seriously/
won't hesitate to break up however when
her own values are being
compromised.*

I

JOANNA

I: Cause Joanna, what strikes me is that you are a very committed person and when you commit yourself to someone like your girlfriend for instance I get the feeling that commitments mean a lot to you and so it wouldn't be easy for you to throw away a commitment...

Commitments taken seriously

R: No

I:...going out for a year that's a long time. And so for you have had to make that decision...would you have ever entertained the thought of quitting university?

R: No, No (emphatically)

I: So he was the one who had to go...(Laugh)

R: Yeah, yeah...because I sort of feel if you don't get along with him, well...if my husband hadn't agreed with me being in chemistry he wouldn't be my husband right now and it was the same with this guy I guess..

I: So you've got your own values and you're not going to let other people change them...

Her own values are very important



R: No, No

I: ...if you feel they are important to you?

R: Then if they want to go, you know...If they want to be with me then they'll have to accept that...and... even encourage it. It's hard, because this never came up when I was going out with him before because it was in high school and our goals were the same....to graduate...

I: But he knew you were going to university?

R: Well, I wasn't sure and I don't think he realised how committed I would be and that I would plan on going for 4

I

JOANNA

years. I guess it just seemed like a long time for him...and I think he probably felt intimidated..because in his family, the father was the boss and the mother just listened and mine wasn't. And I didn't feel that that's the way it should be and I think he probably felt intimidated that I was going to university and would end up with a better education.

I: Where did your own personal standards come from...you've got your own moral standards...you didn't go through or did you go through a wild period at some point?

Never went through irresponsible wild time in high school

R: No, No

I: Did that come from your upbringing would you say?

R: Yeah...also my parents were both Catholic and I think that had something to do with it because we practiced...I went to a Catholic high school..I think all those things made a difference..

Practicing Catholic-main reason for strong moral standards

I: I'm not surprised. The little religion classes aren't very long, they talk about caring for people, I'm sure it would be very reassuring.

R: I remember when I was in Grade 12, a girl came to our high school from Raymond which was just a public school...and she found the atmosphere very different. The people were nicer at our high school, a lot more friendly. She was a wild one herself and she said that...I sort of respected that. I didn't realize there was a difference, but I think there was...

I: So your moral standards come from your religious background and from home

R: Yeah...and I think also that my friend had the same ideas as I did. Like even now...like how could people do that or how could their morals be like that.

I: Like extra-marital affairs, or go from one person on a Friday night to another person on a Saturday night.

I	JOANNA
<p>R: Yeah that's exactly it...we're just so shocked by it still. I guess I was very naive until second or third year university about all these things that really went on. Just because I'd heard about them I thought No, no that doesn't really happen here. And then I hear all this and I was just so shocked and my husband still thinks I'm pretty naive...I just don't like believing that about people, you know unless I absolutely</p>	<p><i>High moral standards</i></p>
<p>I: where you have to, I suppose, and see it right in front of you and even then you probably....is there a part of you that wants to think the best?</p>	<p><i>Likes to think the best about people - doesn't enjoy gossip Her first reaction is not to believe it?</i></p>
<p>R: Yeah, yeah, definitely</p>	<p><i>* I must admit that I do like gossip though.</i></p>
<p>I: That's that optimistic side isn't it thinking it can't possibly be like that?</p>	<p><i>I do like gossip though.</i></p>
<p>R: Yeah..yeah</p>	
<p>(Pause)</p>	
<p>I: Did establishing your standards with the boys help you through life? Is it helpful that you have been able to talk to guys like that? What would it have been like if you were another type of girl who....</p>	<p><i>Finds it easy to communicate with males</i></p>
<p>R: I think it would be really hard and I think if I hadn't been like that before I had started university I would probably not be like that now now because there's just no way around it they are all male and you have to learn how to talk to them. But I think it gave me an advantage at the beginning because it was easy for me and it still is. It was very easy for me to talk to men..</p>	
<p>I: Can you handle it if anybody makes advances to you?</p>	
<p>R: I've never had to deal with that...I don't know I guess I never...my friend and I were talking about this at one time because we just couldn't figure it</p>	<p><i>Men don't make advances towards her. She portrays to them an</i></p>

out why that didn't happen to us and she's very attractive but...

open honesty that probably just doesn't encourage illicit advances.

I: And so are you...there's an aura here I think...you open up communication, there's a feeling that you're not the type who is going to encourage....

R: No...and I think, I don't know whether they sense that or not...

I: What'll happen to you and they will be desperate only because of that. But there's always someone that might...

R: Yeah, yeah...the odd one but I've never had to deal with it ...not with anything bad. Like occasionally I'd be friendly to someone and they'd take it the wrong way and they'd ask me out but I really didn't mean...but that happened more when I was a lot younger than now..

I: And how would you handle that, what would you say?

R: Well, I don't know..(laugh) ...just that I'm sorry but I just want to be friend and that's it (pause) and it's hard...

I: But you don't mind saying that if you have to?

R: No, No...

I: You think it's important. You've don't like to lead anyone on that way?

R: No, no...And I've never had trouble with that....through high school I dated quite a bit and I'd find if I didn't like the person I really didn't have any trouble telling him I didn't want to see him again, whereas other people might have done it over the phone or sort of avoided them but I just told them at the end of the date that that was it I didn't want to see him again.

Keeping communication lines open - important to her.

I: (Laugh) I don't want to see you again, go to another school!

I

JOANNA

R: Yeah, yeah (Laughs). But it was a lot easier, I found that doing it that way. These guys that I went out with and said no to, they remained my friends. I mean I can talk to them and they are great friends, you know, whereas the one's I think if you sort of lead them on and don't end it well then you never can be comfortable around them...like it was probably painful at the time but....

I: You were honest, right (Yeah). Open (Yeah)...you can't be faulted for that, no way..

R: No, no

I: You had a boyfriend in high school however. So you were able to differentiate between fellows, the guys who were your friends but then when you were interested in someone was it pretty easy to turn it into a dating situation?

R: NO (emphatic) (Laughs) I didn't know what to do...

I: It wasn't easy... Was this the first time you were that interested in someone?

*Feels a little shy
when single around
boys she was interested
in*

R: yeah...

I: So you weren't sure,....you're into this new area now...you really like this person....

R: and what do I do....but it didn't go on for long before we went out, so it wasn't too bad.

I: And did he understand you were friendly towards his friends in the group?

R: Yeah...cause they were his friends too. Once I had a boyfriend that was it, everyone else knew and that was that.

(Pause)

I

JOANNA

I: There's one thing I was wanting to sort out. I know that you like to dress well and take care of yourself...that's important to you. Is it important how people perceive you? For instance, you don't like to draw attention to you.(No) Do you like to though be considered in control and you're in Chemistry and you look nice, rather than scatterbrained and spinnny.

Likes to promote an image of being in control, level-headed, neat and well-groomed

R: Yeah, yeah I guess I try to promote that.

I: So you'd rather be considered in control and level headed than here and there and everywhere.

R: Yeah...Like drawing attention to myself...Like sometimes there's people at university that dress to be looked at, you know like in mini-skirts. I would never wear things like that cause I just don't want to be looked at like that. I'd feel so uncomfortable. I don't feel attractive that way...if they're staring at me it's because their, you know, pigs (Laughs)...whereas if they looked at you because you look nice....

Doesn't like drawing attention to herself

I: and not loose...I know...

R: Yeah...that's just not how I want to be.

(Pause)

I: Are you comfortable in a leadership role? For instance you have Launa in the lab now who is new coming up...are you comfortable explaining how things work...

R: Oh definitely...I enjoy it...I'm so used to telling people what to do that it's hard not to.. (both laugh)..Like my husband says you can't have it your way all the time (pause)...even my husband says my Mum listens. If I tell her something she'll listen, eh and I was so used to that...

Likes to be in a leadership role. Finds it easy to help people, to tell them what to do.

I: How do you feel on the other hand if you're being told. How do you feel if someone is criticizing you...I mean.. positive criticism.

R: If it's positive I don't mind. It depends if I feel I deserve it or not. Usually I'm pretty fair to myself, if they're making a valid point and I was terrible then I'll apologize or whatever.

Not afraid of admitting she is wrong and not too proud to apologize.

I: Which role would you prefer - superior or an inferior role? A leadership role or a follower role?

R: It depends... I would never want to manage...because I would never want to be involved in those kinds of things...I wouldn't want to be a manager of a chemical company...

I: Because of all the people problems?

R: Yeah, the politics and things like that...

I: O.K. So you don't like that. Would you enjoy being in charge of a lab? Could you handle that?

Doesn't like "politicking" - would rather deal with situations that crop up directly and go right to the person rather than skirting the issue.

R: Yeah, Yeah, I think I would like that.

I: But you'd want just efficient people to be working there though, right? (Laugh)

R: Yeah...like a lab would be a good thing, it's not too big and it's something that I understand.

I: Great, thanks.

* * * * *

END OF TRANSCRIPT TWO

TRANSCRIPT III

"SCHOOL"

I: INTERVIEWER
R: RESPONDENT

COMMENTS

I: I'll be doing the same thing as we did before, having looked at Transcript 2, hopefully not spending all the time on Transcript 2 then I'll ask you some questions about school itself. O.K. (pause) When you went to Dalhousie you made a choice at that time because you had met your husband already and it was a tough decision to go there but what I'm wondering is...if he hadn't been encouraging and if he was really upset and didn't want you to go, what would you have done.

