ORIGINAL ARTICLE

معايير ونسب الذكاء المتعددة ل Gardner وإرتباطها بالمستوى التعليمي للطلبة في جامعة تبريز للعلوم الطبية في السنة الدراسية ١٣٩٣_ ١٣٩٤

مقدمة : يمكن لنسب الذكاء المتعددة ل كاردنر أن تعكس وجهاً من قدرات وإمكانات الطلاب. وفي هذا المضمار فإن هذه الدراسة الحالية تهدف إلى تعيين الصورة الجانبية لنسب الذكاء المتعددة لكاردنر وإرتباطها مع المستوى التعليمي لطلاب جامعة تبريز للعلوم الطبية في السنة الدراسية(١٣٩٣-١٣٩٤)

الطريقة: الدراسة الحالية هي دراسة مقطعية من النوع التوصيفي الرابطي وقد نفذت بمشاركة ١٥٠ طالب طب و تمريض و توليد من جامعة تبريز للعلوم الطبية في السنة الدراسية (١٣٩٣-١٣٩٤). كانت طريقة إختيار العينات من النوع غير العشوائي و طريقة جمع المعلومات هي ورقة أسئلة معايير الذكاء المتعددة لكاردنروقد تم الإستعانة بمعدل الطلبة لمعرفة الوضع الدراسي للطلاب . قد تم تحليل البيانات بالإستعانة ببرنامج spss19 وطريقة التحليل المرتدة المتعددة.

النتائج : حصل طلاب الطب البشرى على أعلى العلامات في ذكاء الإدراك الوجودى (٤٢/١٨ ± ٤/٦٧) وفي الإدراك الداخلي حصلوا على (١٦/٧٤ ± ٤/١٥) وأما في الفطنة الموسيقية (٣/٩٩ ± ١٢/٥٤) والبدنية على (١٣/٦٦ ± ٤/٤٦) وفي أدنى العلامات . وفي التحليل الرجوعي قد تبين أن من بين نسب الذكاء والفطنة التسعة فقط الذكاء الكلامي (P=٠/٠٠٤، β = ٠/٣٩٢) وذكاء الإدراك الوجودى (P=٠/٠١٤، β = -٠/٣٢٧)، قد كانا يدلان على الوضع الدراسي للطلاب.

النتيجة : قد دلت نتائج هذه الدراسة على أن ذكاء الإدراك الوجودى والداخلي والكلامي لها الحصة الكبرى في إختيار فروع العلوم الطبية . ومن طرف آخر فإن الذكاء الكلامي كان له ارتباط مع النجاح الدراسي اى أن هذه النتائج يمكنها أن يكون لها دور في موضوع الإستشارة الدراسية لطلاب العلوم الطبية .

الكلمات المفتاحية : معايير ذكاء كاردنر . الأداء العلمي . طلاب الطب .

گارڈنرملٹی پل انٹلیجنس پروفائل کےذریعے تبریز میڈیکل یونیورسٹی کے طلباء کی توانائیوں کی جانچ پڑتال

بیک گراونڈ: گارڈنرز ملٹی پل انٹلیجنس پروفائل طلباء کی توانائیوں کو پرکھنے کا ایک اچھا وسیلہ ہے.یہ تحقیق دوہزارچودہ اور پندرہ میں تبریز یونیورسٹی آف میڈیکل سائنسس میں انجام دی گئي ہے۔

روش: یہ تحقیق ایک عبوری تحقیق ہے جس میں میڈیکل، نرسنگ اور میڈ وائفری کے ایک سو پچاس طلباء شامل تھے.یہ تحقیق دہزار چودہ اور دوہزار پندرہ میں انجام دی گئي.اس کے لئے گارڈنرز کے ٹول کے مطابق سوالنامہ بنایا گیا تھا اور طلباء کے اوسط نمبر مد نظر رکھے گئے، ڈیٹا کا تجزیہ ایس پی ایس ایس انیس اور ملٹی پل ریگریشن سے کیا گیا۔

