STATISTICS

Exploring the characteristics of the cadets' learning network under military education

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ABSTRACT. Military academy education is a part of university education. This study aims to explore the characteristics and achievements of the learning network for military academies students in Taiwan order to understand the main reasons for the differences and to identify special students. Moreover, this study analyzed the social network to explain the patterns of the students' learning network. The findings are as follows. (1) An extensively connected learning network exists among the students of different classes. Students who comply with social norms have close relationships and interact frequently with each other. (2) Different cognition of social norms is the main reason leading to differences among students in their learning network and performance. Compliance with social norms is effectively conducive to the access and sharing of knowledge and improvement of learning performance. (3) The academic performances of those who have aloof relationships with their peers are polarized with either extreme good or extreme poor, and most of them comply with no notice or reflect the behavior of rejecting social norms. The academic contribution can support administrator as an important reference for planning education strategy.

Keywords: social network analysis; social norms; learning network.

Introduction

Military academies are the cradle to cultivate military officers and the most important part of a military education system in Taiwan (Chen, Chiu, Lin & Chang, 2021). Military academies implement a small class teaching system with about 15-25 students in each class. The relationship and interaction of each student with the others in one class has a great influence on his/her future development and attitude can predict his/her future interaction with the unit's comrade-in-arms. The cultivation of strong interaction and learning relationships with peers at a military academy not only helps improve learning efficiency, but also exerts a positive influence on workplace performance. Therefore, it is a topic that cannot be ignored when looking to maintain good learning relationships among students so as to enhance class cohesion and promote academic performance.

In an ideal situation, each member of a class can maintain good learning relationships, fully share knowledge, and help and unite each other in order to enhance everyone's overall learning achievement. However, objectively speaking, this might not be the case in the real world. It is inevitable that some students in a class will refuse to interact with some and stay away from others. They choose to be closed and isolated, thus restricting the transmission of knowledge and making knowledge-hiding behavior in class (Jha & Varkkey, 2018). Furthermore, students have different academic performance. It is impossible for them to exhibit academic performance at the same level. Thus, it is worth exploring the relationships between the outer-rim isolated students and their peers and to examine their academic performance.

Past studies on peer relationships often focused on students from private schools, and also provided many contributions and insights (Azizi, Soroush & Khatony, 2019; Abbas, Aman, Nurunnabi & Bano, 2019; Rienties & Tempelaar, 2018), but ignored the link of military education. However, most studies were confined to present the pattern of a social group network via the learning relationships among students and conducted descriptive analysis and discussions of demographic data, while neglecting the reasons for the differences in the learning network and performance among students. Although the military education is a part of university education, military academies offer a relatively closed educational environment, where the learning

relationships among students are known to only a few. It is rare to explore the causes of differences in learning outcomes among peers through theoretical foundations. As such, a few questions arise. What is the learning network of such students? What are the degrees of connection and interaction of each student in such a learning network? What are the reasons for the differences in the learning network and performance among students? These questions are worth further exploration.

On the basis of the above research background and motivation, this paper regarded military academies students as its subjects. Through social norms in the social influence theory, social conflict theory, and social network analysis (SNA), this research demonstrated the intangible learning relationships via a quantitative method and figures. It specifically displayed the learning network and structure among students and probed into the reasons for the differences in learning network characteristics and academic performance so that administrator of military academies could understand the pattern of learning relationships and detect any special situation in a timely manner.

