

The Influence of Educational Trust on the Willingness of Engineering Undergraduates to Participate in Academic Competition*

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Cultivating innovative engineers has become an important responsibility and mission of higher engineering education. Academic competition has emerged as an important carrier and means for the cultivation of innovative talents in engineering universities and colleges in China. However, the willingness of engineering undergraduates to participate in academic competition is low yet, which seriously reduces the effectiveness of innovative education in engineering universities. This study aims to investigate whether and how educational trust affects the willingness of engineering undergraduates to participate in academic competition. A questionnaire survey was conducted and 201 valid responses from an engineering and technical university in Shanghai were received. The collected data was analyzed by binary logistic model and research results show that in interpersonal trust, students' trust in their instructors and teammates has a significant positive influence on their willingness to participate in academic competitions. What's more, in institutional trust, students' trust in their schools has a significant positive impact on their willingness to participate in academic competitions, while their trust in competition organizers has no significant impact on their willingness. Finally, policy implications were proposed to improve the engineering undergraduates' willingness to engage in academic competition. This study provides valuable information for education authorities to make relevant policies to promote the cultivation of innovative talents in engineering universities and colleges.

Keywords: higher education; educational trust; engineering undergraduates; academic competition

1. Introduction

Innovation is the main driving force for economic growth and sustainable development. Engineering graduates of today are expected to possess creative thinking and innovative skills to cope with the great development challenges facing the world in the 21st century [1, 2]. Engineering education is needed to transfer from focusing on fundamental knowledges and skills of engineering disciplines to instilling the skills to creatively solve “real-world” problems [2, 4]. Cultivating innovative talents has become an important responsibility and mission of higher engineering education.

To cultivate future engineers, engineering education reform have been called for by educational organizations in the world wide [5–7]. For instance, UNESCO Report [5] highlighted the importance of the transformation of engineering education to emphasis problem solving, and more effectively applying engineering and innovation to global

issues. In China, where innovation is considered as the key driver for economic development with high quality, education authorities have highly valued innovation in engineering education in recent years [8]. The National Education Conference, which was held in September 2018, declared that innovation education should run through the whole process of talents cultivation in higher education, especially in engineering education. These new requirements have brought Chinese higher educational institutions to rethink how to instill innovative abilities for engineering undergraduates during their four years study in school [9]. In the traditional higher education system, to get bachelor's degree, students need to choose and take lecture-based curriculums characterized by “force-fed” teaching method [8]. The learning approaches adopted by students are passive, uncritical, uncreative and particularly not suitable for developing practical skills for students [10]. This obviously makes students unprepared for dealing with the engineering practical problems full of complexities and comprehensiveness. Based on the understanding of the

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disadvantages of traditional education methods, engineering universities and colleges have been calling for innovative education by applying new education means, such as problem-based learning, active learning, learning by doing, group learning, entrepreneurship and engineering design education, etc., aiming to foster innovative abilities and creative thinking of engineering students [7, 11, 12].

With the characteristics of active learning, team working and deep interaction, academic competition can promote interest of engineering students, offer opportunities for them to improve their innovative consciousness and innovative practical abilities, and can provide platforms to show their creativity and achievements [13, 14]. In China, academic competitions have emerged as effective carriers and important means to launch innovative education in higher education. On October 10, 2019, the Ministry of Education held a press conference to introduce the deepening reform of innovation and entrepreneurship education in colleges and universities, and China's "Internet Plus" College Students Innovation and Entrepreneurship Competition, as well as the relevant information regarding promoting innovation and education through competition. At present, a variety of competitions of different disciplines at different levels have been organized nationwide in China. Competitions concerning engineering and technology account for the largest proportion in all academic competitions, reaching more than 50%. The most influential academic competitions in engineering and technology include Computer Design Competition for Chinese College Students, Mechanical Innovation Design Competition for National College Students, Structural Design Competition for National College Students, National Undergraduate Engineering Training Integration Ability Competition and Robot Contest for National College Students, etc. [13].

