**Design of College Innovation and Entrepreneurship Experience System Based on PSO Algorithm**

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**Abstract:** Innovation and entrepreneurship (INEN) are examples of knowledge-and-action-combining activities. College students' ability to innovate and be entrepreneurially skilled depends on their existing entrepreneurial knowledge and experience. With the support and encouragement of national policies, the majority of college graduates have the confidence to launch their own businesses; yet, the success rate of college students' inventiveness and entrepreneurship cannot be guaranteed. As a result, it is critical to create an INEN experience system as well as an algorithm to assess the efficiency of INEN resource allocation. This study examines the significance of experience learning in INEN before presenting the overall architecture of the experiential system. Finally, this work presents an enhanced particle swarm optimization (PSO) technique for evaluating colleges and universities' INEN resources. According to the experimental findings, the proposed algorithm greatly lowers the assessment error of the system used to assess the creativity and entrepreneurial potential of college students, increases evaluation effectiveness, and has a wide variety of real-world applications. Additionally, the system proposed in this study runs generally well, which benefits fostering innovative and entrepreneurial activity among college students.

**Keywords:** College innovation and entrepreneurship; Experience system; PSO

**1. Introduction:**

The state's leadership, as well as the efforts of universities, colleges, and other educational institutions, have resulted in significant advancements in innovation and entrepreneurship (INEN) education in recent years. The application of educational ideas is lacking in college entrepreneurship courses, and there is a gap between theoretical instruction and hands-on training. Additionally, educational resources are inadequate in entrepreneurial courses at colleges. There are still numerous difficulties that need to be addressed, such as the usability of the practice platform, which is now unavailable. Teaching students how to break past the restrictions of traditional schooling and get them interested about starting their own businesses is a difficult problem for college and university professors to overcome[1,2]. We may be able to discover that entrepreneurship education is first and foremost the manifestation of the union of knowledge and action in the world through research into the fundamental connotation of INEN education. The main goals of entrepreneurship education are to foster creative thinking and entrepreneurial behaviour. INEN skills can be promoted in college students through INEN education, which mixes in-class instruction with practical experience. Learning via doing is the name for this kind of education. In addition to being a theoretical subject, entrepreneurship is also quite practical, as can be shown in the examples below. College students' entrepreneurial skills can only be developed through a new approach to education that encourages students to become more adaptable and has a greater understanding of the entrepreneurial process, and a willingness to adapt to the world of entrepreneurship. Students with a strong entrepreneurial spirit should strive to achieve this in college. When it comes to meeting these requirements, the concept of experiential learning is a suitable fit. Experiential learning is a popular form of instruction among educational theorists and educators alike because it places a strong emphasis on student initiative and connection to real-world events[3-7].

Because of its solid theoretical foundations and relevance to real-world problems, experiential learning is frequently incorporated into the curriculum in higher education, especially in the INEN fields. An essential first step in fostering the coordinated expansion of INEN education is the integration of experiential learning with INEN courses. Combining experiential learning with courses on INEN is a critical first step in getting started in this direction. Instruction in a course has been shown to improve an individual's ability to cultivate an entrepreneurial mentality by enhancing their ability to innovate and effect change in the world. Based on their research, which included more than 400 college students, some researchers discovered that the vast majority of students believe that school will have an impact on their entrepreneurial qualities and abilities, and that abilities are more susceptible[8,9,10]. Scholars have also validated this finding, demonstrating that instilling entrepreneurial abilities in students can significantly improve the chances of a new company's success. This unique method to experiential learning and concentrated practice improves students' ability to participate in divergent thinking and creative expression, as well as their overall ability to learn. This experiential intentional exercise encourages students to freely express their ideas, prevents students from feeling ashamed to express their ideas as bad, helps in analyzing the overt and covert causes of people's resistance to sharing ideas, and highlights the possible repercussions of open-ended group disagreement[11,12]. These experiential intentional exercises have been shown to increase college students' openness of mind as well as their motivation to participate in open interaction. As was the case with the exercises themselves, students were more likely to participate in the exercises if the social pressures surrounding their ideas were lessened or abolished[13,14,15].