Knowledge sharing not only can promote knowledge exchange, but also enhance organizational performance. Knowledge sharing and communication among groups help organizations enhance their competitive advantages (Akram, Lei, Haider & Hussain, 2020; Singh, Gupta, Busso & Kamboj, 2021). Schools are the origin of knowledge sharing. For the learning relationship among peers, good interaction and a supportive environment could lead to effective knowledge sharing and improve the overall academic performance of a class (Al-Kurdi, El-Haddadeh & Eldabi, 2018). However, the first condition of knowledge sharing is the willingness of the knowledge owner to release the knowledge. If the knowledge of the owner is not shared, then the effect of such knowledge is restricted only to the individual (Friedrich, Becker, Kramer, Wirth & Schneider, 2020), it will result in the hoarding and concealment of knowledge. Although providing short-term personal competitive advantage, such maladaptive behaviors will not be conducive to long-term organizational consequences (Nerstad, et al., 2018; Jha & Varkkey, 2018). The motivation for knowledge sharing is based on good social interaction, and knowledge sharing only occurs after the creation of social relations. The factors that affect the motivation of knowledge sharing also focus on social performance, such as social identity, social norms, and reciprocity (Lee, Malik, Rosenberger & Sharma, 2020; Hsu & Lin, 2020). If an individual agrees and accepts the norms given by a group, then he/she is willing to establish relationships with others and take the initiative to make a contribution and exchange knowledge (Guan, Wang, Jin & Song, 2018; Singh, 2019). Thus, if the members of a class can conform to group norms, then good learning relationships will be formed among peers.

Social norms are significant aspects of the social influence theory (Cislaghi & Heise, 2019). This concept originated from the subjective norms proposed in the theory of planned behavior (TPB), mainly referring to the influence on or changes in an individual's attitude, behavior, and intention due to the pressure of other important people or groups during interpersonal interaction, which could also be called as normative conformity (Hassan, Zhang, Ahmad & Liu, 2021; Kelly & Davis, 2018). Normative conformity covers an individual's compliance with and identification of other important people or groups. Compliance means the willingness to accept group norms so as to obtain good responses from others. Identification means that as long as an individual can maintain a good interaction and relationship with group members, then he/she will exert all efforts to conform to the beliefs and behaviors of the group. To sum up, social norms indicate that an individual desires to be accepted, praised and liked, while changing his/her behaviors and willing to share knowledge with others, in order to meet everyone's expectations (Spears, 2021; House & Tomasello, 2018). However, in terms of the proposition of the social conflict theory, though social norms advocate an individual to conform to a group's beliefs and actions, it might actually conflict with self-interests, expectations or values (Cuppen, 2018), he/she would not necessarily accept the values of the group. An individual's compliance with norms depends on the importance attached to such norms by that individual. The more important a group is to an individual, the better he/she will conform to the norms of the group (Legros & Cislaghi, 2020). The relationship between the individual and the group members will thus be closer, and the interaction will be more frequent.

When the social conflict theory was first conceptualized, it was considered as a phenomenon of an anti-norm of an individual who did not conform to the constraint of a group. In other words, there is a gap between an individual and a group, which makes one not bother to interfere with the other. An individual does not care about or ignore the opinions of others and does not conform to the common values of the peer group. He/she prefers to be aloof. Thus, based on the ideas of the social norms of the social influence theory and social conflict theory, this study adopted the difference in cognition to explore if the formation of learning

relationship among students and the advantages and disadvantages of academic performance are be affected by group norms, resulting in differences. According to the research objectives, it classified the students into two categories by their different cognition of social norms - namely, those who strongly agreed with social norms (those who conformed to norms) and those who did not care about or rejected social norms (those who neglected norms) so as to learn the reason for the differences in learning network and performance.

SNA is composed of three elements: actors, relationships, and linkages, it identifies social ties, and perceptual measures identify peer norms (Jorgensen, Forney, Hall & Giles, 2018). A social network is a complicated structure formed by the different relationships among actors. Actors are the subjects of the network structure and are also known as nodes. A relationship is intangible without an actual distance and can be classified into many categories. The degree of strength of a relationship depends on the frequency of contact among actors. Linkages are the paths for actors to establish relationships and are one-way, two-way, and undirected. Linkages cover the following indicators: Closeness of centrality refers to the connectivity of the interaction among students. The lower the connectivity is, the more frequent the interaction is, and the closer the relationship is. Degree of centrality refers to the connectivity between an individual and others. A higher degree of centrality refers to a more important position of an individual at class who is viewed as a core or key figure. Cliques refer to small clusters with high cohesion in class. It takes at least three people to form a cluster. Isolate refers to a lack of interaction with other students. The higher the value is, the more isolated a person is to others (Brewer, Carley, Benham-Hutchins, Effken & Reminga, 2020). With respect to the assessment of degree of centrality, the more linkages actors have, the more favorable positions they hold. They have more channels to obtain resources, meet more demands, and have more options. Actors might belong to a big or small group. In contrast, actors can also be at the outer-rim position and have weak connections. They are considered as isolates. Thus, based on the research objectives, this paper established a learning network and adopted the assessment indicator of degree of centrality to learn the learning relationships among students and the role and position of each student in the learning network.