R: I would have still gone (Laugh)..

I: O.K.

R: Yeah, I don't think I would have changed my mind...I would have felt bad about it but, I think, if he had felt that way it probably wouldn't have worked out over the summer because he would have been mad because I had left...

I: ...and dating someone else..

R: Yeah..

I: I was wondering...encouragement has been very important to you. You've had some very positive people around you, you've had encouraging professors and there comes a point when I was wondering if too, you had enough sense of your own destiny and your own ability to be able to do some of these things without that encouragement....

R: Well, yeah....cause even at that point there were still other people

I

JOANNA

*School - deep
commitment*

I

JOANNA

encouraging me who would have thought I was crazy if I didn't go and...you know, I just felt I couldn't do it to myself....it would be such a lost opportunity and it was only 4 months it wasn't like I was going for good. So...

I: That's right...what if had been graduate school and a case of moving?

R: It would have been more difficult, yeah...but I still would have gone. I mean I can't stay here. It's just, you know, it would have been bad timing to meet somebody like that...just as if I had gone to Halifax and met somebody there. That would have been really bad because it would have been only four months and then I would have to go back home and then back to school. It just worked out that it was good timing...

I: With your husband... your husband seems to be...he's a liberated male I would say.

R: (Laughs) Yes, definitely.

I: He doesn't have this idea that he has to be the breadwinner and he's helping in the house now...he's sort of in charge of the house now. So...you were telling me that in your PhD. you enjoyed the idea of choosing some of your own hours for your family. Have you ever discussed any sharing there or do you think once you get to work back in Guelph will it be a more traditional situation when children come into the picture?

R: Well, we haven't really talked about it but, I think that if it came, you know....it depends on whose, perhaps, whose career is going better. Whose going farther, who had more to lose if they quit or if they had to take time off...and I really think that would make a difference..because just the way he has been with taking care of the

*Very responsible
Once she makes a
commitment she
sticks with it*

*Husband shares in
responsibility of
housecleaning*

I

JOANNA

house and that now that I've been going to school, I mean, that's the thing a lot of people wouldn't do, just with taking care of the house so I could see that if he's doing that..I think he would consider it...

I: If it came down to a crunch...

R: Yeah, yeah...cause I think the same situation could come up with ..if one of use were to be transfer and if you didn't transfer it would jeopardize your chances of moving up or it would sort of depend whose career is more important at that point in time...I don't think it's definitely his and that's it....because obviously he's willing to move with me down East and that's a big move for him. It's a good opportunity for him but it's also quite a move...and it's I think...we discussed before I applied to Graduate School where we liked to go and he sort of said..I'd like to go here but I don't want to go here...I was considering Dalhousie but then the economy is so bad in Nova Scotia that it would limit him. So then I applied... I think we were thinking about Vancouver... and Edmonton and then pretty well Ontario...and that was about it...So I think it's pretty much give and take and just depending on who stands to lose more...

I: That's great. Oh...I was wondering when I was reading about the choice of Medical School. Even though you had contemplated Physio, but then later you said you went into Chemistry because you thought that if you did apply to Medical school it would have held you in good stead. So, it was in the back of your mind at that point...so even though you said you didn't like cutting and blood..It was still in the back of your mind.

R: Yeah..

I: So...which was the factor...time commitment or not wanting to do the gory things or you didn't think you had the ability..

R: Well, actually, I think I started really enjoying chemistry and that made a difference because at first I didn't know what I wanted so I thought I'd start in chemistry and see how it goes but then I started really enjoying it. Another thing I didn't like about medical school was that it just seemed to be so competitive and I didn't want to be involved in that so much.

Didn't like the competition in pre-Med

I: (interrupts)..sort of cut-throat type of...

R: Yes, yes...I just didn't feel prepared for that and I didn't at that point in time, like I said, I didn't want to cut so there wouldn't have been too many options for me in medicine and I just lost the desire for it. Cause, you know, I wanted to keep my options open but I didn't think I would go into medicine after starting university and never really considered it again.

I: Right in that first year?

R: Yeah, yeah..

I: Even before the professor showed interest in....

R: Oh, no I didn't really consider it anymore. I was just taking, you know, keeping my options open just in case but it was never high on...I just didn't think I wanted to do that anymore.

I: So, you just became interested in chemistry itself. Do you prefer...does that competitive drive to get into medicine...did that almost turn you off more than anything?

I

JOANNA

R: Yes, yep.. just the lengths people would go to and just the ethics of people who...I don't know...we just found out today that something got stolen from the organic lab and it's just a book but it's worth a lot maybe \$200.00 and it gives all kinds of spectra, IR spectra?, and part of the final mark for your organic chemistry is to identify two or more compounds by their IR spectra and their melting point and all these kind of things, like somebody stole it yesterday or something, and that kind of thing that I just think that if it's that bad, you know, I just don't want to be involved in that. I just don't want to be up against that kind of thing...I want to compete fairly.

I: Yeah...About nursing? That was never considered really? Do you know why?

R: No...I don't know...it just didn't seem like it was enough...it's not...it seemed to be such a menial kind of job, unless I..if I could be like a surgical nurse, or something like that that would be really interesting or challenging but other than that I just never...I never considered nursing, no...I don't really know why..

*Likes challenges -
reaches for the top*

I: Probably like you said, it just wasn't challenging enough (yeah, hmm, hmm)..you wanted to go to university...also it's not the top of the medical field, a doctor is the top in that heirarchy..you always do that (yeah)...you're shooting for that...except for physio, it's independent in itself...it's tough to get into and involves going to university, so that's challenging... O.K. Oh...this is a fun one.. (Laugh)..Do you....I don't even know why I ask this I was just thinking...I think because I was trying to pick up more on - you like to be neat and you've got the feminine side that likes

I

JOANNA

to look nice...Do you like shopping?
(Laugh)

R: I love shopping (laugh)... I do..

Loves shopping

I: I wondered...because you know when you look in the closet do you have quite a closetful...so you can just sort of flip through in the morning (Yeah)...you can pretty well wear them all, right, you're figure hasn't changed?

R: No, not that much...Well, yeah, most mornings it's fairly easy to choose except some mornings where I try on about four things and keeping throwing them off, no... but that's just a day when...

I: (interrupts) and do you try them on and see how they look together and things like that?

R: Yeah...yeah

I: So that's important to you, you like the outfit to be all an outfit, and then so you would try on say, those earrings or try on another and see which ones fit better..

Neat appearance is important

R: Right...aha, yeah.. Yeah I loved living in Halifax cause there was so much shopping...There's a ferry that goes from Nova Scotia to the states that I wanted to go so badly but it was too much...you got a stop over to go shopping and everything...then you'd come back and you'd get your dinner...

shopping

I: Do you like that...going out for dinner, going out for let's say a nice supper...

R: Yeah, yeah...I always dress up if we go out for supper cause I just enjoy it....I don't like going to Burger King or anything. We'd rather eat at home than eat at Burger King...

Likes a nice evening out - enjoys dressing up

I

JOANNA

I: Did you see an advantage to being a woman in the sciences? Is there some affirmative action going on for hiring or...?

R: I don't know whether there is a policy about it but I think that at graduate schools and that they're encouraging women to come in and I think that perhaps if I was being compared with somebody with equivalent qualifications I may have been accepted being a woman rather than a man just because they want to get more women, because it is such a male dominated...it really is, there's not very many women. Especially at universities, things like that, higher up...there's not a lot of older women in it.

I: Have you missed that. That there haven't been many women that you can talk to. Would you have enjoyed it if there had been one woman professor?

R: I think so

I: Would it have made a bit of a difference, even with you being able to talk to men very easily would you have liked it better.

R: Yeah I think so, especially now that I'm going to graduate school to find out what it's like. Like I've asked some people, some of the professors and that how they feel about going to graduate school and being married and all these kinds of things, but it's difficult because often they had wives who stayed home at that time, and so they didn't have nearly the pressure or the same situation that I'm going to have because, you know, my husband will be working, so there will be both of us working so there will be a lot more sharing of our duties and things like that whereas they probably could dedicate to school and that was it and their wives would probably be expected to be a little understanding and things

Wishes a female chem prof was available to chat to - feels a man's experience is different than a woman's in chemistry Would like someone she could share her concerns with

I

JOANNA

like that and....mostly I've heard positive things about being married and going to graduate school that it would be to my benefit rather than harder on me but it would be nice to talk to a woman who has done it or even just a woman who has done graduate school and not even be married.

She would like to know how other women balance family and graduate school

I: So...you can just find out how she balanced things?

R: Yeah

I: Boy, it would be very tough if your husband wasn't the type of person he is.

R: I don't think I could do it. I really couldn't. Because..you know, even now at the undergraduate level, trying to cook and clean would just be impossible, it really would be. I mean, I do O.K. usually on the weekends I'll do something, you know, he does probably 80% of everything of the housework right now including the cooking...

Relies on husband to work in the house - very critical to her that as she feels she couldn't possibly be solely responsible for the housework and have a career as well.

I: Thank goodness

R: Yes, definitely (Laugh)

I: Yeah, it really would be tough JOANNA wouldn't it? Really he's a rare find. You know, for women to persevere and go on in any field....

