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STARS Model: An Instructional Approach for Enhancing Skill Sets of Engineering Students

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***Abstract*—The competencies of engineering students are measured through personal, interpersonal and communication skills. This work aims to improve these skills of engineering students through a Design Thinking course. The course involves a series of individual and team activities in the process of conceptual design modeling or prototype development, which in turn builds the skills and competencies of students. This paper proposes the unique Instructional Design model by organizing Solo, Team activities with Assessment and Reflection for improving the Skills (STARS) of students. The STARS model consists of questionnaire with 18 questions on design thinking skills, 8 on personal skills, 6 on interpersonal skills, and 5 on communication skills. Data is collected from each student after each assessment. The survey responses are analyzed and the attainment of skills are assessed using the Priority Need Index (PNI) method. It helps the instructor to focus more on specific skills in the forthcoming reviews. The experimental results proved that the proposed STARS model improves the skills of engineering students.**

***Keywords*— STARS Instructional Design, ID Model, Engineering Skills, Engineering Education, Design Thinking**

***JEET Category*—Practice**

I. INTRODUCTION

RECENTLY, people in the educational sector are facing many challenges after the pandemic situation. The research works are focusing more on the knowledge, skill, and attitude of various people such as students, teachers, employers (Huerta, M. V et al., 2021; Karthikeyan, P. et al., 2021; Jaiswal A et al., 2021; Moore & Wang, 2021; Karthikeyan, P. et al., 2020; M. Marques et al., 2018). Skill is one of the most predominant factors for engineering students to shine better in their professional careers. In this work, design thinking, personal, interpersonal, and communication skills are considered. Hence an instructional design model is proposed where activities in Solo, Team, Assessment, and Reflection are conducted to enhance various Skills (STARS). The proposed instructional model is followed in the Design Thinking Course. This course has certain set of individual and team activities which help the students to learn the design processes for developing the conceptual model of the product. The design approach includes activities like collecting the requirements through meeting the stakeholders, designing the low-cost model and then the conceptual model. The detailed Course Outcomes are given in Table VI. The design activities are organized in Canvas, the Learning Management System (LMS). Using the Priority Need Index (PNI) method, priority ranking values are calculated. These values help the instructor to focus more on specific skills improvement of each student.

There are many research work focused on improving the skills of engineering students. Lin et al. (2021) proposed a flipped learning model with the support of mobile technology for improving the communication and self-reflection skills of students through physical education. Nykopp, M. et al. (2019) introduced the coordination profile for an essay writing activity. They found that the collaboration skills were not much higher due to different styles of working by the individuals. But they concluded that significant improvements were found in a few groups. M. Marques et al. (2018) applied the reflective weekly monitoring (RWM) method to enhance the teamwork experience among the student's group in the software engineering course.

Morasse, F et al. (2021) used virtual reality (VR) to assess the socio moral skills, empathy, and sense of presence among the people. Kindness intervention on media literacy skills, self-esteem, social self-efficacy is investigated with female secondary school students in Hongkong (Datu J et al., 2021). A systematic schema based instruction design (ID) model was used to enrich the knowledge on different learning environments. Utilization of Schema based ID model in an empirical study was discussed in detail (Jung E et al. 2022). An instructional design process model namely three-dimensional multi-user virtual environment (3D MUVEs) was implemented in six different groups with seven themes (Doğan, D., Tüzün, H. 2022) and for students behaviors in LMS (Attuquayefio, S. N., 2022).

Due to current pandemic, learners prefer MOOCs to earn skill based course certifications offered by various reputed institutions across the globe. Learning of design thinking skills in a Massive Open Online Courses (MOOCs) is really challenging. The interventions of learning are examined and discussed recently (Schmieden, K et al, 2022). The problem solving, creativity skills were analyzed through design thinking in higher education students (Guaman-Quintanilla et al 2022). There was a study on Facilitative Interpersonal Skills (FIS) of undergraduate students through screening and interview process. Based on FIS, the therapists were assigned and their findings were highlighted (Anderson T et al, 2022).