Methodology

Research model

If an individual has more interaction with a group, then he/she might be assimilated due to peer pressure and intangible norms following the relationships. The behavior of the individual would also meet the expectations of the public; and the individual would conform to the norms of the group. When an individual is accepted by the group, he/she has a sense of belonging and emotional sustenance. Naturally, the learning network becomes close, with frequent contact and a higher degree of centrality. The individual is then involved in a big or small group. In contrast, if an individual neglects social norms, then he/she does not care about relationships with other students and even may not get along well with some. The connection of the learning network is thus loose and aloof, and the degree of centrality is generally low. Such an individual is seen as an alienated member. Hence, this paper proposed the following hypothesis.

H1: The degree of centrality of members who conform to social norms is significantly better than that of those who neglect social norms.

Members who comply with social norms attach high importance to recognition from other important people or peers. Thus, they are prone to be internalized by the group and produce consistent performances with the group. Their academic performance is naturally better than that of alienated members, and they follow the tendency of the group. In contrast, members who ignore social norms do not care about others' views and tend to have no contact with anyone and prefer self-study. Their academic performance is different from that of ordinary people, and such a difference might be extreme. Hence, this paper proposed the following hypothesis.

H2: Different cognition of social norms leads to significant differences in academic performances.

H2a: Members who follow social norms have significantly higher academic performance than those who ignore social norms.

H2b: Members who follow social norms have significantly lower variation of academic performance than those who ignore social norms.

From the perspective of the learning network, each student has a different status and learning performance. The frequency of their contact and interaction with others determines the degree of their academic performance, the social networking activities may significantly impact the effect of the learning activities. A higher degree of centrality stands for more connection, more frequent interpersonal interaction, more channels to obtain resources, and better communication and sharing of information. As they can effectively obtain and share knowledge, their knowledge is quite explicit. Thus, their academic performance should be better than alienated members who have no support. If a member is used to having no contact with anyone and is not good at interacting with others, then he/she cannot obtain academic information in diversified ways. Their knowledge cannot be transmitted effectively, which tends to become implicit, followed by poor academic performance. Hence, this paper proposed the following hypothesis.

H3: Degree of centrality has a significant and positive influence on academic performance.

The research model developed by this paper was based on the theoretical framework of the social influence theory and social network theory. It explored if compliance with norms and anti-norms lead to differences in the degree of centrality and study score. Moreover, it set up a learning network to learn the degree of connection and interaction of each student. Lastly, it discussed whether the degree of centrality affects academic performance. See the research model in Figure 1.
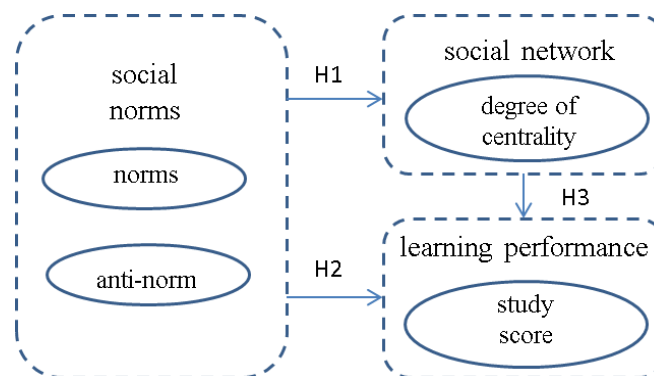

Figure 1. Research model.