R: (interrupts) its difficult because of that because there's a lot of men who aren't like that. I would say the majority aren't like that. You know, I can't imagine...usually I stay at school until 4-4:30 and I come home and I'm just wiped....there's no way I can just get up or something and do dishes, are you kidding...I couldn't and there's just no way and he reaJOANNAes that..

I

JOANNA

I: Well the other option is that with two income earners you could get a housekeeper who pops in once a week.

R: Yeah, well, I definitely plan on having that. We've talked about it already and when we're making money I want a housekeeper. If, you know, if we're both working that hard outside of the home, there's no need for us to do those repetitive things that can be done so easily by someone else. I admire people who do get housekeepers. I don't admire people who don't make a martyr of themselves by just trying to do everything themselves. I would much rather have somebody coming in and do the floors and the windows and whatever needs to be done...the bathroom than try to do it myself...

I: Especially if it saps you of so much energy...you know, you just get tired so you get irritable. It can cost the relationship quite a bit with the two of you having to juggle everything.

R: Yeah...

I: ..Hmm...O.K...well, I think that pretty well pursues that...I might pursue that afterwards. O.K., emotions...I was going to ask you just as an addition to your personality profile. Do you stay quite calm...and, you know, your husband prides you on being level-headed. Do you often think more with your head than with your heart? Or does your heart want to do something but...

R: Yeah, sometimes. It depends too, like I go through stages where I'll be really emotional and ..just anything on TV can just...ooooohhh...you know, but I think that sort of reflects how much stress I'm under also. If I'm under a lot of stress I get upset more easily, I get teary eyed more easily, I read things into little things and I just blow them up...it really depends. If I

Has no time for people who run themselves ragged trying to be martyrs by running home and careers.

** just don't understand them*

Reacts to stress- becomes emotional

I

JOANNA

just had a vacation I'm a lot more stable than where, you know, at the end of a semester when I'm just going crazy. Then I need all the stability at home that I can have...any little thing and I just get so upset and, "Oh no - there's another thing to worry about" then I really blow it out of proportion at times.

I: So do you try to catch it, do you do your best...

R: Yeah, well it depends on who its with. If it's with my husband then I don't try to hold it back cause I really, I really believe that if I say what I feel get it out then, otherwise I would just stew and stew and it will get worse and worse...

I: So you like to get out those feelings. Would you with someone with someone if they were irritating you in a lab so much.

R: Ah..not so much

I: or would you keep that in.. it's only with people who are close

R: Yeah, because I think, like I was brought up where we would say as soon as you got mad and we'd sort of have a fight, but then in 15 minutes we would be the best of friends again. Whereas some people are the other way, they keep it in and keep it in and they just let it drag out and so I'm used to having that kind of interaction where you get it out and then it's over...whereas with some people it's not over that fast, like I can forgive in 15 minutes - it's really easy for me to feel sorry for what I said, whereas maybe other people are more...don't say it so quickly or hold on to it longer...

I: I like to get things off my chest too.

Important to her to express how she feels - to get feelings out rather than letting them build up.

Finds it easy to forgive and forget

R: Well, I think it's a lot better like that.

I: I think so too, you can see people that get into those terrible moods and you don't even know...

R: Yeah...and you just feel worse, because you don't know why they're not talking to you or what you said or what you did. Whereas if you say right away, well that was rude, well you know, you said it...

I: Then you can say, "Gee, I'm sorry" and it can clear the air..

R: Yeah, that's right, whereas if you drag it out well they don't what they did wrong so how can they fix it.

I: O.K.(pause) Let's go back to high school....First I was going to find out what was it in school that made you more interested in the sciences than in say English or Social Studies.

R: I didn't find Social that interesting, I don't know why, maybe it had something to do with my teachers because my chemistry teacher was great and so was physics...

I: (interrupts) O.K....Let's stop for one second..Tell me just on the subject content itself. If you can ignore the teacher at first and then we'll see where the teacher's influence came in. As a student was it the content that made you want to go into the sciences equal to the teacher or is the teacher more influential.

R: I think it was hard, I find, it's hard to separate them...because I didn't enjoy, say a class like Social Studies because of the writing involved. I didn't like writing many papers, things like that and I didn't like the teacher either, not very much but I think it was more the content. If I really

I

JOANNA

Sensitive to other peoples' moods

*Sometimes
- not
always*

SCHOOL

*Didn't like Social Studies
Didn't enjoy writing or memorization - found it too subjective
Found math, chem and physics easy.*

I

JOANNA

would have enjoyed it the teacher wouldn't have stopped me, whereas in chemistry and physics and also in math I enjoyed it and I understood it fairly quickly. Whereas I found Social Studies was like memorization, and sort of reading and reading and trying to understanding. It was sort of abstract I found...a lot of it. Just a lot of memorization or that type of thing, whereas chemistry and physics I found were math oriented, problem solving and I really enjoyed that kind of work...

I: Cut and dried - it's either right or wrong, did you like that?

R: Yeah, yeah, I didn't like the subjective marking that was possible because...I don't know...I really don't know why I didn't like it, I just didn't enjoy it as much.

Arts courses - too subjective

I: Is that pretty well all the way through would you say, did you always like your science classes or did this come to a head in high school?

R: I think it came mostly in high school because in Junior High you're only taking a science...called a science course that incorporates everything.

I: Did you like that?

R: Yeah, that was more the qualitative. It was write up the little experiments and you did different kinds of experiments working on different principles of biology, chemistry, physics...simpler concepts and I really enjoyed that. And Social in those grades was geography and taking countries at a time, like we took the Soviet Union and we took the geography of the Soviet Union and the people, so that was all right, I did well in those classes because I'd study it and I'd know the answers the next day because he always tested us in class, you know what's this, and put up your hands and tell us it...well I enjoyed that but

Enjoyed the experiments in Jr. High

Liked to show teachers that she knew the answers

It was important to her that the teacher liked and appreciated her

when it came to things like the social issues and the politics and that I really didn't enjoy that very much.(Pause) I enjoyed English, I really liked the teacher, she liked the way I wrote...

I: Let's talk about the teachers. You liked the cut and dried type of approach with the subject, so where did the teachers come in, did they really make a difference.

R: Well, let's see my physics teacher, he was very good and he was very encouraging, I didn't notice any chauvenism or anything on his part and I really got along well. I enjoyed physics. Biology was quite good, in a lot of Biology 30 we took nutrition and I was quite interested in that, so that was good. Chemistry, the teacher we had was a real oddball. He, you know, he walked down the hall, he'd almost have his shoulder almost on the wall, sort of shy and you know, the dark rimmed glasses and the messy hair and his pants were almost hanging down to his ankles almost (both laugh). He was just hilarious and he used to always pick on the girls. At first, you know it would be irritating in Grade 10 and 11. It was a little irritating how he'd always say, well let's see what the girls think. At first I thought, "Oh no...he really doesn't like girls". By the time I got to Grade 12, I sort of realized he wasn't being favorite towards the boys, he just, you know, liked teasing and it wasn't malicious. He was the kind who sort of scared you at first, like in Grade 10, I was sort of scared of him but by Grade 12 I really enjoyed him and as it turned out like when I came to university and took Chemistry 1000 it was like almost totally review for me. The professor I had for Chem 1000 said, Yeah, he always turns out good chem students. He's probably the best teacher in Lethbridge for chemistry so I was

I

JOANNA

*Did you work hard for teachers or for yourself Joanna?
(Mainly??)*

Both, I think

*Responded well to encouraging teachers.
Enjoyed studying concepts that were relevant to life eg. nutrition.*

Enjoyed competition - likes to compete with one fellow in particular who gets top marks.

lucky. I had a very good chemistry teacher.

I: Did his mannerisms though, did some girls just, they didn't want to be in his class? So going into Grade 10, do you think that with your personality you were spurred on by him rather than discouraged by him? How did you feel?

R: Well, I was scared of him and I made sure I knew everything because he'd ask you questions and if you didn't know them you're in trouble. And I think, I tried to do well and I did well in his courses and that made the difference because I could do it for him whereas other people wouldn't do well for him and he teased, sort of , and they'd think that it was all towards the girls I think and that was the problem because if you didn't do well maybe he wasn't as lenient as he could have been but, I think, in another respect if you can't do it then you shouldn't be in chemistry.

I: He wasn't very patient would you say?

R: Yeah, he was quite patient, he was very patient but, you know, some people just had trouble with it and they just, maybe they thought it was him rather than the subject which I just don't think that was the case because he was a good teacher.

I: Were the boys too put off, or would it not bother the boys as much?

R: Not as much, but he was still strange, you know, and he was still strange to everybody, but he just made a point of talking about the girls or saying, "Oh girls, this and that" I don't know, I never did consider him to be chauvenistic and I've talked to him since and he has been very positive, like when I told him I was going to graduate school, he said, "Well that's good, you can't do too much with a BSc."

I

JOANNA

If intimidated by a teacher she would work harder to prove to him she could do it. (did you want to work hard to prove it to him or to yourself- which was more of a factor?)

myself

She has a strong self-confidence /she knew that if she studied she could do it / strong sense of her own ability. ✓

I

JOANNA

and that's good for you," so...it's really kind of hard to say because I'm saying from the point of someone who is successful in chemistry and I don't know how people feel who weren't, you know whether they were intimidated by him or...

I: It doesn't matter to me either, I was just wondering out of curiosity if you think you survived that because of who you are. That maybe if you couldn't approach boys or whatever, or had a less of a sense of your own ability, in grade 10 did you have a fairly good sense of your own ability, if you really sat down and worked on something you could do it?