نتیجے:میڈیکل طلباء نے اپنا وجود منوانے اور باہمی تعلقات میں سب سے اچھے نمبر لئے ہیں، اس سے معلوم ہوتا ہےکہ گارڈنر کے نو ملٹی پل انٹلیجنس عناصر میں محض کلامی عنصر اور وجود منوانے کا عنصر ہی طلباء کی تعلیمی صورتحال کو معین کرسکتا تھا. البتہ اعداد وشمار کے لحاظ سے۔

سفارشات:اس تحقیق سے پتہ چلتا ہےکہ گارڈنر کے ملٹی پل انٹلیجنس عناصر میں باہمی تعلقات، فردی حیثیت، اور کلامی عنصر ہی میڈیکل سائنسس میں موضوعات کے انتخاب میں اہم کردار ادا کرتے ہیں.اس تحقیق کے نتائج اپلائیڈ ریسرچ کے طور پرمیڈیکل طلباء کو مشاورہ دینے اور ان کی تعلیم میں مفید واقع ہوسکتے ہیں۔

کلیدی الفاظ: گارڈنرز ملٹی پل انٹلیجنس، تعلیمی صورتحال، میڈکل طلباء۔

Gardner's Multiple-Intelligences Profile and Its Relationship with Academic Performance (Students of Tabriz University of Medical Sciences/Academic Year 2014-2015)

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Background: Gardner's Multiple-Intelligences profile can serve as a powerful instrument for assessment of learners' abilities and aptitudes. The present study aimed to obtain the Gardner's Multiple Intelligences profile of students of Tabriz University of Medical Sciences (TUOMS) in the academic year 2014-2015 and examine its relationship with their academic performance.

Methods: This cross-sectional descriptive-correlational study was conducted on medical, nursing and midwifery students of TUOMS in the academic year 2014-2015. Data was collected by administering Gardner's Multiple Intelligences Developmental Assessment Scales to 150 subjects selected by non-probability convenience sampling. Academic performance of students was evaluated by their average grades. Data was analyzed by SPSS19 using multiple regression.

Results: Medical students scored highest in existential intelligence (18.42±4.67) and intrapersonal intelligence (16.74±4.15) and scored lowest in musical intelligence (12.54±3.99) and bodily intelligence (13.66±4.46). Regression analysis showed that verbal intelligence (P= 0.004, β = 0.392) and existential intelligence (P= 0.014, β = -0.327) were the only Gardner intelligence components that can explain the students' academic performance with statistical significance.

Conclusion: The results showed that among Gardner's Multiple-Intelligences, existential, intrapersonal, interpersonal, and verbal intelligence contribute the most to the selection of medical sciences as the path of education, and that verbal intelligence is associated with academic success. The results of this study can be employed as an applied knowledge to improve the quality of education counseling to be provided for future medical students.

Keywords: Gardner Intelligences, Academic Performance, Medical Students

نیمرخ هوش‌های چند گانه گاردنر و ارتباط آن با عملکرد تحصیلی (دانشجویان دانشگاه علوم پزشکی تبریز: سال تحصیلی ۹۴-۱۳۹۳)

مقدمه: هوش‌های چندگانه گاردنر در ارائه نیمرخی از توانمندی‌ها و قابلیت‌های فراگیران مورد تاکید است. در این راستا، مطالعه حاضر با هدف تعیین نیمرخ هوش‌های چندگانه گاردنر و ارتباط آن با عملکرد تحصیلی دانشجویان دانشگاه علوم پزشکی تبریز در سال تحصیلی ۹۴-۱۳۹۳ انجام گردید.

روش ها: مطالعه حاضر یک مطالعه مقطعی از نوع توصیفی- همبستگی بود که بر روی ۱۵۰ نفر از دانشجویان پزشکی، پرستاری و مامایی دانشگاه علوم پزشکی تبریز در سال تحصیلی ۹۴-۱۳۹۳انجام شد. روش نمونه‌گیری از نوع غیر تصادفی در دسترس بود. ابزار جمع آوری اطلاعات، پرسشنامه هوش‌های چندگانه گاردنر بود و بمنظور تعیین وضعیت تحصیلی دانشجویان، معدل تحصیلی در نظر گرفته شد. داده‌ها توسط نرم افزار آماری *SPSS* نسخه ۱۹ و به کمک روش تحلیل رگرسیون چندگانه، مورد تجزیه و تحلیل قرار گرفتند.

