

Self-Efficacy: Multiple Intelligences and Canadian Students' Academic Performance

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Abstract

This study investigates the relationship between self-efficacy, multiple intelligences and the experiences of Canadian students in academe. Using a predominantly qualitative methodology and a sample of 20 participants, themes that were drawn out were multiple intelligences, and academic performance. This inquiry validates the premise that generally higher self-efficacy levels are closely affiliated with multiple intelligences (one or more) resulting in elevated academic grades. Some students who acquired slightly lower grades seemed to possess lower levels of self-efficacy. Gender, ethnicity, and disability were inconsequential in the findings. The analysis concludes with recommendations to propagate learning strategies to enhance the academic performance of university students.

Key words: self-efficacy, multiple intelligences, academic performance, students, Canada

Introduction

Self-efficacy refers to what an individual is really capable of doing (Bandura, 1980). The renowned psychologist Albert Bandura (1994) further explains: "Self-efficacy beliefs determine how people feel, think, motivate themselves and behave" (p. 1). Perceived self-efficacy denotes people's beliefs in their competencies to emit given accomplishments (Bandura, 1989). The concepts of self-efficacy and perceived self-efficacy are an intricate part of Bandura's social-cognitive theory of human functioning. According to this theory, a person's level of self-efficacy is discursively related to human agency and comprises a three-fold construction between the individual, behaviour and the environment (Bandura, 1980). Self-efficacy, both general and perceived, may be linked to types of multiple intelligences in students' academic experiences (Gardner, 1989; Zarei & Taheri, 2013). Studies have supported the view that the primacy of high levels of self-efficacy and multiple intelligences have been found in high school students' superior academic achievement (Parez, 2007; Schwarzer & Jerusalem, 1995). As well, the generality of multiple intelligences has been known to positively improve the overall academic performances of students (Parez, 2007; Schwarzer & Jerusalem, 1995).

Despite the numerous studies on self-efficacy and the academic experiences of students, no study has yet been done on university students in Canada as a whole. This study mostly uses the qualitative method to examine the relationship between self-efficacy and academic experiences of students in Canada, more specifically, bringing together levels of self-efficacy, multiple intelligences, and academic performance. The argument focuses on the experiences of participants in this study being positively related to self-efficacy, multiple intelligences, and academic performance.

Theoretical framework

Self-efficacy is defined as a person's judgement of his/her ability to execute a specific course of action (Bandura & Journein, 1991; Young & Kline, 1996; Lee, 1983; Desharnais, Bouillon, & Godin, 1986; Boufard-Bouchard, 1989). This well-researched concept has been associated with assertive training (Lee, 1983), pain management (Young & Kline, 1996), exercise routines (Desharnais, Bouillon, & Godin, 1986), and academic success (Boufard-Bouchard, 1989).

The ability or competence of self-efficacy is also seen to promote judgement-related aspects of performance that have a powerful impact on personal goals, self-esteem, and the usage of analytical strategies (Bandura & Journeen, 1991).

There are two forms of self-efficacy – task-efficacy and outcome-efficacy. Task-self-efficacy relates to a person's belief that they are able to perform a specific task. Outcome-efficacy is the conviction that the desired consequence will take place as an effect of a particular course of action (Young & Kline, 1996). The most successful performance generally comes from the highest level of functioning. Those who have high task self-efficacy but a low outcome-efficacy are confident in their abilities but do not expect the desired outcome to be achieved. Hence they often seek to change their environments in order to achieve the outcomes that they are looking for. Those who have low levels of task self-efficacy but high outcome-efficacy believe that the outcome they desire is available and achievable. Yet, sometimes, these individuals blame themselves for being in such environments and for not achieving their goals (Young & Kline, 1996). They often compare themselves to others who have attained their goals, and develop feelings of inferiority. This negative attitude may sometimes result in depression or depressive symptoms (Young & Kline, 1996). All the same, levels of self-efficacy may be enhanced by focusing on positive experiences that increase an individual's ability to perform a task efficiently and competently (Bandura, 1980).