Research Subjects and Questionnaire Design

This study conducted an anonymous questionnaire survey, regarded the class as a network boundary, and classified the participants into two categories. First, it adopted the modified Delphi Method to develop the formal questionnaire. An expert group was formed by 11 scholars and experts, including administrative directors, professors, administrative staffs, representatives of students of different grades, and administrative directors of private universities of military academies. The expert group, through brainstorming and a collection of ideas, offered their feedback and reached a consensus on the topics without accurate analysis so as to ensure the quality of the questionnaire (Nayahangan, Stefanidis, Kern & Konge, 2018). This research conducted a formal questionnaire survey of military academies students. The participants were in grades one to four. Students from two classes of each grade were randomly selected as samples.

In regard to the questionnaire design, this study referred to past relevant studies. Based on the factors of social norms (Prentice & Paluck, 2020) and peer relationship (Griffith, Kadous & Proell, 2020), it initially designed the questionnaire on a learning network suitable for students of military academies. Two rounds of the Modified Delphi Method were conducted. A semi-open Likert five-point scale was adopted for the experts to fill in their answers and proposals. The degree of recognition to each question of the expert group was reviewed to confirm the reliability and consistency of the questionnaire, which served as the basis of the formal questionnaire.

The formal questionnaire contained three parts. First, the concept of relative weight in the analytic hierarchy process (AHP) proposed by Saaty (1980) was employed to carry out a pairwise comparison of each question on learning relationships so as to assess the weights of the dimensions of students at military academies and determine the relative importance attached to each question on learning relationships by all students at military academies. The assessment scale had scores from 1 to 9, standing for relative importance. They were given measurement values of 1, 3, 5, 7, and 9 and trade-off values of 2, 4, 6, and 8. Additionally,

the AHP incorporates a valuable mechanism for scrutinizing the consistency of decision-maker evaluations, thereby mitigating bias in the decision-making process (Chang, Chain, Wen & Yang, 2016; Chung & Chang, 2022; Chen & Chang, 2023). This consistency assessment involves computing the consistency index (CI) and consistency ratio (CR) to validate the coherence of the calculated outcomes. The formula for determining the CI is as follows:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

where λ_{max} represents the maximum eigenvalue of the matrix, and n denotes the dimensions of the pairwise matrix. Then, the CR is subsequently defined as:

$$CR = \frac{CI}{RI}$$

The random index (RI) is the average random value corresponding to the consistency index (CI). If CR ⩽ 0.1, the evaluation results are considered acceptable.

A Likert five-point scale was used to study the understanding of students' social norms. The average score of 4 was used as a threshold; ≧ 4 refers to those who strongly conform to norms, and < 4 refers to those who pay no attention to or reject norms. Lastly, social network scale was employed to investigate the degree of strength of learning relationships among peers. SNA was used to construct the learning relationships among students to the learning relationship matrix with University of California of Irvine Network Programs (UCINET) software and to analyze the degree of centrality. Network drawing (NETDRAW) was adopted to draw a network diagram to show the learning network between the both. Since the numbers of students of each class were different, the absolute values of degree of centrality could not be compared via network analysis. Thus, the relative value of degree of centrality after planning was adopted so as to allow the measurement scales of each class to be consistent. See Table 1 for the questions of the questionnaire.

Table 1. Dimensions and questions of the questionnaire on the learning network.

Dimension	Question
Social norms	1. When I try to study together with some peers, I will push myself to make my academic performance to be the same level as my peers.
	2. I want to know what kind of learning attitude and academic performance can leave a good impression on my peers.
	3. It is important for my peers to recognize my learning attitude and academic performance.
	4. I try to make my learning attitude and academic performance to meet the expectations of my peers.
	5. It is not necessary for me to care about the opinions of my peers on my learning attitude and academic performance. (Negative statement)
Learning relationship	1. When you run into learning bottlenecks, which students actively help you? (Active concern)
	2. When you run into learning bottlenecks, which students do you consult? (Consult peers)
	3. With whom do you often discuss homework or form a reading party? (Reading party members)
	4. Which students are willing to share their homework and reading experience? (Share new knowledge)

The students' total scores of the semester were provided by military academy and used as a secondary source of information. Using original total scores as the assessment standards would be unfair, thus, the original results were converted to T scores to exclude the inconsistency caused by different classes or subjective scores. t-test, quartile deviation, and multiple regression analysis were adopted to verify if the data supported the hypothesis. Lastly, conclusions and suggestions were made based on the research findings, serving as a reference for management.