یافته‌ها: دانشجویان علوم پزشکی بالاترین نمرات را در هوش‌های هستی‌گرایی (۴/۶۷ ±۴۲/۱۸) و درون‌فری (۱۶/۷۴±۴/۱۵) کسب نمودند و در هوش‌های موسیقیایی (۳/۹۹ ± ۱۲/۵۴) و بدنی (۱۳/۶۶±۴/۴۶) پایین‌ترین نمرات را دریافت کردند. تحلیل رگرسیون نشان داد از هوش‌های نه‌گانه گاردنر، فقط هوش کلامی (P=۰/۰۰۴ ،β =۰/۳۹۲) و هوش هستی‌گرایی (P=۰/۰۱۴ ،β = -۰/۳۲۷)، بطور معنی داری پیش‌بینی کننده وضعیت تحصیلی دانشجویان بودند.

نتیجه گیری: یافته‌های این مطالعه نشان داد که هوش های هستی‌گرایی، درون‌فردی، برون‌فردی و کلامی در انتخاب رشته‌های علوم پزشکی بیشترین سهم را دارند و از طرفی هوش کلامی با موفقیت تحصیلی نیز ارتباط دارد. یافته های مطالعه حاضر می تواند به عنوان دانشی کاربردی در راستای آموزش و مشاوره تحصیلی دانشجویان علوم پزشکی بکاربرده شود.

کلمات کلیدی: هوش‌های گاردنر، عملکرد تحصیلی، دانشجویان پزشکی

INTRODUCTION

Intelligence is one of the most significant factors of human adaptation to environment and thus how different individuals react to the method of education (1). The concept of intelligence has gone through an evolution from a monolithic concept to a multidimensional one (2). In this context, Gardner's multiple intelligences theory has opened new horizons for researchers to understand human intelligence and its relation with the efficacy of education process. As such, this theory can have significant effects on evaluation of learning process and academic performance (3).

Gardner believes that intelligence is "the capacity to solve problems or to fashion products that are valued in one or more cultural setting" (4). The basic concept of his theory is that people could be intelligent in more than one way. Since birth, people may develop a variety of particular talents and can be stronger in one or more aspects of intelligence and less so in others (5).

One of Gardner's intelligence dimensions is the interpersonal intelligence. According to Gardner, interpersonal intelligence allows the person to communicate with others. Typically, teachers, university professors, politicians, religious leaders, therapists, traders, and salesmen rely on interpersonal intelligence for their work (4).

Another dimension of Gardner's intelligence theory is the intrapersonal intelligence. This intelligence reinforces a person's ability to know himself, become aware of his inner feelings, dreams and desires, to understand his role in relationships with others, and to discover his strengths and weaknesses. Researchers, theorists, and philosophers need to have a high level of intrapersonal intelligence (6). People with naturalist intelligence are able to classify and identify different subjects based on their similarities and differences including visible and latent capacities and features. Gardner believes that scientists, poets, artists, social scientists, hunters, farmers, and gardeners receive a high score in this dimension of intelligence (7). The existential intelligence allows people to raise profound questions about life, death, and their role in the world. This intelligence is associated with the fields of philosophy, religion, and aesthetics, and usually philosophers, religious leaders, artists and architects receive a high score in this intelligence (8). People with high verbal/linguistic intelligence are able to use their verbal and written language and vocabulary more sensibly. Teachers and university professors, writers, lawyers, religious leaders, poets, journalists and translators often receive a high score in this intelligence (9). The logical/mathematical intelligence allows people to use reasoning, logic and numbers more effectively and to think conceptually with the help of numerical and logical patterns. People with high logical/mathematical intelligence are good at dividing and classifying information, working with abstract concepts and understanding their relationship with each other, using or following a long chain of arguments, planning and conducting controlled experiments, enquiring about natural phenomena, performing complex mathematical calculations, and working with geometric shapes. Scientists, researchers, engineers, computer programmers, mathematicians, and accountants need a high level of this intelligence (10). The bodily/Kinetic intelligence is another aspect of Gardner's theory. This intelligence allows people to effectively control their body movements, use objects, maintain a good sense of balance, and achieve better hand-eye coordination. This intelligence is important for dancing, physical fitness, exercise, using body language, handcrafting, acting, imitation, use of hands to make or create things, and in expressing feelings through body language (4). People with high level of this intelligence are able to produce and understand music, and can think through sounds, rhythms and musical patterns. They react to music immediately, either by admiration or by criticism. Musicians, composers and singers strongly rely on this particular intelligence (6, 10). The visual/spatial intelligence refers to the ability to understand visual phenomena. People with high visual/spatial intelligence are good at making puzzles, reading, writing, understanding graphs and shapes, they have a good sense of direction. Sailors, engineers, mechanics, architects, inventors, sculptors, and interior designers benefit from this intelligence in their work (8).

