

**Analysis of Argumentation Techniques of Gifted
Students from their Responses
in the Public Examination
on Liberal Studies**

(依據資優學生在通識教育
公開考試中的表現，分析他們的論證技巧)

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Background

- Liberal Studies (LS) a new compulsory subject in public exam starting from 2012
- The subject demands students to respond to questions related to various contemporary social issues
- Different thinking skills required, such as problem solving, analytical and critical thinking, provision of explanations, synthesis of arguments, and evaluation etc

Background

- From the HKDSE results in 2012, 2013 and 2014:
 - Level 3 or Level 4
 - More than half (55.22%) in the performance of Level 3 (15%) or Level 4 (40%)
 - Chinese Language: 48.11% (33%/15%)
 - English Language: 42.97% (27%/16%)
 - Mathematics: 32.29% (24%/ 8%)
 - Level 5 or Level 2
 - 41.45% of our alumni obtained Level 5 or above in LS and 3.33% obtained Level 2 or below
 - Chinese Language: 45.23%, 6.66%
 - English Language: 49.95%, 7.08%
 - Mathematics: 63.70%, 4.02%

Study Design

- A representative sample of 72 live scripts in 2015

Performance Level	Total Number of Relevant Live Scripts	Number of Samples Selected
5**	87 (9.6%)	8 (11.1%)
5*	174 (19.1%)	12 (16.7%)
5	193 (21.3%)	14 (20.8%)
4	326 (35.9%)	28 (41.7%)
3	129 (14.2%)	10 (13.9%)
Total	909	72

Study Design

- Four experienced LS exam markers were sourced
- An initial kick-off meeting was held to clarify the aims of the study and discuss the marking criteria and the corresponding rubric
- After each stage, a meeting was held to discuss the marks assigned by the markers so as to resolve any inconsistencies in marking

Assessment Scores of Each Student

- For each student script, **paper scores** and **scores of the eight aspects** concerned
 - 1) Understanding and application of relevant knowledge, key ideas and concepts of the subject
 - 2) Handling of relevant information
 - 3) Interpretation and analysis of the interdependence among personal, local, national and global issues
 - 4) Synthesis of opinions/ suggestions
 - 5) Evaluation
 - 6) Consideration of values and views of others
 - 7) Respect for evidence
 - 8) Communication of ideas

Quantitative Analysis: Paper Scores

Summary statistics of paper scores (Full mark = 126) of sample scripts and their group differences

Overall Summary Statistics :		Mean =72.79, Std Dev =9.97, C.V.=0.1370				
Group Difference						
Grouping	Mean 1 (N1)	Mean 2 (N2)	Std Dev 1	Std Dev 2	Difference (M1 – M2)	p-value (one-side 2-sample t-test)
Low (L3/4) vs. High (L5 or above)	65.11 (38)	81.38 (34)	5.54	5.93	-16.27	<0.01**
Male vs. Female	70.54 (39)	75.45 (33)	9.89	9.53	-4.91	0.018*
^ Math/ Sci vs. Hum/ Leadership	71.64 (44)	74.11 (27)	9.37	10.76	-2.47	0.16
Inactive vs. Active	69.42 (26)	74.70 (46)	10.48	9.24	-5.28	0.019*

Note: *The difference is statistically significant at 5% significance level.

** The difference is statistically significant at 1% significance level.

^ One student, who was in multi-domains, was excluded in the compilation.

Quantitative Analysis: Paper Scores

- Main findings:
 - The difference between low-level performance (i.e., Level 3/ 4) students and high-level performance (i.e., Level 5 or above) students was highly significant
 - A significant difference was found between male and female student members
 - Besides, active student members in the HKAGE did performance significantly better than the inactive ones
 - However, there was no significant different in paper scores between students from Math/Sciences domains and the ones from Humanities/ Leadership domains