Engineering undergraduates, as the educated objects of innovative engineering education, are the first important participants in academic competitions. Their active engagements in competitions are influential to put academic competition into full play in cultivating innovative talents. However, for engineering students, participating in academic competitions is different from taking theory courses. Taking professional theory course is a kind of passive learning activity that college students must finish, while whether they participate in academic competitions featuring active learning depends on their own subjective willingness. As a matter of fact, at present, only a few students with excellent grades participate in competitions actively. The proportion of engineering undergraduates engaging in competitions is very low and the

vast majority of engineering students have low willingness to take part in them. Under the backgrounds of innovative education being highly emphasized and academic competitions being extensively carried out [15], how to encourage and enhance engineering students' engagement in competitions is an important issue for engineering colleges and universities, which are important places for cultivating innovative engineers in China.

There are numerous studies on the academic competitions and innovative education of college students conducted by Chinese researchers and educators [16]. In the year of 2018 and 2019, the Expert Working Group of "Research on Competition Evaluation and Management System in Colleges and Universities" of China Higher Education Society compiled and published the "The White Paper of Chinese National College Students' Competitions" [13, 17] for two consecutive years, which evaluate the qualities of students engagements in competition around national universities, aiming at promoting the connotation establishment and high-quality development of academic competition. Zhao Chunyu et al. [15], based on the statistical analysis of the data of 19 major national undergraduate competitions from 2012 to 2016, proposed three countermeasures to optimize the governance of academic competitions for education authorities, such as attracting the strong to help the weak, optimizing the structure and strengthening the management. Furthermore, from the perspective of colleges and universities, some studies proposed a mode of cultivating innovative talents based on academic competitions [18], and constructed the management system, mechanism and operation mode of academic competition [19–21]. In addition, Lu et al. [22] from the point of the competition organizers' view, divided academic competitions into four categories according to time and space: open, semi-open, closed and semi-closed, and put forwarded management measures for each type of competition from the aspects of competition system arrangement, competition rules and expert review. What's more, Wang and Zhang [23] investigated how college teachers build a practice teaching system based on academic competition to promote the reform of practice teaching.

To summarize, previous studies focused on how to strengthen academic competition management from the perspectives of education authorities, universities, competition organizers and competition instructors. Despite of that, there are knowledge gaps in this area. Few have paid their attention to the phenomenon that the rate of students participating in competition is low, and few have attempted to investigate how to motivate college

students to participate in the existing competitions. There is also a lack of studies taking the engineering undergraduates as research objects in the competition related researches. Based on an important relational theory proposed by Putnam [24] that trust helps to mobilize individual will and behavior enthusiasm, and its effect is no less than that of formal system, this study aims to answer the following questions: (1) whether and how educational trust affects the willingness of engineering undergraduates to participate in academic competitions; (2) how to enhance the willingness of engineering undergraduates to participate in academic competitions by improving educational trust. The results of this paper will provide valuable information for education authorities to make relevant policies to promote the cultivation of innovative talents in engineering universities and colleges.

2. Theory and Research Hypotheses

Trust is a concept originating from sociology theory. In the sociological point of view, trust, regarded as a way of dealing with disappointment of expectations [25, 26], is the foundation of human life and is a necessity for complexity reduction [27]. Trust is the result of constant communication between people, and the same with confidence, is the precondition for engagement in activities in society [28]. Confidence makes participation possible and trust, argued by Luhmann [25], expands the scope and extent of participation. As a core component, trust, together with network and norms, is considered as an important social capital [29]. Putnam [24] thought that there is abundant social capital in the community, and it is impossible to analyze its preferences, motives and behavior choices comprehensively and objectively when talking about individual wishes and behavior without considering its social domain.