R: Yeah I think so, yeah...

I: Did you see success as being more to your ability than to effort, to your effort?

R: Yeah, definitely

I: Not to luck? (No) Would you say gosh, I was lucky to get that?

R: No, I think that mainly I thought it was due to effort.

I: But if you failed something, JOANNA from what you tell me you haven't given up on it you just sort of dig your heels in...

R: Well, that's right, I think that obviously I did it wrong, I didn't study properly, the way I should have or...people have different ways of testing and if you're used to one way of testing then sometimes it's difficult to get used to another so you have to study differently...

I: So, if you didn't do well for him and he said, "What's the matter with you JOANNA"..you saw it as "Gee I better really study" this rather than saying "Gee I must be really stupid" (Yeah)

*Sees success as
due to her own
ability and effort
and not to luck*

✓

I

JOANNA

Did you ever say, gee I must be really stupid.

R: No, no because I knew if I didn't put the time in and didn't get the mark I knew darn well why.

I: For you his teasing was a motivator was it?

R: Yeah, yeah...I think it was a motivator.

I: Why not physics instead of chem? What was the physics teacher like?

R: Well he was really friendly. I definitely got along better with the physics teacher, he was more friendly and more outgoing, because this chemistry teacher wasn't very outgoing, you know, he was an oddball sort of, whereas the physics teacher was more...got along with the kids and participated... if there was a teacher, student activity he would participate. So I got along with him better. I just found chemistry more interesting.

I: So you liked it, did you find that a you respond more to an academic teacher, one who challenged your intellect a bit more or did he challenge you too?

R: Yeah, yeah...I think he did (pause)... but it's hard to say because I took physics here at the university quite a while after taking Physics 30 so it's hard to say how much I learned from him.

I: You just didn't like physics as much as chemistry?

R: I took it in university too and it was all right but it's not something I would like to pursue?

I: Is it because it's not related enough perhaps to society, would you have

Found the subject interesting (Chem) in itself - independent of teacher influence.

She didn't like Physics so much - too mechanical and abstract

I

JOANNA

liked to have seen more examples of maybe how the arm as a lever rather than the jet turbine or something...

R: Yeah, I think so, it's so mechanical...I wasn't really interested in that kind of thing and I studied a lot in physics and I found I just couldn't do as well as I could in chemistry by studying and I just didn't find it as interesting.

I: So those two worked together, interest and you found you really got the product when you studied as well in chemistry.

R: Yeah, and I think also physics tends to be more abstract as you get to higher levels and I don't enjoy really abstract things. Like electricity, I have difficulties with electricity, it's fairly abstract and really and that's only at the second year level and I can just imagine higher up...(Pause).. But then people say, well what about an atom, you can't see it, you can't feel it, you don't know what that is either, I understand that. I think it has a lot to do with what I found easier and what I found interesting.

I: And English you liked (Yeah) but you wouldn't have gone into English?

R: No, no...well I think I really enjoyed English because it was a lot of reading and I love reading and that's what English 30 is a lot of, you know, writing essays, things like that and I did well so I enjoyed it. But things like poetry, I don't enjoy analysing things like that it's just too subjective again.

Enjoyed English because of the reading - Don't like the subjective aspect of analysing poetry, etc.

I: Yeah, well it makes sense. You like things that are more straight forward but you still liked to read because it plays on your imagination. Did you like analysing a book?

I

JOANNA

R: Yeah

I: You didn't mind that it was just poetry?

(Both laugh)

R: Yeah

I: Having to figure out what they're trying to get at, and why can't they just say it straight out...

(Both laugh)

I: Chemistry is more straight forward, like then.

R: Yeah, like I would never take a drama course. I am just not interested in it. I did have the opportunity last semester, I had time and I needed another course. My brother was trying to convince me to take it and I thought, "No way!"...I don't think that I'd get anything out of it personally. He really objected to that because he's really into drama. I'm not saying drama is bad, I'm just saying I don't think I would enjoy it. So I wanted to take something I would enjoy so I took Music 1000 which was appreciation and that's a lot different than making a spectacle of myself, things like that I just didn't want to do.

Doesn't like to make a spectacle of herself

I: Well, the thing is that's your choice. That's his choice and her choice too. Oh... Give me a rundown of your high school courses, what you took in Grade 12.

R: In Grade 12 I took Physics, Biology, Chemistry, Math 30, English, I took typing that was to prepare me for University. I took French..

Gr 12 subjects
 Physics 30
 Biol 30
 Eng 30
 Chem 30
 Math 30
 French 30

I: How did you find it?

R: It was quite easy (pause) ..and I think that was it.

I

JOANNA

I: Why didn't you tackle Math 31 was there a reason?

R: Uh...I didn't have time. I was pretty busy with three sciences plus French. So I really didn't have time and it was a double period and we only had 8 double classes in the whole year and so...mind you I took Biology 30 when I was in Grade 11 so I didn't have a really busy year, but I didn't really want to take Math 31, like I ...well I don't know, I wasn't that interested. As it turns out it wouldn't have helped much anyway, but, I just didn't want to.

No interest in Math 31 - not related to the math teacher

I: Yeah, what was your Math teacher like.

R: Umm, I really liked him I got along with him quite well. He was another sort of oddball but I got along with him quite well. I enjoyed it but I just didn't want to pursue 31.

I: So, his encouragement or lack of it wouldn't have been an influence.

R: No, I can't really remember anyone stressing taking Math 31 and that's because with these other courses I had enough to do.

I: Yeah, I remember I didn't take Social 30?

R: No, I didn't either.

I: Oh, is that right?

R: I had to take religion too, I took religion all through school. I had to always have a single period for religion.

I: When the subjects were taught what did you like - the labs more than the lectures or how did you feel about that?

I

JOANNA

R: I enjoyed the labs they were fun. You know in high school they were sort of qualitative, yeah, I really enjoyed them but the lectures were very interesting too. I liked both.

Labs - fun and so were lectures

I: Did you like it when relevant examples were presented, for instance you were telling me about tonic water and the fact that it has quinine in it, did you like that?

R: Yeah, and I think they made a point of doing that in the sciences. We had to record everything we ate in the month and had to analyse our diet for a number of different things, for calories, for vitamins and for minerals... It was really interesting, it tied things to yourself..so it was really good. Yeah, I think they made a point of doing that so you'd reaJOANNAe that it was relevant.

Enjoyed it when the relationship to society was pointed out - made it interesting.
(Was this really imp't to you Joanna or did you just enjoy working on problems for their own challenge?)

I: Is that important to you? What if it was taught to you very theoretically?

R: I wouldn't enjoy it as much because I wouldn't see the point of teaching it is until they say well this is where it's useful. But when they're just teaching you the stuff and you have no idea why or where it could be used or anything, I'd just say, Oh, well what's the use...you have nothing to relate it to so it's difficult to remember.

Likes relevance

I: Did you like relating things to the human body? What about physiology for Biology 30 did you enjoy that?

R: Yeah, I'm really interested like in nutrition and things like that personally more than for any other reason so I find that very interesting. Like even now in biochemistry or something like that if I find something interesting I like to tell someone, tell my husband or whatever and... cause I find it very interesting... it is relevant and it's easier to tell

Likes to share info from her job with others

Relationship made it relevant - not necessarily to society just the concrete aspect - the relevance of the problems made them more interesting.

people also about what you're doing if there's some relevance to it, whereas if you're just doing something and there is no real goal in sight which isn't any use to anybody. Yeah, it's very difficult to tell people what you're doing. Like math, I took Calculus I here, I hated it, I had no idea what I was doing it for and I just hated it. But now finally in fourth year chemistry and things like that in which we're using it and I say, well, all of a sudden, well it does have some use. But why didn't they tell us that, you know, it's really difficult to enjoy it when you have no idea what it's application is.

I: Do you think..that this new science curriculum is coming out in the province that is tying in science, technology, and society and you really have to emphasize the linkage. Would you anticipate that more kids generally will be interested in science because of that?

R: I don't know if it would make more people go into it. Because it's hard to get through it. You know if you're struggling all the time, it makes it very difficult. I admire people who can stick with it when their having that hard of a time cause I even see it in some of my friend, you know in chemistry, there's not very many who can get it very easily.

I: Why? Do you think it's ability or that they aren't putting the time in.

R: Well, I think it has something to do with ability and how they use their time and sometimes you have to know how to study for things. They can take two or three exams from a person and still not realize that you have to do it this way or else you won't get it, you know you can read the book til your blue but you've got to memorize what's in the notes. Some professors teach this way, some that way, some ask strange

Science is a difficult subject - Pointing out relevancy alone may not be enough

I

JOANNA

questions whereas others are into problem solving. It depends what their course is like but you have to learn how to study properly and I think that if you learn you can do whatever he wants but then he better learn how to do it right and I think that's where a lot of people have problems.

I: And high school too would you say..

R: Yeah, I think so. Also they don't study enough. People think they can get away with not studying very much and they can't. I mean I find that even on exams now, you know you think there's not very much material or it's so repetitive that it doesn't warrant studying but that's not true because there's so many ways to ask it. Unless you know it inside out you're never going to do well. I think people just don't study enough.

I: If teachers taught you how to approach problems step by step or thought out loud while they worked through the problems, did you appreciate that? When the teacher said notice what the problem shows you, pulling out the numbers - did you approach problems like that?

