Recreating Romance of Civil Engineering: 2001 Summer Camp at Indian Institute of Technology Kanpur, India

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Abstract: This paper describes an initiative to enthuse undergraduate Civil Engineering (CE) students in India about the profession. Various issues impacting CE students are addressed in a novel approach, the 2001 Summer Camp at IIT Kanpur. A select group of undergraduate students who had completed their second year of the Bachelors program in CE were chosen for the camp from different engineering colleges across the country. The objective of the camp was to provide an exposure to technology through motivation, personality development, fun-filled schedules, and excursions. For one month, through a series of activities, these students (1) interacted closely with the captains of CE industry in India to share their present concerns and future dreams in the CE profession and to understand expectations of the industry and society, (2) visited various sites with impressive engineering projects and some outstanding projects under construction, and (3) took part in diverse technical, nontechnical, and extracurricular activities, such as technical video shows, personality development workshop, debates, quizzes, sports, and entertainment. The camp proved to be an eye opener to all participants, the CE industry, and institutions imparting CE education. A questionnare administered at the end of the camp revealed that the perceptions of the students about the CE profession and their self-esteem underwent a positive change. The camp also helped bring the industry and academia in India onto a common platform.

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Introduction

In India, civil engineering (CE) was once the most prestigious of the engineering branches. Today, it is not even regarded as a viable career option, not just in the minds of the younger generation but also their parents. For the last several years, CE has been one of the lowest priorities for a career choice by successful candidates in the various engineering colleges across the country. Even for those who have initially selected CE, many students decide to change to study another discipline of engineering after their first year. Even after graduating with a degree in CE, many students choose non-CE professions as their career option. Many engineering colleges in India have dropped CE from their list of options and opted for other widely preferred Information Technology (IT)-based engineering options. Civil engineers who were once the master integrators of society may be heading for a very bleak future. In India, the profession itself seems to be undergoing a critical phase: Cut-throat competition between various construction organizations at the cost of safety, undercutting among consultants short-changing design and durability; erosion of self-respect and pride in the profession—threatening in equal measure to ground the profession to dusty ignominy (Khanna 2001; Muralikrishna 2001).

It was under this gloomy scenario that the Indian Institute of Technology Kanpur (IIT Kanpur) and Tandon Consultants Private Limited (TCPL), New Delhi joined together to undertake an experiment that would attempt to recreate the romance of CE and help to inspire a new generation of highly competent and motivated engineers to join the field. It was decided to target a select group of undergraduate students of CE programs from across India, who have completed their second year of studies. For 30 days during their summer vacation, these students were exposed to the magic and realities of CE in India.

Many engineering departments of universities in the United States and other countries have conducted summer camps and retreats. These camps were primarily intended to inform young students of secondary and high school of the challenges in the engineering profession (e.g., Pickett et al. 2000), including CE. In the process, it was hoped that some students who have not chosen what they would like to do in the future for a profession, may be inspired to take to engineering. On the other hand, it was recognized that the CE profession does not offer higher prestige and greater returns in Northern America. Also, student quality, enrollment, and research funding in CE programs have been declining across North America (Nehdi 2001). However, few camps held in the continent really focused on reinforcing the choice of students who are already undergoing undergraduate program in the CE and facing the trauma of a possible bleak future. In India, while the situation is no different, even initiatives at the school level are virtually nonexistent. Therefore, the Summer Camp 2001 under

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discussion is a forerunner in the country to excite college sophomore students about CE as a profession.