Quantitative Analysis: Aspect Scores

Mean scores of the eight aspects concerned and their group differences

	Understand	Handle Info	Interpret & Analysis	Synthesis	Evaluation	Cultural	Evidence	Comm.
Overall Mean	4.10	4.15	4.04	3.74	3.39	3.48	3.79	4.18
High	4.32	4.40	4.19	4.07	3.73	3.73	4.08	4.39
Low	3.90	3.93	3.90	3.45	3.08	3.21	3.54	3.99
H – L	0.42	0.46	0.29	0.61	0.66	0.51	0.54	0.41
p-value (ANOVA)	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**
Female	4.15	4.19	4.09	3.82	3.52	3.52	3.85	4.25
Male	4.06	4.12	4.00	3.68	3.27	3.41	3.74	4.12
F-M	0.09	0.07	0.08	0.14	0.25	0.11	0.11	0.13
p-value (ANOVA)	0.29	0.52	0.31	0.25	0.02	0.29	0.28	0.10
Active	4.15	4.21	4.09	3.82	3.48	3.52	3.85	4.23
Inactive	4.01	4.06	3.96	3.59	3.22	3.35	3.69	4.08
Act-InAct	0.14	0.15	0.13	0.23	0.26	0.16	0.16	0.15
p-value (ANOVA)	0.11	0.17	0.12	0.07	0.02	0.13	0.15	0.07
Maths/Sci	4.11	4.21	4.04	3.78	3.39	3.49	3.80	4.18
Hum/Lead	4.08	4.06	4.04	3.68	3.38	3.41	3.78	4.19
M/S –H/L	0.03	0.14	0.01	0.10	0.01	0.08	0.01	-0.01
p-value (ANOVA)	0.99	0.34	0.69	0.72	0.69	0.88	0.78	0.73

Note: **The difference is statistically significant at family-wise 1% significance level after applying the Bonferroni correction (i.e. Type I error is set to $.01/8 = .0013$ for the hypothesis testing)

Quantitative Analysis: Aspect Scores

Main findings:

- The low-order thinking skills (i.e., understanding, information handling, interpretation and analysis, communication) have mean scores higher than that of high-order thinking skills (i.e., synthesis, evaluation, cultural respect and provision of evidence)
- Amongst high-order thinking skills, evaluation skills got the lowest scores.
- With regard to group differences, only grouping according to grade level shows statistically significant differences.

Linear Discriminant Analysis (LDA): Skill Set Difference between Low and High Levels

Main differences between Low and High Levels is the contrast between two different sets of skills:

- Evaluation and Understanding (and application of relevant knowledge, key ideas and concepts)
- Synthesis of opinions and Interpretation & analysis of the interdependence

Linear Discriminant Analysis (LDA)

