THE ROLE OF MULTIPLE INTELLIGENCES AND CREATIVITY IN STUDENTS' LEARNING STYLE

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Abstracts: Developments and studies in the field of intelligence and creativity had been widely popularized by educators, practitioners and psychologists. Many studies had been conducted in examining the relationship between intelligence and creativity where contradicting findings were reported. The types or degree of intelligences varies among individuals and is not a fixed attribute which is similar with the nature of creativity. Both intelligence and creativity could be developed in varying degrees throughout the development of an individual. Therefore, it is the objective of this study to examine the relationship between creativity and intelligence. This study adopted a descriptive survey method where a set of questionnaire was used for the purpose of data collection in determining the relationship between the two variables. A total of 1040 randomly selected students which consisted of both male and female students were involved in the study. Research findings showed that overall, there was a significant and positive relationship between multiple intelligences and creativity (r=0.648). Research findings also showed that students from both gender possessed high intelligence in common domains, namely interpersonal (M=3.795, SD=0.61), followed by intrapersonal (M=3.656, SD=0.628) and musical (M=3.648, SD=0.863) as well as similar characteristics of creativity in two constructs (imagination and fantasy, and playfulness). To conclude, it is important to identify students' intelligence profile as well as their creativity level according to domains. This is to aid students learning, providing them with the optimum learning environment through their preferred learning medium and help them to achieve their fullest potential in their respective talented areas.

Keywords: creativity, intelligence, learning style, multiple intelligences, multiple intelligence profile.

LITERATURE REVIEW

Creativity and Multiple Intelligences

Modern psychometric approaches to the evaluation of individual cognitive abilities are believed to take on two types of approaches. They are either concerned with the 'correctness' or the 'rightness' of a response. The correctness and rightness of a response shows the degree to which logical reasoning or intelligence is present, whereas, the goodness of an answer relates to the extent to which an answer or solution to a problem is appropriate or suitable to the cause of problem or context, which is the central factor in creativity, along with originality and novelty (Shouksmith, 1970). Creativity is believed to be similar with intelligence, where it is something that everyone possesses in some amount and it's not a fixed attribute instead, a person's level of creativity could be developed in varying degrees (Sternberg & Lubart, 1995). Wallach & Kogan (1965) had stressed that it is critical that to achieve the full and thorough understanding of cognitive functioning, a joint study of both intelligence and creativity is crucial. Therefore, it is the objective of this study to examine the relationship between creativity and intelligence.

Rhodes (1961/1987) suggested that the definition of creativity is related to four different potential research areas: (a) the person who creates, (b) the cognitive processes involved in the creation of idea/product, (c) the environment in which creativity occurs, and (d) the end products of creativity activities. An individual is being regarded as creative if he or she solves problems frequently and is capable of displaying content in a certain domain in a flexible

and novel manner (Gardner, 2006; Wodtke, 1964) and eventually will be recognized and agreed upon by others regardless of culturally setting differences. Individuals who are creative in nature tend to utilize their cognitive and affective resources and abilities to resolve difficulties and challenges in life (Helson & Srivastava, 2002). Creative individuals are believed to exhibit a style of living and thinking that leads to a regularity of breakthroughs in specific domains or disciplines rather than across the broad (Gardner, 1993). According to Gardner (2006), "*Creativity* is a characterization reserved to those whose products are initially seen to be novel within a domain but are ultimately recognized as acceptable within an appropriate community."

According to Freeman (2006), the strongest kind of creative works is to be able to discover and open up a plethora of problems and possibilities and takes into account the act of belief and faith. However, there is no clear and precise definition on creativity in the literature. Therefore many researchers had used the term creativity and divergent thinking skills interchangeably. Many educators believed that divergent thinking skills is used to measure creativity similar with the use of intelligence tests are used to assess intelligence (Han & Marvin, 2002). According to Amabile & Tighe (1993), in their theory of creativity, there are three basic components within an individual that are required for creativity in any given domain or discipline. The three components are namely domain-relevant skills, creativity-relevant skills and task motivation. Domain-relevant skills refer to elements related to the individual's level of expertise in a specific domain which includes basic intelligence or talent in the domain, knowledge acquired through education, experience and technical skills in the domain. Creativity-relevant skills consist of cognitive and personal styles that are important in producing novel and useful ideas in any domain. The third creativity component is task motivation where it involves one's self-perceived motivation for engaging in a particular task in a specific domain at a particular point in time. The task motivation may exist in two forms, intrinsically and extrinsically.

