Department of Information Technology :: VRSEC III/IV B. Tech - VI th Semester 20IT6205C - INTRODUCTION TO DATA STRUCTURES A.Y: 2023-2024 Active Learning Method: Collaborative Learning

Collaborative Learning is an educational approach that emphasizes active participation, cooperation, and shared responsibility among students in the learning process. In such environments, students work together in groups or teams to achieve common learning goals, solve problems, complete tasks, or discuss concepts. It encourages all students to actively engage rather than passively receive information. Each member of the group contributes their unique perspectives, knowledge, and skills, promoting collaboration, communication, and interpersonal development. Collaborative learning fosters critical thinking skills as students engage in discussions, analyze information, evaluate alternative viewpoints, and solve problems collectively. Teachers play a facilitative role, providing guidance, support, and feedback as needed. Ultimately, collaborative learning creates dynamic and enriching environments that support deeper understanding and meaningful learning outcomes.

Topics:

- Organization of Data Structures, Algorithms, Time and Space Complexities,.
- Stack Representation and its Operations.
- Dynamic memory allocation and Linked list representation.
- Queue Representation and its Operations.

Organization of Data Structures : Data structure allows us to understand the organization of data and the management of the data flow in order to increase the efficiency of any process or program. Data Structure is a particular way of storing and organizing data in the memory of the computer so that these data can easily be retrieved and efficiently utilized in the future when required.

Data Structures into two categories:

- 1. Primitive Data Structure
- 2. Non-Primitive Data Structure

The following figure shows the different classifications of Data Structures.



Algorithm is a set of well-defined instructions to solve a particular problem. It takes a set of input(s) and produces the desired output.

Time Complexity: The time complexity of an algorithm quantifies the amount of time taken by an algorithm to run as a function of the length of the input.

Space complexity refers to the total amount of memory space used by an algorithm/program, including the space of input values for execution.

• Stack Representation and its Operations

A stack is a **linear data structure** where elements are stored in the LIFO (Last In First Out) principle where the last element inserted would be the first element to be deleted. A stack is an Abstract Data Type (ADT), that is popularly used in most programming languages.

Stack is considered a complex data structure because it uses other data structures for implementation, such as Arrays, Linked lists, etc.

Stack Representation

A stack allows all data operations at one end only. At any given time, we can only access the top element of a stack.

The following diagram depicts a stack and its operations -



A stack can be implemented by means of Array, Structure, Pointer, and Linked List. Stack can either be a fixed size one or it may have a sense of dynamic resizing. Here, we are going to implement stack using arrays, which makes it a fixed size stack implementation.

Basic Operations on Stacks

Stack operations are usually performed for initialization, usage and, de-initialization of the stack ADT.The most fundamental operations in the stack ADT include: push(), pop(), peek(), isFull(), isEmpty().

- **Dynamic memory allocation in c language** enables the C programmer to allocate memory at runtime. Dynamic memory allocation in c language is possible by 4 functions of stdlib.h header file.
 - 1. malloc()
 - 2. calloc()
 - 3. realloc()
 - 4. free()

Representation of a Linked list

Linked list can be represented as the connection of nodes in which each node points to the next node of the list. The representation of the linked list is shown below -



• Queue Representation and its Operations

A Queue is defined as a linear data structure that is open at both ends and the operations are performed in First In First Out (FIFO) order.



Standard Operating Procedure (SOP)

Introduction:

Collaborative learning encourages all students to actively engage in the learning process. Rather than passively receiving information from the teacher, every student take an active role in constructing their understanding of the material through interaction with their peers.

In this learning activity, students are assigned a single topic within a group setting. Each student is tasked with generating one point related to that topic. Following this individual contribution phase, the teacher facilitates a discussion to ensure comprehensive coverage of the topic, addressing any aspects that students may have overlooked or omitted. Through this process, students collaborate to collectively explore the subject matter, contributing their unique insights while benefiting from the guidance and expertise of the teacher to achieve a thorough understanding of the topic.

ACTIVE LEARNING

Name of the Faculty: P. Rama Devi	Designation: Assistant Professor	Subject: Introduction to Data Structures
Year/ Semester: 3 rd Year, VI th Sem	Branch: EC	Topics:
		Organization of Data Structures, Stack Representation and its Operations, Linked list representation , Queue Representation and its Operations.
Name of the Activity: Collaborative Learning	Date: 06-02-2024	No. of students attended: 37

Objective of the Activity:

- Encourage Participation: By involving every student in the discussion, the activity ensures that all students actively engage with the material and contribute to the learning process.
- Foster Critical Thinking: By prompting students to think deeply about the topic and identify key points or areas of interest, the activity encourages critical thinking and analysis.
- Promote Collaboration: Through group discussion and the sharing of ideas, students collaborate to construct a comprehensive understanding of the topic, drawing on each other's insights and perspectives.
- Enhance Communication Skills: The activity provides opportunities for students to articulate their thoughts clearly and effectively, as well as to listen actively to their peers during the discussion phase.
- Address Knowledge Gaps: By facilitating a discussion after the individual contributions, the teacher can identify any gaps or misconceptions in understanding and provide clarification or additional information as needed.