TRIZ is a new technique for promoting imaginative and entrepreneurial thinking that has been developed over the last decade. One of the major tenets of TRIZ theory is the use of rule-based techniques to new invention and production. Many new technologies are plagued by the same fundamental defects and logical inconsistencies that have plagued previous ones. The same problem-solving approach and technical innovation concept can be used over and over in new products, allowing for a continuous cycle of innovation. Numerous actions show that the TRIZ theory offers a framework for issue solving that is both useful and efficient. A 13-week TRIL theoretical course was taken by students from Melbourne Institute of Technology's scientific and engineering college [16–21]. The participants were 42 students from the science and engineering college. According to the results of the survey, TRIZ theory lessons had a far stronger impact on students' problem-solving abilities than simply studying essential subject matter. According to some experts, universities and institutions can assist students in developing their creative thinking skills by incorporating the TRIZ concept into their curriculum in novel ways. Following the Ministry of Education's reform of the teaching of higher polytechnic education as well as real-money teaching research projects, some schools have applied the TRIZ theory to innovative education, which has resulted in excellent teaching results as well as the development of innovative training models.

Some scholars have argued in favour of using digital badge technology to gauge the potential of college students by evaluating their capacity for creativity and entrepreneurship. Some academics assert that the use of data analysis and other techniques can be used to evaluate students' entrepreneurial and creative potential. This method is used to extract an educational factor indicator that has an impact on college students' innovation and entrepreneurial potential. The evaluation of college students' potential for INEN is then finished by calculating the weight of the educational factor indicators[22,23]. A college student's creativity and entrepreneurial potential can be judged in two ways, according to the maturity model: first, by looking at it from the standpoint of innovation, and then by looking at it from the perspective of entrepreneurial potential. In this project, we will model college students' INEN capacity maturity, input data for training, and obtain evaluation findings for college students' potential for INEN[24,25,26].

In this study, a university-based innovation and entrepreneurial experience system is developed using the ideas of experiential learning and CDIO. An updated PSO algorithm that may be used to evaluate an institution's capacity for entrepreneurship and innovation is another innovation presented in this research. It was shown that the algorithm created by the researchers is capable of reducing errors in the methodology used to assess college students' creativity and entrepreneurial potential and enhancing evaluation efficiency. Additionally, the strategy suggested in this study functions consistently across the board, which is useful for inspiring college students to create and launch enterprises[27-28].

**2. INEN System:**

The employment situation at colleges and universities is influenced by various factors, including the availability of resources and, perhaps more importantly, the integration of modern technological advancements in the educational system. With the support of science and technology, it is possible to continuously update the traditional college employment model, fully utilizing new information technologies and data integration opportunities. These technological improvements can significantly enhance the development of INEN models for college students. By emphasizing the importance of INEN, students in our country could greatly benefit, as these advancements provide better employment opportunities and support, facilitating their transition from education to the workforce. In the conventional college employment paradigm, there is a lack of job information transmission and dissemination, and as a result, college graduates are underutilized. The robust expansion of professional opportunities for new college graduates is being hampered by blindness. Therefore, it is an inevitable development in the employment of college graduates that information technology be incorporated into a student's INEN experience system. College employment analysis and execution adopt a scientific and logical overall planning strategy to ensure that graduates and the labour market are properly matched. The rapid information sharing between the parties is advantageous to both[29-30].

The initial part of the project involves doing an assessment of the company's requirements. The development of a system for controlling the evaluation of students' INEN ability is necessary in order to successfully boost their college students' INEN capacity, according to the authors. For the purpose of meeting the current research and evaluation requirements, the undergraduate INEN sub-system selects the primary research modules, which include modules for managing user information and personal data, modules for managing projects and teams, and modules for student self-evaluation and peer evaluation, among other features[31].

After determining the system's requirements, you may start building the functionality and database for college students to use in the INEN analysis system. a description of the design approach used to create the database used to gauge INEN skills.

The data of teachers and pupils can be handled by the system administrator, who can also contribute their own data to the database. Using the user name and password confirmation feature, administrators can add information to their profiles, information about instructors can be added using the teacher ID and password feature, and information about students can be added using the student ID and password feature. Using the student ID and password feature, students can add job title, lecturer, and a photo to their profiles. After teachers and students have been added to the database, the system administrator has the ability to edit, delete, and see the information associated with them. Individuals, such as tutors and students, can update their personal information by signing into their individual accounts[32-33].

Teachers and students can log in to provide project information after building their own pages, and the instructor can add projects once the administrator has provided the appropriate data. With the addition of this additional content, users now have access to information about the projects on which they are currently working, such as their ID and name, as well as information about the categories and subcategories within which they are currently working. It is the administrator's responsibility to create new items, amend existing ones, and delete items. They also have the ability to view the specifics of each item.