Results and discussion

Delphi Method Analysis Results

This paper distributed two rounds of Delphi Method questionnaire to 11 experts. The questionnaire analysis results show that the contents of the two rounds of questionnaires both meet verification standards. Only the texts of some questions were modified. All the questions were retained. Mean (M) values of the two rounds remained bigger than 4, and M of the second round was slightly higher, indicating that the experts

considered the importance of the question content to be suitable. In the second round, the mean of |Mode (MO) -M| was lower than that of the first round, indicating high consistency. In quartile deviation (QD), the experts only reached medium consensus in the first round. After modification, their consensus was higher in the second round. In standard deviation (SD), the opinions of the experts in the second were more centralized that those in the first. Therefore, the questionnaire content designed in this paper met acceptance convergence criteria, and a formal questionnaire could be developed based on it. The two rounds of Delphi questionnaire are shown in Table 2.

Table 2. Analysis results of the two rounds of Delphi questionnaire

Dimension	Question	M	MO	|MO-M|	QD	SD
Social norms	N1	3.90/4.45	3/5	0.9/0.5	1.00/0.50	.876/.820
	N2	3.80/4.18	3/4	0.8/0.2	1.00/0.50	.919/.603
	N3	4.00/4.09	3/4	1.0/0.1	1.00/1.00	.866/.831
	N4	3.78/4.00	4/4	0.2/ 0	0.75/0.25	.972/.667
	N5	4.22/4.18	4/4	0.2/0.2	0.50/0.50	.667/.751
Learning relationship	S1	4.60/4.64	5/5	0.4/0.4	0.50/0.50	.699/.505
	S2	4.70/4.64	5/5	0.3/0.4	0.50/0.50	.483/.674
	S3	4.30/4.55	5/5	0.7/0.5	0.63/0.50	.823/.522
	S4	4.40/4.45	5/4	0.6/0.5	0.50/0.50	.699/.522
Average value		4.19/4.35	-	0.57/0.31	0.71/0.52	0.78/0.66

*1. First round/second round. 2. Verification criteria: M≧4; |MO-M|≦1; QD≦1; SD < 1

Questionnaire analysis results

Statistics of basic data

The participants included 160 students from 8 classes. There were 158 valid copies of the questionnaire and two invalid ones, for an effective questionnaire rate of 98.7%. The majority of military academies students were male (146, accounting for 91%; 14 were female, accounting for only 9%). Seventy-three (45.6%) students were from Chung Cheng Armed Forces Preparatory School (CCAFPS), while 87 (54.4%) were from private schools and passed the entrance exam of military academy. See Table 3 for the demographics summary.

Table 3. Demographics summary

Class	Gender		Enrollment source		Total
	Male	Female	CCAFPS	Private schools	
Grade 1 Class A	22	1	12	11	23
Grade 1 Class B	17	1	11	7	18
Grade 2 Class A	15	2	6	11	17
Grade 2 Class B	7	4	4	7	11
Grade 3 Class A	24	1	19	6	25
Grade 3 Class B	22	2	3	21	24
Grade 4 Class A	17	2	11	8	19
Grade 4 Class B	22	1	7	16	23
Total	146	14	73	87	160
Percentage	91%	9%	45.6%	54.4%	100%

## Analysis of relative weight

The questions of the questionnaire were designed based on the concept of a weighted AHP and were confirmed first by the Delphi Method. A pairwise comparison was conducted. The pairwise compared matrices must pass consistency verification. If the pairwise comparison showed CR ≤ 0.1, then the questionnaire would be regarded as valid. The AHP method was used to calculate the relative weights. The analysis results show that all the students believed the most important aspect of learning relationships is consulting peers (weight 0.335), followed by active concern (weight 0.251), sharing new knowledge (weight 0.225), and being members of a reading group (weight 0.189). We thus learn the relative importance of the factors influencing the learning relationships of students of military academies, which serve as the standard to assess the degree of strength of the learning network among students, as shown in Table 4.