Objectives

An activity of this kind requires the rigor of a formal structure and the flexibility of novel activities to ensure the free flow of ideas. Thus, the following set of broad objectives was developed:

1. Provide an exposure to students to give them a bird's eye view of the CE profession, through lectures/presentations by leading experts in various aspects of CE.
2. Conduct visits to sites of significant ongoing/completed CE projects in the country to show them the magnificence, scale, challenges, multidisciplinary nature, vagaries, and humility of the human endeavor behind CE projects.
3. Screen videos of great CE projects in the world to sensitize them to the travails and triumphs that pioneering civil engineers across the world experienced through their work.
4. Create an environment for informal and close interaction with captains of the CE industry who would also be potential employers, in an effort to make the students appreciate the dedication, determination, and commitment that those personalities have demonstrated throughout their careers.
5. Provide a forum for students to see for themselves and explore through discussions, the opportunities that exist in the vast field of CE.
6. Provide a one-to-one contact with selected middle level engineers of a high technical caliber, such that students could picture themselves 10 years down the road in technology jobs.
7. Conduct hands-on projects and activities based on their first two years of engineering courses, so that the students can experience the practical value of their education to date.
8. Provide the necessary support for self-evaluation and self-appreciation, introspection, and repositioning of career options, thereby emphasizing a strong focus on personality-related issues.

Thus, the camp is an experiment to provide an exposure to engineering technology through motivation, lectures, personality development workshop, fun-filled schedules, and excursions.

Background Preparation

In order to achieve the aforementioned objectives, it was planned to provide the participants with the experience of a lifetime, and the event was entitled *2001 Summer Camp—A Civil Engineering Jamboree*. The camp was open for second year undergraduate students of CE. It was scheduled to be held at IIT Kanpur from June 3 to July 2, 2001. The expenditures incurred by the participants, (including their travel, boarding, and lodging), visits to project sites, and visits from distinguished guests in the industry, were to be borne primarily by industry.

Industry was approached to get an initial reaction about the proposed camp. It was emphasized that this would be a joint venture between industry and a university. While there were some apprehensions that this would be an exercise in futility as the CE profession had reached a point of no return in its degeneration process, most of the replies were positive and encouraging. Contributions from industry were offered in the form of monetary support, detailed presentations to the students at Kanpur/New Delhi, arrangements for visits to sites, hosting dinners to facilitate the interaction between a large group of industry leaders and the participants of the camp, providing relevant literature, and administrative help.

Three camp coordinators were identified, one from the industry (TCPL) and two from the university (IIT Kanpur). Close interaction, the spirit of teamwork, and strengthening bonds within the coordinators was key to the successful planning of the event. The coordinators envisaged various levels of activities, such as collecting videos of outstanding civil engineering projects, contacting industry for lectures from distinguished personalities, and arranging visits to various project sites.

In order to strike a balance between work and play and to retain the interest of the participants over a sustained period of one month, it was envisaged that the camp would have (1) technical activities, (2) nontechnical activities (including a personality development workshop), and (3) entertainment and extracurricular activities. In general, each day would be divided into five sessions—two in the morning, two in the afternoon, and one after dinner. Two sessions were earmarked for technical activities, comprised of presentations by visitors or video shows. The third would be an activity session for technical projects/games, while the fourth would be reserved for outdoor games/sports. The fifth session at night would accommodate miscellaneous activities—sometimes a video presentation, sometimes a technical activity that spilled over from the afternoon session, or on occasion a camp decompression party. The activities in the third and fourth sessions would be competitive in nature generating points to the participants. In addition to the aforementioned activities at IIT Kanpur, a 10-day field trip was also planned in the middle of the camp to give exposure to major civil engineering projects in northern India. A three-day personality development workshop conducted by a professional facilitator was also included in the schedule, as it was felt that issues relating to the overall growth of personality and communication skills could never be overemphasized (Meyer and Jacobs 2000). Since the Camp was also visualized as a small window to professional life ahead, emphasis was placed on certain communication aspects of an oral and written nature, resulting in the inclusion of items like oral project presentations and written camp reports.

To attract students for the Camp, letters were written to Principals and Heads of the departments of CE of all engineering colleges (both government and private) in the country. The letters invited the nomination of two students completing their second year of the Bachelors program in CE by summer and who, in their opinion, would benefit most from the camp. The nomination form required students to provide their academic background, career goals, and involvement in extracurricular activities. Based on these inputs, a committee of three Professors of IIT Kanpur short-listed thirty-five students from the eighty-seven nominations received from 35 colleges, ensuring that only one student from each institution was selected. However, owing to some last minute changes in examination schedules, eight of them could not join the camp, leaving the final group of 27 participants.