After completing the project information, the teacher can now include the project team in the project. In order to be included in the project, specific information about the project team is required. The project number, name, category/project identification number, name of the project manager, group identification number (GID), group name, and student's class are all included in this data. After uploading project team member information, administrators, instructors, and students can update, remove, and check specifics of group member information on their own interfaces, whereas students can access their own information on their own interfaces.

After the instructor has established the project team, students and teachers will be able to perform evaluations of their work. It is possible for teachers and students to evaluate one other's and their own innovation and entrepreneurial qualities. Evaluate. It is divided into two phases of evaluation since it is a process-based system for evaluating innovation and entrepreneurial activity. First, a pre-assessment of INEN projects is carried out, followed by an evaluation of the entire process of INEN projects in the second stage. The findings of the study and the findings of the literature review serve as the basis for the evaluation technique[34-35].

The evaluation results for INEN are delivered in accordance with the summary of evaluation index scores and the uploaded assessment results after both teachers and students have done evaluations. They can be shown in three different ways. Grades 0–59 are considered failing, while 60–79 are considered qualified, while 80–89 are considered adequate, and 90–100 are considered exceptional. A line graph and a bar graph show the sums of each student's scores on the first and second assessments. Each student's evaluation indicator performance. Figure 1 depicts and analyzes the evaluation and analysis of the INEN process.

Start

Log in

Find project members

Whether to evaluate

Yes

Whether to evaluate

No

No1

Yes

Over

**Figure 1: System of INEN process**

The organizational structure of the module is depicted in the diagram to the right.

After signing in, the project manager should select the appropriate project type and fill out the essential information for the project declaration, such as the project name, operation cycle, leader, and members of the team, before submitting the declaration. It is advised that teachers modify the project's guidelines. Department heads must give final approval to each project proposal before it may move forward. Before they are turned in, all of the school's application projects must be approved by the project administrator. Send the application back to the applicant if there are any issues so that they can be fixed and it can be submitted again. The project application has likely been approved if there hasn't been any opposition. For the sake of avoiding misunderstanding, the project team should make it clear that the project host is responsible for the project and serves as the project's official representative. In terms of civil rights, students should be the primary rights holders for any civil rights that may be incorporated in the project, regardless of who they are. The Fund Management Office should be informed as quickly as possible of any changes in the project's host organization. The following individuals are ineligible to submit an application for this position: The User INEN Fund Project Managers are the University Student INEN Fund project managers who have started but have not yet finished their task. Participants in INEN programmes offered by their school who have overseen the projects of other college students but have not yet finished them. It is the responsibility of the project administrator to maintain track of all of the projects that have been filed, as well as to invite experts from both within and outside the institution to review them. The projects that will be accepted should be chosen in the order in which they obtained their scores, rather than the reverse. It is the responsibility of the project management committee to sign off on an agreement with the project approval project team that covers the project's operation time, project closing circumstances, and the amount of funding to be allocated to the project. Major projects and general initiatives are evaluated by an expert assessment panel, and funding requirements are established for important projects and general initiatives. A down payment is needed to begin the project, and the remaining balance is due when it is finished. All required information, such as the ID number, bank card number, amount of financing, and agreement for project approval, will be entered into the system by the person in charge of the project team who approved the project. The initial start-up funds for the project will be provided by the project committee in the form of a 30 percent down payment on the total amount of funding that has been decided.

In order to assist college students' INEN fund project staff in resolving issues that arose during the process of nurturing and incubating student projects, as well as to improve the project staff's knowledge of INEN and their ability to confront problems, it was decided that a project committee would be established during the course of the project's operation. Experts from within and outside the school are invited to participate in the project training camp activities, where they will share their knowledge on the current thinking style and development trend of INEN for college students. Experts from within and outside the school are invited to participate in the project training camp activities. In addition to the professionals already present, more have been hired to provide entrepreneurial outdoor training sessions for the project team. Give students the chance to direct their own learning through a variety of contexts and activities that feature unique material and cutting-edge delivery methods. By taking part, they are given the chance to explore and learn in a particular setting, which challenges their ideas and stimulates new ones. To succeed, people and teams need to be reawakened and repositioned. By participating in activities, you may encourage college students and entrepreneurs to have a good outlook on life and demonstrate the benefits of leadership, self-management, and group mutual aid to them as well. Games are utilized to teach the exercises, and they are both entertaining and informative at the same time. Involvement in group activities such as cooperative problem solving, competition, simulated conflict, and so on can help entrepreneurial teams strengthen their cohesion and self-confidence. Depending on the current operational conditions, a mid-term report and relevant certification materials will be provided to the system after the event has taken place[26].