Table 4. List of relative importance attached to each question by all the students.

Question	Average weight	Ranking
Active concern	0.251	2
Consult peers	0.335	1
Reading party members	0.189	4
Share new knowledge	0.225	3

Learning network

This paper used UCINET which is a software tool used for SNA to construct the learning relationship matrix among students of each class and analyzed the degree of centrality and the degree of strength of learning relationships. There is no significant difference in the degree of centrality of each class. $P = 0.188$ (> 0.05) shows that the pattern of learning network connection of each class is similar and consistent. The network diagram was drawn with NETDRAW to indicate the pattern of the learning network and the linkage among students. Students (S*) used blue square to imply compliance and red square to indicate neglect of norms. Bigger (S*) blue square means bigger degree of centrality and means that the student has more links with others and holds a favorable position. In contrast, a student has less contacts with others and holds an alienated position with a smaller (S*). Thicker lines connecting dots indicate better learning relationships, as shown in Figure 2. It can be seen from the network diagram that each class shows an extensive learning network. Most blue squares were closely connected and had a big shape. Most red square were alienated with a weak connection and a small shape. This means that students who conform to social norms have close and frequent learning relationships, while those who neglect social norms have alienated learning relationships with their peers. Take Grade 4 Class A for instance: S2, S5, S6, S7, S9, S10, S14, and S15 show the tendency of neglecting social norms. Most of them are at the edge of the network diagram. Only a few of them have a favorable position. These students have less and weaker connections with others. The learning network diagrams can help management to grasp the learning relationship among students and to identify specialties.
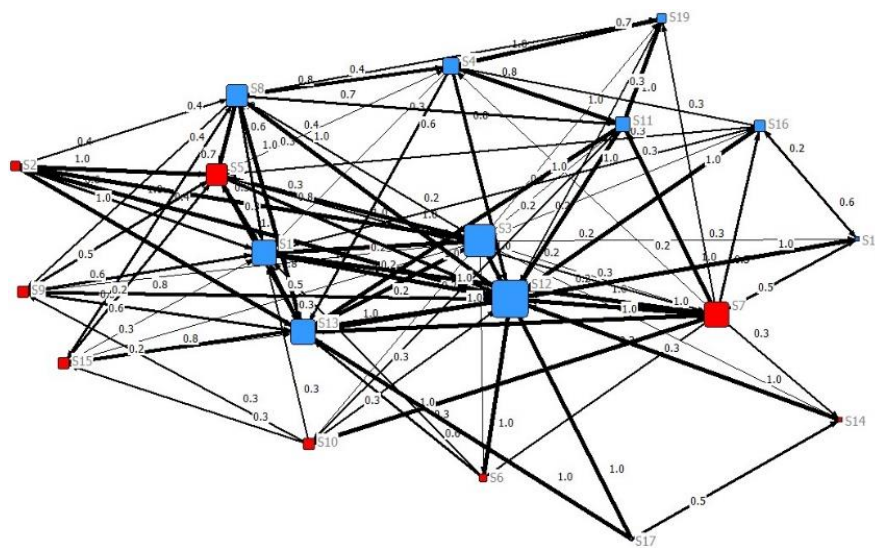
Figure 2. Characteristics of learning network of Grade 4 Class A

Verification of the hypothesis

This paper verified the differences in degree of centrality of the learning network from the perspective of cognition of social norms. The average score of 4 was used as a threshold: $\geqq 4$ refers to those who strongly conform to norms, and < 4 refers to those who pay no attention to or reject norms. Thus, there are two groups of students: those who conformed to the norms and those who ignored them. The t-test of independent samples shows that $t = 3.89$, $p = 0.00$ (< 0.05), indicating that the variance of the two groups of samples is heterogeneous. The degrees of centrality of the learning network of students who conform to the norms and those who ignore them show significant differences; and that of those who conform to the norms (M =.416) are significantly better than those who ignore them (M =.306). In other words, those who conform to the norms show close connections, while those who ignore them have weak connections, as shown in Tables 5. Thus, the results support the following hypothesis.