Implementation

The Director of IIT Kanpur inaugurated the Camp at a modest ceremony on the June 4, 2001, which was attended by some distinguished visitors from industry. It was envisaged that the camp participants must be able to work in a group as well as compete against each other with a healthy spirit of sportsmanship in order to develop team orientation (Meyer and Jacobs 2000). To facilitate this, an ice-breaker session was held at the end of the first day where participants went through the Team Building event, which helped the participants to familiarize themselves with each other

Table 1. Guest Lectures During the Camp

Serial No.	Lecture	Affiliation of Lectures
(a) Technical material		
1	Reclaiming the sea	Industry
2	Basic concepts in bridge design	Industry
3	Architectural aspects in engineering design	Academia
4	2001 Bhuj earthquake	Academia
5	Earthquakes—How they happen?	Academia
6	Privatising Indian airports for efficiency and world class facilities	Industry
7	Gabions in civil engineering	Industry
8	General concept in urban transport	Industry
9	Chandigarh—City planning	Academia
10	The magic of Taj	Academia
11	Incremental push launching and precast segmental constructions of bridges	Industry
12	Technical challenge and innovation in TCPL projects	Industry
13	Bridges and flyovers	Industry
14	Emerging innovations in the construction industry	Industry
15	Civil engineering—The evergreen fascinating profession	Industry
(b) Professional matters		
16	Opportunities/options in civil engineering	Industry
17	Motivation	Industry
18	Carrier opportunities of civil engineers in government organisations	Industry
19	Academia—A career option!!	Academia
20	Civil engineering in India . . . . Over the years	Academia
21	The importance of being a civil engineer	Industry
22	Thrills in civil engineering profession	Industry
23	Dwindling interest of young engineers in civil engineering	Industry

and to form four groups, namely Red, Blue, Green, and Yellow, with a leader chosen for each of these groups. A camp leader was also chosen two days after the start of the camp who would coordinate the organizers and participants.

The activities of the Camp were organized into three phases. The first phase, which lasted for two weeks, mainly included all activities related to the familiarization to the profession and personality development at IIT Kanpur. The second phase involved a 10-day excursion to northern India where the participants visited existing projects and major ongoing activities in the CE profession. In the third phase, which lasted for a week, the participants came back to IIT Kanpur and synthesized all their experience in the first two phases of the Camp to compete individually as well as in groups.

Phase I

In this part of the Camp, the aim was to present the whole spectrum of the CE profession to the participants through a series of lectures from distinguished visitors from the industry and video shows on various themes. A typical day would start at 5:45 a.m. when participants would engage in morning exercises, games and sports, swimming, and walking depending upon their interest. After breakfast by 9 a.m. the participants would assemble for a lively interactive session with eminent visitors from industry. Through these sessions, the visiting professionals discussed the wealth of career options and opportunities in CE. Table 1 provides a list of lectures from these distinguished visitors. Sessions were also organized in the form of video shows where the students were exposed to problems and achievements in the realization of a few of the most significant CE projects ever undertaken across the world, for example, on the Panama canal and Kansai airport. The schedule also included a group discussion on *Software versus Hardware Jobs*. This topic generated a lot of interest among the participants and they debated and analyzed career options in the IT industry (software) and CE (hardware). A personality development workshop conducted by a professional trainer was one of the most appreciated activities of the Camp. This segment of the Camp also included a visit to the biggest vaulted dome, the *Badaa Imaambaadaa* in Lucknow.

The support for various activities, e.g., logistic support related to the arrival and departure of the distinguished invitees and of the participants, the multimedia projection facilities, preparing the handouts, and conducting the entire days proceedings, was provided by a small group of dedicated postgraduate students. They also conducted the activity and games/sports slots of the day, in association with the faculty member in charge of the event. Table 2 summarizes various technical video shows, activities, games, and personality development-related events conducted during the Camp.