**3. Method:**

This study improves the PSO algorithm and incorporates it into the planned system to optimise the allocation of INEN resources in colleges and universities. This work integrates PSO with the differential evolution (DE) approach to realise the optimal allocation of fixed educational resources because the classic PSO algorithm lacks the capacity to provide the optimal resource allocation during the optimization process.

The expression to initialize the population is

 (1)

where  and  are the lower and upper limit of the search space.

The expression for mutation operation is

 (2)

where  is a random individual,  is the variation factor.

The expression for the intersection operation is as follows

 (3)

where  represents the cross factor.

The expression for the selection operation is as follows

 (4)

where  is the fitness of .

The steps of PSO are similar to DE, the first is to initialize the particle swarm

 (5)

 (6)

where  represents position,  represents speed

The second step of PSO is to update the speed and position. At time t, the optimal position searched by the particle is compared with the fitness of the optimal position at the previous time. If it is better, it will be replaced. The formula for calculating the current optimal position is:

 (7)

The formula for calculating the global optimal position is

 (8)

The velocity and position at the next moment are

 (9)

 (10)

where is the consistency coefficient,  and  are the self and group learning rate, respectively.

The stopping condition of particle search is

 (11)

 (12)

To maximize the structure of constrained educational resources, this research employs the DE technique. The results obtained from the DE method are then incorporated as constraints into the PSO approach, combining the strengths of both methods for enhanced optimization. The flowchart of this integrated technique is illustrated in Figure 2.

INEN data

Initialize the particle swarm

Restrictions

Whether the constraints are satisfied

No

Yes

Over

Parameter update

DE

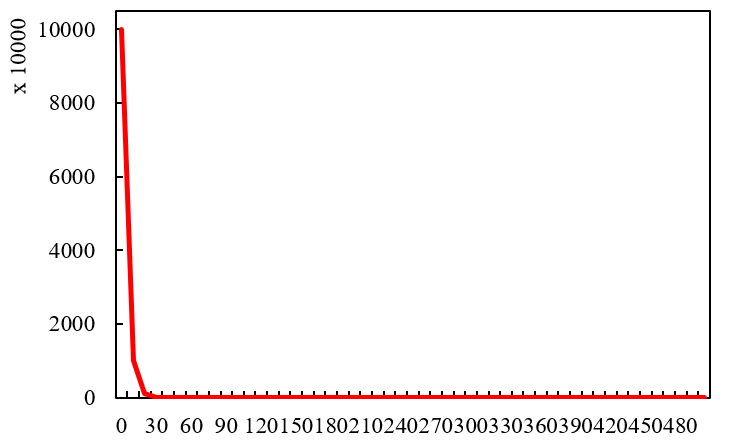
**Figure 2: Flow chart of our method**

**4. Results:**

One way to assess educational success is to consider the efficiency with which education is delivered. Determine how to provide the most education for the least amount of money when allocating college and university resources for INEN instruction. Because of the large number of variables involved in a system as complex as education, we can't really tell how input influences output in this system. As a result, the first step in improving INEN education's efficiency and maximizing the distribution of available resources is to build an index system for the resources used in the field. Mathematical optimization model with many goals. In order to develop a comprehensive system, the literatures 7 and 13 were synthesized, and the indicators of INEN education resource input and output were selected. Human resources, financial resources, scientific research output, and the production of talented individuals were the four metrics selected for this article. In a province in China, eight schools were selected to conduct research on the statistical data on INEN in Chinese colleges and universities from 2015 to 2021, and the data was collected from eight different sources.

In terms of parameter settings, we set and  to 2, the particle population size to 50, max  to 0.01, and the maximum number of iterations to 500.

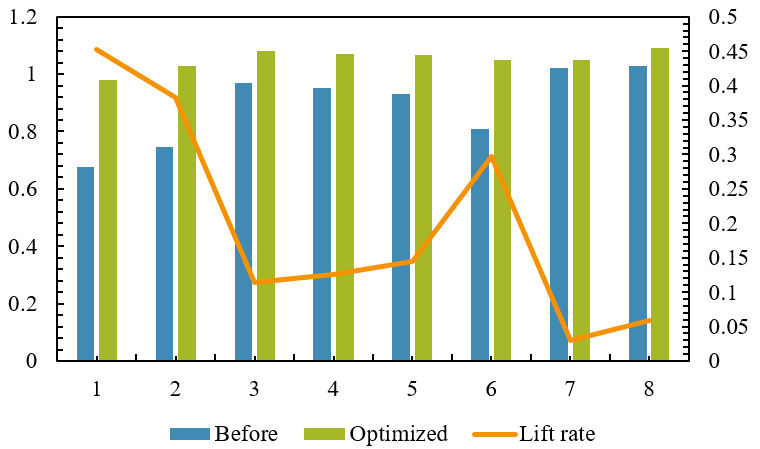
The iterative diagram of the algorithm is presented in Figure 3. It shows that after 50 iterations, the logarithmic fitness function value reaches 130.12. By the time the number of iterations reaches 260, the function value stabilizes at 3.67. At this point, the efficiency of INEN resource allocation is maximized.



