

Improving Critical Thinking Skill of Students using aRPiGDs: An Effective and Alternative Method to Role Play

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Abstract: Using various active learning strategies namely Think-Pair-Share, Peer-Instruction, Debate, Jigsaw, Problem based Learning, Game based Learning, Project based Learning, Team-Pair-Solo, etc, we engage the students in learning process. Role play is an activity where students perform the real time case study, to express the concept. Looking to efforts required, it is recommended to opt for the animated role play through effective video for demonstration. In the present study, we considered the newly designed activity using Animated Role Play Immediate Group Discussion followed by Sharing in the classroom (aRPiGDs). In this activity, instructor creates animated role play video and plays that video in the class. Entire class is further divided into a group of 7-8 students for studying role play and to identify the pro and cons of various methods. After discussion, each group shares their findings in the form of pros and cons on the topic.

This activity is experimented for the course Operating System of Third Year Computer Science and Engineering. Feedback from the students at the end of the activity is taken to assess their learning through aRPiGDs.

Keywords: Role Play, Animated Role Play, Operating System, Likerts' Scale, Group Discussion, aRPiGDs.

1. Introduction

Active learning strategy is basically getting the students to engage with the course content effectively through some activity/s in the classroom and to assess their learning. The research has already proved the effectiveness of use of active learning methods, in which students do activities other than listen to lecture, such as read, write, pose questions, respond to questions, reason,

discuss, solve problems, etc. Chandler & Mayer (2001) claimed that students benefit more from active learning environments.

Some Active Learning Strategies are

- Think-Pair-Share: It is a well known active learning strategy in which students work on a problem posed by instructor, first individually (Think), then in pairs (Pair) and finally together with the entire class (Share). This activity develops soft skills, promotes confidence, self learning & critical thinking ability.
- Peer-Instruction: Instructor teaches the topic and asks the question on the taught topic. Students vote their answers. Instructor checks the % of the correct answer. