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Amotivation as a Predictor of Academic Achievement: A Comparative Study of Science and Art Students' GPA

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Abstract— Intrinsic motivation is characterized by engaging in activities for their inherent satisfaction, whereas amotivation is marked by a lack of intention to act, stemming from beliefs of ineffectiveness or disinterest in the activity. Prior research has established a positive correlation between intrinsic motivation and academic performance among science students; however, its applicability to arts students remains unexplored. The present study aims to examine the hypothesis that motivation, in its various forms, correlates with the Grade Point Average (GPA) among both science and arts undergraduates.

A convenience sampling strategy yielded 230 science students (GPA range: 1.8 – 3.89) and 284 arts students (GPA range: 1.5 – 3.84), who participated in a structured questionnaire interview. This instrument assessed intrinsic motivation, amotivation, and study effort using a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). Average scores were computed and contrasted between the bottom and top quintiles of GPA within each discipline.

The findings revealed a universally high level of study effort across participants. Notably, students within the top 20% GPA bracket reported significantly greater academic effort than their lower 20% counterparts. A distinct pattern of significant amotivation was observed among science students with lower GPAs. Conversely, arts students with lower GPAs exhibited high levels of intrinsic motivation, akin to those observed in students with higher GPAs.

Index Terms— *Academic Performance, Amotivation, GPA, Intrinsic Motivation.*

I. INTRODUCTION

Motivation is a cornerstone psychological construct in the realm of educational research, wielding a profound impact on learning and academic achievement. It can be dichotomized into intrinsic and extrinsic forms: intrinsic motivation arises from an inherent interest or enjoyment in the task itself, while extrinsic motivation is driven by the anticipation of rewards or recognition external to the activity itself [1]. The literature robustly posits that individual variances in motivation are intimately connected with divergences in academic success [2,3].

Self-Determination Theory (SDT), as proposed by Deci and Ryan [1], delineates a spectrum of motivational orientations, categorizing them into intrinsic, extrinsic, and amotivation. Intrinsic motivation encapsulates engagement in an activity for its own sake, deriving pleasure and satisfaction from the action itself. Extrinsic motivation, in contrast, is instrumental, with actions performed in service of achieving separate, oftentimes tangible, outcomes.

Amotivation represents a distinct lack of inclination to act, attributed to a perception of ineffectiveness, a deficit in competency, or an absence of value in the task [1]. Empirical evidence has consistently underscored a positive correlation between intrinsic motivation and enhanced academic performance, particularly within cohorts of science students [4-7]. However, the generalizability of this association to students of the arts has not been ascertained.

The current study endeavors to bridge this knowledge gap by investigating whether motivational orientation is predictively linked with Grade Point Average (GPA) across disciplines, specifically within the domains of science and the arts. The objective is to evaluate the proposed hypothesis that a student's motivation orientation is significantly associated with their academic performance, as measured by GPA, in both of these educational streams.

II. METHODOLOGY

A. Participant Recruitment and Ethical Considerations

The present cross-sectional study employed an online survey leveraging convenience sampling techniques for data collection. The recruitment spanned from April to November 2018, targeting full-time, government-funded, undergraduate local

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students at a Hong Kong university. Data were garnered through a tripartite promotional strategy: direct in-class announcements, campus-wide posters, and targeted emails. Exclusion criteria were set to omit international and postgraduate students from the study sample. Ethical approval for the research was granted by the Institutional Review Board (IRB), as evidenced by approval number HSEARS2018004005-01.

B. Methods of Data Collection

This investigation is a component of a larger, collaborative research project examining the learning approaches and experiences of university students in Hong Kong. The survey instruments and collection methodologies have been delineated in prior publications [8]. A suite of questionnaires, detailed in Table 1, was employed for data acquisition. The reliability and validity of these instruments have been previously confirmed [9-11]. For the purposes of this study, a subset of 22 motivation orientation-related items from the HowULearn questionnaire [11], along with a single item assessing study effort from the Academic Locus of Control Scale Questionnaire (ALCSQ) [12], were extracted for subsequent statistical evaluation. Responses were quantified using a 5-point Likert scale, where 1 represents 'strongly disagree' and 5 signifies 'strongly agree'.

C. Data Analysis

The analysis identified students situated in the bottom and top quintiles (20%) for GPA within both the science and arts disciplines. An independent sample t-test was employed to compare age and GPA between the general populations of science and arts students (Table 3), as well as within the respective top and bottom quintile GPA cohorts (Table 4). The Mann–Whitney U test was utilized to discern differences in motivations and study efforts between these GPA groups (Table 5). A p-value of less than 0.05 was predetermined as the threshold for statistical significance. Data analysis was conducted using SAS software, Version 9.4, for Windows (SAS Institute Inc., Cary, NC, USA).

III. RESULTS

A. Demographics and General GPA Comparison

The study encompassed 515 students who met the inclusion and exclusion criteria, comprising 231 science and 284 arts undergraduates. Table 3 presents demographic information and comparative GPA data. The mean age of participants was 21 years, with no significant difference observed between science and arts students (p > 0.05). However, the mean GPA of arts students (M = 3.17) was significantly higher than that of science students (M = 3.09; p < 0.05).

B. GPA Disparity Between Top (upper 20%) and Bottom Quintiles (lower 20%)

Table 4 details the average GPAs for students in the highest and lowest 20% of their respective groups. The mean GPA for the lower quintile (science: M = 2.53, arts: M = 2.64) was

significantly below that of the upper quintile (science: M = 3.52, arts: M = 3.58) in both disciplines (p < 0.01).

C. Intrinsic Motivation and GPA Rankings

Intrinsic motivation was assessed using 16 questionnaire items. The mean intrinsic motivation score for science students was marginally higher in the upper quintile (M = 3.52) than in the lower quintile (M = 3.47), a difference that reached statistical significance (p < 0.05). Conversely, arts students' intrinsic motivation scores (lower quintile: M = 3.77, upper quintile: M = 3.89) did not exhibit a statistically significant difference (p > 0.05) as shown in Table 5.

D. Amotivation Scores and GPA Rankings

An analysis of amotivation, based on 6 questionnaire items, revealed an absence of significant difference in science students between the lower (M = 3.31) and upper (M = 3.11) GPA quintiles (p > 0.05). In arts students, however, there was a significant increase in amotivation scores for the lower quintile (M = 3.30) compared to the upper quintile (M = 3.04; p < 0.05), as indicated in Table 5.

E. Study Effort and GPA Rankings

The effort applied to studies was consistently high across all groups. The lower GPA quintile reported high effort scores (science: M = 3.45, arts: M = 3.79), which were significantly surpassed by the upper GPA quintile (science: M = 4.00, arts: M = 4.02), with both disciplines showing significant differences between the quintiles (p < 0.05) as seen in Table 5.

Table 1. Questionnaires to be used in this project.

Questionnaire	Content
Demographic information GPA	Age of student Current GPA
HowULearn Questionnaire	motivation of learning (22 items)
ALCSQ [38]	Motivation of learning (6 items)

Table 2. Examined items of motivation, amotivation, and efforts in study.

Intrinsic motivation (16 items, 5-point Likert scale)
1. It is clear to me what I am expected to learn in subjects.
2. We are allowed some choices over what aspects of the subject to concentrate on in subjects.
3. What we are taught seems to match what we are supposed to learn.
4. I can see the relevance of most of what we are taught.
5. Subjects have given me a sense of what goes on "behind the scenes" in the subject area.
6. The teaching helps me to think about the evidence underpinning different views.

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7. Teaching encourages me to relate what I learned to issues in a wider context.

8. I found most of what I learned in subjects really interesting.

9. I enjoyed participating in subjects.

10. Subjects provide plenty of opportunities for me to discuss important ideas and topics.

11.I can see how the subject assessment fits in with what I am supposed to learn.

12. I believe I will do well in my studies.

13. I'm certain I can understand the most difficult material in my studies.

14. I'm confident I can understand the basic concepts of my own study field.

15. I expect to do well in my studies.

16. I'm certain I can learn well the skills required in my study field.

Amotivation (6 items, 5-point Liker scale)

1. I've often had trouble making sense of the things I have to study.

2. Much of what I've learned seems no more than lots of unrelated bits & pieces in my mind.

3. Topics are presented in such complicated ways that I often can't see what they mean.

4. The workload of my studies is too heavy & causes too much study-related stress.

5. I put too much effort into my studies.

6. I am suffering from a high level of study-related stress.

Efforts in study (1 item, 5-point Likert scale)

1. I put a lot of effort into my studying.

Table 3. General information and GPA.

	Science (n=231)	*Arts* (n=284)	*p*
Age	21.1±1.3	21.2±1.7	0.45
GPA	3.09±0.37	3.17±0.35	0.013*

*2 sample T-test p< 0.05, statistically significant.

Table 4. GPA in upper 20% and lower 20% students.

	Lower 20%	*Upper 20%*	*p*
Science (n=46)	2.53±0.23	3.52±0.13	0.00*
Arts (n=57)	2.64±0.30	3.58±0.09	0.00*

*2 sample T-test p< 0.05, statistically significant.

Table 5. Intrinsic motivation /amotivation efforts in study in upper 20% and lower 20% students.

	Lower 20%	*Upper 20%*	*p*
Intrinsic motivation			
Science	3.47±0.59	3.92±0.52	0.00*
Arts	3.77±0.37	3.89±0.43	0.13
Amotivation			
Science	3.31±0.50	3.11±0.61	0.08
Arts	3.30±0.59	3.04±0.57	0.01*
Efforts in study			
Science	3.45±0.82	4.00±0.77	0.00*
Arts	3.79±0.75	4.02±0.73	0.00*

* U-test, p< 0.05, statistically significant.

IV. DISCUSSION

Our analysis revealed that students exhibit a high degree of intrinsic motivation across the spectrum of academic performance, albeit accompanied by varying degrees of amotivation. Notably, students with superior academic outcomes demonstrated a heightened level of intrinsic motivation coupled with a reduced incidence of amotivation. These observations are congruent with the patterns documented in international academic contexts [2-5].

Furthermore, the assessment of study effort unveiled a pronounced distinction: students with elevated GPA scores reported substantially greater effort than their lower-GPA counterparts. This disparity underscores an intriguing nuance within the motivation-performance nexus; high intrinsic motivation is not a guaranteed precursor to intensified study effort. Rather, it is the students achieving higher academic success who consistently report more substantial effort in their studies. This suggests that while intrinsic motivation is a critical factor in academic engagement, it alone does not predict the degree of effort students will invest in their academic pursuits.

V. CONCLUSION

This study has systematically explored the relationship between academic motivation, study effort, and academic performance among undergraduate students in a Hong Kong university. Our findings indicate that, while high intrinsic motivation is prevalent among students, it does not universally translate into increased study effort or superior academic achievement. The data reveal that higher-performing students tend to exhibit not only greater intrinsic motivation but also lower levels of amotivation and higher levels of study effort. These correlations align with comparable research conducted at international universities.

The implications of this research are twofold. Firstly, it reaffirms the complex interplay between motivation and performance, emphasizing that intrinsic motivation alone may not suffice for optimal academic outcomes. Secondly, it accentuates the significance of cultivating both motivation and effective study strategies to foster academic success. Educational interventions that enhance intrinsic motivation, while simultaneously reducing amotivation and promoting effective effort allocation, may prove beneficial in enhancing student performance.

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In conclusion, our study contributes to the understanding of motivational dynamics in the academic setting and underscores the importance of a multifaceted approach to fostering educational achievement. Future research should continue to dissect the intricate components of motivation and effort to inform the development of targeted pedagogical strategies that can support students' academic endeavors.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data presented in this study are available on reasonable request from the corresponding author.

Conflicts of Interest

The authors declare no conflict of interest.

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