There are many studies presented exclusively on interpersonal skills (Priyadarshini, S 2022; Reyes, J.R et.al 2022; Bosméan, L et al, 2022), personal skills (Buta, B 2022;Jardim J et al 2022; Tolla I & Jabu B, 2022), communication skills (Coffman-Wolph & Estell 2022; Syed 2022; Kakepoto et al 2022), design thinking skills (Wallisch & Paetzold 2022; Galoyan et al 2022; Lin et al 2021) and creative thinking skills (Jawad et al 2021; Wannapiroon et al 2022; Craps et al 2022). Zhu, M. and Doo, M.Y (2021) surveyed personal skills among MOOCs learners. In particular, the relations of self-monitoring and self-management skills were discussed. Liang, C et al. (2021) introduced a log-based group formation algorithm to improve the interpersonal skills among primary school students. Qattawi A et al. (2021) did a case study on the contribution, skills, and satisfaction of each team in a capstone design project with two cases that are single disciplinary and multidisciplinary. In terms of contribution and skills, multidisciplinary teams performed better than the other. A study on the impact of mindfulness program on interpersonal and intrapersonal skills of first-year engineering students was carried out in (Huerta, M. V et al., 2021) where the improvements in interpersonal skill competencies such as empathy, teamwork, and intrapersonal skill competencies such as self-regulation, resilience are measured and discussed. A mixed-method approach is introduced in (Jaiswal A et al., 2021) to analyze the team retrospectives. In this, the project-based learning environment was considered with different orientation patterns. College instructors and employers involved in a survey where the competencies on language skills, product management skills, innovative and technical skills, and design skills were collected. Need assessment analysis and content analysis were conducted to analyze the data and its quality respectively (Kornchanok & Thanin, 2019).

The Machine Learning Augmentative and Alternative Communication (MLAAC) model proved that the issues of AAC users were reduced. This was proposed mainly for autism and people with trauma (Li, W. et al., 2021). In the literature, there are many instructional design models for enhancing the skills of graduate students (Laura A. S., 2020; Caliskan 2014; Ilie 2014). The Read, Reflect, Display and Do (R2D2) model was suitable for online teaching and learning (Bonk & Zhang, 2008). An automated feedback model is proposed in (Liaqat, A et al., 2021), for supporting English Language Learners (ELLs). A systematic interdisciplinary instructional model was designed to address the students' collaboration, communication, problem-solving, and design thinking skills (Z. Huang et al., 2021). A corpus-based writing instruction was given for English as a foreign language (EFL) learner to improve their written communication proficiency (Tsai, YR., 2021). From the review of existing work, there is no exclusive work focusing on skills alone using the instructional model. In this paper, STARS instructional design model is proposed to enhance the skills of engineering students through the design thinking course.

II. METHODOLOGY

This section describes different activities that were used in the STARS instructional design model, as shown in Fig. 1. There are 30 activities which are classified in five terms such as Solo, Team, Assessment, Reflection and Skills.