There are different kinds of trust, such as psychological trust, ontological trust and trust in systems, which mentioned by Giddens [26]. Bryk and Schneider [30] investigated the trust in school, stating that even the basic activities in schools are embedded in complicated social exchange networks. The concept of educational trust is introduced to examine the students' engagement in education under the framework of sociology [31]. Existing studies captured the effect of educational trust on education outputs and highlighted that students' trust in teachers enhances their learning outcomes, such as motivation [32, 33], engagement [34], and performance [35]. Cavanagh et al. [36] stated that student' trust originate from instructor understanding, accepting and caring for the students and discovered that student's trust in instruc-

tor relates to student participation in active learning and final grade. What's more, Görlich and Katznelson [31] identified three elements of educational trust: social security and recognition, flexibility in structures and progression in skills, expanding educational trust from the trust of student in instructor to a wider range. In addition, the relationship between college teachers' relational trust in three main referents (the administration, colleagues, and students) and their job performance were investigated [37]. To summarize, instead of focusing on students' self-confidence and endeavor, studies relating to trust provide a new research paradigm for investigating the influences of social relationships and social systems involved in education on the students' learning outcomes.

Coleman and James [38] described trust as interpersonal trust and institutional trust. Interpersonal trust is a kind of generalized expectation established in interpersonal interaction, which is mainly the expectation of verbal commitment and reliability of written or oral statements. Institutional trust often depending on legal and political institutional environment is a kind of trust caused by social phenomenon based on "non-interpersonal" relationship. Based on Coleman and James's study, this paper studies the influence of educational trust on the willingness of engineering students to participate in academic competitions from two aspects: interpersonal trust and institutional trust. The two main bodies of interpersonal interaction for college students in their study and life are teachers and classmates. Therefore, this paper analyzes interpersonal trust from two aspects: students' trust in teachers and students' trust in classmates. Students' participation in competitions needs to be carried out under the system and rules formulated by schools and competition organizers. Therefore, the system trust is analyzed from two aspects: college students' trust in their schools and competition organizers.

In fact, for the majority of engineering students, when deciding whether to participate in the academic competition, they lack self-confidence, have little access to competition information and take less initiative. They often participate in the competition out of the trust in their instructors. Winning a prize in an academic competition has a high requirement for students' abilities and skills, so it is very important for instructors to carry out professional training and give careful guidance to the participating students in the whole process. If engineering undergraduates trust their instructors, their confidence in winning the competition will be increased, which enhances their willingness to participate in the competition. Therefore, the following hypothesis 1 was proposed:

H1: Engineering undergraduates' trust in instructors positively affects their willingness to participate in academic competitions.

The majority of academic competitions in engineering and technology require students to participate in the competition together with team members, and the comprehensive strength of the team has a great influence on winning. Whether they could find trusted classmates to participate in the competition directly affects their willingness to participate in the academic competitions. If some students are willing to team up with them, and team members trust each other's learning ability, innovation ability and collaboration ability, their willingness will be enhanced. Therefore, the following hypothesis 2 was proposed:

H2: Engineering undergraduates' trust in team classmates positively affects their willingness to participate in academic competitions.

In order to encourage engineering undergraduates to participate in competition, engineering universities would introduce corresponding incentive mechanisms, such as direct cash rewards, and setting the competition as a condition for applying for scholarships and outstanding graduates. At the same time, engineering universities will provide students with various guarantees such as learning places and extending the opening hours of canteens during the preparation period. If the schools have perfect incentive mechanisms and guarantee mechanisms for students, their trust in schools will enhance their willingness to participate in academic competitions. Therefore, the following hypothesis 3 was proposed:

H3: Engineering undergraduates' trust in schools positively affects their willingness to participate in academic competitions.

At present, the organizers of engineering and technology academic competitions include the Ministry of Education, the Professional Teaching Steering Committee, the China Higher Education Society, trade associations and academic organizations. If the organizers arrange the competitions conscientiously and thoughtfully, and the awards are objective, fair and just, then the authority and quality of the competition can be guaranteed. If so the students' trust in the competition organizers will be increased. The increased trust enhances their willingness to participate in academic competition. Therefore, the following hypothesis 4 was proposed:

H4: Engineering undergraduates' trust in organizers positively affects their willingness to participate in academic competitions.