Since the choice of academic discipline is one of the critical issues of education system, has profound social, political and cultural dimensions, and is the basis for success or failure to provide high-quality labor with right academic and psychological skills for the occupations required by nation, high school and college students need to be provided with proper, efficient, up-to-date, and compassionate educational counseling equipped with latest learning and assessment tools so as to ensure the quality of future human resources. One of the most important variables associated with the choice of academic discipline and future occupational skills of students is their ability in each category of intelligence as described by theorists such as Gardner. Review of prior studies indicates that given the wide variety of theoretical views regarding the constituent components of intelligence, intelligence cannot be considered as a reliable predictor of academic performance, but it cannot be ignored either. For example, studies of many researchers have proven the undeniable role of intelligence in academic performance (11-14). But other studies such as the one conducted by Neisser et al. reports that intelligences are not a good predictor of academic performance (15). A research by McMahon and Rose has shown that students who receive high scores in Gardner's logical intelligence are more successful in reading comprehension (7). Snyder has also shown that talent of students in this area leads to an improved academic performance (16).

Review of the related research literature shows that only a few studies have been dedicated to this particular subject, and interestingly their results have been partially inconsistent. Therefore, the present study was conducted to determine the Gardner's multiple-intelligences profile of students of Tabriz University of Medical Sciences (TUOMS) during the academic year 2014-2015 and examine its relationship with their academic performance.

METHODS

Design, setting and participants

This cross-sectional descriptive-correlational study was conducted on 150 medical, nursing and midwifery students

of TUOMS during the second semester of the academic year 2014-2015. The sample size (n=150) was calculated for a population size of 500 people using the sample size formula with 95% confidence level and permissible error of 8%. Then for each of the fields (medical, nursing and midwifery), a sample size proportional to size was calculated.

The inclusion criteria were informed consent of participants and progression to at least the second year of education. The exclusion criterion was the failure to fill the questionnaire in full. Subjects were selected by non-probability convenience sampling. For this purpose, after preparing the questionnaires and coordination with university staff, the students residing in the university dormitory were briefed about the study and then questionnaires were distributed among those who were willing to participate. In the briefing, the purpose of the study was explained and students were ensured about the confidentiality of their identity and inputs. Participants were asked to carefully read the entire questionnaires, answer all questions, and ask researchers to clarify possible ambiguities.

Measures and data collection

Academic performance of students was evaluated by their average grades. Gardner's intelligence dimensions profile of students at TUOMS was obtained by Multiple Intelligences Developmental Assessment Scales (MIDAS) questionnaire. This questionnaire has been designed by Hurmoz and Dogas and has been translated into Persian by Hosseini. This questionnaire, which has 45 questions devised based on six-item Likert scale, measures the intelligences of respondent as defined by Gardner's multiple intelligence theory. In this questionnaire, each of the 9 intelligence components is measured by 5 questions; more specifically, musical intelligence is measured by questions 1 to 5, bodily intelligence by questions 6 to 10, visual intelligence by questions 11 to 15, logical intelligence by questions 16 to 20, verbal intelligence by questions 21 to 25, interpersonal intelligence by questions 26 to 30, intrapersonal intelligence by questions 31 to 35, naturalist intelligence by questions 36 to 40 , and existential intelligence by questions 41 to 45.