Literature review on self-efficacy and multiple intelligences

Research studies validate the notion that self-efficacy and multiple intelligences are strongly linked (Zarei & Taheri, 2013; Beichner, 2011). According to Howard Gardner (1989) each individual is unique in possessing some type of multiple intelligence. Gardner (1989, pp. 4-9) propounds eight different types of intelligences:

1. **Visual/Spatial** - Involves visual perception of the environment, the ability to create and manipulate mental images, and the orientation of the body in space.
2. **Verbal/Linguistic** - Involves reading, writing, speaking, and conversing in one's own or foreign languages.
3. **Logical/Mathematical** - Involves number and computing skills, recognizing patterns and relationships, timeliness and order, and the ability to solve different kinds of problems through logic.
4. **Bodily/Kinesthetic** - Involves physical coordination and dexterity, using fine and gross motor skills, and expressing oneself or learning through physical activities.
5. **Musical** - Involves understanding and expressing oneself through music and rhythmic movements or dance, or composing, playing, or conducting music.
6. **Interpersonal** - Involves understanding how to communicate with and understand other people and how to work collaboratively.
7. **Intrapersonal** - Involves understanding one's inner world of emotions and thoughts, and growing in the ability to control them and work with them consciously.
8. **Naturalist** - Involves understanding the natural world of plants and animals, noticing their characteristics, and categorizing them; it generally involves keen observation and the ability to classify other things as well.

The above intelligences cover broad areas of expertise and skills including efficacy in sports (Ermiş & Imamoglu, 2013), music (Stark, 2004), existential and moral intelligence, and academic performance. In addition to the above eight types of multiple intelligences, Visser, Ashton, & Vernon (2006) proposed the *g* factor, a single central type of intelligence, taking into consideration non-cognitive aptitudes or personality traits.

While they are often separated, the multiple types of intelligences and self-efficacy are positively correlated. In a study of teachers in China, it was found that students who were taught a class in mathematics or art in more than one way and with the use of 2 or more multiple intelligences received higher grades than those who were instructed with the use of only one type of intelligence (Beichner, 2011). Career-wise intelligences are strongly correlated with the higher strata of multiple intelligences along with personal interest, quality of home life, and education. These influences have roles in increasing the practical aspect of academic performance and in motivating the choice of suitable careers in students (Taylor, 2007).

The promotion of multiple intelligences in students has been associated with specific courses that are taught at the university level. A study of 475 college students in Baltimore indicated that interpersonal and verbal-linguistic intelligences were deemed the most favorable in academics, a factor to consider while drawing up curriculums (Parker, 2008).

However, in contrast to this finding, it was found in US and non-US students, only 23% preferred the verbal-linguistic intelligences as the most effective way to learn; over 70% preferred kinesthetic intelligences, and 47% favoured social intelligences (Griggs, Barney, Brown-Sederberg, Collins, Keith, & Iannacci, 2009). Computer programming studies have shown that students' positive attitudes were affected by multiple intelligences (Stewart-Iles, 2009). As well, in writing, for example, interpersonal intelligences, verbal-linguistic intelligences, and existential intelligences correlated best. Spatial and kinesthetic intelligences were important but applied to a lesser extent (Rad, Khogasteh, & Kafipour, 2014). These different types of intelligences then contribute to higher levels of self-efficacy.

Science students were seen to be less sociable but more scholarly and intellectual, an indication of mathematical-logical intelligence (Sanchez-Ruiz, Perez-Gonzalez, & Petrides, 2010). Practicum students were seen to have the ability to teach with multiple intelligences, particularly when problem-solving questions arose (Petruda, 2014). Males in the sciences were seen to have more self-control, drawing a parallel to greater intrapersonal intelligence, self-efficacy, and improved academic performance. Students with high levels of multiple intelligences and self-efficacy connected with non-conformity, and, ironically with social-extroversion (Sanchez-Ruiz et al, 2010).

Generally, male students exhibited higher intelligence levels in the existential, spatial, and mathematical/logical spheres while females demonstrated more verbal/linguistical, and interpersonal skills (Furnham & Ward, 2001). Male students fared better in visual and kinesthetic intelligence, whereas female students scored higher in intrapersonal and verbal intelligence (Ermis & Imamoglu, 2013). Females who were involved in individual sports were more efficient in musical and visual intelligences over a period of time (Ermis & Imamoglu, 2013). Given that self-efficacy improves over time (Bandura, 1980), it is likely that improvements can be made in sports-efficacy. These findings have been applied more strongly to females who performed well both in individual and group sports (Ermis & Imamoglu, 2013).

Regarding musical intelligence, it was found that in a study of 255 college students, singers had significantly superior musical and linguistic intelligence than did non-singers (Stark, 2004). Male singers possessed significantly higher musical intelligence levels than did female singers. Special needs students who had issues with reading and writing in fast-paced class environments demonstrated greater difficulty with verbal-linguistic intelligences. However, personal kinesthetic training including a dance program such as the Jacob's Pillows program have been seen to help, indicating that the exercise of kinesthetic intelligence boosts academic performance, classroom interaction, and self-efficacy ratios (White, 2015).