Table 2. Technical Videos, Personality Development Events, Activities and Games during the Camp

Video shows	Personality development events	Activities	Games
Panama canal	Personality development workshop	Team building	Badminton
Kansai airport	Debate: Civil engineering industry should be high-tech-based	Overhang—building the longest overhang from wood blocks	Ultimate frisbee
Shaping the built environment: The Delhi flyovers	Group discussion: Software versus hardware jobs	Jenga—building the tallest tower from wood blocks	Table tennis
Domes	Project presentation	Origami—developing building forms with paper	Cricket
Super bridges	Cultural program	Load—how much a truss member carries	Swimming
A century of civil engineering	Report writing	Map the camp—a surveying-based field game	Basketball
Leaning Tower of Pisa		Bridge building—with ice-cream sticks	
Earthquakes		Technical civil engineering quiz	
Coliseum		Visits to civil engineering laboratories, and National Wind Tunnel facility at IIT Kanpur	

Phase II

An important component of the Camp was the tour to north India—to see some significant ongoing and completed projects of the nation, to meet some of the captains of the Indian industry, to witness first hand challenges at project sites, and above all to be given an opportunity to experience a kaleidoscope of images of CE structures in their natural surroundings. In this phase, the participants visited not only some ancient masterpieces, such as the Qutub Minar and Taj Mahal, but also modern ongoing and completed CE projects, such as

- Delhi Metro Rail Corporation Project (DMRC), India's first significant light rail transit system for the Greater Delhi area, flyovers and bridges,
- Shimla-Kalka narrow gauge railway track,
- Bhakra Dam, aptly called as the temple of modern India,
- Radisson hotel, a modern five-star hotel in Delhi,
- The well-planned city of Chandigarh, and
- Khalsa Heritage Foundation Complex.

Discussions regarding how ancient structures were built and how numerous state-of-the-art technologies, novel project engineering strategies, and positive attitude of project engineers are helping the successful execution of these modern projects, helped students understand the hard realities of the profession. Tables 3 and 4 give various technical projects sites and nontechnical outdoors sites visited during the Camp. Also, during these visits, the participants were addressed by top-level executives and middle-level engineers from various organizations, such as DMRC, TCPL, Construction Industry Development Council, Housing and Urban Development Corporation, Continental Construction Limited, UNITECH Limited, Ministry of Surface Transport, Airports Authority of India, National Highway Authority of India, and Ministry of Urban Affairs, about the expectations of the industry and society. The participants spent time with these captains of the CE profession to share various issues related to decision making, quality of work, safety, need and importance for alternative technologies and low-cost housing, and the success and tensions of these as they continue to implement India's premier quality civil engineering projects.

Phase III

On their return to Kanpur, the students embarked on a debate about whether the CE industry should be high-tech-based or just labor intensive. The final lap of the Camp also had a few presentations by some of the leading giants in the CE industry. They aptly summarized the camp objectives through their detailed multimedia presentations on the importance, contribution, and thrills of being a civil engineer in nation building.

This phase tried to consolidate the proceedings of the Camp. Competitions were held for the students to review all that had

Table 3. Technical Projects Visited during the Camp

Site No.	Project site	Location	Construction status
1	Historic Monuments—*The Imaam Baadaas*	Lucknow	Completed
2	Delhi Metro Rail Corporation Project	New Delhi	Ongoing
3	Historic Monument—*The Qutub Minar*	New Delhi	Completed
4	National Highway Project	Shahabad	Ongoing
5	The Le Corbusier City	Chandigarh	Completed
6	Khalsa Heritage Foundation Project	Anandpur Sahib	Ongoing
7	Bhakra Dam and Irrigation Projects	Nangal	Completed
8	Narrow Gauge Mountain Train Project	Shimla-Kalka	Completed
9	Global Business Park	Gurgaon	Completed
10	Lotus Temple	New Delhi	Completed
11	Historic Monument—*The Taj Mahal*	Agra	Completed
12	Radisson Hotel	New Delhi	Completed
13	Bridges and Flyovers	New Delhi	Ongoing
14	Group Housing Projects	New Delhi	Completed
15	Water Treatment Plant	Kanpur	Completed