Developments and studies in the field of creativity had been widely popularized by educators, practitioners and psychologists. Many studies had been conducted in examining the relationship between intelligence and creativity; however, according to Wodtke (1964), many studies had cited negligible correlations between measures of intelligences or aptitude tests and creativity test. There exists a mix perspective on both the domains. Some researchers believed that intelligence and creativity are both interrelated whereas some stressed that both are unrelated independent domains. Critics

in this field argued that the findings were not entirely valid as creative thinking abilities studies often involved respondents with high intelligence and its is unreasonable to expect the respondents to obtain an even higher score in intelligence tests. Although in the extensive set of literature reviews concerning the field of creativity and intelligences present a mix finding of the relationship and correction between both variables, no valid and concrete findings had been reported to reject the relationship of both domains. Based on the study conducted by Wodtke (1964), although the correlations between intelligence and creativity were smaller in the scores obtained but they were still generally statistically significant indicating a positive relationship between the two variables.

The first major work concerning this area is a study done by Getzels & Jackson (1962). However, they believed that creativity and intelligence are not synonymous, which leads to their objective of investigating the differences between these two aspects of ability. The research findings indicated that there is no significant or clear justification which showed a distinctive difference between creativity and general intelligence. Following the study by Getzels & Jackson, Hasan, Parmeen & Butcher (1966) conducted a partial replication of the study with Scottish children which indicated that every creativity measure correlated positively and significantly with a verbal Reasoning Quotient. Another research that had reported a positive correlation between creativity and intelligence is the study conducted by Schlicht & Anderson et al. (1968) which examines the relationship between creative thinking as measured by Cattell Culture Fair Test and had reported a moderate but significant research finding.

According to Silvia (2008), the best known study that found no relationship between creativity and intelligence is the study conducted by Wallach & Kogan (1965) on fifth grade children. The research findings indicated that creativity tests correlated strongly with each other (average, $r = .41$), the intelligence and achievement tests correlated highly with each other (average, $r = .51$), but the creativity tests did not correlate with the intelligence tests (average, $r = .09$). However, current studies assessing the relationship between creativity and intelligence applied latent variable analysis which is a more sophisticated approach to multivariate data that was not available during the time of Wallach & Kogan's research. The latent variable analysis revealed that creativity and intelligence were more highly correlated (magnitude relationship, $\beta = .20$) compared to the initial findings by Wallach & Kogan (1965).

One of the main issues in the research of creativity is whether to categorize creativity as domain-specific or domain-general (Han & Marvin, 2002). Domain-general creativity refers to creativity that is general in nature and could be applied to all disciplines and fields and is normally being measured using the divergent thinking skills of students. On the other hand, domain-specific creativity refers to creativity that is specific in a certain domain or discipline. With the on-going research in the field of creativity, researchers had suggested that divergent thinking skills may not be a valid and reliable tool in measuring creativity as contradicting findings were obtained in studies examining the relationship between divergent thinking and creative performances. Hence, researchers had suggested that creativity may highly be domain-specific especially since after the introduction of the Multiple Intelligence Theory by Howard Gardner. The notion of intelligence had undergone a paradigm shift since the introduction of the multiple intelligence theory proposed by Gardner in his book *Frames of Mind* (Gardner, 1983). The perspective on intelligence had since been widen and not being restricted in the domain of logic/mathematic and linguistics that is emphasized in standardized exams under most educational system. In addition, methods in assessing one's intelligence is no longer being bounded to IQ scores obtained from intelligence and aptitude tests.

Till date, among some of the most frequently used creativity tests are the Wallach-Kogan Creativity Test and the Torrance creativity test. The Torrance creativity test consists of two forms, the verbal form and the nonverbal/figural form. Torrance (1974) had also developed streamlined scoring in the creativity test where he incorporated five norm-referenced measures (fluency, originality, abstractness of titles, elaboration and resistance to premature closure) and thirteen criterion-referenced measures (emotional expressiveness, story-telling articulateness, movement or actions, expressiveness of titles, syntheses of incomplete figures, syntheses of lines, of circles, unusual visualization, extending or breaking boundaries, humor, richness of imagery, colourfulness of imagery, and fantasy) in the conceptual framework of creativity.