The concept of self-efficacy and its link to multiple intelligences has been applied to other cultural groups in parallel studies, despite the fact that each culture has its own varieties and intricacies in forms of multiple intelligences (Massalski, 2010). In a study of 510 Chinese students in Hong Kong, multiple intelligences scales in the areas of verbal-linguistic, mathematical-logical, interpersonal, intrapersonal intelligences and leadership skills were looked at (Chen, 2015). It was found that mathematical-logical intelligence was most linked to achievement, and future planning (Chen, 2015). These compound effects were strong when leadership skills were taught at an earlier age, suggesting the notion that the use of multiple intelligences promotes governance competencies (Chen, 2015). Hence, it is necessary to take into account the varied forms of multiple intelligences of students while designing and teaching courses at the university level (Griggs et al., 2009). Considering this viewpoint will most likely enhance the academic performance of university students. This qualitative study will look at the relationship between self-efficacy levels, and multiple intelligences, and its impact on academic performance in a sample of Canadian students.

Methodology

This study utilized the online-interview method in collecting data. An interview, according to Beck and Perry, (2008), refers to a constructed form of conversation in which the researcher asks questions and where the participant is able to provide answers.

a) Email/online interviewing

The definition of an online interview would entail that it is any exchange that can take place through a digital means that is accessible (Meho, 2006). This can include a telephone interview but also may consist of one through Skype, email, or texting. The purpose of an email interview would be to obtain information by contacting an individual and asking specific questions through a questionnaire.

It is created to reduce possible errors in answers as well as lack of clarity, to increase both its reliability and its validity. The structuring of the questions includes instructions, recommendations, and information relating to a discussion. The online interview is semi-structured with the participant having the freedom to provide as much information and context as desired (Beck & Perry, 2008).

b) Questions

The first group of demographic questions related to data on gender, age, ethnic background, marital status, place of residence, employment status, year of study, and academic major. The second group consisted of specific questions on multiple intelligences connected to academic work, using “a mixed-mode approach” (Dillman, Smyth, & Christian, 2009 in Goodwin & Goodwin, 2013, p. 422; Meho, 2006).

Questions relating to social self-efficacy were selected from Perceived Social Self-Efficacy (PSSE) scale such as how well one comprehended when others needed help, how well one could interact with others, and how these relationships contributed to academic performance (Di Guinta et al., 2015). Questions from self-efficacy and multiple intelligences were obtained through the appropriate scales on mathematical procedures and visual stimuli (Parez, 2007). The scales relating to mathematical operations involved questions relating specifically to the ability to carry out tasks such as addition, subtraction, multiplication, and other practical as well as theoretical mathematical tasks. Visual stimuli questions in the scales referred to questions relating to geometrical concepts of mathematics, and the practical and theoretical implications thereof. Questions relating to academic performance and self-efficacy were selected based on the entire course curriculum and level of performance. Since the study was mainly qualitative in nature, there are no causal or numerical correlations in the findings. All patterns or even frequencies drawn from the findings are simply positive qualitative relationships.

c) Sample

In the study N = 20 University or college students were interviewed online. There were N = 11 males and N = 9 females. All participants were single. The participants were between the ages of 19 and 34 years of age. N = 3 were 19 years old, N = 1 was 20 years old, N = 3 were age 21, N = 6 were age 22, N = 5 were age 23, N = 1 was age 27, and N=1 was 34 years old. Eighteen participants (N=18) identified themselves as Caucasian, 1 as Indo-Canadian, and 1 as Native-Canadian. There was N=1 participant from Nova Scotia, N = 3 from Alberta, N=1 from Saskatchewan, and N = 2 from British Columbia, N = 5 participants were from New Brunswick, N = 1 was from Nunavut and N = 7 were from Ontario. N = 9 were visually impaired, the only non-sighted participants who were willing to take part in the study. The rest N = 11 were sighted participants. The findings in the study indicated that there was no difference between visually impaired and sighted students.