Table 4. Nontechnical Outdoor Visits during the Camp

Site no.	Place	Description
1	Rock Garden, Chandigarh	An outdoor theme park with extensive use of waste materials in decorative art.
2	Sukhna Lake, Chandigarh	Recreational boating at a natural lake adjoining the metropolitan area.
3	Anandpur Sahib Gurdwara and Langar, Anandpur Sahib;	One of the oldest religious places of the Sikh religion.
4	Khalsa Heritage Foundation Complex, Anandpur Sahib	New building complex under construction for audio–visual, library, and lecture rooms for providing information on the Sikh religion to all visitors of the complex.
5	J K Temple, Kanpur	Modern marble temple with deities of the Hindu religion.
6	Ganges River Front, Bithoor (near Kanpur)	The riverfront of the sacred river where holy dips are taken by pilgrims.
7	Flight on Twin-seater Un-Powered Glider, IIT Kanpur	Winch-toed and airborne gliders provide an air tour of the IIT Kanpur campus.
8	The Mall, Shimla	The tourist arcade with shopping and recreation of the hill town of Shimla.
9	Hindi Movies in Theatres, Kanpur City	Popular Hollywood movies screened at the local theaters.

happened during the preceding four weeks: *Map the Camp Contest, Oral Technical CE Quiz*, and *Bridge Building Competition*. Also, the students made oral presentations of the projects that they brought from their homes. This exercise was considered important to give the students the experience of standing in front of an audience giving a technical talk, a skill that will be most useful in their professional life. The most taxing of all the items in the third segment of the Camp was the preparation of the *camp report*. The strong inadequacies of the students in the area of making formal written presentations were exposed. The camp reports presented by the four groups lacked finesse. But, considering that the students were just in their second year, their effort to put together a 50-page document was, itself, commendable. It is hoped that the students will hone their skills in this regard by the time they complete their undergraduate studies.

On the penultimate day at the Camp, the participants also presented a cultural show with only logistic support offered by the faculty and volunteers. The Camp provided the students with yet another unique experience—a flight over the campus on the Institute's glider to inspire them to reach soaring heights and succeed in reaching their professional goals whatever the conditions! The closing ceremony was held on July 2, 2001, which included the presentation of a summary of various activities during the Camp, and the distribution of prizes and certificates by the Director of IIT Kanpur.

Observations and Recommendations

Through the 2001 Summer Camp, numerous steps were initiated to address the dire straits of the CE profession in India. Even though with a small group of students, the thought process has been initiated to rebuild the dignity and pride back into the profession of CE in India. It is anticipated that the participating students of this camp would become motivators and ambassadors in their class. An expected outcome of this camp has been in the form of organizers being flooded with inquiries from the next batch of students seeking admission to the camp. Thus, the effort is likely to start a chain reaction that will help to prepare a highly motivated group of future civil engineers. It is heartening to see that one of the participants of the camp has already done a follow-up survey in other colleges (Khanna 2001). A partnership of the industry has been started with a view to shoulder this rehabilitation effort of bringing the profession of CE back on the rails.

Postcamp Activities

An important follow up activity to understand the impact of the 2001 Summer Camp on the participants is to keep in touch with them in the years ahead. It is proposed to use the medium of the Internet efficiently to keep in touch with the ''graduates'' of the 2001 Summer Camp. It is of interest to keep track of the progress in their studies, their eventual choice of a profession, etc. A web page (http://www.iitk.ac.in/civil/2001sc/index.htm) was set up at the start of the Camp. It is proposed to update this page as and when things change on the front of the 2001 Summer Camp participants. This page now has all data on the Camp. Currently, the students are in their senior year of the undergraduate program and will be making their professional career choices by mid-2003. The data on their career choices will be interesting feedback on the success of the camp.