3. Research Methods

3.1 Data Collection

The data of this study were collected by questionnaire survey. The designed questionnaire included the basic information of college students, their cognition of academic competition, their willingness to participate in academic competition, the main reasons for participating in competition, and their trust in instructors, classmates, schools and competition organizers.

The questionnaire survey was conducted from June to August, 2019. Eventually, a total of 215 responses were received, among which 201 are valid. The respondents are undergraduates from an engineering and technical university in Shanghai, China. Among the students interviewed, freshmen account for 21.29%, sophomores account for 26.24%, juniors account for 37.62%, and seniors account for 14.85%; Male students account for 45.05%, and female students account for 54.95%.

3.2 Data Analysis

The binary logistic model was used to analyze the influence of educational trust on engineering undergraduates' willingness to participate in academic competitions. P represents the probability of willingness, and its value ranges from 0 to 1. The model was constructed as follows:

$$\ln\left(\frac{P_i}{1-P_i}\right) = \alpha_0 + \sum \beta_i \chi_i + \varepsilon \quad \text{Formula (1)}$$

In this formula, the subscript i indicates the i th student interviewed ($i = 1, 2, 3, \dots, n$). P_i is the probability that the i th student is willing to participate in the academic competition; $1 - P_i$ is the probability that the i th student is unwilling to participate. α_0 is the constant term; χ is explanatory variable; β is the parameter to be estimated and ε is the random disturbance term.

In this model, "willingness to participate in academic competitions" is the explained variable. The data came from the students' answers for survey question "Are you willing to participate in the academic competition?". Assign "willing" to 1 and "unwilling" to 0.

This study investigated the influence of educational trust on engineering undergraduates' willingness to participate in academic competitions from two aspects: interpersonal trust and institutional trust. In interpersonal trust, two variables were chosen: "trust in instructors", and "students' trust in team classmates". And in institutional trust, the two chosen variables are: "students' trust in schools", and "students' trust in competition organizers". Data of the explanatory variables were

from the following four measurement questions: I trust my instructors, for they will give professional and careful guidance to our team during the whole competition; I trust my classmates, for they have the ability of learning, innovation and teamwork; I trust my school, for it has established perfect incentive mechanisms and guarantee mechanisms for academic competitions; I trust the competition organizers, for competition system is scientific and reasonable, and the awards are fair and just. The Likert scale was used in each question, delimited from 1 (strongly disagree) to 5 (strongly agree).

As for control variables, personal characteristic variables and “cognition of academic competition” may also affect engineering undergraduates’ willingness to participate in competition. The personal characteristic variables selected in this study include gender, grade, grade point average and the number of communities they participated. For “cognition of academic competition”, completely not knowing was assigned as 1, having heard of but not concerned about was assigned as 2, knowing it to some extent was assigned as 3, and knowing it well was assigned as 4.

4. Survey Results

4.1 Results of Descriptive Statistics Analysis

Descriptive statistical values of explained variables, explanatory variables and control variables are shown in Table 1. 52.97% of the respondents were willing to participate in the academic competition. Students’ trust in instructors (mean = 3.55) and

schools (mean = 3.53) is higher than that in classmates (mean = 3.27) and organizers (mean = 3.39). The trust types and willingness to participate in competitions of students in different grades are shown in Table 2. With the growth of grades, engineering undergraduates’ willingness to participate in academic competitions increased significantly, from 37.2% in freshmen to 79% in seniors.

4.2 Model Regression Results

In order to explore the influence of educational trust on students’ willingness to participate in academic competitions, three logistic models were established, and the regression estimation results are shown in Table 3. Model 1 is the basic model. It investigated the influence of personal characteristics (including grade, gender, grade point average and the number of participating clubs) on students’ willingness. Among them, students’ grade positively affects their willingness at a significant level of 5%, and students’ academic performance positively affects them at a significant level of 1%. The control variable “competition cognition level” which may affect college students’ willingness was included in Model 2. The Nagelkerke R^2 of the model increased from 0.138 to 0.244. and this variable has a positive impact on their willingness at a significant level of 1%. Model 3 added four variables on the basis of Model 2: “students’ trust in instructors”, “students’ trust in classmates”, “students’ trust in schools” and “students’ trust in organizers”. The Nagelkerke R^2 of Model 3 increased significantly from 0.244 to 0.377. Therefore, educational trust has a positive effect on