Of the five norm-referenced and thirteen criterion-referenced measures being incorporated in the Torrance creativity test, it is evident that elements of the eight types of multiple intelligences are present and students' creativity is indirectly being assessed in these areas of intelligences. In other words, creativity could be specified in certain types of intelligences and students may not be creative in all types of intelligences. Therefore, it is logical to induct that

students may have high creativity in one or more types of discipline and intelligences just like they possessed one or a mixture of dominant intelligences. Gardner proposed that intelligence does not exist as a single and fixed entity but a multifaceted entity that could be nurtured and changed over time through training and development. An MI approach in education attempts to overcome the problem of incongruities and imbalances of intelligent behaviour between students and also within students themselves (Gardner & Moran, 2006). Although the eight types of intelligences are independent of each other, the interaction between these intelligences forms a unique arrangement of abilities (Bordelon & Banbury, 2005) in an individual, which is being regarded as the multiple intelligence (MI) profile of an individual. Gardner (1983) had also identified the components of MI learning and proposed that it is possible as well as useful to identify the MI profile of students to enhance students' learning environment and performances. Till date, Gardner had identified eight types of intelligences which include verbal/linguistic, logical/mathematical, visual/spatial, bodily/kinaesthetic, musical/rhythmic, interpersonal, intrapersonal, and naturalistic intelligence.

Researchers who viewed creativity as domain-specific suggested that creativity is highly correlated with the eight types of intelligences proposed by Gardner. Students were believed to be creative in certain domain or discipline rather than possessing a general nature of creativity. According to Han & Marvin (2002), a domain-specific perspective on creativity presents a more useful and flexible way to identify students' ability and to help them in developing their dominant strengths where this belief is in congruent with the findings of their research supporting the school of domain-specific creativity. Creativity needs to be nurtured and fostered in order to develop and flourish (Freeman, 2006) similar with the nature of multiple intelligences. In identifying creativity that is domain-specific, educators will then be provided a platform to nurture and aid the development of creativity through teaching strategies that go hand-in-hand with the dominant learning styles of students. With a firm grasp of the dominant learning styles of students, teachers will be able to design and implement appropriate selections of instructional designs to enhance and optimize the learning experience of a wider range of students.

METHODOLOGY

Sample
The participants for this study were randomly selected Secondary Form 4 students from different schools in the state of Selangor. A total of 1040 students which consisted of both male and female students were involved in the study.

Gender	Frequency	Percentage (%)
Male	434	41.7
Female	606	58.3
Total	**1040**	**100**

Table 1: Frequency and Percentage distribution by Gender

Stream	Frequency	Percentage (%)
Science	425	40.9
Social Science	615	59.1
Total	**1040**	**100**

Table 2: Frequency and Percentage distribution by Students' Stream

Intelligences	Male (n=434)		Female (n=606)		t	Sig
	Mean	Standard deviation	Mean	Standard deviation		
Visual spatial	2.517	.721	2.397	.677	2.742	.006*
Linguistic	2.664	.705	2.898	.624	-5.639	.000*
Naturalistic	3.074	.794	3.143	.777	-1.405	.160
Logical-math	3.177	.724	3.223	.696	-1.013	.311
Intrapersonal	3.656	.628	3.749	.613	-2.396	.017*
Interpersonal	3.795	.610	3.798	.590	-.070	.944
Musical	3.648	.863	3.794	.800	-2.800	.005*
Kinesthetic	3.090	.744	2.830	.690	5.795	.000*

* $p < .05$

Table 3: Comparison of Students' Multiple Intelligence Profile by Gender

Intelligences	Science (n=425)		Social Science (n=615)		t	Sig
	Mean	Standard deviation	Mean	Standard deviation		
Visual spatial	2.554	.702	2.372	.685	4.163	.000*
Linguistic	2.868	.666	2.753	.667	2.726	.007*
Naturalistic	3.166	.796	3.078	.775	1.771	.077
Logical-math	3.384	.663	3.075	.710	7.204	.000*
Intrapersonal	3.662	.577	3.744	.647	-2.090	.037*
Interpersonal	3.756	.577	3.824	.611	-1.813	.070
Musical	3.765	.831	3.711	.828	1.035	.301
Kinesthetic	2.979	.704	2.911	.737	1.495	.135

* $p < .05$

Table 4: Comparison of Students' Multiple Intelligence Profile by Stream

Table 1 shows distribution of students in this study by gender. There were 434 (41.7%) male students and 606 (58.3%) female students as respondents for this study.