During the camp, a self-esteem evaluation questionnaire was completed by the participants once in the early days of the camp on the 09 June 2001 and once at the end of the camp. An analysis of these questionnaires (Table 5) indicated that the camp helped boost the self-esteem of most of students. Based on the feedback at the end of the camp, the overwhelming acceptance of the concept and the contents of the camp by the participants are very satisfying to the organizers. In fact, IIT Kanpur and TCPL Delhi have decided to conduct the camp in the future also.

Student Concerns

The Camp also brought out some genuine concerns of students. The potential civil engineers of the future appeared disheartened by the disproportionate importance given to other disciplines in society, institutions, and at home in regard to CE. They felt that there were not enough jobs of quality that were accessible and available. Salaries are low and the image of the profession is demoralizing. While many of these concerns are true, this is seriously not a complete picture of our profession, at least in India. It only emphasizes the downslide of the profession. The CE profession, as a whole, has to wake up and make attempts to actively work toward improving the situation apart from merely trying to provide packaging.

Industry Institute Interaction

One of the motivating factors behind the camp was the importance of industry–institute interaction. Such an interaction has many aspects and great importance. One aspect is to prepare the future civil engineers for what lies beyond the protective walls of the institute in the real world outside. To begin with, the relations between the various industry partners, who were part of the inaugural 2001 Summer Camp, and IIT Kanpur have been strengthened. An environment, where a dialogue can start to make CE graduates more prepared to choose careers in the CE profession,

Table 5. Summary of the Self-Esteem Questionnaire Completed by Participants at the Beginning and End of the Camp

	Measure of self-esteem		
Student no.	Before	After	Increase
1	40	72	32
2	43	41	−2
3	46	49	3
4	47	64	17
5	50	71	21
6	51	61	10
7	52	63	11
8	52	56	4
9	53	65	12
10	54	73	19
11	55	40	−15
12	56	65	9
13	56	60	4
14	56	72	16
15	56	55	−1
16	57	67	10
17	58	64	6
18	59	63	4
19	60	69	9
20	61	67	6
21	64	70	6
22	64	60	−4
23	64	64	0
24	67	73	6
25	68	74	6
26	69	70	1
27	74	84	10
Average	56.74	64.15	+7.41
Standard deviation	8.09	9.75	

is now available between the CE industry and IIT Kanpur. The importance that the CE industry assigned to the camp objectives was obvious from the way industry representatives treated the participants of the 2001 summer camp during their visits to project sites and the way they presented the realities of the CE profession with patience, care, detail, and humility. Each dignitary who came to the IIT Kanpur campus from long distances or who met with them on the tour to the north of India, forthrightly and emphatically offered them opportunities for their summer industrial training and careers in the profession. The participants' happiness knew no bounds on hearing the resounding echoes of employment opportunities—another *myth* that ''there are no jobs in CE'' is dispelled.

Motivation and Marketing

It is well known that there is an IT raid on the traditional branches of engineering including CE (Khanna 2001; Muralikrishna 2001; Nehdi 2001). While we wish the IT industry well, we must make an attempt to ensure that the potential stock of the few civil engineers in the country is neither dwindled nor downgraded to a second- or third-level profession. The collapse of multistory buildings during the 2001 Bhuj Earthquake in Western India is a stark reminder of this need. The immense storehouse available to market the CE profession is unmatched by any other. The visualization of the CE profession, its onward transmission, and communication to young minds can be most effectively achieved with minimum effort. Landmark structures that have survived the ages and those that are being built today can be seen, visited, and appreciated most effectively—such a convenience is not available for any other profession.

Marketing, therefore, is essentially limited to packaging as the intrinsic worth of the product and is already well established. This initiative was aimed at students that have already completed 50% of their undergraduate studies. Going by the precedents in the other countries, initiatives begin when children are still in school; this aspect needs to be addressed in the Indian context. Further, looking at the vastness of our country, wide exposure to opportunities of the present day youngsters and, of course, the competing opportunities that are presented by other younger disciplines, it is clear that CE cannot rest on the glory of the past. It has to be relevant to today's society and its demands, concerns, and aspirations. It has to present a true picture of how it would address these issues. This is another important aspect of packaging that we ponder in connection with the marketing of the CE profession.