Table 1. Analysis results of variable descriptive statistics

Variable category	Variable name	Mean	Std Dev
Explained variable	Willingness to participate in academic competition	0.53	0.500
Explanatory variables	Students’ trust in instructors (T1)	3.55	0.968
	Students’ trust in team classmates (T2)	3.27	0.733
	Students’ trust in schools (T3)	3.13	0.871
	Students’ trust in organizers (T4)	3.72	0.722
Control variable	Grade	2.46	0.988
	Gender	1.55	0.499
	Grade point average	1.84	0.526
	Number of associations participated	1.86	0.868
	Competition cognition level	2.48	0.671

Table 2. Trust types and willingness to participate in competitions of engineering undergraduates in different grades

Grade	Trust in instructors	Trust in classmates	Trust in schools	Trust in organizers	Frequency	Willingness to participate (%)
Freshman	3.65	3.35	3.44	3.40	43	37.2
Sophomore	3.40	3.21	3.67	3.32	52	49.1
Junior	3.49	3.28	3.55	3.43	76	57.9
Senior	3.67	3.27	3.46	3.41	30	79.0
Mean	3.55	3.27	3.53	3.39		

Table 3. Logistic regression results

Variable		Model 1	Model 2	Model 3	Marginal effect/% (Based on Model 3)
Personal characteristics	Grade	0.450*** (0.157)	0.349*** (0.171)	0.482** (0.195)	6.163** (0.022)
	Gender	0.015 (0.301)	0.373 (0.240)	0.282 (0.386)	3.693 (0.039)
	Grade point average	0.981*** (0.119)	0.849*** (0.160)	1.073*** (0.108)	13.838*** (0.052)
	Number of associations participated	0.155 (0.178)	0.063 (0.099)	0.128 (0.117)	1.663 (0.049)
Competition cognitive level			1.573*** (0.301)	1.564*** (0.339)	20.420*** (0.019)
Trust	Trust in instructors			0.753*** (0.204)	9.783*** (0.028)
	Trust in team classmates			0.602** (0.337)	7.822** (0.033)
	Trust in schools			0.422** (0.224)	5.973** (0.009)
	Trust in organizers			0.394 (0.146)	5.612 (0.016)
Constant term		0.523 (0.986)	-3.485** (1.368)	-10.499*** (1.046)	
chi-square		21.869 (P = 0.000)	56.123 (P = 0.000)	95.170 (P = 0.000)	
Nagelkerke R ²		0.138	0.244	0.377	

Note: *, ** and *** indicate passing the significance level of 10%, 5% and 1% respectively; the values in brackets indicate standard errors.

engineering students' willingness to participate in academic competitions.

5. Discussion

5.1 The Influence of Interpersonal Trust on Engineering Undergraduates' Willingness to Participate in Academic Competitions

In interpersonal trust, trust in instructors positively affects students' willingness to participate in academic competitions at a significant level of 1%, which verifies hypothesis 1. The marginal effect of 9.783% implies that if other conditions remain unchanged, the probability of college students participating in academic competitions will be increased by 9.783% for every additional unit of students' trust in instructors. This finding shows that the increase of students' trust in instructors can enhance their willingness to participate in academic competitions to a certain extent. Engineering and technology competitions, especially nationwide competitions, have high requirements on students' learning ability, innovation ability and engineering practice ability. It was found in the questionnaire survey that "lack of self-confidence, feeling that I cannot complete tasks or achieve excellent results" is the most critical factor hindering engineering undergraduates from participating in academic competitions. Under the condition of possessing insufficient abilities, if students trust their instructors and believe that they can get professional

training and careful guidance from them in the whole process of the competition, their expectation of winning the competition will be raised, which would enhance their willingness to participate in the competition.