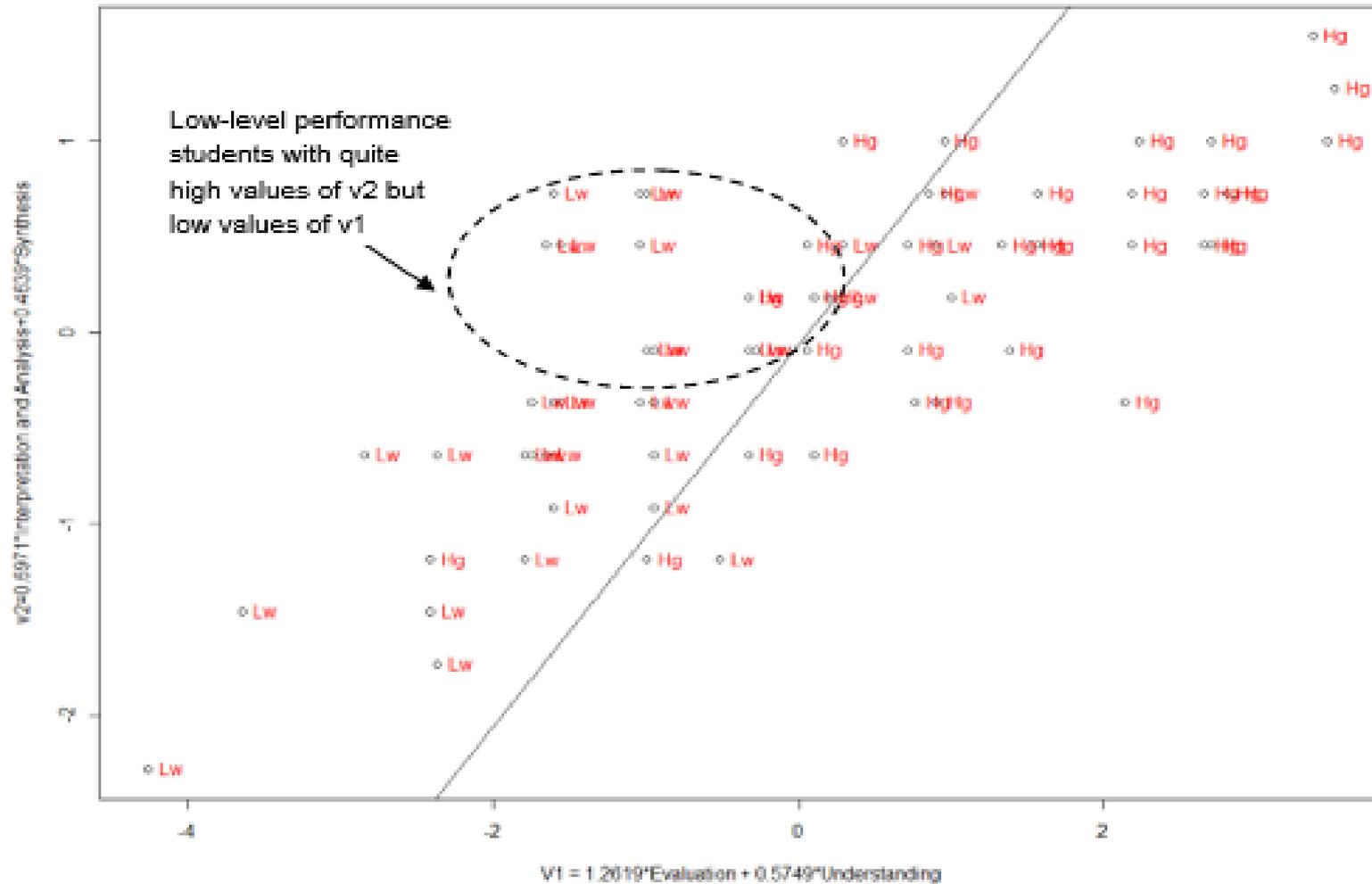
Linear Discriminant Analysis results after standardization for the grouping effect of grade level

Aspect	Separation	Discriminant Function Coefficient (Discriminant Score < -0.065 → high level Separation = 96.9867)	
		(A)	(B)
Understand	37.4126	-0.5749	-0.5749
Handle Info	26.3167	-0.1671	-
Interpretation & Analysis	14.8112	0.6971	0.6971
Synthesis	38.4827	0.4638	0.4638
Evaluation	69.5760	-1.2619	-1.2619
Cultural Respect	36.5989	0.2161	-
Evidence	41.7493	-0.01243	-
Communication	40.5274	-0.2726	-

Classification results based on Linear Discriminant Analysis

Group\ Classification	Classification based on discriminant scores	
	H(igh)	L(ow)
High-level Student	29	5
Low-level Student	3	35

Scatter plot of derived variables v1 vs. v2 with the group labels and the line: $v2 = -0.065 + v1$



Qualitative Analysis: Illustrations

Question context:

It is learned that plastic surgery is common amongst youngsters in Hong Kong.

“愈來愈多香港青年人進行整形外科手術。...”

Two opposite views provided in the question paper for further discussion.

“我們關注到更多青年人以至家長會忽略這種手術的風險和後果。由於侵入性手術*對發育中的青年人有潛在危險，因此有需要實施禁令。”

“然而，類似禁令的提案卻在廣州遭受批評。一位教育專家說：「培養18歲以下人士的個人成長是學校和家庭的責任，不應以法律限制青少年的自由。」”

Gifted Students' Responses: Level 3

整形外科手術的風險很大，所以政府應禁止他們進行手術。但我不認同這說法，因為考慮風險是青少年自己及他們家庭的責任，不應由政府決定風險因素而去禁止他們進行手術。根據資料B，一位教育專家說，培養青少年個人成長是學校和家庭的責任，不應以法律限制青少年的自由。

However, the question context has mentioned ...