R: Well, I think, they have questions - questions that help people think more clearly. Like they're questions that people can practice and I think perhaps students should be taught to problem solve more effectively...because, like we had a question like that on an exam. The prof just wanted us to see if we could logically think of the answer. So he had this thing about so and so was making potato salad for his guests and he has 5 eggs and so many ounces of potatoes and so many ounces of mayonnaise, etc. and this would yield 4, 5 1/2 ounce servings of potato salad. Well someone ate one of his eggs so now he has to cut everything down to 4/5 from what it was - now what

*Conscientious
- doesn't hesitate
to study*

*Is able to logically
sift through questions
separating the
pertinent from the
extraneous*

was the serving size? Well, you would just cut the serving size down by 4/5 right? But a lot of people went through and took 4/5 of everything, added it up...and this is 3rd and 4th year chemistry students doing this. So, I think they need to be taught to see through a question and just think about it instead of right away jumping at it and starting writing everything down. I don't have a problem with those kinds of questions. I think that really helps me because I can sort of see what the question is, cause I think that's half the problem because people get scared on an exam. They don't read the question properly, they don't think about what they're really asking. One of our professors really encourages us to write in pen all the time even on exams, which is a real switch but his idea is if you use a pen you're not going to write, write, write, you're going to think about it before you write and then if you cross something out don't cross it out totally so you can at least see how you're thinking. I think that's a really good way to do it. They should try to teach students to do that to think before they write. There's a post doctorate here from Italy and he said when he was in graduate school or in university, he could write down the answer but once he wrote it down, he wasn't allowed to erase it - if he made a mistake he was wrong. That's a little harsh but I think they should teach that to think before you start just writing and writing. It's important in most things I find - it's so easy to just charge ahead but you make mistakes all the time whereas if you just stop and think before you do the next think, you know...

I: Do you self-talk as you work through things?

R: Yeah, and I look at things and I think well how should I approach this, and not just rush off and try it...

I

JOANNA

I: Have you done that all the way through pretty well in high school, in tackling chemistry problems...

R: Yeah...I think I had a knack for it ...I just think I was lucky, I find it very easy. These things just fell out for me whereas other people just couldn't see it.

I: But you used a calm approach initially, right?

R: Yeah, but I think, like you said, it can be taught. Like we've been taught unit analysis, and if you really stick to unit analysis a lot of times you can work your way through a problem because if your units don't cancel you know you've done something wrong. And that's a good way to do things to have checks like that and they don't teach that enough I don't think and if you don't come by it naturally you can really have trouble.

I: So in a lot of those things, the teacher can really help people if they went through things like that?

R: Yeah

I: O.K. thanks. I think we'll stop there today.

*Keeps calm -
approaches problems
logically - self-
talks.*

* * * * *

END OF TRANSCRIPT THREE

TRANSCRIPT IV"SCHOOL, PERSONALITY"

I: INTERVIEWER
R: RESPONDENT

COMMENTS

I: Again Joanna, I looked through your transcript again and jotted down a few things... O.K, first...Do you mind telling me what your GPA is?

IJOANNASCHOOL

R: About 3.4.

High grades

I: I just wanted to know that just so I can indicate it in the paper. What were your marks out of grade 12? Above average?

R: Probably about an 85.

I: About an 85?

R: Yeah, I'd say somewhere in there.

I: Does that include French as well to get over 80 in all your subjects?

R: Yeah, except I think religious studies I got about a 70 something.

I: OK, chemistry teacher. Did the fact that your chemistry teacher, the fact that he was teasing the girls and a little bit intimidating, did that spur you on to work harder than the physics teacher who was nicer?

R: Yes it did. I don't know why it did. I'm not really sure, I'm really not sure why he spurred me on, but yeah he sort of baited you, and tried to make you want to do it just to show...

Takes challenges with spirit - tends to make her work harder (doesn't buckle under a challenge)

I: So you just wanted to prove to him that you could do it?

- R: Yeah.
- I: The physics teacher - he didn't challenge in that way?
- R: Yeah I think so.
- I: Can you elaborate anymore on that? Does it tie in with not wanting to make a spectacle of yourself and not knowing the right answer?
- R: Yeah cause I'd be embarrassed if they asked me and I didn't know it. I'd feel really bad about it so I'd definitely make sure I'd done my homework and you know I like to do well on exams because he appreciated it and he always gave bonus marks on his exams with all this...if you got over 100% and it was sort of a thing to drive for to get over 100% on his exams. Yeah, I think his teasing probably, he wanted to show more that you're not that bad and as you did better in his course the teasing it didn't go down, it probably increased a bit, you know.
- I: Did you enjoy that back and forth, almost like sparring?
- R: Yeah, yeah because you could sense he sort of respected you. He wasn't teasing you negatively, it was in a good natured way. Perhaps he did get results out of you, I don't know.
- I: If you weren't doing very well, if the student couldn't respond to that, they would feel picked on wouldn't they?
- R: Yeah, rather than taking it in the fun sense, right? ... because if you're doing well you know that he's teasing you. He's not being mean because you're doing well. Whereas if you weren't doing well you might feel that he was doing it...you know, picking on you.

I

JOANNA

Didn't like to be singled out for not getting homework done or likes to receive pos. reinforcement from teacher

Was praise important to you? Did it make you work harder Joanna?

Yes, it made me work harder because praise was like getting a good mark from the teacher.

Enjoyed getting high marks and being respected by the teacher and having that special relationship high ability students have with their teacher

I

JOANNA

I: If he wasn't like that do you think you would have worked as hard?

R: No, probably not as hard. I think that it encouraged me to work hard I don't know about other people. But I know that a couple of my friends, the ones who did well in chemistry they really grew to like him but in Chemistry 30 those didn't do well in chemistry tended to drop out and that was probably more due to marks than to him. If he was the type of teacher who would appear quite intimidating at first but by the time that you had him for three years you realized he was a good teacher you learned to like him and you could sense that he liked you.

I: Did he care...could you really sense that he really genuinely did like you?

R: Yes. He liked chemistry and he liked the students he just wanted people who were interested in it and would work hard for him.

I: Did he ask guys and girls in the class questions pretty well evenly?

R: Yeah he'd go up and down the row so it wasn't like he was..

I: So you knew you'd be asked possibly in the day?

R: Yeah.

I: So you'd make a point of making sure that you knew your stuff.

R: Yeah, that's right. I'd make sure that I had it done because I didn't want to embarrass myself to say I didn't do it, unless you genuinely didn't know how to do it. But if you hadn't even tried it. I feel really bad about that.

I: Your English teacher too she really appreciated the work you did. She

Important to her that the teacher is genuinely interested in the students

(How imp't is this - does it make you work harder for him/her Joanna?)

Doesn't like to be embarrassed by not getting homework done (Was this a major factor to getting your homework done Joanna?)

Definitely makes me work harder for them because if the teachers are interested in the student they tend to be more encouraging.

Not really the reason I did all my homework. I did it because it was part of the course work to get good marks you have to do homework.

liked your writing. How much of it in schooling is it that you wanted the teachers to really respect you and was a lot of it that?

R: Yes that was an important part. I didn't want them to think I was a slouch; that I wasn't doing the homework or I didn't care. I was interested and I really didn't think it was fair to them not to do the homework because they were doing their job so I guess we should do ours and not try to get away with as much as possible. I never tried that unless I really couldn't get it done and that way if I couldn't get something done they believed me because I usually do have most things done. I just, I don't know, maybe things are not doing it just because you don't feel like it I just never had that problem because I just got my work done and that was it and I think it paid off.

*Importance of respect from teachers
She didn't want to disappoint them by not doing well*

(Which is major factor - not disappointing them or yourself?)

More disappointing to me.

I: How they must have really appreciated it?

R: Well I'm sure because it must be really frustrating to have people who just refuse to do their homework what can you do. You can't threaten them or anything (laugh).

I: Did he ever give you marks for doing it like little check marks or was it just through questioning?

R: Yeah, mostly through questioning. We didn't have a lot of assignments but we always were assigned homework but we just went through it in class so you could easily get away without doing it and you'd just figure out which question he was going to ask you. So if you were in the fourth row and you were the fifth one back you know you would get this question so you'd ask somebody and it was easy to get away with it. But...

I: So did people do that much?

R: Yeah.

I: But you didn't want to do that because you felt it was important and it was assigned to you?

R: Yeah and I often find...that you can't study if you haven't done the questions and that kind of thing because there's nothing to study from so I just felt it was easier to study.

I: How about the labs? I was just wondering, you liked the lectures too because he made them interesting you were saying. When you were in Junior High, though, what would you have thought of the class if there had been no labs just straight lectures? Would it have mattered as much? You still would have studied and it wouldn't have made you less interested science? Did the labs have any influence on you being interested in science from Junior High?

R: Yeah. Yes, I think so especially in Junior High because the labs were very, everyday things we were sort of shown. Like we did an expansion experiment with the different expansions of co-efficients of different metals...and so we had a ball made of one thing and a ring made of another thing and you know you have the ball and it won't fit through ring and things like that which were very applicable. I think they really helped...this is what we would end up writing up as our labs and it really helped because of theory, it wasn't quite as abstract. The labs were very everyday oriented and so I think you learned...actually the labs in Junior High were better for me than the labs any other time. In think it's the same in university, we have more labs in the introductory courses than in the later courses. There's a lot more emphasis on theory. So I guess

*Conscientious, mature,
able to see the conn-
ection between
homework and doing
well on tests.*

On Labs

*In Junior High -
enjoyed labs
(More than
lectures?) →*

*She enjoyed the
fact that they
are concrete not
abstract ↙*

I

JOANNA

they know at that time you are interested and you don't have to be shown everything. The labs earlier on they give you an idea of what can be accomplished and what can be determined, whereas on paper it just something to learn, it's not very real.