In the interpersonal trust, trust in classmates positively affects engineering undergraduates' willingness to participate in academic competitions at a significant level of 5%, which verifies the hypothesis 2. The marginal effect is 7.822%. That is to say, if other conditions remain unchanged, the probability of students participating in the academic competition will be increased by 7.822% for each additional unit of trust in team classmates. This shows that enhancing engineering students' trust in their team members can enhance their willingness to engage in academic competitions. The academic competitions require students to participate in groups. Compared with individual capability, the overall strength of a team has a greater impact on whether the group can get good results in the competition. Ideally, the team members have a clear cognition of what they should do in their team and can work together with each other. If other students are willing to team up with them and trust each other, engineering students will have a strong willingness to participate in academic competitions. If they cannot find right teammates, their willingness to participate in the academic competition may be reduced even if they have confidence in their own abilities and trust their instructors.

5.2 *The Influence of Institutional Trust on Engineering Undergraduates' Willingness to Participate in Academic Competitions*

Regarding institutional trust, the trust of college students in their university positively affects their willingness to participate in academic competitions, with a significant level of 5%, which verifies hypothesis 3. That the marginal effect was 5.973% indicates that if other conditions remain unchanged, the probability of students participating in the academic competition will be increased by 5.973% for every additional unit of trust in their school. It is concluded that enhancing engineering undergraduates' trust in schools can increase their willingness to participate in the academic competition. If the university has established appropriate incentive mechanisms and guarantee mechanisms for students who participate in the academic competition, the engineering undergraduates will trust the policies made by the school authority, which can enhance their willingness to participate in the academic competition to a certain extent. On the contrary, if the school authority does not establish the corresponding incentive mechanism and guarantee mechanism, the atmosphere of students' participation is weak, which will weaken their willingness to participate in the academic competition to a certain extent.

In institutional trust, the influence of trust in competition organizers on engineering undergraduates' willingness to participate in academic competitions has not passed the significance test and H4 is not verified. It shows that engineering undergraduates' willingness to participate in academic competitions is not affected by their trust of competition organizers. The possible explanation is that engineering undergraduates generally do not have rich experiences in participating in academic competitions, and they pay more attention to whether they can complete the works that meet the requirements of the competition put forwarded by the organizers and how to improve the level of their works, rather than paying attention to the arrangement and organization of competition and scoring rules. In the descriptive statistical analysis of the four measurement variables of trust (as shown in Table 1), the mean value of the variable "trust in organizers" is 3.72, higher than the mean values of other three variables "trust in instructors", "trust in team classmates" and "trust in schools". Therefore, no matter who hosts the competitions, it is authoritative organization for students whom students have strong trust in. Another explanation is that the teachers and schools have screened the competitions according to the quality of the competitions when they issue the competition notice. For student, the organizers of competitions should be trustworthy.

Therefore, trust in competition organizers does not significantly affect engineering undergraduates' willingness to participate in academic competitions.

5.3 *Policy Implications*

Firstly, according to the result that students' trust in competition instructors significantly affects their willingness to participate in academic competitions, the construction of instructor teams in engineering universities and colleges should be strengthened, by the way of improving their professional ability, enriching competition guidance experience and stimulating their competition guidance willingness. A normalized instructor training system should be established; thus instructors can have more opportunities to learn to improve their professional ability. In addition, the experience exchange meetings of competition instructors should be held regularly. Instructors can share their successful experiences and puzzles in guiding competitions and learn from each other. If so, their experience in guiding competitions will be enriched constantly. What's more, instructors' enthusiasm for guiding academic competitions can be promoted by being provided with workload subsidies, guidance bonuses, awards and so on. Through multi-measures, the abilities and initiatives of competition instructors can be improved, which will enhance the trust of engineering students in them. In this way, the willingness of engineering undergraduates to participate in competitions will be increased.