N = 16 participants were employed and N = 4 were unemployed. N = 3 were in their fourth year of study, N = 4 were in their third year of study, N = 3 were in their second year of study, N = 3 were entering first year, N = 1 was in their 5th year of study (Master’s degree) and N = 6 completed their degrees. With regard to disciplines, Optometry (N=1), Graphic Design (N=1), Commerce (N = 1), Psychology (N=2), Social Work (N=1), Computer Science (N=2), Accounting (N = 1), History (N=2), Rural Development (N=1) Engineering (N = 1), Law (N = 1), Computer Engineering (N = 1), Mathematics (N=1), Criminal Justice (N=1), and participants with no majors (N=3).

d) Procedure

The sample data was obtained by contacting acquaintances known to the researchers both through their network and mailing lists. *Convenience* and *quota* sampling methods were used (Salkind, 2009). Convenience sampling simply included individuals whom the researchers knew and contacted through their network. Quota sampling “selects people with the characteristics [the researcher] wants” (Salkind, 2009, p. 98). The potential participants consisted of persons on the mailing list from the Canadian Federation of Blind Students. They were contacted either through Facebook, the phone, email, and/or Skype. A total of N = 80 were contacted between the period of June 2015 and July 2015. The study was open to any student over 18 years of age and those who were willing to sign an informed consent form.

Each potential participant who was initially approached was either sent an email or a Facebook message. Those who emailed the researchers were sent the letter to participate and the questionnaire. The researchers explained that they were looking for as many participants as possible for the research, and that their participation would be greatly appreciated.

They were informed that the questionnaire would only take approximately 30 minutes, and that they should include as much detail as possible for the answers, and finally that their information would be kept confidential.

Interested participants were sent the questionnaire package including the letter, informed consent form, and the questionnaire itself. For ease of completion the researchers posted the questionnaire, letter and the consent form in the email message. This was done to give the participants the option of either filling in the document or completing the questionnaire within an email message, allowing for flexibility in case one of the methods worked better. They were informed that they would be asked basic demographic questions and specific questions about their academic study, multiple intelligences, skills and aptitudes. The participants were informed that there were no risks associated with participation in the study, that participation in the study was voluntary, and that they could withdraw at any time if they chose to. Participants were given the opportunity to ask the researchers any questions they may have or raise and any concerns that were addressed by contacting and conversing with the researchers either through phone, email, Facebook, or Skype.

e) Method of Analysis

The analysis of data was conducted at two levels – first analyzing personal accounts of the students such as *what* was said and possibly *why* it was said. Second, the analysis applied psychological studies to the personal accounts to substantiate and endorse the relevance of the data. Specifically, the data analysis was carried out in relation to the self-efficacy levels, multiple intelligences and the academic achievement of participants.

The email interview data were numbered for easy identification on the basis of gender, age, discipline and grade point average. Direct quotes that were forceful, persuasive, convincing and suitable were highlighted and underscored for referencing. The theme that was drawn out related specifically to the topic under study, namely self-efficacy, multiple intelligences, and academic performance. Self-reported alpha grades or grade point averages indicated each participant's level of academic performance.

Findings

From the data collected, it was found that *all* participants (N = 20) possessed advanced language skills which they could use to communicate in spoken and written forms. Many thought that it was necessary in the competitive educational context, whether they used the skill extensively or whether the skill really made a difference. Physical exercise was considered important (N=16) as it helped in concentration, taking breaks from studies, emotionally enabling students to cope, relieve stress, and maintain a healthy lifestyle. Thoughts of nature empowered many participants (N=16) to relax, calm down, be inspired, and concentrate on studies. Some (N= 4) did not think that nature helped them focus on studying. Most students (N=18) in the study preferred listening to music to relieve stress or change their moods, while others (N=2) thought that it was a real distraction while studying. Evaluating oneself was considered by many (N=14) to be helpful in self-reflection. Self-evaluation fostered logical thinking, personal growth, and studying techniques for many participants. Others (N=6) found the self-evaluation process ineffectual or were unaware of its real value. Regarding proficiency in mathematics and statistical intelligence, four (N=4) stated that they were competent in mathematics and statistics while seven (N=7) noted that these subjects were *not* their strengths. Only 4 (N=4) participants out of the 5 (N=5) responded positively to the question on existential intelligence and link to education.

The following were some of their comments with respect to the various categories on multiple intelligences. The various categories were a) language skills, b) physical exercise, c) thoughts of nature, d) listening to music, e) evaluating own self, personality and character, f) mathematical and statistical intelligence g) existential intelligence and link to education Information in brackets indicates the number of the participant, gender, age, and self-reported alpha grade.

a) Language skills

All participants (N=20) noted that they possessed strong language skills which helped them to score better marks, whether they extensively used them or not.

