Blended Learning Approach through Industry Electives

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Abstract

One of the strategic functions of the Infosys Education & Research Unit is the 'Industry-Academia partnership program'—Campus Connect (CC), launched in May 2004 to nurture an ecosystem to enhance the right quality and quantity of the input talent (students in the engineering institutes) before they join. A systemic change in the education system is implemented through CC by co-creation and co-teaching of Industry Electives along with Autonomous Engineering Institutions and Deemed Universities in India. The purpose of industry elective is to provide customized programmes for students in institutions that are based on 'learn and apply', enable students to have special interest to round-up their general education and facilitate faculty members to create learning channels with industry. The CC has developed a framework for effective, consistent and predictable deployment of the industry electives so that the talent available for the Information Technology (IT) industry is industry ready and available in large quantities. This model was further strengthened by incorporating co-teaching for the co-created industry electives. This article focuses on how co-creation and co-teaching of industry electives successfully blend the sessions offered by Infosys experts through the technology-based virtual learning mode with the lectures offered by the institution faculty members, live in their respective classes.

Introduction and Background

The Information Technology (IT) industry is by nature, 'people-centric' and the demand for quality manpower is rising continuously. Quality manpower is essential to remain ahead of competition in the global marketplace. It is not uncommon that each of the major players is recruiting a significant number of entry level engineers each year in the recent times. However, there were growing concerns about large parts of the existing talent pool being unsuitable for employment due to skill gap. The pool of 'ready and available' talent pool is limited. Several research conducted by renowned bodies also substantiated the same. Hence,

with this very objective of aligning the skill gap between industry requirements and fresh recruits from the academic institutions, CC was conceived.

CC is an Infosys programme to help increase India's competitiveness in the knowledge economy. Currently CC partner with 360 engineering institutions aimed at creating an effective means of backward integration into the supply chain by going into the college campuses from where the IT industry gets its people for its growth. A systemic change in the engineering education system is effected through the co-creation and co-teaches of Industry Electives along with Autonomous and Deemed Engineering Institutions in India by the CC. The industry best practices are made part

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of the curriculum, further strengthened by incorporating co-teach sessions for the co-created industry electives and thereby making the students industry ready.

Literature Survey

Agodzo and Songsore (2005) emphasized the need for training and re-training of academic staff for inculcating industry awareness and such training will continue to be relevant to the industry. Several stake holders such as industry, academic institutions and government agencies have a role to play in ensuring that the right competencies are built among engineering staff and students (Sudheer et al., 2013).

Industry-wide surveys and analysis reports of bodies such as NASSCOM (National Association of Software and Service Companies, India), has alerted on the employability of engineering graduates and the 2020 talent shortage forecast for the IT industry in India. It has highlighted the need for industry intervention very strongly. Hence, the organization had felt that the time has come to face this challenge, thus the idea was born to initiate a programme called CC which would reach out to the learning community to enhance their skills without any commercial interest.

Although, abundant work and research study have been carried out on industry readiness of students, there is less amount of effort put in exclusively on designing industry based curriculum and reaching out to students directly through online and virtual learning and teaching modes. Hence, the present work and research study by the researchers is relevant and significant in the context of sharing the experienced learning.

Very few industries were proactively worked on to equip the college students in designing industry curriculum and teaching students directly. However, there is not much data analysis, impact and outcomes were documented. Hence, the present study.

Genesis

The CC programme aims at aligning the competencies of the engineering students with the industry needs, providing industry perspective to the faculties and opportunities to showcase their expertise and ideas. Students and faculty from the engineering institutions are the target audience for this programme. Through this collaboration, the technical and behavioural competencies, required to make the engineering graduates industry-ready, were packaged in to competency development programmes, and the institution faculty members were enabled to impart these to their students.

Having a governance model was a core need to ensure success of the programmes. CC has a very strong governance framework. The CC is supported by strategic initiative governance model with well-defined roles, responsibilities, core processes and budgets. Figure 1 illustrates the programme team organization.

The Infosys core group works closely with the core group from the partner college. Each of the members from the either group plays an important role in arriving at the design as well as the content for the programmes. The responsibility for implementing and running the programme smoothly in the college is shared by both the groups.

Keeping in mind the distinct needs and constraints of different types of institutions, the programme was offered in two major modes in line with principles of Engage–Enhance–Sustain model:

1. In the **Autonomous/Deemed institutions** that have the flexibility of defining their own curriculum, industry electives provide a channel for collaboration to institutionalize CC offerings and to sustain them. Infosys collaborates with universities to co-design and co-teach industry oriented electives. Outcome based learning approach is implemented for the industry electives that are credit/non-credit
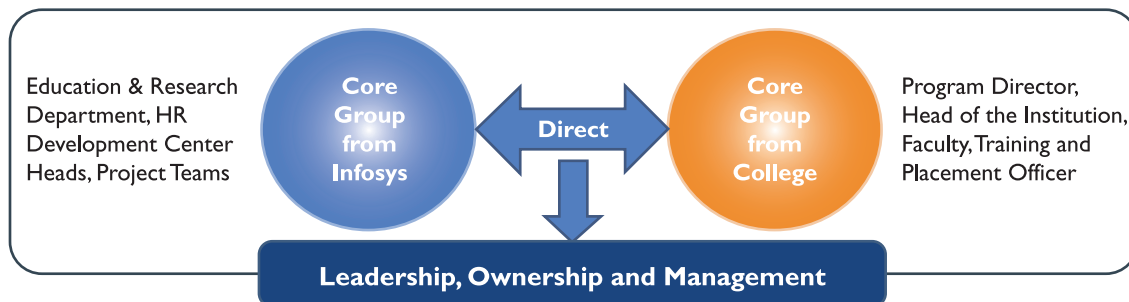

Figure 1. CC Governance Framework

Engage
- Awareness Creation
- Formal MoUs
- Governance Structure
- Stakeholder Engagement
- Pilots

Enhance
- Enhance the Offerings
- Performance Focus
- Globalization

Sustain
- Industry Electives (Co-create and Co-teach)
- Institutionalization

Figure 2. Engage–Enhance–Sustain Model

based courses in the curriculum. These customized programmes are based on 'learn and apply' model.

2. In the **Non-autonomous institutions**, the Industry-academia programmes are conducted as a parallel training program, in addition to their academic curriculum. The core of the CC is the Foundation Programme and Soft-skills programme rolled out at the college premises. This Foundation Programme courseware represents the Intellectual Property.

Figure 2 demonstrates Engage-Enhance-Sustain model.

Research Design

There were couple of questionnaires designed and subsequently surveys were conducted. A questionnaire was prepared in order to collect information and a survey was conducted to gauge the value seen by the institutions and the support provided by CC to the institutions. The survey was opened to 108 institutions that are active in the process of co-creation and deployment of electives, out of which 57 institutions responded to the survey. Likert 4 point scale was used with 1 being lowest satisfaction level and 4 being the highest satisfaction level. The summary of key survey questions and the average ratings are given in the Table 1.

Finally, the collected data were analyzed to see that while the syllabus design, courseware design and faculty enablement are fine and the student interest is also quite high, the student feedback on the impact seen is less than satisfactory (2.7 on a scale of 4) is a concern.

Apart from the survey given earlier, the heads of the institutions were constantly urging for more participation from the industry teaching to students at several occasions. While they see value in their faculty getting enabled, it is also important for the industry subject matter expert to directly handle classes to students for the greater impact. Keeping in view of the earlier analysis and other parameters, there was a need to enhance the model. Hence, this model was further strengthened by incorporating co-teach sessions for the co-created industry electives.

In order to understand the needs of engineering institutions before the launch of the co-teach sessions, a survey was conducted for the institutions that have successfully

Table 1. Stakeholder Feedback Summary on Industry Electives Co-creation

No.	Survey Question	Rating (On a Scale of 1–4)
1	Campus Connect Support for Syllabus Design (Faculty Feedback)	3.48
2	Campus Connect Support for Board of Studies Presentation (Management Feedback)	3.48
3	Infosys Support for Courseware Design (Faculty Feedback)	3.45
4	Faculty Enablement Program—Value Seen by Faculty (Faculty Feedback)	3.82
5	Students Interest in Opting for the Electives (Faculty Feedback)	3.45
6	Student Feedback on Impact of Electives (Exposure to Industry Practices)	2.7

Table 2. Stakeholder Response Summary on Industry Electives Co-teach Limitation: Data Were Collected from CC Partner Institutions Located in India

No.	Survey Question
1	Is your Institution planning to offer one of the Infosys Electives in the June–December 2012 Semester?
2	Which of the Infosys Electives are you planning to offer? Please specify the course title.
3	Have you offered these Infosys Electives in the past?
4	How many batches of Infosys Electives are you planning? If you are offering more than one Infosys Elective, please specify the number of batches for each.
5	What is the typical batch size for the Infosys Electives?
6	What is the starting date of your odd semester this year?
7	What is the closing date of your odd semester this year?
8	What is the final exam date for the Elective? If date is not available, please specify tentative week and the month.
9	How many assessments do you have for Industry Electives?
10	The lectures from Infosys will be conducted through online platform. Does your institution have the necessary infrastructure, that is, desktop with internet connection and projector connectivity, speaker phone, suitable classroom?
11	Assessments and Feedback will be taken using Moodle Platform. Does your institution have Moodle set up in the labs?
12	The recorded webinars would be made available on the Campus Connect Portal. Do you have the facility to play them in a classroom (with projector), in case you miss a class due to some reason?

co-created industry electives under the CC were targeted with a detailed questionnaire and the responses were consolidated. The questionnaire contained questions related to the kind of Industry Elective planned for rollout in a particular semester, the number of students registered for the Electives, the semester start/end dates, timeslot suitable for the institution (choices were given to pick from) for the co-teach sessions, infrastructure readiness etc. In addition, the faculty were requested to suggest topics that they would like to be covered under the co-teach initiative. The responses were consolidated and based on the number of institutions/students, it was decided to focus on selected Electives for the co-teach initiative. Stakeholder response summary on Industry Electives Co-teach is provided in the Table 2.

Methodology for Co-creation of Industry Electives

Syllabus design, content creation, faculty enablement and Elective rollout support are the key stages in the Industry Electives Co-Creation Process. The academic rigor ensures that these stages are followed, for each and every single Elective that comes in to the curriculum. This makes it possible to sustain the training programmes in the institutions. The academic rigor is leveraged to institutionalize the industry relevant training programmes to bring relevance to these electives.

In the **Syllabus Design** stage, the institution works with CC to identify the learning needs and come up with the syllabus for the industry elective. Focus here is on providing industry exposure to the students through the elective so that they can become industry ready. Both Technical and Behavioural competencies are addressed through electives. Technical Electives are in areas such as Foundations of IT, Business Intelligence and Introduction to Mainframes, Enterprise Architecture and Design of Aircraft Structures etc. Soft Skills Electives are in areas such as Business English, Communication Skills and Team Working etc.

Content Creation stage is where the relevant content for the defined syllabus is prepared/references to standard text books provided.

Faculty Enablement happens through focused week long workshops to introduce the faculty to the rationale/ objectives of the electives, the course coverage, the teaching methodology and related tools and techniques. The Faculty enabled through these workshops imparts the training to their students in their institutions. In FY2012, 20 such workshops covering more than 750 faculties have been conducted in Technical/Soft Skills related areas. In Q1 and Q2 FY2013, nine Elective Workshops have been conducted covering more than 350 faculties.

Elective Rollout support is provided to the faculty and the Institutions in terms of rollout reviews, additional case studies/study materials, expert seminars etc. More than 21,000 students from over 50 institutions have successfully undergone the CC Industry Electives in FY2012. In Q1-Q2, FY2013, more than 8300 students from over 20 institutions have completed the Industry Electives.

The five stage Industry Electives—Co-creation and Deployment system is shown in the figure below.

Table 3. Role of Key Stakeholders in Elective Rollout

Stakeholder/Stages	Collaborative Development	Syllabus Design	Content Aggregation	Pilots	Stable Rollout
Institution	High	Moderate	Moderate	High	High
Department at Institution	High	High	High	High	High
Industry	High	High	High	Moderate	Low (co-teach initiated to strengthen this)

Findings in Co-create Approach

The co-create model was worked out with institutions. It required the stakeholders' engagement in the following way (Table 3).

The faculty members are enabled to provide industry exposure to the students. However, students are unable to feel the impact. CC's scalable model to enable the students is by enabling the faculty and supporting them to train their students. The problem of scale (more than 110 institutions) arises when Infosys practitioners teach the students directly. If virtual mode of learning is chosen to address the problem of scale, the effectiveness of delivery becomes an issue. This is the crux of the problem that needs to be addressed and achieving scale without compromising on the effectiveness.

This model was further strengthened by incorporating co-teach sessions for the co-created industry electives.

Methodology for Co-teach Industry Electives

Co-teach Industry Electives is the programme designed and deployed to address the problem stated. This section describes the strategy, design approach, implementation details and impact seen by the stakeholders. The problem of scale and learning effectiveness needs to be addressed together. To achieve scale, it is necessary to leverage technology to conduct virtual training sessions, rather than physically being present in an institution and teach to students. The choice of the technology should be such that it is readily available or easily available to the institutions. If the institutions are familiar with the technology, it would be added advantage as they can get in to the learning mode with a high level of comfort. To achieve effectiveness, the technology should have features that enhance virtual learning experience, such as chats/interactive modes of audio, video etc.

Co-teach Governance Structure

Having a governance model was a core need to ensure success of the programme. The co-teach initiative has a very strong governance framework and has several stakeholders—partner colleges that have agreed to participate in co-teach initiative by aligning their course schedules, Education & Research for delivering the Technical and Behavioural skills sessions and owning the content for the same, virtual learning platform vendor for supporting online virtual class room and CC portal team for managing the courseware and lecture videos.

Co-Teach Governance Structure (Figure 3) is shown below.

The stages of co-teach deployment framework workflow is elaborated in Figure 4.

Technology Infrastructure: CC has been regularly using the platform of Webinars to reach out to institutions to conduct technical and soft skills seminars. So, the CC partner institutions are quite familiar with the Webinar mode of lecture delivery. Effective use of the virtual learning platform by all the instructors is a must for a seamless learning experience. In addition to the virtual learning platform, the learning experience can be enhanced by providing offline support mechanisms to create the feeling

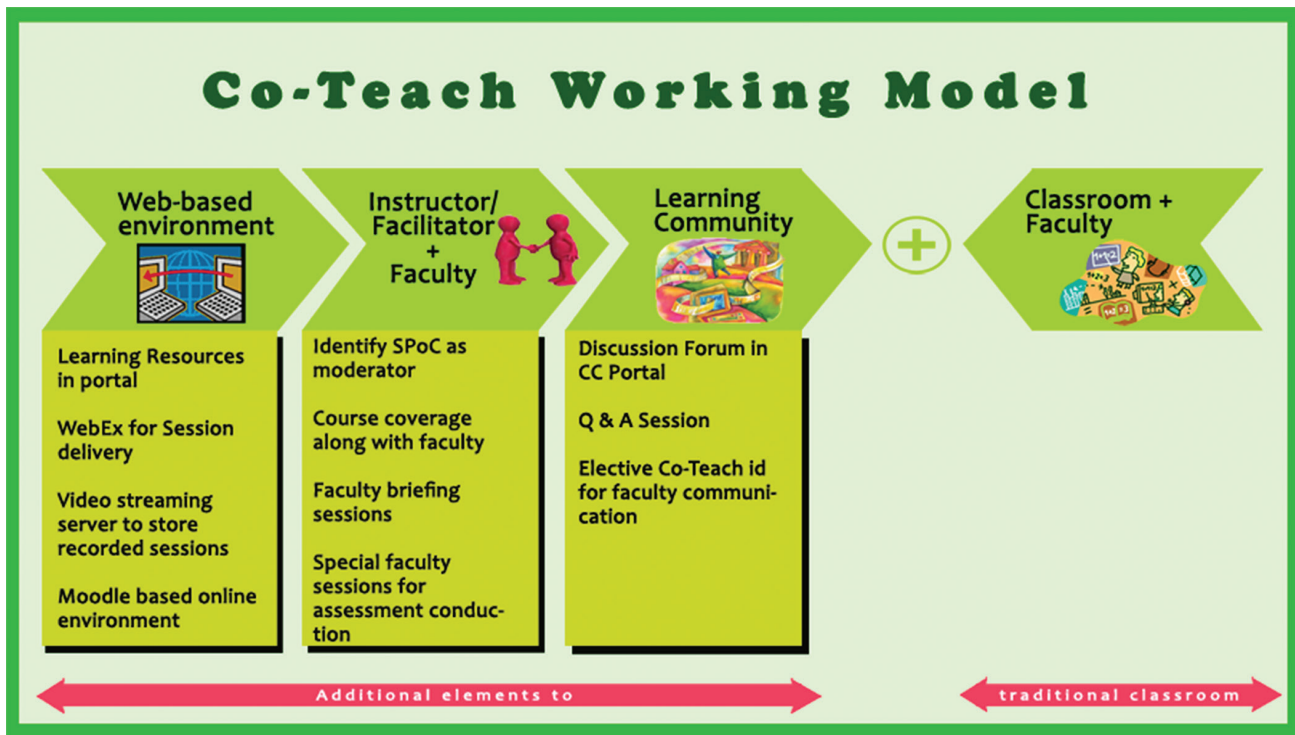**Figure 3.** Co-teach Governance Structure

Figure 4. Co-teach Working Model

of continuity. These include providing recorded lectures in the archive of the CC portal, creating vibrant discussions in discussion forums on the topics covered, providing the course material used in the sessions etc.

Scoping: Once the technology is identified, next comes the scoping. There are several CC Industry Electives being offered in institutions. It is not possible to cover all Electives under the co-teach initiative. The courses for co-teach need to be identified based on the number of institutions/students undergoing that Elective. Also, the focus needs to be on those institutions that offer the Elective in the selective semester. In order to provide an opportunity for the institution faculty to teach along with Infosys subject matter experts, it is decided to cover 25–30 per cent of the total lecture hours in the Elective under the co-teach initiative. The rest of the lectures will need to be covered by the institution faculty.

Online Feedback: A continuous online feedback mechanism is provided to capture the session-wise feedback and make course corrections to enhance the learning experience. How all the above are translated from strategy to design and design to implementation will be described in the following sections.

Blending the co-teaching initiative with the sessions handled by the institution faculty is becoming a challenge.

The students should not view the co-teaching sessions as independent sessions. The faculty should feel that they are teaching along with industry experts and not alone. The blending can be achieved through proper briefing to institution faculty and our own instructors and by providing additional learning material to faculty.

Regular feedback is taken from all the stakeholders, that is, institution management, faculty members and students, to gauge the impact of the Industry Electives and to improve the programme. This feedback is taken during the syllabus reviews, faculty enablement programmes, principals meets and through an online survey for students, faculty and institution management.

Impact

The co-teach initiative was started with an intention of reaching out to the students directly, on a large scale, leveraging technology without compromising on the effectiveness of learning. The primary statistics is about the coverage itself, in terms of average number of institutions, number of students and number of faculty. The second level metric is about the rating-based feedback.

Table 4 gives the primary statistics.

Table 4. Co-teach Primary Statistics

	Foundations of IT	Business Intelligence	Business English	Total (All 3 Electives Combined)
Student Webinars	14	13	12	39
Average Institutions	6	6	8	20
Average Students	216	185	306	707
Average Faculty	26	13	31	70
Faculty Webinars	4	2	12	18
Average Institutions	6	6	5	17
Average Faculty	34	25	22	81

Faculty participation summary (Figure 5) is given below.
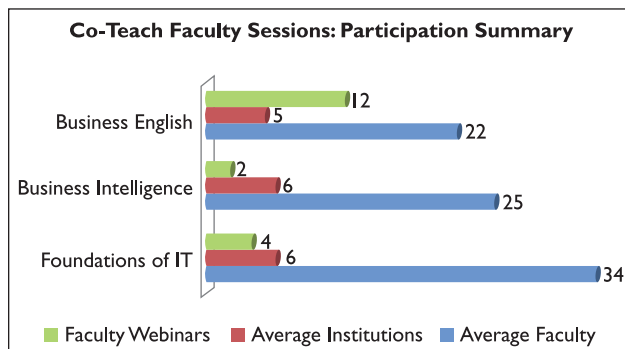
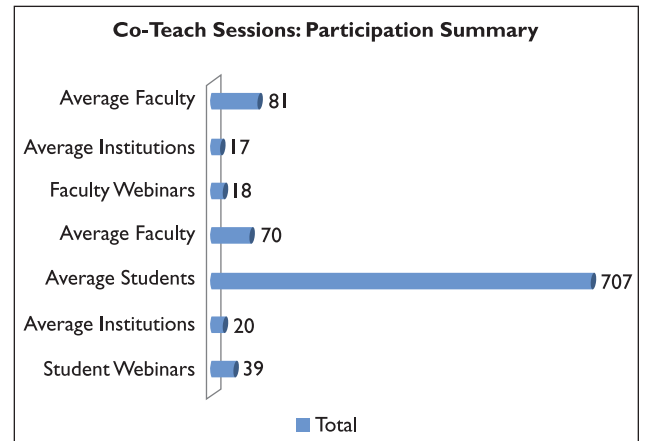**Figure 5.** Faculty Participation Summary

Graphical representation of Student's participation (Figure 6) is shown below.

Figure 6. Student's Participation Summary

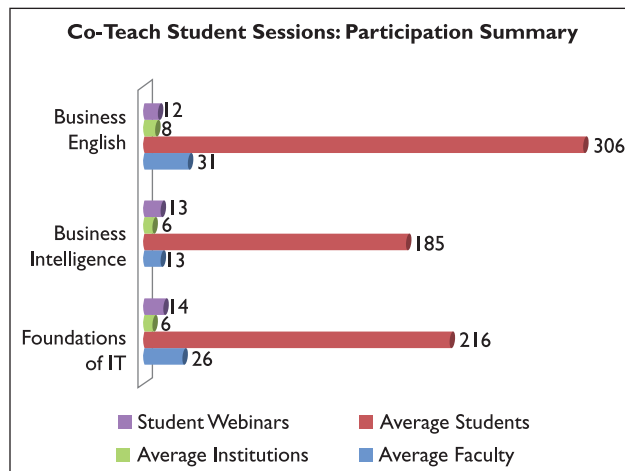Overall participation summary (Figure 7) is given below.

Figure 7. Overall Participation Summary

At the end of each session, the institution faculty and students feedback is collected and consolidated on some questions that were put in the form of affirmative statements, with a rating of 1 to 5, where 1 indicates the strong disagreement to the statement and 5 indicates their strong agreement.
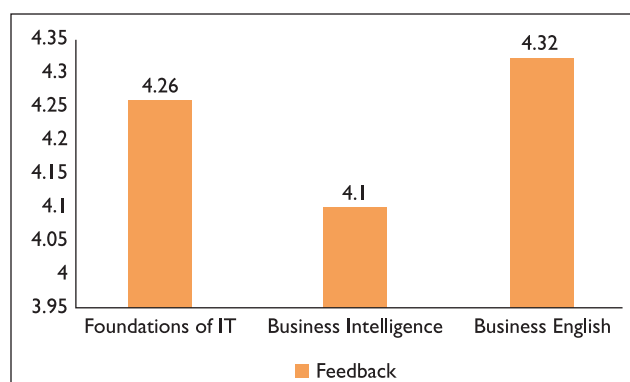
As can be seen, the rating is more than 4 for all the aspects and this is a first level indication of the impact of co-teach initiative. And the feedback is consistent across Electives that implies that this blended mode of learning is suitable for all Electives equally. Table 5 gives the average ratings for key feedback questions.

Table 6 demonstrates the average ratings for questions on learning outcomes.

Table 5. Co-teach Feedback Summary

No.	Feedback Question	Rating (on a Scale of 1–5)		
		Foundations of IT	Business Intelligence	Business English
1	Session Objectives Set and Met	4.31	4.03	4.43
2	Session Design was Effective	4.31	4.06	4.23
3	Session Duration was Appropriate	4.09	4.07	4.18
4	Q&A Session was Effective	4.24	4.06	4.24
5	The Virtual Learning was an interesting and enriching experience	4.20	4.23	4.24
6	Audio/Video Clarity was good	4.47	4.12	4.59
7	Overall Rating for the Session	4.25	4.06	4.33
8	Content walkthrough was appropriate for this course	4.24	4.23	4.33
9	The course improved my abilities in responding to the current industry needs	4.20	4.12	4.18
10	Overall rating for this course	4.26	4.1	4.32

Figure 8 given below depicts the course-wise feedback.

Figure 8. Course-wise Feedback

Summary and Future Scope

In summary, the CC team successfully managed to handle the problems of scale and effectiveness by leveraging technology and other enabling or offline support mechanisms to reach out to a significantly large audience.

In the years to come, this initiative will be strengthened by the lessons learnt in this edition of the programme and the feedback or suggestions received from the stakeholders.

1. State of the art content provisioning
   a. Slicing the content further, and rendering it for this medium of delivery.
   b. More sessions on demonstrating open source tools such as Requirement Analysis, Design, Development, Testing, Version Control etc.

Table 6. Co-teach Learning Outcomes Feedback

No.	Feedback Question	Rating (on a Scale of 1–5)		
		Foundations of IT	Business Intelligence	Business English
1	Learning outcomes are clearly stated in terms of measurable student learning (what should students know, be able to do and/or value).	4.27	4.03	4.33
2	The teacher of an online classroom has surpassed expectations described in the Student Learning Objective and/or demonstrated an outstanding impact on student learning.	4.12	4.32	4.16
3	The findings are compared to traditional approaches, with a description of similarities and differences, where relevant.	4.12	3.92	3.78
4	Please rate on the strengths and limitations of the programme learning objectives and assessment activities.	4.33	4.20	4.06

  c. Introduction of Domain specific sessions such as Mobility, Banking, Cloud Computing etc.
2. Enhanced Infrastructure Support
  a. Integrating speaker's video for live Webinars.
3. Systemic integration of Faculty and Students
  a. Giving opportunities to the faculty of participating institutions with additional resources.

Acknowledgement

References

Agodzo, S. K. & Songsore, J. (2005). Competency-based learning: The case of Wa Polytechnic of Ghana. Proceeding of the Commonwealth Association of Polytechnics in Africa (CAPA) Seminar, Hosted by the Conference of Polytechnic Principals (COPP), Ghana from the 22nd–27th of August, 2005 in Accra.

Campus Connect Portal Retrieved from https://campusconnect.infosys.com/

Sudheer, Reddy K. & Srinagesh, C. (April, 2013). *Fostering problem solving through innovative knowledge events* (pp. 1233–1238). 8th IEEE International Conference on Computer Science & Education. Colombo, SriLanka: Sri Lanka Institute of Information Technology.