**Figure 3: Iterative graph of the algorithm in this paper**

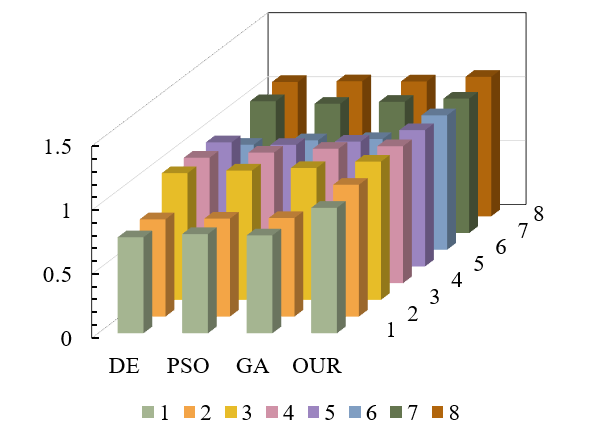
To validate the effectiveness of the method proposed in this paper in enhancing resource utilization efficiency, an experimental analysis was conducted on the eight universities included in the dataset. The analysis compares the resource utilization efficiency of each university before and after the implementation of the method. The results of this experiment are presented in Figure 4.

Figure 4 demonstrates that the distribution of resource utilization efficiency among universities is balanced and that, on average, each university's resource utilization efficiency rose by 20.04 percent between before and after the experiment (before and after the experiment). The eight schools under investigation had an average utilization rate of 0.89 before optimization, with the greatest utilization rate being 1.03 and the lowest utilization rate being 0.68. The results showed that the lowest usage rate was 0.68 and the greatest utilization rate was 1.03. Optimization resulted in a utilization rate of 1.05, a maximum rate of 1.09, and a minimum utilization rate of 0.98, all of which exceeded the baseline. In the previous period, the average utilization rate was With a 45.19 percent escalation in resource utilization compared to its lower utilization rate prior to the experiment, the first school in particular saw the most significant improvement.



**Figure 4: Resource utilization efficiency results before and after optimization**

Furthermore, the method proposed in this paper is compared with traditional DE, PSO, and GA to further assess its performance. The experimental data remains the INEN data from the eight schools, and the results of this comparison are presented in Figure 5.



**Figure 5: Comparison results of resource utilization efficiency optimized by different algorithms**

As shown in Figure 5, the method proposed in this paper significantly outperforms the other three methods. The DE method yields the lowest performance, with an average utilization rate of 0.91. PSO follows closely with an average utilization rate of 0.93, while GA shows a slightly better result with an average utilization rate of 0.941, which is only marginally higher than PSO. In contrast, the method proposed in this paper combines the strengths of both DE and PSO, achieving superior performance with an average utilization rate of 1.05.

**5. Conclusion:**

Most college graduates are confident in their ability to start their own businesses, supported by national policies and encouragement. However, the success rate of college students' entrepreneurial ventures remains uncertain. Therefore, developing an INEN experience system, along with an algorithm to evaluate the effectiveness of INEN resource allocation, is crucial. After exploring the importance of experiential learning in INEN, this paper outlines the system's design for experiential learning. The development of an enhanced PSO algorithm for evaluating the INEN resources of schools and institutions concludes the work. Experimental results indicate that the proposed algorithm not only enhances evaluation efficiency but also significantly reduces errors in assessing college students' innovation and entrepreneurial potential. This algorithm has wide practical applicability, and the system proposed in this study operates smoothly, with positive implications for promoting INEN activities among university students.

To further support college students in their INEN training, future work will focus on creating a more advanced INEN resource evaluation algorithm and developing a resource recommendation module for the experiential system. This will enhance the overall effectiveness and user experience of the INEN system.

**Availability of data and material**

The data used to support the findings of this study are available from the corresponding author upon request.

**Competing interests**

Declares that he has no conflict of interest.

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