Table 2 shows distribution of students in this study by types of streaming. 425 (40.9%) students were in science stream and 615 (59.1%) students were in social science stream.

Instrument

This study adopted a descriptive survey method where a set of questionnaire was used for the purpose of data collection. Correlation analysis was used to determine the relationship as well as the significant magnitude among the eight types of intelligences profile and creativity profile of students.

The questionnaire consists of three parts, Part A, Part B, and Part C. Part A of the questionnaire is made up of items to obtain demographic information of respondents, Part B of the questionnaire determines the Intelligence profile of the respondents, and Part C determines the creativity profile of respondents. All

items are assessed using the 5-point likert-scale ranging from (1) Strongly not agree, (2) Not agree, (3) Less agree, (4) Agree, and (5) Strongly agree.

Table 3 shows the analysis of students' multiple intelligences by gender. The table shows that the male students had the highest intelligence in interpersonal (M=3.795, SD=0.61), followed by intrapersonal (M=3.656, SD=0.628) and musical (M=3.648, SD=0.863). For female students, they had the highest intelligence in interpersonal (M=3.798, SD=0.59), followed by musical (M=3.794, SD=0. 8) and intrapersonal (M=3.749, SD=0.613).

An independent-samples t-test was conducted to compare students' multiple intelligences according to their gender. As shown in Table 3, between male students and female students, there are significant differences in students' visual spatial intelligence (t=2.742, p=0.006), linguistic intelligence (t=-5.639, p=0.000), intrapersonal intelligence (t=-2.396, p=0.017), musical intelligence (t=-2.8, p=0,005) and kinesthetic intelligence (t=5.795, p=0.000).

Table 4 shows students' multiple intelligences by stream. The table shows that students from science stream had the highest intelligence in musical (M=3.765, SD=0.831), followed by interpersonal

(M=3.756, SD=0.577) and intrapersonal (M=3.662, SD=0.577). Meanwhile, students from social science stream had the highest intelligence in interpersonal (M=3.824, SD=0.611), followed by intrapersonal (M=3.744, SD=0.647) and musical (M=3.711, SD=0.828).

An independent-samples t-test was conducted to compare students' multiple intelligences according to stream. As shown in Table 4, between science stream students and social science stream students, there are significant differences in students' visual partial intelligence (t=4.163, p=0.000), linguistic intelligence (t=2.726, p=0.007), logical-math intelligence (t=7.204, p=0.000) and intrapersonal intelligence (t=-2.09, p=0.037).

Table 5 shows creativity of the students based on their gender. The table shows that male students possessed strongest characteristics of imagination and fantasy (M=18.5, SD=3.644), followed by independent (M=16.991, SD=2.592) and openness (M=16.673, SD=2.882). Meanwhile, female students were found to show strongest characteristics of imagination and fantasy (M=19.777, SD=3.666), playfulness (M=18.046, SD=2.852), extroversion (M=17.373, SD= 3.281).

An independent-samples t-test was conducted to compare students' creativity according to gender. As shown in Table 5, between male students and female students, there are significant differences in students' playfulness (t=-8.328, p=0.000), imagination and fantasy (t=-5.555, p=0.000), extroversion (t=-7.904, p=0.000) and independent (t=2.795, p=0.005).

Table 6 shows students' creativity by stream. The table shows that students from science stream had strong characteristics of imagination and fantasy (M=19.784, SD=3.55), followed by playfulness (M=17.449, SD=2.914) and extroversion (M=16.8, SD=3.214). As for students from social science stream, they possessed strongest characteristics of imagination and fantasy (M=18. 872, SD=3.773), followed by playfulness (M=17.389, SD=3.042) and independent (M=16.753, SD=2.545).