I have a strong grasp of English which has been incredibly beneficial in my studies. Had I studied in French, I would not have been nearly as successful as I was (F3, 22 years, A)

In social services we are taught a specific language and to think about how to say something to someone when trying to help that person or deliver a message, because now our everyday language that we use may not be so good to use anymore.

Any word if used incorrectly or in the wrong context can severely harm a person. So we are taught to be more aware of our language and how we speak. This has helped me out for sure. I no longer use certain words myself anymore (M10, 23 years, B)

In my field, talking to people is about 90% of what I do (F4, 21 years, B)

It is a hit or miss. I've written papers before using the most extensive language I had and received a C grade. And other times, I've used language lesser to my ability and received an A grade (F2, 20 years B)

In world history, there are many different names, places, expressions and of course terminology. Without learning these different words, which is sort of another language, you cannot perform well. (M5, 22 years, B-)

Fairly well, thus far, but a higher level may be required for law (M3, 34 years, A-)

The better I can communicate, the better people can understand me and help me (M4, 22 years, B)

Language skills are not immediately useful to my program. Maybe when talking to professors it is useful to know all the definitions, but I don't think that counts as language skills, or knowledge of the material (M6, 23 years, A+)

My ability to explain my directions, knowledge, and thoughts is essential to my performance in my program (F7, 23 years, A)

Language assists in comprehension of material (F8, 23 years, A)

Hard to say. I am English speaking, it is my mother tongue. Therefore, I suppose this may be an advantage over someone whose mother tongue is not English (F9, 19 years, A)

Excellently (M11, 22 years, C+); Communication is my better strengths (F5, 19 years, C)

The following student (M9) stated that even though he possessed strong language skills, other issues contributed to his inadequacies in achieving a higher grade. Another student (M2) felt that language skills really did not make a difference in academic achievement in his discipline.

As the visible majority member speaking the primary language, my skills are not the deciding factor, it is the shortcomings of others that can cause issues (M9, 21 years, B)

Doesn't make a difference in my discipline (M2, 27 years, B)

b) Physical exercise

In this category, most (N=16) students concurred that physical exercise helped in studying and improving their grades, relieved stress or simply contributed to giving them a break from academic work. Some of their comments were as follows:

Yes, healthy body, healthy mind, exercise aids and blood flow and brain function (M3, 34 years, A-)

Yes, because it helps clear my mind and calm me down if I'm stressed (M11, 22 years C+)

Yes, it clears my mind, relieves stress (M4, 22 years, B)

Most of the time (F2, 20 years B)

I love to work out whenever I can. It helps me release rage and stress more than anything else. Plus I like to feel good about myself and also I'm on a jujitsu team in Truro Nova Scotia. So it pays off to be in good shape (M8, 23 years, B-)

It helps take your mind off the immediate problems but it also trains you to continuously attempt and push yourself further to accomplish what you set out to do (M5, 22 years, B-)

It gives me energy to get through the day of classes (M2, 27 years, B)

For me, physical exercise is a required part of my lifestyle; without exercise, I have issues with concentration and by ability to emotionally cope with stress (F7, 23 years, A)

I have always been active, so I have nothing to compare it to. In general, for everyone, a healthy lifestyle helps with concentration; this, it is not one thing, but a variety of lifestyle choices that would help improve academic success (F8, 23 years, A)

I use exercise more as a break from working, to stop thinking about my courses. I have never had a new idea while exercising (M6, 23 years, A+)

The following students (N=4) found exercise adverse to studies, yet helpful in giving them a much needed break. Other students either had physical injuries or simply found exercise more stressful.

It does not help me study, but it would help me complete work and think as I could take an intense break from studying (F1 22 years, A)

Not really, but it is always a good idea (F2, 20 years, B)

I do not participate in a daily exercise routine, as I have an injury. I plan to start one again soon (F4, 21 years, B)

It does not do any of these things. In fact, it is just one more stressful thing to think about (F5, 19 years, C)

c) Thoughts of nature

When asked if thoughts of nature helped in bettering their levels of self-efficacy and their academic grades, some participants (N=16) made the following comments:

It helps a lot to have breaks from studying to go outside for a brief moment (female, 19 years, B); it does not help me at all. (F3, 22 years, A)

It is useful for inspiration (F2, 20 years, B)

Nature provides inspiration often, but nature also has many lessons and morals involving the natural order of animals or weather--these lessons and morals in nature help with an alternative approach to critically solving problems (M10, 23 years, B)