Secondly, engineering universities and colleges should continue to establish and improve incentive mechanisms and guarantee mechanisms to support the students' participation in competitions based on the result that students' trust in schools significantly affects their willingness to participate in academic competitions. To stimulate students' potential, incentives should be set both for participants and winners. For example, all participating students can get innovative credits, while winning students can get direct cash rewards and more opportunities to get scholarship and the title of outstanding student. In terms of guarantee aspect, three kinds of measures should be taken. First of all, engineering innovative training bases should be further constructed. Moreover, the existing campus resources such as various laboratories, libraries and engineering training centers should be made full use to serve academic competitions as much as possible on the premise of ensuring normal teaching. Finally, guarantees, such as offering learning places and extending the supply time of canteens, should be provided for students when they are preparing for competitions. In conclusion, by strengthening the system construction, students' trust in schools and their willingness to participate in academic competitions can be enhanced.

Thirdly, the cultivation of students' teamwork spirits and teamwork abilities should be attached great importance. Our survey showed that whether engineering undergraduates can find trusted students and form an excellent team have great influence on their willingness to participate in academic competition. Teams with good cooperation mechanism, reasonable division of labor and good communication can learn and practice more efficiently and thus they could achieve better competition results. The existing teaching system in many engineering universities focuses on the cultivation of students' individual abilities and ignore students' teamwork abilities. Volkwein and Lattuca [39] argued that engineering graduates are better at professional work, but are still lack of abilities and skills for team work. To solve the problem, instructors should set up more tasks in the theoretical and practical teaching courses, which should be completed by student teams. In the process of working together as a team, students should be guided to improve their teamwork spirit and ability by their instructors. In this way, students' mutual understanding and trust could be enhanced, which will increase their willingness to participate in competitions.

Finally, a special academic competition website should be built to improve students' cognitive level of competition. Our empirical study showed that the degrees of students' cognition concerning the academic competitions directly affects their willingness to participate in the competition. However, at present engineering undergraduates have limited access to competition information. According to our survey, they got competition information mainly from their teachers and classmates, accounting for 86.63% and 55.94% respectively. Therefore, it is suggested to build a special academic competition website and put the web link on the homepage of campus network for the purpose that students can access the relevant information of the competition at any time. The contents of the website can include multiple parts such as the introduction of each academic competition, the link of the competition registration system, the knowledge related to the academic competition, the questions of previous competitions, the display of students' competition results, and students' participating experiences. Students' trust in instructors and schools can be further improved by the way of comprehensive understanding of the competition.

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6. Conclusion

Engineering education is needed to transfer from focusing on fundamental knowledges and skills of engineering disciplines to instilling the skills and abilities to creatively solve “real-world” problems. Engineering universities and colleges have been calling for innovative education by applying new education means. Academic competitions, characterized by active learning, team working and deep interaction, can offer opportunities for engineering students to improve their innovative consciousness and innovative practical abilities. This study investigated the influence of educational trust on the willingness of engineering undergraduates to participate in academic competition from sociological perspective. In this study, educational trust was described from two aspects, interpersonal trust, involving interpersonal students' trust in instructors and trust in team classmates, and institutional trust, involving students' trust in schools and trust in competition organizers. The methodology of a questionnaire survey and binary logistic modelling were conducted. The research findings are as follows:

Interpersonal trust has a significant impact on the willingness of engineering students to participate in academic competitions. In interpersonal trust, the students' willingness to participate in academic competitions would be raised by 9.783% and 7.822% for every one percent increase in the trust of instructors and team classmates. In institutional trust, trust in schools can significantly promote students' willingness to participate in academic competitions. Students' enthusiasm for participating in competitions will be increased by 5.973% for every one percent increase in the trust of schools. However, trust in competition organizers in institutional trust has no significant impact on students' willingness. The relationships of influence degrees of trust on students' willingness to engage in competitions are: the effect of trust in instructors is higher than the effect of trust in team classmates, and the effect of trust in team classmates is higher than the effect trust in schools.

This study expands the related research on the cultivation of innovative talents in engineering universities and colleges from the sociological perspective, and provides a reference for education authorities to formulate relevant policies on the cultivation of innovative engineering talents.

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