I: For you to choose chemistry and physics, even coming out of Junior High, did you have an idea that science was where your interests lay or did you know you wanted to take an academic route?

R: Yeah, well at that point of time it was sort of you had the choices of matriculation or not matriculation or you could take...there was some flexibility there too, you know, because you didn't have to take all three sciences but I needed so many credits and there was certain things I wasn't interested in also. So I ended up taking alot more science because I didn't want to take social, I didn't want to take drama, things like that so I ended up taking more sciences, not only because I was interested but I was more interested in those than the other choices I had.

Interested in sciences going into Grade 10 - even then didn't enjoy "artsy" type courses

(Too abstract?)

→ Abstract or maybe just quite subjective

I: Even coming out of Junior High?

R: Yeah, yeah and I also, it gives you the most options and I guess I was also thinking of that at that point in time too and I know that my schedule for medicine or whatever that I was interested in.

Planning future - looks ahead, even in Grade 10.

I: Was that in the back of your mind then?

R: Yeah, I think so, at that point I wanted to be a doctor and I knew you had to have a science background and that was what I was interested in, I wasn't interested in, you know drama, the arts and I wasn't quite as interested in that.

Science preference not arts

I: When you chose medicine or when you were thinking about, what was the big factor that directed you towards thinking, "Gee, maybe, I'd like to be a doctor?" Was it just in yourself?

R: I...yes it must have been cause I really don't know what influenced me that way because I had wanted to be one for so long that I really can't remember.

I: Since when would you say?

Goal oriented

R: Probably in elementary, that's what I thought I'd like to be and it really never changed until the last minute.

I: Yeah, actually not until high school when you realized you didn't like cutting and doing dissections. I wonder if it's the Biology 10 dissections that made you think about it...

R: It could be (laugh)...cutting into things I didn't know if I could do that for a living..

I: So back in elementary when you first thought of medicine did you feel held back at all by being a girl. Would you say you didn't think about it?

No sense of being disadvantaged or having limits put on her because of her sex.

R: No, no I didn't think about it. No, not at that point it didn't affect me too much about what decisions I made.

I: But you were aware of being a little girl to the extent that you enjoyed dressing up, being with girlfriends. Did you play with the girls in the playground. What was it like in the playground can you think back?

R: Well I can remember we used to have monkey bars and we'd play on those every recess, and skipping.....

Played active games in childhood - with the girls not boys

I: All the girls and the boys?

R: It was more girls, we played with girls more, the boys kept to themselvesand the girls we did skipping and throwing the ball against the wall and things like that. I was there and I was with the girls mostly. Of course at that age little boys and girls didn't mix that much and I wasn't any different. So...I guess...I wore dresses and everything. I don't think I was any different than any other little girl.

I: Do you ever remember anybody ever telling you, you can't be a doctor, you should be a nurse?

R: I don't remember anything like that.

I: Do you ever remember any discussion on you being a girl and being in chemistry in high school? Saying all the guys are in that...did anyone ever tease you about that? Or in physics?

R: No, no I never noticed that, no, not at all. There weren't as many girls in physics but it was never picked out that I was in physics.

I: Noone gave you a rough time. None of the girls said oh, you're just in there for the boys, you know how people sometimes say things like that.

R: No, no, not at all.

I: And you felt very comfortable as you have said, with the boys.

R: Yeah, I never really thought about it, I've never really thought about it really. Now that I think back on it, it didn't make any difference to me that there weren't many girls in physics.

I: Hmm...hmmm

R: I guess I understood why because....but I didn't think it was as much of a

Didn't feel any peer pressure to not take Physics or Chemistry because there were few girls

→ Never actually registered that there were fewer girls → wasn't important

She didn't feel strange being only one of a few girls in Physics

gender thing as just girls weren't as interested in physics...it wasn't that girls don't take physics. I guess that's what I thought at that time.

I: Yeah, O.K. (Pause) You know how you'd tell me about the questions in chemistry and how you'd attack those questions and go step by step and how you would pull out the important numbers from the unimportant numbers, where did you learn to do that? How did you learn that approach - was there an influence by a teacher in Junior High say in math or ?

R: (Pause)...I think part of it was probably the way we were taught in chemistry. I think he was one of the teachers who used to put in extra information and make us find what was important and that really makes you learn because everything's there and anything's that's extraneous isn't there and everything that you need is there. A lot of times if you're not quite sure how to do it you can say, well let's see this equation has all these variables that he's given me so this must be the one to use so if your not too sure and you have all this extra information then you won't be able to find the right equation I think he tried to train us in that and I think that's probably the major area where I got it from. Umm...I think a lot of it has to do with, I think a natural ability to do that also because some people you have to teach them and they really have to practice a lot and I don't think I ever had to practice that. It's just a natural thing, I think in one way and other people think in different ways and that makes it a little easier on me and also it depends on if you understand things well enough you realize that this is extra but I don't know whether actually....I think chemistry was the only thing that I really remember where they had that and put in extra information.

*Pos. influence
of Chem teacher in
helping her think
logically but also
feels it's an
inherent ability she
has??*

I: So, he kept you on your toes, didn't he?

R: Yeah, yeah... like even our final exam was an open book which is sort of, you know, in high school just in Chemistry 30 - but I think he did that to teach us that just because it's open book you have to study and he of course put hard questions on and a lot of people didn't realize that you only had so much time. You couldn't always look up everything and trying to go from an example. You had to go quickly and use your notes for a reference. So I think he was quite advanced. I really think the chemistry teacher was a big influence in teaching us things that you know, were going to prepare us for university.

I: Did you appreciate that intellectual challenge...his approach was really a dialogue approach was it where he said well what do you think about this?

R: No, I don't think he did that as much. I think it was more the way he tested and in our labs that he tried to give us, you know, teach us that...he'd write on the board a lot. I don't think it was so much dialogue only. For example, in Chemistry 30 we had to do a section on radiation chemistry and it was all independent. We had to come in on our own time and do experiments and it was worth you know 10% of our mark and it went over the whole semester so we did one a week and different radiation experiments which we...now that I think of it. it's probably more than you had to do. It probably wasn't a requirement and it was just that you had to come in on our own time. It was teaching us a little more independence and that we had to use our spares and, I don't know, it was probably a good way to teach us. Even though at the time you always said "Gee, why do we have to do this on our own time" but I think he was really

Teacher had students work independently on one unit

(Did this help you learn on your own Joanna - was it a big influence or did you already do a lot of this?)

I think it was a good influence because in high school the teachers tend to baby you & everything is done during classtime whereas in this class, we had to schedule our spare time to do the radiation labs & I think this gave us a greater sense of responsibility.

I

JOANNA

intent on preparing us for university. That's the way I feel because the transition to university chemistry was fairly easy.

I: Sounds like it.

R: Yeah

I: It's quite an interesting approach for high school.

R: Hmm Hmm... yeah...and it was just in chemistry 30 that he did this. 10 and 20 was more, you know...lead you by the hand but I think he figured by 30, people who didn't want it had dropped out and weren't doing well, so he had better students by the time Chemistry 30 rolled around.

I: Did you find that if you took the time to work the problems out on your own without any help did that help strengthen your self-confidence? Did you enjoy, when working on a problem, just the problem and work on the problem and come up with a solution yourself? Did you enjoy that interaction with the problem?

R: Yeah, Yeah...and I think that...I've always liked the problem solving end of it...it's more the qualitative reading that I don't find quite as interesting. Like, I find the mathematical aspects of it better. You know, when I can do something really well, like solving a problem and I know how to approach it really well, I really enjoy doing it.

I: And it's challenging in itself?

R: Yeah, uhu..

I: Regardless of relevance?

R: Yeah, yeah, the relevance doesn't really bother me too much. It's just, you know, if I can figure it out. Especially if I find it fairly easy, if

More so than in any other class.

Enjoys the challenge in problem solving

(Joanna - how do you find spatial tasks - are they easy for you to do?)

I'm not sure what you mean by spatial. I'm fairly good at stereochemistry in Organic Chemistry which requires 3D perception on 2D molecules on paper.

I get frustrated with totally unfamiliar material if it is difficult to understand. I seem to need some

I can sort of see through the question then that's the biggest part. You know if I don't even understand what it's asking then I don't like it at all.

I: But if you can't understand it initially will you keep at it.

R: Yeah, I think so. I try a couple of different approaches and see if I can find something that will help me. There's got to be something in your notes or something that's similar to that equation. They wouldn't give it to you otherwise. Usually you can find a way.

I: How do you think you'll feel having to design it? When you get into graduate school do you have to design experiments?

R: I don't know yet.

I: How would you do with that do you think?

R: Well, I suppose if you chose a project that they haven't done a lot of work on, yeah I'm sure you would have to do something.

I: Would you enjoy that Joanna, you know, trying to figure out how you could approach this.