Industry Concerns

The 2001 Summer Camp also provided an opportunity for the industry to express its feelings on the quality of the graduates that are being produced in the country. The general attitude of the graduates to site work is not very encouraging. It was a unanimous feeling that the current four-year undergraduate program does not necessarily prepare the students for their first job. A concrete suggestion in this regard was that the undergraduate program should be five years, with the last six months to a year being an internship at the site/industry. This will help to shape the students toward the realities of the job environment and also develop a sense of sincerity and dedication to the job and a commitment to the society. These concerns of the industry representatives also provide an issue for the academic institutes—to reconsider their academic programs and retune the same to the needs of the industry. They should also consider the new scenario when computer-aided design is an integral part of the industry and the entire practice of CE has been changed. Modern civil engineers must understand their role in the new information age. In addition to the technical skills, successful CE practice will now also require a great breadth of other professional skills, such as communication, project management, marketing, team building, and leadership qualities. Most undergraduate programs appear to be lacking in terms of preparing students to manage and lead complex professional maneuvers requiring the above qualities (Russell et al. 2000; Graef et al. 2002).

We now have to ensure that the civil engineers also have an equally bright future where they can contribute effectively to the development of the society and regain the place occupied by civil engineers of the past. Although the objective may appear difficult to achieve, it can be accomplished best by small initiatives in large numbers. This camp was such an initiative. It is hoped that this small initiative will spark many such initiatives to put the brakes on the downslide of the profession owing to the acts of omission and commission of the present day civil engineers, and thus bring back the glory, romance, and prestige of the CE profession. CE is the oldest engineering discipline; its future development and importance can be achieved only by understanding that it needs to be nurtured again. We strongly believe that such small initiatives will help the civil engineers ''once again become the master integrators of the society, guiding change in our tech-

nologically dependent society instead of performing only as doers.'' (Russell et al. 2000)

Summary and Outcome

The paper presents a novel effort to provide select sophomore CE students in India with first hand information of their chosen branch of study. A four-week *Civil Engineering Jamboree* held at the Indian Institute of Technology Kanpur, offered the students a kaleidoscope of the challenges and opportunities in civil engineering through a blend of lectures, demonstrations, field visits, and self-experimentation. This activity was instrumental in (1) contributing to the awareness of students about their future profession, (2) improving the self-esteem of the participants, (3) developing linkages between academia and industry, and (4) highlighting a crisis of low morale of the stakeholders in CE in the country, in particular of the students.

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References

Graef, L. W. et al. (2001). ''Engineering the future of civil engineering.'' ⟨http://www.asce.org/pdf/tcfpd-complete.pdf⟩ (Apr. 10, 2003).

Khanna, A. (2001). ''Is civil engineering a dying profession? If so, save it!'' *Indian Concr. J.*, 75(11), 699–671.

Meyer, M. D., and Jacobs, L. J. (2000). ''A civil engineering curriculum for the future: The georgia tech case.'' *J. Prof. Issues Eng. Educ. Pract.*, 126(2), 74–78.

Muralikrishna, I. V. (2001). ''Civil engineering education in making india a knowledge society.'' ⟨http://www.gisdevelopment.net/education/papers/edpa0007.htm⟩ (Apr. 10, 2003).

Nehdi, M. (2001). ''Crisis of civil engineering education in information technology age: Analysis and prospects.'' *Proc., 31st ASEE/IEEE Frontiers in Education Conf.*, IEEE, New York, T2B-20-T2B-29.

Pickett, M. et al. (2000). ''Hands-on engineering experiments for secondary school students.'' *J. Prof. Issues Eng. Educ. Pract.*, 126(2), 69–73.

Russell, J. S., Stouffer, B., and Walesh, S. G. (2000). ''The first professional degree: A historic opportunity.'' *J. Prof. Issues Eng. Educ. Pract.*, 126(2), 54–63.