更多青年人以至家長會忽略這種手術的風險和後果

Gifted Students' Responses: Level 3

He/She against the ban...

我認為香港政府不應立法禁止。

根據資料B，教育專家認為政府不應以法律限制青少年的自由...

首先，年青人亦有他們的人權和自由。他們有權利去選擇是否進行整形外科手術，法律不能限制青少年的自由...

Next, the student presented the benefits to support his stand

根據資料A，美麗的外表能使他們變得更加有自信心和有自尊...

However, the risk and dangerous consequences of the plastic surgery were totally ignored

Gifted Students' Responses: Level 4

He/ she supported the ban...

我較大幅度同意這看法。

...而根據資料B，部份入侵性手術對發育中的青年人有潛在危險， ...

再者，手術的風險一般較高，假若手術失敗，令外觀變得奇怪，甚至影響部分重要器官的運作，對其身體及自尊心亦有甚大的影響

Gifted Students' Responses: Level 4

The student attempted to argue against the opposite views:

此外，有人提及立法禁止是限制青少年的自由，認為應以教育、社教化青少年不要做整形手術。

我很小程度認同這看法。首先，現時的社會風氣是「重視外在美」。例如，社會上不少有學識、教育水平高的人士、藝人都有進行整容.....或有人會提出社會風氣在教育之下是可以改善的。但我認為社會上人士大多有既定價值觀，而成年後人的價值觀其實已經很難改。

因此，為保青少年能培養正確價值觀，立法禁止的方法較有效。能強硬地禁止青少年進行整形手術，違者會被罰款等，其阻嚇性相對比較大

Some unwarranted/ unrelated statements to fight against the opposite views; i.e.,

- “Many people with high education and entertainers have undertaken the plastic surgery. Thus, the plastic surgery had been already highly accepted in the whole society”.
- “Adult’s value system ...hard to change”

Besides, he/she stated that legislation could educate youngsters with the right values, which was generally in doubt.

Level 3 Students' Argumentation

- State the stand clearly
- Selectively choose appropriate information already provided to support their stands
- No further personal experiences or examples
- Largely speaking, no serious consideration about opposite view and no tactful attempts to attack (e.g., provision of examples about ineffectiveness of opposite view)
- Broadly speaking, they state their views; but they don't argue

Level 4 Students' Argumentation

- State the stand clearly
- Selectively choose appropriate information already provided to support their stands
- No further personal experiences or examples
- Some attempts to attack opposite view. However, he used some unwarranted/ unreasonable statements and his presentation was a bit confused.

Further Examples

Question 3b in Paper 2 concerns discussion the statement, “Soft power is the most effective way for governments to increase their influence in the world”

Level 3:

我同意「軟實力」是政府增強其在世界上的影響力的最有效途徑。

第一，以南韓為例，南韓在全球知名度 and 關注度在過流不數高，直至南韓政府力推娛樂產業的發展，令他在國際間的地位有所提升...

第二，國家政府可以通過推行舉行大型活動，以提升政府在世界上的影響力。以巴西為例，巴西一國在推行「世界杯」...

第三，以中國為例，...中國可以通過定下和計劃更完善和國際性的政策和制度改革，以軟實力的方式令中國政府在世界上的影響力有所突破。

第四，國家政府可以通過政策和制度改革，令國家變得更重視人權自由，和民主發展，令政府得到國際間的認同和尊重，改善國家與國際之間的關係...

第五，一個在經濟方面有着完善和穩定的政策和制度，可吸引外國商家來本地投資。

No evaluation of the effectiveness of the soft power of a country against that of the hard power was ever undertaken.

Further Examples

Question 3b in Paper 1 is used in the following illustrations. The question requested the students to discuss two global concerns that could be induced due to an up rise in tourist traveling in the future.