R: Yeah, I think I would really like that. Like how to start, what the best way to set it up would be. Things like that, especially when your time, when you have enough time. Cause I find that one thing I don't like about doing my independent is that there's not enough time in a semester to get an experiment set up to begin with. You work on it 6 - 10 hours a week, you know, over 13 weeks that's not very much time. Compared to like when you have a job at the university for the summer you have 4 months of fulltime work to get basically some results, not

I

JOANNA

Gets discouraged with totally unfamiliar content - likes to have some familiar concepts (too much of a challenge?) Doesn't give up easily

Appreciates autonomy but feels more secure with people available to interact with re:project.

Likes to have the time to carry things to completion - likes to see results

'easing in' of the material. I think this is a fairly common reaction. I have to understand the concepts + what it leads to before I can manipulate the equations with any confidence

*

What I feel are good results too.

a whole lot but to get some results. When I worked at Dalhousie, the first month I didn't get any results, he just said well I want you to get familiar with the procedure. You can fool around with it. Get some results but I'm not going to count them or publish them, whereas with an independent there's just not enough time. It's the time factor that really bothers me because I just know that I'm not going to get any good results so I try hard but I don't feel bad if I haven't got a lot because I know how long it takes. If I had more time I'm sure I'd be able to design an experiment much better and also be more efficient and more reproducible but you just can't do it on that time scale.

I: Is it an extension of a professor's project?

R: Well he's been sort of been working on it here and there with other students and we thought we'd do the same idea but then we changed it as we went along, saw what was interesting and then decided. You know, I put in my title for an independent it was very general, I didn't say we're going to do this and then if I didn't have results, you know, I wouldn't have passed. Whereas we made a broad topic and then just saw how it developed and then went that way. I think that's what you have to do with a project, you know, you have to design something and see how it goes. You can't decide ahead of time what you're going to do because it may not work or you could have the wrong hypothesis or...

I: When you are in that situation would you utilize them?

R: Yeah

I: Did you ever get the feeling, especially for instance in Dalhousie. Did you ever want to show them that you really do know? Did you ever worry

about asking a question in case they thought it was stupid?

R: No

I: Or did you know yourself well enough. Tell me about that.

R: I think, I would ask questions fairly regularly and sometimes maybewell it's hard to say...now that I look back, I think, well I guess I would have understood a lot more about what I was doing at Dalhousie when I was there. But then also I was just out of my second year and I didn't realize all of these resources that I would have been able to find and that I would have been able to understand it. I may not have even been able to understand it. So, I understood as far as they explained to me but, I think at that point I didn't maybe research it as much as I could just from my own benefit because I think often you think it is too difficult or...they don't really say too much about...they give you some things to read and I understood those but you know, you almost need like courses in what you're doing to really understand it and at that point in time I didn't have that, whereas I think with a PhD I would take courses and I would understand a lot better. So I don't think I hesitated to ask questions because I always got very good answers.

I: And you didn't hesitate, you wouldn't hesitate because they thought you wouldn't read or ...

R: No, No, because I didn't think they expected that much of me. If they expected me to know everything because it was just totally new to me. A research project like that, they vary so much - there's no way you could know about everything.

Has reasonable expectations of herself. (Won't hesitate to ask if she doesn't know something - doesn't feel badly about it)

I: So you thought, you did the best you could and if you had a question to ask it was just obvious that...

R: Well, I didn't have the course work behind me, so it wasn't a dumb question because at that point in time I didn't know any better.

I: How do you react if someone says, "Gee, she should know that!" Has anyone said that? How would you handle that? Have you had any antagonism like that?

R: Well, not personally. As a class we've had that (laugh). But I think that's more...I don't get intimidated by that because I don't remember things that well. If I don't use them I don't remember them and I know most people don't so I don't feel it's

Accepts her shortcomings academically and works around them/ not bothered by it

I: So, if they're like that you would just think...

R: I can look it up in a minute, you know..sometimes I wish I had a better memory for those kind of things...but...it's not, I just don't feel I'm a computer or anything, I don't worry too much about that.

I: So you don't have really unreasonable expectations of yourself. Are your expectations quite realistic?

Has realistic expectations-able to approach situations rationally & calmly

R: Yeah...I think so. I know that if I had to write a graduate exam, if they made me write it tomorrow, I probably wouldn't do very well because I don't remember everything. But if I went back and studied I'd be fine. It's just, I mean, how can you remember. Not everything stays in your brain that's the general idea of studying. I'm sure memorizing them wouldn't take very long because you've just have to, you know, you've memorized it once and you've learned it, it's just a matter

I

JOANNA

of refreshing your memory. But obviously, you're not a machine...

I: Do some people expect a person to be? How do you feel interacting with someone...have you had a professor's who has been short with you?

R: No, no...not that way. At least, if you don't try, like if you haven't looked it up and are asking dumb questions because you just don't feel like doing the work yourself, O.K. then they might tell you to go and look it up yourself.

I: But do you try not to do that?

R: No, I try not to do that, I try to find it myself before. They don't get testy, I think they understand if you don't know where to look...things like that, I've never had that problem in them getting upset about it because they're the same. They can't remember. I mean some are better than others too. Some of my friends were very knowledgeable and I think "How can they remember that and I don't" but in other areas I can remember things better or maybe... I think maybe I am a little more problem oriented than memorization and that can make a difference too. You can see a lot of variation in chemistry students as to what they find easy, what they find hard, what they remember and you know, sometimes I don't remember as much but I understand more.

I: Like approaches?

R: Yeah, that's right, so it doesn't bother me. Like some people will ...like my husband's uncle he's a science teacher in a small town and....he says, "Oh what's the structure of xylene?", I said I don't know...why would I know that. How would I know?

Acknowledges her own strengths and weaknesses - sees her weakness in memorization as a fact not a problem

(Positive, rational outlook)

→ This has only been a recent development since I've discovered that even professors don't know or remember everything nor do they expect us.

Doesn't want to worry about little details that can be looked up - "a waste of time"

- I: Why would I want to know? (Laugh)
- R: Yeah, that's right. That's not a very relevant thing to know whereas problem solving things are very important to know whereas the structure of an organic molecule can be looked up. Why would you want to know that? I just don't.
- I: He's probably just teasing you a little bit.
- R: Or, maybe he has just a different impression of what chemistry is all about. Like they'll say, "Oh you're a chemistry major, do you have to memorize the whole periodic table." No. Why, you think I'm going to waste my time memorizing the periodic table? You know, I can have one right in front of me. Why would I want to do that? That's just a waste of brainpower! (Pause) But that's more non-chemistry people. I did have to memorize it once, just a part of it. It was just so I could learn more of the groups. Even that wasn't too critical. It was a very minor part of the course. I think he just has a different impression of what chemistry is really about - that you have to memorize all these little things.
- I: So, you will accept the fact of your shortcomings as far as memorization but your not obsessed with it. That's probably where not being a perfectionist probably saves you because you'd probably be going crazy trying to memorize...
- R: Yeah,...it doesn't bother me, because I know I'll remember it if I see it again or you know if I have to. Like if I have to write an exam, I'll study for it and I'll know it for the exam or...it's the same when I'm in the graduate program, I'll be working with these things everyday, like one project everyday so I'll know everything about

A "sensible" outlook to life (as my mother would say!) - she won't try and overload herself with extraneous facts. It's important to her to get to the heart of the problem & that's where her energy is directed

that project that I need to know. And if I don't need to know other things then I won't remember them, I won't be able to it's just impossible.

I: Hmm Hmm...Do you get people who are the types that will bait you at all? Like colleagues who say "Oh, how come you don't know that or?" have you ever had anything like that?

R: No, no because they don't know either (Both laugh). If they bait me I just, I don't know...

I: What do you do if they bait you...have you ever had that.. Like you're so hot with your office up there?? Do you ever get anything like that?

R: No, no, nonothing like that....

I: You've got nice people there with you don't you?

R: Yeah, yeah..

I: But what happens if that does happen? Have you ever had anything close like that?

R: I mean...?I have.??ever had was from one chemistry student ... and if they ever say anything like that then I would say well, "What's your GPA?" you know, like I would because they shouldn't be saying that to me when I have a higher GPA than them.

I: So, would you say that...

R: Yeah, I would..

I: (Laughs) Oh, good for you.

R: Because I get really irritated. I don't know, because...

I: Have you had some antagonism?

She realizes that everyone has their own shortcomings. Accepts that her strengths make up for any weakness - her strong self-concept is coming through

Not afraid to assert herself - will not hesitate to fight "fire with fire" if need be

(Was this the case prior to your marriage Joanna - would you stand up like this?)

Yes, but perhaps a bit more now.

I

JOANNA

R: There has been and it's only in the last year or so. It's one particular person because his views and my views differ quite a bit on like, sort of the role of women and this kind of thing. His wife doesn't work and sometimes he's a little irritating that way...because he's actually very catty, like, "Oh, are you going home to watch soap operas." You know, give me a break! Or, "How come you're going home so early". It's just...buzz off you know, it's not your business.

ON WOMEN

Upset with people who limit women to a "traditional" role only (She is a feminist - she believes in choices)

I: What do you say to him?

R: Well, one time I was just furious. One day I was talking in general to my friends that my husband and I were going to get a cleaning lady and he says, "Well who's going to pay for it?" and he says, "Well you should pay for it because it's your duty?" and ooooh (grits teeth) you know, I'm sure my face must have just looked horrible because he apologized just immediately because I'm sure he saw how mad I was. I was just gasping I didn't even know what to say. Like, I don't know what he thinks I'm there for, that I'm just going to university for what? So there's been a few run ins that way... and he's really the only one like the rest of my friends really I think respect me and they don't think anything of it that I'm a woman. That makes no difference.