An independent-samples t-test was conducted to compare students' creativity according to stream. As shown in Table 6, between science stream students and social science stream students, there is a significant difference in imagination and fantasy (t=-3.925, p=0.000).

Intelligences	Science (n=425)		Social Science (n=615)		t	Sig
	Mean	Standard deviation	Mean	Standard deviation		
Visual spatial	2.554	.702	2.372	.685	4.163	.000*
Linguistic	2.868	.666	2.753	.667	2.726	.007*
Naturalistic	3.166	.796	3.078	.775	1.771	.077
Logical-math	3.384	.663	3.075	.710	7.204	.000*
Intrapersonal	3.662	.577	3.744	.647	-2.090	.037*
Interpersonal	3.756	.577	3.824	.611	-1.813	.070
Musical	3.765	.831	3.711	.828	1.035	.301
Kinesthetic	2.979	.704	2.911	.737	1.495	.135

* $p < .05$

Table 4: Comparison of Students' Multiple Intelligence Profile by Stream

Characteristics	Male (n=434)		Female (n=606)		t	Sig
	Mean	Standard deviation	Mean	Standard deviation		
Physical energy	15.065	2.657	15.144	2.777	-.461	.645
Smart	16.113	3.398	16.236	3.439	-.572	.567
Playfulness	16.530	2.955	18.046	2.852	-8.328	.000*
Imagination and fantasy	18.500	3.644	19.777	3.666	-5.555	.000*
Extroversion	15.758	3.204	17.373	3.281	-7.904	.000*
Independent	16.991	2.592	16.551	2.435	2.795	.005*
Passionate	16.272	2.223	16.320	2.013	-.365	.715
Openness	16.673	2.882	16.621	2.927	.286	.775

* $p < .05$

Table 5: Comparison of Students' Creativity by Gender

Characteristics	Science (n=425)		Social Science (n=615)		t	Sig
	Mean	Standard deviation	Mean	Standard deviation		
Physical energy	15.012	2.727	15.179	2.726	-.972	.332
Smart	16.433	3.562	16.013	3.312	1.949	.052
Playfulness	17.449	2.914	17.389	3.042	.322	.747
Imagination and fantasy	19.784	3.550	18.872	3.773	3.925	.000*
Extroversion	16.800	3.214	16.629	3.431	.809	.419
Independent	16.708	2.460	16.753	2.545	-.282	.778
Passionate	16.172	2.076	16.389	2.118	-1.637	.102
Openness	16.612	2.851	16.663	2.945	-.282	.778

* $p < .05$

Table 6: Comparison of Students' Creativity by Stream

Creativity characteristics / Intelligence	Physical energy	Smart	Playfulness	Imagination and fantasy	Extroversion	Independent	Passionate	Openness	Creativity
Visual spatial	.095**	.301**	.229**	.207**	.164**	.166**	.217**	.307**	.361**
Linguistic	.047	.393**	.368**	.317**	.289**	.145**	.239**	.295**	.460**
Naturalistic	.175**	.309**	.303**	.282**	.244**	.165**	.238**	.287**	.432**
Logical-math	.147**	.393**	.377**	.309**	.225**	.210**	.262**	.354**	.491**
Intrapersonal	.133**	.343**	.397**	.314**	.195**	.348**	.349**	.363**	.514**
Interpersonal	.124**	.328**	.351**	.257**	.117**	.293**	.368**	.366**	.459**
Musical	.004	.198**	.244**	.352**	.210**	.233**	.120**	.232**	.352**
Kinesthetic	.105**	.322**	.278**	.301**	.157**	.268**	.310**	.420**	.457**
Multiple intelligences	.151**	.473**	.466**	.436**	.299**	.334**	.380**	.481**	**.648****

**. Correlation is significant at the 0.01 level (2-tailed)

Table 7: Correlation between Multi Intelligences and Creativity

Table 7 shows the correlation between multiple intelligences and creativity. The table shows that overall, there is a significant and positive relationship between multiple intelligences and creativity (r=0.648). The table also shows that there is a significant relationship between kinesthetic intelligence and openness (r=0.42). Besides, the findings indicate that multi intelligence has strong correlation with openness (r=0.481), followed by smart (r=0.473), playfulness (r=0.466) and imagination and fantasy (r=0.436). The findings also show that creativity is strongly correlated with intrapersonal intelligence (r=0.514), followed by intelligences based on logical math (r=0.491), linguistic (r=0.46), interpersonal (0.459), kinesthetic (r=0.457), and naturalistic (r=0.432).