Table 5. Group statistics and independent samples test of social norms cognition and degree of centrality

Social norms cognition	N	Mean (M)	Variance	QD	t	Sig.
Conform norms	82	.416	78.152	5.52	3.89	P =.000***
Neglect norms	76	.306	108.992	7.78		

H1 (The degree of centrality of members who conform to social norms is significantly better than that of those who neglect social norms) is valid.

This study then verified the differences in academic performances from the perspective of social norms. The average score of 4 in the Likert five-point scale was used as a threshold to distinguish the two groups of compliance and negligence. However, first, it was necessary to confirm if the original academic performances of each class could objectively stand for an assessment standard. One-Way ANOVA was used to display the statistics of the original academic performance of each class. The total average score was 83.047. The 95% confidence interval estimated the values of Grade 4 Class A, Grade 4 Class B, and Grade 1 Class B were not included in the total average score. The variance analysis of class and academic performance $F = 10.514$, significance $p =.000$ (< 0.05) shows that the academic performances of different classes have significant differences. The Scheffe Method is widely recognized and commonly used in situations involving multiple comparisons, particularly for testing differences among multiple group means. The Scheffe Method was used for multiple comparisons and shows that the average academic performances of higher grades are generally better than those of lower grades, as detailed in Tables 6 and 7. Therefore, the original academic performance is not suitable to serve as an assessment standard. Thus, it was converted to a T score via the formula of $T = 10*[(X-M)/SD]+50$; X stands for the original scores; M means mean; and SD stands for standard deviation. The T score was used to obtain the relative fairness of academic performance.

Table 6. Descriptive statistical and ANOVA of original study score of each class

Class	N	Degree of centrality average	95% Confidence Interval of the Difference		Minimum	Maximum	F	Sig.
			Lower	Upper				
4A	19	85.432	84.168	86.696	79.61	89.53		
4B	22	88.995	87.171	90.819	77.74	94.22		
3A	24	82.524	80.726	84.321	73.44	89.48		
3B	24	84.895	82.899	86.892	75.69	92.37		
2A	17	81.145	78.47	83.814	74.08	91.06	10.514	P =.000***
2B	11	83.238	79.429	87.047	70.67	91.31		
1A	23	80.846	78.004	83.689	65.02	93.03		
1B	18	75.684	71.382	79.987	55.13	86.61		
Total	158	83.047	82.039	84.055	55.13	94.22		

Table 7. Multiple comparisons by Scheffe method

(I) Class	(J) Class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
4A	1B	9.748*	1.782	.000	2.965	16.531
4B	3A	6.471*	1.565	.021	.513	12.429
4B	2A	7.850*	1.733	.007	1.254	14.446
4B	1A	8.149*	1.597	.001	2.068	14.230
4B	1B	13.310*	1.705	.000	6.821	19.800
3A	1B	6.839*	1.675	.024	.464	13.214
3B	1B	9.211*	1.689	.000	2.781	15.641

*The mean difference is significant at the 0.05 level.

The results of the t-test of independent samples show that $t = 2.405$, $p =.017$ (< 0.05), indicating that the variance of the two groups of samples was heterogeneous. The academic performances of students who conform to the norms and those who ignore them show significant differences; and that of those who conform to the norms ($M = 51.8$) are significantly better than those who ignore them ($M = 48.1$). In addition, the dispersion degree of academic performance variance (Var = 78.152) and quartile (QD = 5.52) of those who conform to social norms is lower than that of those who ignore social norms, which means that the academic performance of those who conform to social norms is relatively centralized, as detailed in Table 8. Thus, the results support the following hypothesis.

Table 8. Group statistics and independent samples test of social norms cognition and study score

Social norms cognition	N	Mean	Variance	QD	t	Sig.
Conform norms	82	51.885	78.152	5.52	2.405	P =.017*
Neglect norms	76	48.169	108.992	7.78		

H2 (Different cognition of social norms leads to significant differences in academic performances) is valid.

H2a (Members who follow social norms have significantly higher academic performance than those who ignore social norms) is valid.

H2b (Members who follow social norms have significantly lower variation of academic performance than those who ignore social norms) is valid.

This study finally verified the impact of degree of centrality of the learning network on academic performance. According to the previous research hypothesis, the degree of centrality of students who ignore social norms is low, and their academic performance are extreme (either excellent or poor). In order to learn the correlation between degree of centrality of the learning network and academic performance, the special and extreme values are excluded, and the multiple regression method was used to analyze data. The results show that degree of centrality of the learning network against academic performance R^2 =.331 has strong explanatory power. Thus, the results support the following hypothesis: The variance analysis is conducted to verify the significance of the overall regression model. The results show that F = 70.837 and a significance p = .000 (< 0.05), indicating that the model is up to suitability, as shown in Table 9. Thus, the results support the following hypothesis.

H3 (Degree of centrality has a significant and positive influence on academic performance) is valid.

Table 9. Regression analysis and ANOVA of degree of centrality and study score

Regression analysis		ANOVA	
R	R^2	F	Sig.
.576[a]	.331	70.837	P =.000***

a. Predictors: (Constant), degree of centrality; b. Dependent Variable: Study score

Conclusion

Students of military academies are a special group. In one class, all the students are together morning and night. Learning relationships matter to the overall learning environment and atmosphere of the whole class. It is suggested that management like department directors, class tutors, and company commanders should take advantage of learning the network diagram and observe if the learning relationships among students are close or aloof, and if their interactions are frequent or sporadic so as to make guidelines to unit peer relationship, establish appropriate class norms and beliefs, and make the whole class more united. This result is also consistent with the research opinions of Al-Kurdi et al. (2018). The establishment of effective peer learning relationships is contingent upon a conducive environment characterized by robust interaction and support. Such an environment fosters knowledge sharing, consequently enhancing the overall academic performance of the entire class. Individuals who identify with and embrace the norms of the group are more likely to actively engage with others, thereby fostering the contribution and exchange of knowledge. This knowledge sharing not only facilitates the dissemination of information but also contributes to heightened learning effectiveness.

The few students in a class who stay aloof from others are in an alienated position. Their connections with others are weak, and their interactions with others are sporadic. They show a lack of caring and require other's deep concern the most. It is suggested that the reason why the alienated students reject group norms or constraints must be promptly identified so as to propose future educational strategies. The academic performance of such students should also be stressed. If they have excellent academic performances, then perhaps due to their superior conditions there is no need for them to study together and interact with other students. They tend to hoard knowledge and are unwilling to share, resulting in implicit knowledge. This result coincides with the research views of Cuppen (2018) and Friedrich et al. (2020). While societal norms

advocate for overt adherence to a group's beliefs and behaviors, practical conflicts may emerge due to an individual's self-interests, expectations, or values. The extent of an individual's conformity to norms depends on their perceived significance of the group to themselves; a heightened perceived importance correlates with a greater likelihood of conformity to the group's norms. In the domain of knowledge sharing, a fundamental prerequisite is the willingness of knowledge proprietors to disseminate their knowledge. Without such sharing, the impact of the knowledge remains confined to the individual. It is suggested that alienated members can be converted into key figures in a class. It involves how management can effectively utilize knowledge management and turn implicit knowledge into explicit knowledge, which is also a major topic. For alienated members who have poor academic performance, they should conduct academic counseling through counseling mechanisms, such as learning and early warning systems, supplementary teachers or face-to-face classes.

This paper combined social norms with SNA, developed a research model, and designed a learning network questionnaire to study the social network of students at military academies. It is suggested that a future research should be conducted for each grade in each semester so as to understand real-time learning relationships and interaction progress, obtain the relational data of students in different semesters, and further implement longitudinal analysis, which can serve as a reference for management to make future educational planning and guidelines.

Acknowledgments

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