I: Well, you'll probably hit that attitude at some point so it's just as well to have a little taste, it gives you strength..

R: Oh, I just can't deal with it. I just get so angry like II think that's one very bad thing, I can't...I find it very hard when people condescend towards women or that women can't do this. I mean it's just as a rule. They're not even directing it at me. Because one time we were visiting

I

JOANNA

someone and it was an older lady and she was talking about her grand-daughter, how her granddaughter is riding horses and that now she wants to jump them and just how horrible that was. She's a little girl and she should be playing with dolls and that, I just was seething. I was just furious, you know, I didn't say anything...

I: Maybe it's because it was an older lady? If she was younger would you have said something to her. You probably were showing respect to her (Yeah, yeah) Let's say it was this fellow saying that.

R: Oh, I would have...I probably would have said something not that I was mad at him, but if it was ever directed at me I probably would be rude about it maybe. Because that, something like that really upsets me.

I: So do you feel quite indignant that anyone would even contemplate that someone wouldn't be able to do something just because they're female or male or whatever?

R: Yeah. Or that women have certain duties, whether they are a nuclear physicist, you know, or whatever they are, they still have to be the ones that are at home. Another time, "Oh, what are you going to do, put your kids in daycare?" in just such a horrible tone of voice. And you know, that's none of your business.

I: And just because children are at home doesn't mean they're going to get good care because daycare workers are paid to look after kids, they generally really like kids that's why they've gone into that area and often a child in that environment will receive as much or more stimulation.

R: Yeah, yeah...and I've read some things about that too that often the mother

I

JOANNA

that stays at home is with the baby all the time and is so busy with other things that their not really actually paying attention and giving quality time to the child and whereas if you're working when you come home then you can listen to what they have been doing all day and I think try to spend a little time with them sort of in a recreational way rather than just being around.

I: So, you don't hesitate to say things like that to someone if they're really riding you?

R: No, not at all. I don't know, I just can't understand that kind of attitude. It really infuriates me (Laughs).

I: O.K. (pause)...Oh...Let's say you were an adult student and hadn't had any chemistry in high school....would you say your high school background has stood you in good stead in university? Could you handle university fairly easily if you hadn't had that background?

R: No, I think it would be really difficult. It's so condensed here, especially if it's your first taste of the subject you only understand what has been taught in that short amount of time especially with the subjects that take longer to understand. I just don't think anything like French or, like I took a lot of French in high school, and if I hadn't taken that and come into university and tried to take French I just think the time span is too short and it would make it very difficult.

I: So did it help you having good teachers in school. I guess that's what I'm driving at. Are your teachers quite influential to you? Would you say they gave you a good start?

R: Yeah. Personally for me I really think they did. I think that for me it

I sense some concern about how the balancing act between career and family is going to work

(Is this how you feel Joanna - are you a little worried?)

I am wondering how it will work out for me. I don't know too many women who are now in the position I will be when I have children. Not really worried.

INFLUENCE OF TEACHERS

I

JOANNA

would have been difficult to come out with no chemistry...maybe not...it's really hard to put myself in that position....but, you know, you look at other people though. There's a lot of people who haven't done well in high school, even in their first year of university but they often do really improve and all of them amazingly like they can be straight "A" students by the end of their fourth year but I think that has more to do with maturity than anything so I think in that case really they haven't got a good background behind them because they didn't pay attention.

I: So does a lot have to do with personality do you think. With your own space your in while in school and the type of crowd you're in?

R: Yeah, well I think the maturity level you're at has a lot to do with it. Because this happens, especially a lot with men, that they don't reaJOANNAe until their third and fourth year that they have to make a living at this. I think girls realize it faster and are more conscientious about it especially in high school. So I think, for girls, high school is a very good preparation whereas I really don't think guys get as much out of it. They're not as concerned about it at that point in time. They're just not as mature. So for me it was very important but I can see people may not ? (get benefit from it)

I: Hmm, O.K. (pause) Let's see, did competition with guys at school ever bother you - did you ever feel they should win so you don't knock their ego? At school did you ever have any sense of that?

R: No....no. Some of these questions that you ask me I would never consider it.

ON COMPETITION

*She enjoys compet.
if it's taken in
a positive spirit
(eg. male friend in
univ. class - compete
for top marks) - is
this true Joanna?*

*Yes, it's a
very friendly
competition,
never really
acknowledged
but it is there*

I: Well, there are some girls that haven't got such a strong sense of themselves that are so oriented to wanting the boys to like them that they almost sabotage themselves. But you'd never, did you ever go through that?

R: No, No.

I: You'd never think of doing that.

R: No, because marks were very important to me all along and I didn't think that would make me any less attractive or anything. I just didn't think about that. It was just a part of me.

I: The fellow you went out with, was he quite bright?

R: No...he didn't do that well in school. Did he ever tease you about being an honors student? Not really...

I: It just bothered you when you went to university then.

R: Yeah, yeah...but, you know, he wasn't very supportive either. Like I was awarded honors and he didn't come and watch. You know, those awards ceremonies and that...so for him I guess it wasn't such a big deal..

I: But it didn't drag you down so you didn't do very well..

R: Actually my husband teases me about studying and that but he doesn't do it maliciously to make me stop because often you know, if I'm not studying he makes me study. (Both laugh).

I: And, if he wasn't you'd still be studying?

R: Yes, I think so...?(tape erased)

(After a short discussion I decided to put the tape back on as I felt the following question should be pursued)

What did getting high marks signify to you - in what way were they important?

Not bothered about associating with people who aren't honors students

(What traits did you like about your boyfriend)

Good marks meant:
 - success
 - that I was fairly intelligent
 - they really just felt good when I got them.
 - bad marks were quite devastating & weren't worth it.
 - options for me.

→ He was part of the friends I hung around with - fun!

I

JOANNA

I: Just for fun JOANNA, how much of yourself would you say is influenced by environment and how much is in your personality?

PERSONALITY INFLUENCES

VS.

ENVIRONMENT

R: It's hard to say because my mum encouraged me and so she set my environment and yet she's had an effect on my personality. But, mind you...I think my personality... like I'm fairly outspoken and that's a personality trait rather than an environmental kind of thing and I think that's got a lot to do with it. I don't know if I'm explaining myself and I don't know if that's what you want to know but I have a friend and she's always wanted to go to school for a certain thing and her parents discouraged it and now her husband discourages it and I just feel like shaking her and saying you just do what you want. Like tell him you're going to go and that's it... but she's not firm enough and she's just, I don't know whether she doesn't want to make waves or she doesn't want to, you know....and I don't know whether part of that is environment because she's got people not wanting her to go but part of her is personality for not standing up to them.

I: Because you have enough sense of self to stand up to that problem later and I'm wondering if that came from your mother who was so encouraging. What if she hadn't been, what if she had been more like your Dad, more oriented to your brothers, how would you have felt?

R: I think I would have been less sure of myself and wouldn't have felt as bad about not going to university because I wouldn't have had the encouragement.

I: Would you have gone do you think?

R: That's a hard question..Umm....If my marks had been equivalent, yeah I think I would have.

I

JOANNA

I: But you would still want the teachers to think well of you, maybe you would have got your encouragement from other sources.

R: Yeah, not so much from my Mum as I would have got it from other people and I think...it's just that she probably made me more firm in it. In that I'm more willing to stand up for it. Whereas if I hadn't had her encouragement and had a boyfriend who also wasn't encouraging I may have felt well...maybe I shouldn't.

I: Hmm...Hmmm

R: Well, it's really hard to say because I don't whether I would have wanted it if my environment had been a lot different. It would have been very negative, like I said, that guidance counsellor caused me to turn down physiotherapy. So had my parents been very negative about university at all, I probably wouldn't have gone.

Believes for herself that her environment was the dominant influence in her decision making

I: You might have gone to work?

R: Yeah, if they had had that attitude I probably would have, so I think it's very...cause who do you listen to, you know at that age, it's your parents. (pause) Or you know, if they felt that you couldn't afford it and you shouldn't go and take loans and that. I think your parents have a lot of effect on you.

Parent influence is important

I: If the guidance counsellor had been positive and say your parents had been negative. I'm wondering if those kids that don't come from positive homes do you think teachers and guidance can really help to offset that?

Also teacher influence

R: Yeah, I think so ...yeah...because I don't know whether parents...I don't think so many parents are very negative it's just they're not very positive. It's not that they say "Don't go" but

I

JOANNA

they don't say "Go, go"....you know, so I don't know whether it's that they're real negative it's just that they're neutral, like non-encouraging and...I think guidance counsellors because they're the ones who are really right there and say it whereas teachers are encouraging but in more subtle ways.

I: They don't lay out all the careers.

R: No, no...it's the guidance counsellor who really is the one, especially at that age, you know when I was in high school I thought adults were infallible I thought they knew everything and it's only recently that I realize that's not true, you know, my professors are not perfect and they don't know everything. They are a bigger influence than I think they realize.

She sees the role of the Guidance counsellor as critical in encouraging high school students

(Pause)

I: Well, thanks Joanna - I guess that wraps it up.... thanks a million!

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END OF TRANSCRIPT FOUR