DISCUSSION AND CONCLUSION

This study sought to determine whether students exhibit distinct profiles of multiple intelligences as well as their creativity level in each domain based on the eight indentified types of intelligences in order to enhance the learning of students in the classroom context. MI theory insists that every person has at least one dominant intelligence domain and it is necessary to find the strong intelligence domains and consistently develop them. Besides, the dominant domains serve to complement weaker domains, it is also important to develop the weaker intelligences in order to facilitate overall achievement (Jung & Kim, 2005).

The notion of multiple intelligences and creativity level helps focus on students who might be outstanding in different talent areas such as art, music, mathematics, science, and other aesthetic or academic areas. Research findings showed that students from both gender possessed high intelligence in common domains, namely interpersonal (M=3.795, SD=0.61), followed by intrapersonal (M=3.656, SD=0.628) and musical (M=3.648, SD=0.863). This research finding is very much similar with the findings obtained by Chan (2001) where students were reported to have higher ratings on items related to interpersonal and intrapersonal intelligences, and lower ratings in items

related to bodily-kinesthetic and visual spatial intelligences.

Based on the findings, between male students and female students, there are significant differences in students' visual spatial intelligence ($t=2.742$, $p=0.006$), linguistic intelligence ($t=-5.639$, $p=0.000$), intrapersonal intelligence ($t=-2.396$, $p=0.017$), musical intelligence ($t=-2.8$, $p=0,005$) and kinesthetic intelligence ($t=5.795$, $p=0.000$). This indicates that there is a significant difference between the 'talents' of students according to gender which is similar with the idea proposed by Chan (2001) and Loori (2005), however, the differences in domains may be different in the studies conducted.

Based on the research findings, a significant positive correlation ($r=0.648$) was obtained between multiple intelligences and creativity level of respondents, indicating that creativity does exhibit through specific domain or discipline based on the eight types of intelligences instead of across a general domain or notion of intelligence. The idea that creativity is indeed domain specific is being emphasized further in the findings provided in table 6. The findings indicated that students from science stream had strong characteristics of imagination and fantasy ($M=19.784$, $SD=3.55$), followed by playfulness ($M=17.449$, $SD=2.914$) and extroversion ($M=16.8$, $SD=3.214$). As for students from social science stream, they possessed strongest characteristics of imagination and fantasy ($M=18.872$, $SD=3.773$), followed by playfulness ($M=17.389$, $SD=3.042$) and independent ($M=16.753$, $SD=2.545$). Students from both arts and sciences streams showed similar dominance in the elements of creativity with varying degrees, proposing that students exhibited a range of creative abilities across different domains, rather than a uniform creative ability in diverse domains. This finding is believed to be incongruent with the research findings conducted by Han & Marvin (2002).

The findings also show that creativity is strongly correlated with intrapersonal intelligence ($r=0.514$), individuals who are creative tends to be 'in touch' with their emotions and are able to express their feelings through their creative production (Restak, 1993). Creative individuals needs to be able to identify and also control their own emotions well in order to express themselves and convey their emotion to others through the creative production of their work which deviates from the norm through alternative forms of problem solving. Hence, it is agreeable that they tend to possess high intrapersonal as well as interpersonal intelligences with correlates significantly with their high level of creativity.

Based on the research findings, creativity may very well be correlated with the type of intelligences possessed by individuals based on the theory of multiple intelligences. However, contradictory findings had been obtained from researches done in the area of intelligence and creativity. Therefore, creativity is neither completely domain-general nor domain-specific but researchers believed that it tends more towards domain-specific than towards domain-generality (Sternberg & Lubart, 1995). The findings of the study were discussed and to conclude, it is important to identify students' intelligence profile as well as their creativity level according to domains. This is to aid students learning, providing them with the optimum learning environment through their preferred learning channels and medium and help them to achieve their fullest potential in their respective talented areas.

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