Helps me relax my thoughts when I am in a natural environment (M1, 21 years, B)

Being in nature is relaxing for me. Being around dogs is relaxing. Both help with studying (M4, 22 years, B)

I have never really analyzed how thoughts of nature affect my studying or academic performance, but looking outside when I study tends to calm me down (F7, 23 years, A)

They do help me (M9, 21 years, B)

Visualization of a calmer place can put your mind at ease. Meditation (F2, 22 years, B)

They help me stay calm when I always seem to be frustrated with people (F5, 19 years, C)

Perhaps helps to relax; but other than that not something I put a lot of time into (F8, 23 years, A)

The following participants (N= 4) did not really think much about nature, found thoughts of nature distracting to their studies, or a hindrance, (particularly the snow) to move around.

As much as I enjoy nature, I find it distracting when trying to study. I perform best when I focus entirely on the material (M6, 23 years, A+)

I don't really think about nature that much, the only thing I will say here is that the snow and ice in the winter can make it pretty difficult to get around especially with a cane. Other than that I don't really think about nature (M10, 23 years, B)

I have never thought of those things to help focus on studying (M2, 27 years, B)

I don't know; not something I focus on really (M3, 34 years, A-)

d) Listening or playing music

When asked if listening or playing music was helpful to studying, the following were some of the comments of most students (N=18).

I absolutely love music, like I'm always listening to music. I find music kind of helps me get into the working mode. Sometimes I'll even listen to music while working on assignments. I just love music. I have a guitar that I will sometimes play with when I'm feeling musical (M10, 23 years, B)

Listening to music is a consistent habit while studying my school notes or attempting to understand the material. There has only been a few occasions of creating music in the form of rhymes of study terms, tapping a pencil rhythmically that has assisted in absorbing study material. Playing guitar and learning how to accomplish different sounds does teach another level of critical thinking and a form of kicking back and relaxing (M5, 22 years, B-)

Yes, a style of electronica called goa trance is generally calming and it helps me concentrate when I don't feel like studying. I play the piano and it helps me relax. I also listen to death metal, black metal and doom metal. I listen to those genres when exams are done as they help me relax (M11, 22 years, C+)

It helps to keep me from being distracted. Also helps my mood (M2, 27 years, B)

A little in that it helps to lower stress which can have a positive impact (M3, 34 years, A)

Listening to music allows me to zone the world out and focus on work for extended periods of time (M4, 22 years, B)

I enjoy listening to classical music while studying (music with lyrics can be too distracting), and I find that can be calming. I do not play any instruments (M6, 23 years, A+)

I find that listening to instrumental soundtracks helps me focus because it cancels out small noises that would otherwise distract me. I also listen to white noise while I study to block out background noises like TVs, people chatting (F7, 23 years, A)

Playing music while working helps as it can suppress background noise (M9, 21 years, B)

I frequently take music breaks to sing. It's part of my self-care (F3, 22 years, A)

Yes, I tend to listen to music whenever I'm working (F5, 19 years, C)

I hate quiet atmospheres, so I need music or talk radio for the most part (F8, 23 years, A)

The following students (N=2) found music distracting and preferred a quiet atmosphere while studying.

No, I find it distracts me (F9, 19 years, A)

No, music is distracting, I need to study in silence (F3, 22 years A)

e) Evaluating own self, personality, and character

Self-evaluation as a process was looked at in diverse ways by the participants. Many (N=14) students found the process interesting and insightful. Personality tests and visual learning techniques were also viewed favourably. Others (N=6) had not really thought about evaluating themselves in the presence of others around them. The following were some of their comments:

Some courses, such as my leadership courses required self-reflection so that assisted me with assignments. If I did poorly on anything, I could successfully identify what my problem was (e.g. not studying for enough time properly) and not make the same mistake again the next time (F3, 22 years, A)

Studying certain academic material can reveal what resonates with yourself and you certainly can find yourself forming opinions and beliefs. If you identify strongly with a certain topic then you will remember it very well and vice versa with subject material that does not resonate with your character. Taking it - personality test or online quiz to determine which character in a fictional universe you relate to - is very fun perhaps will inspire you to tackle your course material how the character you related to would (M5, 22 years, B-)

Yes. All my life I have had a curious mind and have been a logical thinker, and I have a love for all sciences along with a thirst for knowledge (M11, 22 years, C+)

Self-reflection is important for personal growth. Improving who you are as a person will benefit your academic performance (M4, 22 years, B)

I find that realizing I learn visually has helped me change my studying techniques to better suit how I learn (F7, 23 years, A)

These students, even including some better performing students, (N=6) looked negatively at the self-evaluation process as the practice fostered discouragement and despair. One of them really did not know how it would affect her (F8).