Level 3:

..由此碳足印上升的趨勢可見，配合國際旅遊業上升趨勢，因旅遊業而產生的二氧化碳排放量亦同時急速上升。此趨勢正正是嚴重地加劇了全球暖化的趨勢，令到全球暖化成為全球焦點之一。

With respect to the concern of an increase in the release of carbon dioxide, the student only quoted the term, “Global warming”. However, no further elaborations about the consequences were provided.

Further Examples

Level 3 or 4

Wrong/Irrelevant concepts:

於國際旅遊業急速發展的趨勢下，或引起國民文化素養之關注點。...由於國際旅遊業的急速發展的趨勢而令各國的文化增加交流的機會。於交流當中，或文化不同而反顯國民文化素養成為當中的注意點。文化全球化因國際旅遊業急速發展而帶領，當中的文化衝突亦成為一大問題，並反顯國民文化素養。

...如果遊客普遍都不文明，可能很多地方...環境都會造成難以估計的破壞。例如如果遊客若亂拋垃圾的話，因著旅遊人數的增加，可能最終形成垃圾山，嚴重影響環境。而為了國家本身的清潔和印象，無疑，旅遊的文明也漸漸受到全球不同國家的關注。

Summary of Findings

- Quite a number of low-level performance students (Level 3 or 4) in LS exam were quite good at synthesis and interpretation & analysis; however, they did not do well in the aspects of evaluation and understanding (and application of relevant knowledge, key ideas and concepts)
- With respect to the aspect of evaluation, the sampled scripts showed that Level 3 students did not attempt to argue against the opposite views in their responses at all; while Level 4 students used unwarranted/unreasonable statements
- With respect to the aspect of understanding, the sampled scripts showed that the low performance level students used...
 - the inappropriate/irrelevant concepts, and/or
 - the right concepts without any elaborations

Related Study...THINKALOUD

- 10 Students (L5** or L5* - 3 or L5 - 1, L4- 5 and L3 -1) are interviewed and asked to state their steps when answering a Liberal Studies question of 2015 HKDSE (Paper 1 Q3 b)
- The verbal statements were recorded
- The transcript of each statement was examined one by one and might be assigned with a point along the following aspects, depending on its content and nature
 - K: Knowledge (the use of knowledge)
 - I: Interpretation (to make meaning of something)
 - A: Analysis (to compare, break down, infer from the data given, to relate items/elements/phenomena)
 - O: Formulating opinions (to synthesis from pieces of information, to evaluate the impact/ relative importance)
 - E: Using evidence/ examples (to use examples as evidence for supporting the argument)

Note: One statement may be scored in more than one aspect

Some Findings...

Performance of a typical student (by taking average within the group)

Points scored by a student on average:

Area	Level 5** or 5	Level 5	Level 4	Level 3	Total
K+I	27	15	18	14	74
A	23	23	15	9	70
O+E	44	40	26	6	116
Total	95	78	58	29	260

Proportions of points scored by a student on average:

Area	Level 5** or 5*	Level 5	Level 4	Level 3	Total
K+I	0.3	0.2	0.3	0.5	0.3
A	0.2	0.3	0.3	0.3	0.3
O+E	0.5	0.5	0.4	0.2	0.4
Total	1.0	1.0	1.0	1.0	1.0