Overall, the objective of the activity is to create an interactive and inclusive learning experience that empowers students to take ownership of their learning while fostering collaboration and critical thinking skills.

Execution Plan:

Time management: Class time: 50mins

- Student Explanation : 40 mins
- Teacher summary : 10 mins

Expected Outcomes:

The students can be able to engage meaningfully with the material, develop essential knowledge, and skills, and construct their understanding of the topic in a collaborative and supportive learning environment.

No. of students attended: 37

			I	
S.No	Hall_Ticket	Student_Name	\$	Status
1	218W1A04F6	KALISETTI ADITYA VARDHAN		×
2	218W1A04F7	KARANAM RAMA SRIJA		~
3	218W1A04G2	KOLLIPARA NAVYA SRI		 Image: A set of the set of the
4	218W1A04G4	KOSURU TEJO ROHITH		~
5	218W1A04G6	MADDURI RAMA PRASANTH		×
ó	218W1A04H0	MANCHA DIVYA POOJITHA		~
7	218W1A04H2	MANDEM SRUJANASREE		~
8	218W1A04H3	MANGALI RAGINI		×
9	218W1A04H4	MATURI RAMYA SRI		~
10	218W1A04H5	MOKKAPATI HARSHITHA		~
11	218W1A04H8	PADALA GOWTHAM		×
12	218W1A04H9	PASAM BALADITYA		×
13	218W1A04I0	PASAM NARENDRA		~
14	218W1A04I3	RAMAVATH RANGA NAIK		×
15	218W1A04I6	SENNAMSETTI SIVA RAMA KRISHNA		~

16	218W1A04I8	SHAIK SHAFIYA	×
17	218W1A04J0	SUDABATHULA SAI TEJA	×
18	218W1A04J1	SUNKARA VIGNESH NAGA MANIKANTA	~
19	218W1A04J2	TATINENI NAVYA SRI RASHMITHA	~
20	218W1A04J7	ABDUL EREFAN BAIG	×
21	218W1A04J8	ALAMANDA KRANTHI KUMAR	×
22	218W1A04K0	ANNAVARAPU SAMUEL	×
23	218W1A04K2	AVULA CHANDRAKANTH	~
24	218W1A04K3	BHAVIRISETTY PRANAV PARASHURAM	~
25	218W1A04K4	BOLLA HARI SAI CHANDU	~
26	218W1A04K5	BURLA SURYA TEJA	~
27	218W1A04K9	GADUTHURI RAM VINAY BHARATH KUMAR	~
28	218W1A04L5	HARSHITHA TALAPALA	×
29	218W1A04L6	J JAYA RAMA KRISHNA SHABAREESH	×
30	218W1A04M2	KONGARA VINNU	~
31	218W1A04M6	KUNDETI SAI CHAND	×
32	218W1A04N0	MAMIDI HEMA VARSHINI	~
33	218W1A04N2	METTELA CHANDU	×
34	218W1A04N3	NADENDLA VENKATA SIVA SIDDARTHA	~
35	218W1A04N6	NARISETTI JASWANTH	×
36	218W1A04N9	PAIDISETTY SRI CHARAN	~
37	218W1A04O0	PINABAKALA BALA RAJU	~
38	218W1A04O3	PODURI KUMARSWAMI	~
39	218W1A04O6	PULLA SANDEEP KUMAR	~
40	218W1A04P3	THOTA KRUPA SAGAR	~
41	218W1A04P7	VASANTHALA HARSHINI SAI RAMA KATYAYANI	×
42	218W1A04P8	VEMAVARAPU SURYATEJA	~
43	228W5A0406	PODUGU YAMINI	×

44	228W5A0407	SANEGAVARAPU BINDU NIKITHA DEVI	~
45	228W5A0413	PONUGUPATI YAGNIKA	~
46	228W5A0415	BELLAMKONDA NAGA LAKSHMI	~
47	228W5A0416	IDDAMSETTI POONAM	~
48	228W5A0417	MECHARLA NAVEEN BABU	~
49	228W5A0418	PATCHIPULUSU VENKATA SUPRIYA	~
50	228W5A0419	PRATHIPATI SANDHYA	
51	228W5A0420	SOLASUTTU BHAVANI	~
52	228W5A0421	THADIBOINA GOWTHAM	~
53	228W5A0425	PEDASANAGANTI BHUVANA SRI HARIKA	~
54	228W5A0427	SANGEPU BHUVANESHWAR	~
55	228W5A0428	SUDABATTULA MOHAN KIRAN	~

Few Glimpsesof the Activity:







➤ 31% of students secured less marks from Assignment-1, this Active Learning Method helped students to understand all the concepts and could able to score Good Marks in Sessional-1.