I hate evaluating myself because you don't want to make yourself look really good...but you also don't want to make yourself look like absolute crap so it's hard to evaluate yourself. Or at least I find it tough (M10, 23 years, B).

I've never compared my performances in courses where I do self-evaluate and those where I do not. If I had to guess, I would say I perform better when I take a step back and examine my situation and character (M6, 22 years, A+)

Not at all (F5, 19 years, C); No (F7, 23 years, A); Don't know (F8, 23 years, A)

I don't think so. Unless I am not doing well and feeling down on myself (severely), then my grades and motivation are certainly affected (F2, 20 years, B)

f) Mathematical and statistical intelligence

These four participants (N=4) stated that they were fairly proficient and/or were strong in basic statistics and mathematics.

I am very proficient at basic mathematics (algebra, logic, BEDMAS, etc.) but I do not have a firm grasp of calculus. I am not good with statistics, though I can interpret basic economics statistics and things such as mean, median, and range. (F1, 22 years, A)

I use statistics and mathematics in analyzing data for experiments conducted in chemistry, biology, physics and psychological experiments and correlations (M11, 22 years, C+).

Having a strong understanding of basic mathematics (grade 12 pre-calculus), algebra, and logic was incredibly beneficial in my program. I needed it in many of my business courses. (F3, 22 years, A)

Yes (M6, 23 years, A+)

The following seven participants (N=7) stated that they were *not* particularly competent in mathematical and statistical intelligence, possibly because they were in the arts disciplines.

I received a B- in pre-calculus and never took statistics. If I had the time and motivation to work at these, then I could be good. (M5, 22 years, B-)

I am not good at math or statistics. I can do my basic adding and subtracting, dividing and multiplying but that's pretty much it nowadays. (M8, 23 years, B)

To an extent yes. It's not one of my strengths though. (M4, 22 years, B)

Not very good (M2, 27 years, B); No (M1, 21 years, B). Average (F7, 23 years, A)

I'm average at these subjects. (F8, 23 years, A)

g) Existential intelligence and link to education

Existential intelligence refers one's knowledge about the meaning of life and death (Gardner, 1989). The four out of the five participants (N=5) who responded to the link between existential intelligence and education answered with the following comments:

It would depend on how you are defining success; if it is in grades, finances, personal understanding and satisfaction or all of the above. I suppose I never really thought of my success and my learning being linked before: success is not taught. (M5, 22 years, B-)

It's very important to understand the link of your education. Specifically in the social services field it's much more than just having a job. If just having a job that you get money is all that matters to you then you shouldn't probably be in the social services field of work. In this line of work your clients should always come first. It's not about you, okay you and all your crap that you may be dealing with ends at the threshold of college. First term of social services is a chance for you to confront all that painful stuff you're dealing with and to move on. After that it's not about you and if you can't look past yourself or get past the looking glass then you sure as hell don't belong in this field of work.

Because you are only going to hurt your clients, if you can't help yourself then you can't help others who are looking for someone to help them. (M4, 23 years, B)

Without training [in existential intelligence], I would not be able to do what I do every day; so in the end my teachings were the stepping stones to my career. (F2, 20 years, B);

In my schooling, all the subjects I am taking pertain to my profession, so my success is directly linked to understanding the meaning of my education. (F3, 22 years, A).

This student (M7) saw no link between existential intelligence and education.

I don't consider them linked in any way. (M7, 22 years, A)

Most of the above comments in the assorted categories of multiple intelligences indicate the connection to higher levels of self-efficacy and concomitant academic performance.

Language skills helped in writing, expressing thoughts, communicating, and incorporated knowledge accumulation (N=20). Physical exercise aided in releasing rage and stress, being in good shape, clearing one's mind, and in emotionally coping with academic work (N=16). Thoughts of nature contributed to ease most participants' moods (N=16). Listening to music was a consistent habit for some (N = 18) while others found the activity distracting (N=2). Some participants did not like to evaluate themselves (N=6) while others found self-reflection as being vital for personal growth and motivation (N=14). Those students who had these multiple levels of intelligences, definitely were at an advantage over those who did not. Consistent with Howard Gardner's categories (Gardner, 1989, 2006), students who possessed these various forms of multiple intelligences developed higher levels of self-efficacy contributing to better academic performances. Further, students who seemed to exhibit existential intelligence with link to education (N=4) also seemed to indicate elevated levels of self-efficacy.

Students who performed in the higher grades generally possess multiple intelligences and were inclined to perform at a higher academic level than did those who used only one form of intelligence (Feichtner & Davis, 1984). Research has endorsed the notion that self-efficacy has its impact on multiple intelligences and academic performance (Sanchez-Ruiz et al., 2010). This finding confirms the premise that the existence of multiple intelligences raised self-efficacy levels, leading to better academic performance (Motlagh, Amrai, Yazdani, & Abdrahim, 2011). Other studies have confirmed positive linkages between self-efficacy, musical intelligence, exercise, and academic performance (White, 2015; Griggs et al., 2009). Davis (1998) suggests in his study that several students developed carefree emotions in their bonds with nature and music Ernis and Imamoglu (2013) learnt in their study that existential intelligence in life's meaning and vocation was present. A study of elementary school students, in grades three to five, demonstrated that using mathematical skills improved academic grades (Dillihunt, 2004). Here, self-efficacy levels were linked to the manner in which these elementary school students used their numerical skills impacting leadership abilities and overall academic performance (Dillihunt, 2004; Murphy, 2002).

Thus, possessing various skills in multiple intelligences contributed to higher echelons of self-efficacy (and vice versa) and an improved standard in academic performance. Students used music to concentrate and work towards achieving an enhanced academic grade. Understanding course content, self-evaluation, and introspection were strong ties that augmented academic performance. These strong attributes could assist in improving professional demeanour and career accomplishments.

Implications and Conclusion

The analysis of the study provides connections between levels of self-efficacy, multiple intelligences and academic performance. Most participants in this study possessed higher levels of *multiple intelligences* (N=14-20) in the verbal-linguistic, musical, visual-spatial and body-kinesthetic spheres. All (N=20) had a strong grasp of spoken and written English, most exercised regularly (N=16), connected with nature (N=16) and listened to music (N=18). Some (N=14) were able to evaluate their own personality character and traits for personal growth and progress. Science and engineering students (N=4) professed high mathematical and statistical intelligences. Some (N=4) attributed academic success to existential intelligence.

Consistent with the findings in this study, research in North America (Taylor, 2007) and China (Beichner, 2011) validate the notion that multiple intelligences, or a variety of skills found in students, did play a significant role in transmitting higher levels of self-efficacy and grade point averages (Zarei & Taheri, 2013). However, Pretz and McCollum (2014) argue that global self-perception of creativity may not necessarily reflect actual resourceful performance.

Strengths and limitations of the study

The main *strengths* of the study relate to the use of the “mixed-mode approach” in methodology, drawing out the theme of multiple intelligences from interview data, and the analysis of the direct quotes of the participants. The sample size of 20 participants across Canada was an added strength. Other assets of the study pertained to a gender balance and inclusions of ethnicity, and disability in the sample.

Regarding limitations, the grade point averages provided in this study were specifically self-reported alpha scores and not official records obtained from post-secondary institutions. Therefore, the accuracy of the information may have been subjective and hinged on the honesty and memory of the participants. There were differing levels of education, work experience and disciplines which might have had an altered outcome on the findings.

The email questionnaires caused the participants to give briefer answers such as “yes” or “no” to some questions. The researchers could not ask for instant elaborations as would have been the case in face-to-face interviews. Many of the participants personally knew the authors on a social level, or as an acquaintance, and the answers to some questions may not have been sincere.

Recommendations

There are several *recommendations* that would be beneficial to students, professors, and policy makers as a result of this research study. Listening to music in the background sometimes helps academic performance. The professor may either play music in class or allow students to listen to such music in non-testing situations. Listening to music during individual study may be beneficial to some students. Some students performed best academically while listening to more music. One participant stated that listening to music helped him reduce stress and perform better (M3, 34 years, A). Another participant with an A+ stated that he listened to classical music. Some students (N = 2) individuals found that listening to music were distracting, other students (N=7) in the A range found that it did help them be calm, be relaxed, and block out background noise. Thus, self-efficacy of musical intelligence and academic performance links mentioned in this study do indeed signify that playing music on one’s own personal time or in class is a beneficial way to improve the academic performance, and well-being of students.

An emphasis on the existential meaning of life and nexus to education is necessary to boost academic performance. Personal reflection time in each course on how the information will be functional and constructive in students’ daily lives will foster character and personality growth.

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