Observations

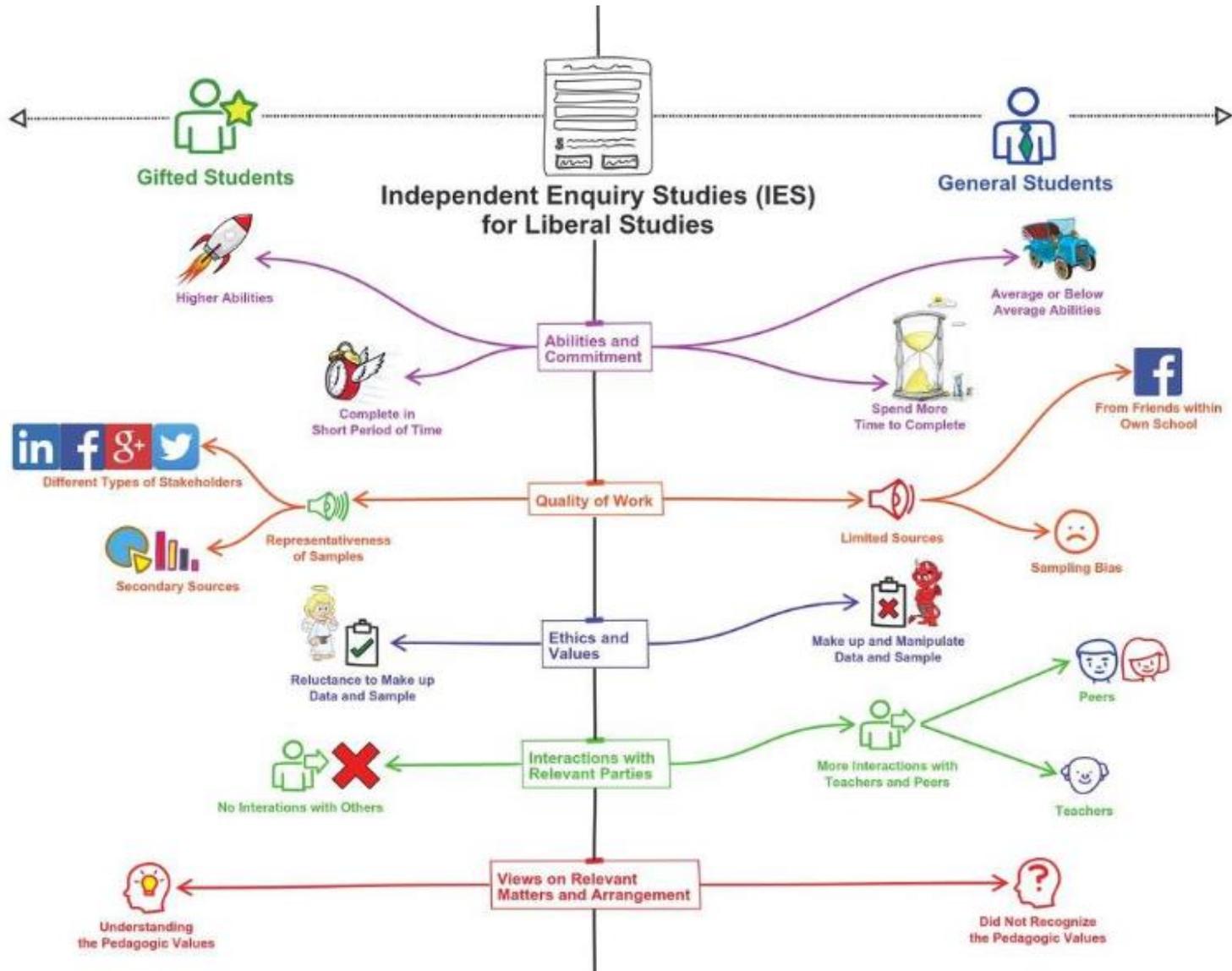
Level 4 students...in general

- Mainly using examples provided in the sources only, which are particular/local instances and cases
- Could not effectively link up with the key term, “Global”
- The seriousness of the impacts could not be clearly explained
- Missing links are not uncommon in their answers
- A number of L5 or above students show the ability of meta-cognition

Supplements...A Study on IES

- Semi-structured interviews were conducted with six student members of the HKAGE and they were invited to attend a 1.5-hour individual interview
- Their performance levels in LS ranged from mid to high levels
- Six non-HKAGE students from a secondary school were purposefully selected for a focus group interview; the public exam results of this secondary school were more or less on the average level
- The performance of these six non-HKAGE students in IES spread equally into three broad groups (2 high-level, 2 medium-level and 2 low-level) based on the assessment information provided by their teachers
- Students were asked to describe their investigations, interactions with teachers and their views on some relevant matters and arrangements (e.g., marking process)
- One experienced LS teacher was invited to facilitate the study and provided his views about general characteristics of a common student when conducting his/her IES for the sake of comparison

Supplements on IES



Thank YOU