Validity and reliability of this questionnaire have been confirmed in several studies. A study by Pishghadam and Moafyan has reported a reliability of 0.78-0.89 for the questionnaire subscales and a reliability of 0.93 for the entire questionnaire (17). A study by Mostaphapoor has also reported a total reliability of 76% for this questionnaire (18). In the present study, reliability was evaluated by Cronbach's alpha, and was calculated to 0.692 for musical intelligence, 0.614 for bodily intelligence, 0.666 for visual intelligence, 0.536 for logical intelligence, 0.530 for verbal intelligence, 0.772 for interpersonal intelligence, 0.704 for intrapersonal intelligence, 0.755 for naturalist intelligence, 0.752 for existential intelligence, 0.897 for the entire questionnaire.

Statistical analyses

Collected data was analyzed in SPSS19 using descriptive statistics (frequency and percentage, mean and standard deviation) and inferential statistics (multiple regression analysis) to determine whether academic performance can be predicted by Gardner's intelligence dimensions.

RESULTS

In this study, 118 (78.5%) of the students were female and 32 (21.5%) of students were male. Respondents aged between 18 to 42 years old. Other demographic specifications of the subjects are presented in Table 1. Distribution of Gardner's intelligence dimensions among TUOMS students showed that, on average, medical students score highest in the existential, intrapersonal and interpersonal intelligences and score lowest in the musical and bodily intelligences, nursing students score highest in the existential, intrapersonal intelligences and score lowest in the musical and bodily intelligences, and midwifery students score highest in the existential, verbal, naturalist, intrapersonal intelligences and score lowest in the musical intelligence. With the effect of academic discipline excluded, TUOMS students score highest in the existential and intrapersonal intelligences and score lowest in the musical and bodily intelligences (Table 1).

Table 1. Descriptive statistics of study variables*

Variable	Medical	nursing	midwifery	Total
Age	26.76±7.34	25.47±4.83	21.56±1.29	24.67±5.56
Academic performance	14.24±1.48	15.24±1.84	14.54±1.46	14.68±1.65
Musical intelligence	12.26±4.54	11.91±3.39	13.56±3.93	12.54±3.99
Bodily intelligence	13.88±5.06	12.66±3.37	14.56±4.46	13.66±4.46
Visual intelligence	13.79±4.46	14.81±4.01	14.91±4.65	14.51±4.46
Logical intelligence	14.56±3.92	13.17±3.62	14.41±3.33	14.01±3.66
Verbal intelligence	15.76±3.41	14.83±3.63	16.84±4.71	15.77±3.98
Interpersonal intelligence	16.06±4.88	15.25±4.33	15.15±4.67	15.49±4.61
Intrapersonal intelligence	17.08±4.21	16.55±4.28	16.59±4.07	16.74±4.15
Naturalist intelligence	14.62±5.81	13.52±3.68	16.28±4.22	4.74±4.78
Existential intelligence	19.41±5.11	18.01±4.89	17.84±3.81	18.42±4.67

*All data are presented as Mean ± standard deviation

Table 2. Results of simultaneous multiple regression analysis

Predictor variable	R	R^2	unstandardized coefficients		standardized coefficients	t	P
			B	S.E	Beta		
Constant	0.349	0.155	15.099	0.913		16.544	0.0001
Musical intelligence			-0.38	0.048	-0.091	-0.784	0.435
			-0.021	0.044	-0.057	-0.484	0.631
Bodily intelligence			-0.021	0.044	-0.057	-0.484	0.631
Visual intelligence			0.077	0.039	0.204	1.974	0.051
Logical intelligence			-0.064	0.054	-0.143	-1.195	0.235
Verbal intelligence			0.163	0.055	0.392	2.982	0.004
Interpersonal intelligence			-0.018	0.049	-0.051	-0.374	0.709
Intrapersonal intelligence			0.016	0.055	0.041	0.295	0.769
Naturalist intelligence			-0.021	0.044	-0.056	-0.448	0.655
Existential intelligence			-0.116	0.046	-0.327	-2.516	0.014

Table 2 shows the results of simultaneous multiple regression analysis of relation between academic performance and Gardner's intelligence dimensions. According to the results, Gardner's intelligence components account for 15 percent of variance in students' academic performance, and the verbal intelligence (P= 0.004, β = 0.392) and the existential intelligence (P= 0.014, β = -0.327) are the only intelligence components that can explain the students' academic performance with statistical significance.