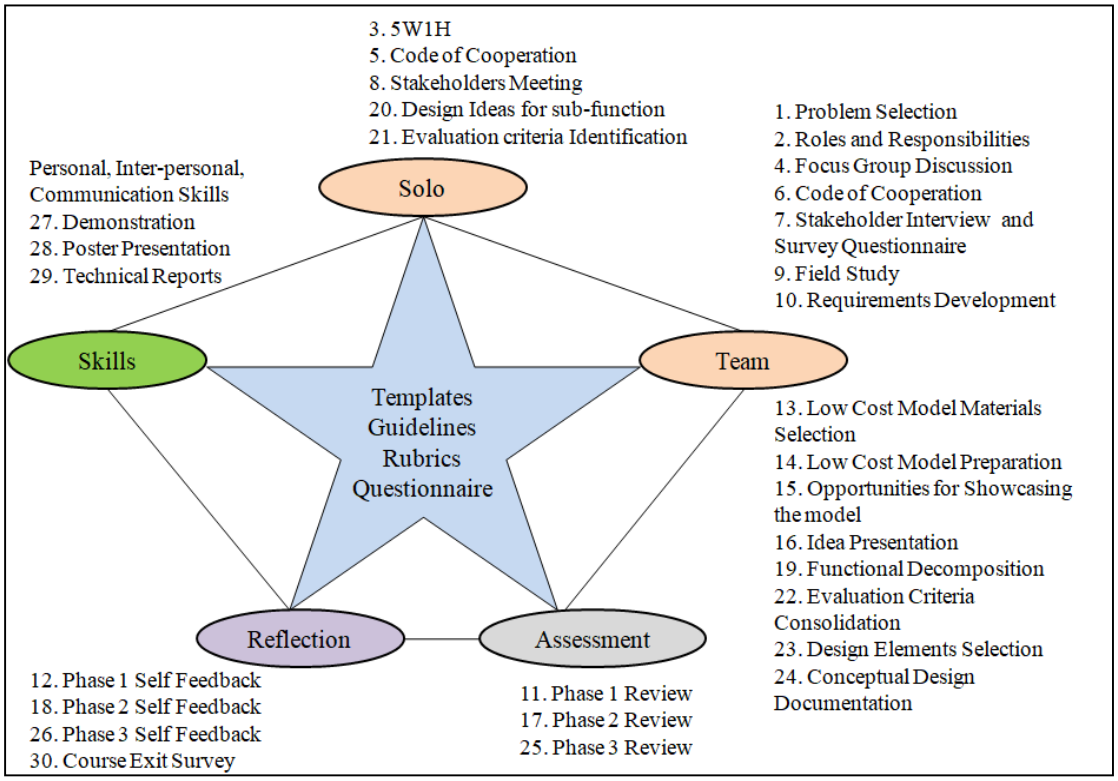

Fig. 1. STARS Instructional Design Model

All the solo and team activities were carried out using the Canvas tool for moderating and monitoring the progress of all project teams. A detailed instructional design document has been prepared for the set of individual/team design thinking activities. Rubrics, questionnaires, guidelines, and presentation templates were designed for each stage of the assessment. Instructions and guidelines were given to all students for the following:

- Selection of problem domains based on the Sustainable Development Goals (SDGs) such as quality education, clean energy, good health. The list of themes was explained briefly and shared with all the students.
- Collected the team details such as team size, roles, and responsibilities of each individual in the team, problem domain, and the technical mentor using Google Form. There were 5 roles introduced from the EPICS (University of Purdue, n.d.) such as project manager, project partner liaison, project archivist, webmaster and finance officer.

There are three major modules in the design thinking course. They are project identification, specification development, and conceptual design. The STARS activities are discussed in each module below.

A. Project Identification

A set of activities in project identification is illustrated in Fig.2. Few of the activities are carried out solo and few are in the team. The pre-work discussion for brainstorming and code of cooperation are solo activities. Team meeting, focus group discussion, stakeholder's interview, survey and voice of customer are team activities.

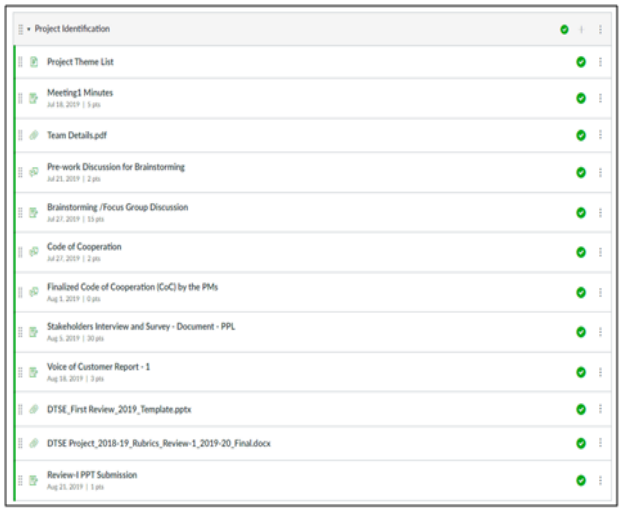

Fig. 2 Activities in the project identification module

(i) 5W1H Activity (solo): This is a pre-work discussion before the brainstorming activity. Each individual was asked to think about the problem and its functions in different perspectives like Who, What, When, Where, Why, and How. Then they recorded their views in the discussion forum created for this purpose.

(ii) Focus Group Discussion (team): The 5W1H perspectives on the selected problem were discussed in the team by following the guidelines

- Give opportunity for everyone to talk
- Record ideas by one person (Use tape or manual note)
- Do not use negative or discouraging talks
- Do not think about the implementation of the idea
- Consolidate discussed points - useful ideas, areas for further exploration, new approaches to the problem

The team was also expected to identify the stakeholders in this brainstorming discussion. At the end of this activity, each team was asked to submit pieces of evidence like photos, videos, audios, and minutes of the meeting for carrying out the activity successfully. The entire activity was moderated by the team leader. Fig. 3 illustrates the team discussion screenshot in LMS.

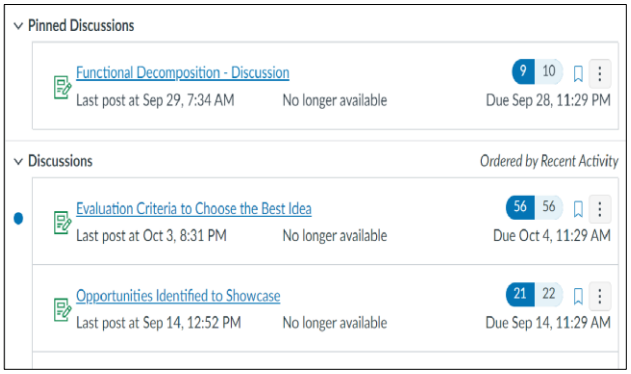

Fig. 3 Online team discussion in LMS

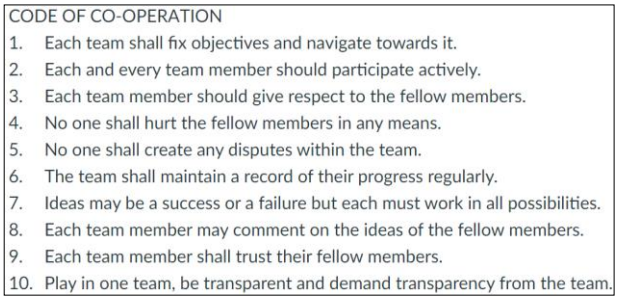

Fig. 4 Final CoC prepared by all the team project manager

(iii) Code of Cooperation (solo and team): The teacher explained what is Code of Cooperation (CoC) is in the class and asked each individual to collect various points related to that. All these points were discussed within the team. The Project Manager of each team described his team's CoC in the Project Manager's meeting. Finally, the CoC for the class was discussed, summarized, and communicated to all the teams. It is shown in Fig.4. The CoC was expected from each individual within the team as well as among the teams throughout the project.

(iv) Stakeholders Interaction (team): The project team was ready to meet the stakeholders and get their voices to have a better understanding of the problem and its issues or challenges. The team initially prepared a set of questions that need to be asked to the stakeholders. Few teams used a survey

questionnaire for collecting the requirements, few teams used the field study approach for understanding the requirements, and other teams interviewed the stakeholders and recorded their requirements. All the teams carried out requirements development activities, prepared requirements specification documents, and presented them in the first review.

B. Specification Development

The Fig.5 shows, various activities that are carried out in this module. The main activities are preparation of project specifications, materials identification for low-cost model preparation.

Fig. 5 Activities in the specification development module

(v) All project teams were asked to prepare the low-cost model for their project. The instructor demonstrated this activity using sample instruments and videos. The teams discussed the materials required like charts, paper, and so on, for demonstrating their ideas. All teams were asked to identify the opportunities for showcasing their ideas/solutions/products to the customers or stakeholders by exploring the market. Based on the explored ideas, the low-cost model was prepared in a team. The video was captured while designing and developing the model and it was submitted for the second review.

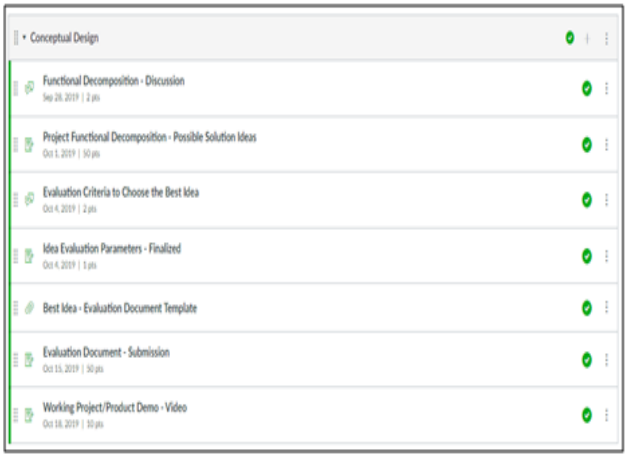

Fig. 6 Activities in the conceptual design module

C. Conceptual Design

The Fig.6 shows various activities carried out in this module. The main activities are preparation of project specifications, materials identification for low-cost model preparation.

(vi) The Functional Decomposition activity was carried out by each project team after the instructor demonstrated this activity using sample instruments and videos. All project teams discussed the functional and non-functional requirements and come up with the list of modules required for the product. Each individual in a team was assigned one or two modules by the team leader. Each individual did a detailed study and documented the possible ideas of solution. In a team discussion, each team had come up with a list of evaluation criteria suitable for their application. For example, Usability, aesthetics, user friendly, satisfaction are a few criteria of application projects and accuracy, error rate, the execution time of an algorithm-based project. With the help of the instructor, the evaluation parameters for the design were finalized for the class and communicated to all the teams. The design was implemented by each team and demonstrated in the third review.

TABLE I
REVIEW RUBRICS

Reviews	Descriptors
Review 1	Need assessment, identification of stake holders, definition of basic stakeholder requirements, project plan and communication skill
Review 2	Problem environment and stake-holders' profile, Mock-ups or prototypes, customer specifications and evaluation criteria, adherence to project plan and communication skill
Review 3	Functional decomposition, alternate solutions and their evaluation, prototype, adherence to project plan and communication skill

D. Assessment

All projects are evaluated at three different stages by the team of Faculty members. Rubrics and presentation templates were shared with all Project teams before assessment. Table I shows the review 1, review 2 and review 3 rubrics. During review 1, the consolidated functional and non-functional requirements were validated against the voice of the customers or stakeholders. During review 2, the low-cost model design was projected in the Design Expo forum and was given feedback by the visitors. Students and Faculty from all the Departments visited the exhibition and validated the design. During review 3, all the project teams were asked to do poster presentations for demonstrating their design ideas and submit their project report. The review Likert scales are exemplary, proficient, partially proficient and incomplete.

E. Reflection

At the end of each stage, the students were asked to reflect on their experience while working in a team. The questionnaire was prepared and their responses were collected for further study, and are shown in Tables II, III, and IV. The questionnaire included questions about the improvement in their design thinking, personal, interpersonal, and communication skills.

F. Skills

The STARS model designed all the activities such that the design thinking, personal, interpersonal, and communication skills of each student would get improved. Priority Need Index (PNI) based review method was used to measure the personality development of each student, based on their survey responses after each stage of assessment. Eq.1 shows the calculation of PNI.

$$PNI = (E - A) / E \qquad \text{(Eq. 1)}$$

where, E -Expected value and A - Actual response

III. Results and Discussions

The STARS model was implemented to a batch of B.Tech IT 131 students during their third semester for the course Design Thinking. 32 teams participated in these activities where each team size consisted of 3 – 4 team members. In the team, each individual was assigned a unique role such as project manager, project partner liaison, project archivist, webmaster, and financial officer. Team level CoC was shared by each project manager across the team and finalized CoC. The finalized CoC is circulated to all for following them during their project duration.

Fig 7. Low-cost model – Expo

The Fig.7 shows the low-cost model demo of a team and Fig.8 shows a sample poster presented by a team. Fig. 9 shows the data analysis and categories of student's reflections after each review.

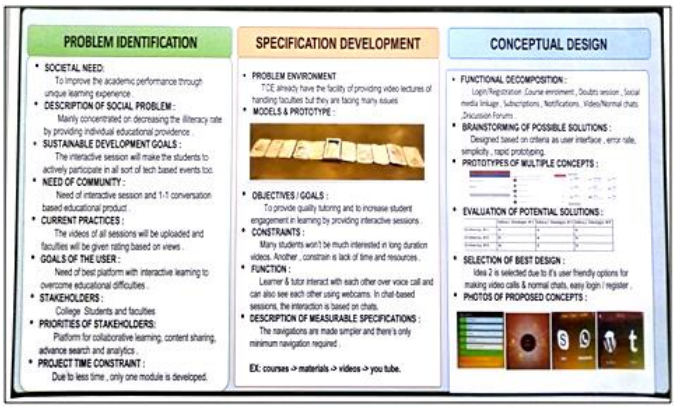

Fig 8. Sample Poster

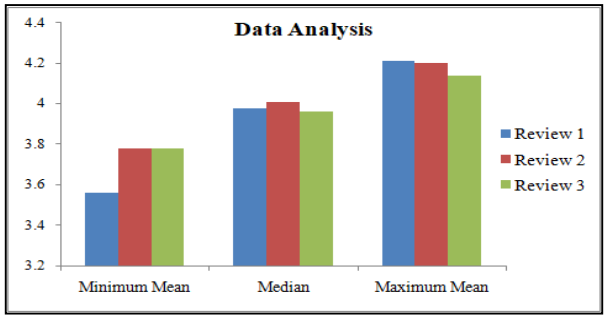

Fig. 9 Statistical Data Analysis of Reviews

Priority Need Index value for 4 different parameters like design thinking, personal, interpersonal, communication skills, and their sub-parameters was calculated using Eq. 1 and is shown in Tables II, III, and IV for reviews 1, 2, and 3. There are 26 questions shared to the students in every review in which, design thinking skills contain 7 questions, personal skills contain 8 questions, interpersonal skills contain 6 and communication skills contain 5 questions. The survey responses given by each student after each stage of the project were consolidated and analyzed for process improvement. The mean value of each sub-parameter *(actual responses A)* was used in determining the PNI value. The initial level of data analysis on these mean values helped to have scale values like Extremely High (EH – 4.01 to 5.00), High (H – 3.01 to 4.00), Moderate (M – 2.01 to 3.00), Low (L – 1.01 to 2.00), and Extremely Low (EL – 0.01 to 1.00). As the survey was designed with a 5-point Likert scale, the expected response value (E) for each parameter was set to 5. The action plan for improvement is prepared when any of the sub-parameter gets the value < 3.

TABLE II
PROJECT IDENTIFICATION (REVIEW 1)

Q. No	Description	Category	Mean (A)	Std. Dev	Expected Value (E)	PNI	Priority Ranking
Design Thinking Skills		High	3.85	0.72	5	0.230	1
Q1	Problem Identification	H	3.87	0.87	5	0.226	4
Q2	Brainstorming Activity	H	3.82	0.83	5	0.236	3
Q3	Stakeholders Interview Activity	EH	4.03	0.88	5	0.194	7
Q4	Stakeholders Survey Activity	H	3.98	0.78	5	0.204	6
Q5	Voice of Customer Report	H	3.90	0.88	5	0.220	5
Q6	Literature & Patent Reviews	H	3.56	0.86	5	0.288	1
Q7	Time Management	H	3.58	1.03	5	0.284	2
Personal Skills		EH	4.10	0.67	5	0.180	3
Q8	Decision Making	H	3.97	0.81	5	0.206	3
Q9	Self Confidence and Enthusiasm	H	3.93	0.86	5	0.214	1

Q10	Know the Importance of Hard work	EH	4.21	0.74	5	0.158	8
Q11	Adapt to Changes	H	3.98	0.77	5	0.204	5
Q12	Work Independently	H	3.95	0.97	5	0.210	2
Q13	Work with Others	EH	4.08	0.75	5	0.184	6
Q14	Accept of Feedback/ Criticism	H	3.97	0.94	5	0.206	3
Q15	Identify Strengths/Weakness	EH	4.12	0.76	5	0.176	7
Interpersonal Skills		EH	4.15	0.86	5	0.170	4
Q16	Accept Roles and Responsibilities	EH	4.21	0.83	5	0.158	6
Q17	Follow Code of Cooperation	EH	4.05	0.85	5	0.190	5
Q18	Facilitate Effective Meetings	H	3.94	0.94	5	0.212	1
Q19	Listen and Discuss Effectively	EH	4.02	1.00	5	0.196	3
Q20	Positive and Effective Feedbacks	EH	4.04	0.88	5	0.192	4
Q21	Technical Collaboration	H	3.99	0.90	5	0.202	2
Communication Skills		EH	4.04	0.74	5	0.192	2
Q22	Preparation of PPT/Report	EH	4.16	0.76	5	0.168	5
Q23	Participation in Discussion Forums	EH	4.12	0.74	5	0.176	4
Q24	Dialogues / Conversation in Team	EH	4.05	0.83	5	0.190	3
Q25	Fluently in English	H	3.72	0.94	5	0.256	1
Q26	Oral communication in Team Meetings and Reviews	H	3.98	0.84	5	0.204	2

TABLE III
Specification Development (REVIEW 2)

Q. No	Description	Category	Mean (A)	Std. Dev	Expected Value (E)	PNI	Priority Ranking
Design Thinking Skills		High	3.989	0.75	5	0.202	1
Q1	Preparation of Stakeholders Profile	H	3.91	0.84	5	0.218	4
Q2	Requirements Specification Development	H	3.78	0.83	5	0.244	1
Q3	Preparation of Low Cost Model	EH	4.03	0.95	5	0.193	6
Q4	Determine evaluation Criteria	H	3.80	0.88	5	0.24	3
Q5	Time Management	H	3.79	0.96	5	0.242	2
Q6	Participation in Design Contests	H	3.99	0.89	5	0.202	5
Personal Skills		EH	4.16	0.78	5	0.167	4
Q8	Decision Making	EH	4.02	0.86	5	0.196	3
Q9	Self Confidence and Enthusiasm	EH	4.01	0.82	5	0.198	1
Q10	Know the Importance of Hard work	EH	4.18	0.86	5	0.165	8
Q11	Adapt to Changes	EH	4.03	0.78	5	0.193	4
Q12	Work Independently	EH	4.14	0.91	5	0.171	5
Q13	Work with Others	EH	4.01	0.82	5	0.198	1
Q14	Accept of Feedback/ Criticism	EH	4.15	0.84	5	0.169	7
Q15	Identify Strengths/Weakness	EH	4.14	0.81	5	0.171	5
Interpersonal Skills		EH	4.02	0.91	5	0.196	2
Q16	Accept Roles and Responsibilities	H	3.96	0.93	5	0.209	5
Q17	Follow Code of Cooperation	H	3.91	0.93	5	0.218	1
Q18	Facilitate Effective Meetings	H	3.93	0.83	5	0.213	3
Q19	Listen and Discuss Effectively	H	3.92	0.95	5	0.215	2
Q20	Positive and Effective Feedbacks	EH	4.02	0.83	5	0.196	6
Q21	Technical Collaboration	H	3.95	0.96	5	0.211	4
Communication Skills		EH	4.09	0.72	5	0.18	3
Q22	Preparation of PPT/Report	EH	4.15	0.77	5	0.169	4
Q23	Participation in Discussion Forums	EH	4.11	0.85	5	0.178	3
Q24	Dialogues / Conversation in Team	EH	4.09	0.79	5	0.18	2
Q25	Fluently in English	EH	4.00	0.86	5	0.2	1
Q26	Oral communication in Team Meetings and Reviews	EH	4.19	0.75	5	0.16	5

TABLE IV
CONCEPTUAL DESIGN (REVIEW 3)

Q. No	Description	Category	Mean (A)	Std. Dev	Expected Value (E)	PNI	Priority Ranking
Design Thinking Skills		High	3.86	0.83	5	0.227	1
Q1	Perform Functional Decomposition	H	3.94	0.86	5	0.212	4
Q2	Provide possible Solutions/Ideas	H	3.96	0.89	5	0.208	5
Q3	Apply the Evaluation Criteria	H	3.78	0.88	5	0.243	1
Q4	Identify the Best Idea	H	3.92	0.91	5	0.216	3
Q5	Demonstrate project/Product	H	3.78	1.01	5	0.243	1
Personal Skills		EH	4.08	0.74	5	0.184	3
Q8	Decision Making	EH	4.10	0.85	5	0.18	8
Q9	Self Confidence and Enthusiasm	EH	4.02	0.79	5	0.196	4
Q10	Know the Importance of Hard work	EH	4.08	0.82	5	0.184	7
Q11	Adapt to Changes	H	3.88	0.84	5	0.224	2
Q12	Work Independently	EH	4.08	0.89	5	0.184	6
Q13	Work with Others	H	4.00	0.75	5	0.2	3
Q14	Accept of Feedback/ Criticism	EH	4.04	0.89	5	0.192	5
Q15	Identify Strengths/Weakness	H	3.86	0.94	5	0.227	1
Interpersonal Skills		EH	4.10	0.76	5	0.18	4

Q16	Accept Roles and Responsibilities	EH	4.14	0.72	5	0.173	6
Q17	Follow Code of Cooperation	EH	4.02	0.79	5	0.196	5
Q18	Facilitate Effective Meetings	EH	4.00	0.80	5	0.2	4
Q19	Listen and Discuss Effectively	H	3.90	0.78	5	0.22	2
Q20	Positive and Effective Feedbacks	H	3.96	0.72	5	0.208	3
Q21	Technical Collaboration	H	3.88	0.97	5	0.224	1
Communication Skills		H	3.96	0.77	5	0.208	2
Q22	Preparation of PPT/Report	EH	4.06	0.81	5	0.188	5
Q23	Participation in Discussion Forums	H	3.94	0.83	5	0.212	3
Q24	Dialogues / Conversation in Team	H	3.86	0.85	5	0.227	1
Q25	Fluently in English	H	3.92	0.91	5	0.216	2
Q26	Oral communication in Team Meetings and Reviews	EH	4.02	0.73	5	0.196	4

The summary of prioritized parameters is shown in Table V. From Table V, it is understood that the 'Design Thinking Skills' of students have to be given priority for improvement. The instructor may modify the instructional design such that activities related to this may be improved for the subsequent module and batch of students. The analyzed data of review 1 says that 'Communication Skills' has to be given the second priority.

TABLE V
PRIORITIZATION OF PARAMETERS

Reviews	Design Thinking Skills	Personal Skills	Interpersonal Skills	Communication Skills
Review 1	1	3	4	2
Review 2	1	4	2	3
Review 3	1	3	4	2

From Table V, it is evident that the communication skills of students improved slightly (PNI value changed from 0.192 to 0.18) during stage 2. It is also understood that the activities implemented through the STARS model enhanced the personal, interpersonal, and communication skills of all project teams, as their PNI values change between 2, 3, and 4 always.

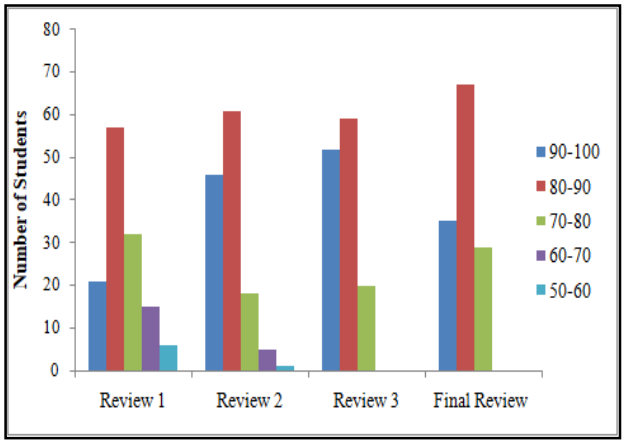

Fig 10. Performance of Students in Reviews

This ensures that the solo and team activities enabled the team-building skills of all students which in turn would improve his communication skills and personality development. Apart from these skills development, these STARS model activities supported each student to score high marks in the intermediate reviews as well as in the final review, as shown in Fig. 10. From the results, it is observed that the proposed STARS model improves the skills of engineering students. At the end of this course, all the students gave feedback about the attainment of Course Outcomes (COs) through the course exit survey, and the analysis was shown in Table VI.

TABLE VI
COURSE EXIT SURVEY (IN %)

Course Outcomes		Rating 4	Rating 3	Rating 2	Rating 1
CO1	Identify a specific social need to be addressed	15.2	38.9	35.8	10.1
CO2	Identify stakeholder's requirements for the societal project	19.1	34.3	36.6	10
CO3	Develop measurable criteria in which design concepts can be evaluated	14.5	37.4	37.4	10.7
CO4	Develop prototypes of multiple concepts using user's feedback	21.4	29.8	40	8.8
CO5	Select the best design solution among the potential solutions with its functional decomposition	15.3	34.3	42.1	8.3

In the course exit survey, the different ratings are referred to as follows: rating 4 - excellent, rating 3 - very good, rating 2 - good, and rating 1 – fair. From Table VI, it is evident that more than 90% of students *(*Rating ≥ *2)* reflected that this course and its content delivery helped them to attain the required course outcomes.

IV. CONCLUSIONS

Engineering institutions train and develop the students as industry ready engineers. Skills of the students are the most important factors for getting jobs. This research work considered different skills of engineering students like design thinking, personal, interpersonal and communication skills and made an attempt for their improvement using the proposed STARS instructional design model. The students felt comfortable with this model and gained necessary individual and team building skills. The interactions among the team members were remarkable. The PNI method for analyzing the responses of students supported the instructors to give more attention to the weakest skill. The future work includes the behavioral assessment of individual and team through the courses System Thinking and Capstone Projects which are offered in the subsequent semesters.

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