DISCUSSION

This study aimed to determine the Gardner's MI profile of TUOMS students and its relationship with their academic performance. Distribution of Gardner's intelligence dimensions showed that excluding the effect of academic discipline, TUOMS students score highest in the existential, intrapersonal, interpersonal, and verbal intelligences and score lowest in the musical and bodily intelligences. The results also showed that on average, medical students score highest in the existential, intrapersonal, interpersonal, and verbal intelligences and score lowest in the musical and bodily intelligences, nursing students score highest in the existential, intrapersonal, and interpersonal intelligences and score lowest in the musical intelligence, and midwifery students score highest in the existential, verbal, interpersonal, and intrapersonal intelligences and score lowest in the musical intelligence. These results are consistent with the findings of Ansari et al, Lobo et al, Gonzalez et al. regarding the distribution of Gardner's intelligence dimensions among medical students (5, 11, 12, 19). These results are also consistent with the report of Martinez on how medical students score high in intrapersonal and interpersonal intelligences but not with his report on high scores of these students in musical and bodily intelligences (13).

The second objective of this study was to determine whether any of the intelligence scores can predict the academic performance. According to the results of multiple regression analysis, verbal and existential intelligences are both significant predictors of academic performance. However, while verbal intelligence predicts the academic performance positively (with direct association), existential intelligence does so negatively (with inverse association). The significant positive association between verbal intelligence and academic performance has also been reported in some studies which have reported that students who had high scores in Gardner's verbal intelligence had a better academic performance. However, our results regarding the inverse association of existential intelligence with academic performance are inconsistent with the aforementioned studies. This inconsistency can be theoretically explained by the reports of Martin and Gardner (20, 21). In traditional education systems such as Iran's, many dimensions of intelligence are generally ignored, so only the students who have high logical and verbal intelligences can excel in their education. In fact, such systems ignore that every student, whether in college or high school, can be seen as a unique prism with a range of intelligences like a color spectrum. Each prism decomposes the sunlight, which unlike its appearance is composed of different colors, into a unique color spectrum, containing not only the visible and distinct colors but also UV and infrared rays that are invisible to the eye. Some people consider general intelligence as the sunlight, that is, a monolithic concept that can be either weak or strong. But Gardner's theory argues that each person, like a prism, can turn the seemingly monolithic general intelligence into a unique spectrum of intelligences of different types. Sometimes these intelligences are perceptible and obvious, but sometimes they are latent and need to be discovering an explored. It is therefore necessary to provide a set of diverse and yet coherent educational approaches to allow all students express and exploit their

own type of intelligence in the course of education. Education system (including primary, secondary, and higher education) should accept and acknowledge the presence of multiple differentiable intelligences in students and provide equal opportunities and facilities for all students with all aspects of intelligence instead of focusing on one or two most visible dimensions of intelligence and effectively undermining the chance of realization of any alternative potential. Attention to students' individual abilities and to the fact that these abilities cannot be measured by a simple test at a limited time can be a start for the support of all students and acknowledgment of their abilities and talents, and thus help them cultivate and exploit these features as a means to progress and success in their education and occupational life (22).

Limitations of the present study include failure to use a random sampling method and limiting the sample population to dormitory students of only three academic disciplines, which undermine the generalizability and external validity of the results. The future studies are recommended to consider random sampling and to include in their investigations the students who reside both in and out of dormitory, students of other disciplines, and also the first-year students. Another limitation was the psychological condition of the participants that should be considered in future study designs.

CONCLUSION

The findings of this study show that Gardner's multiple intelligences play a significant role in the choice of academic discipline, and that verbal intelligence is a good predictor of student's academic performance. In view of these results, we suggest this questionnaire to be administered nationwide to a large population of students with different academic disciplines and different levels of academic performance sorted from unsuccessful to successful in order to determine the Gardner's profiles recommended for academic success in each discipline and thus obtain a reference for counseling future students in selection of their education path.

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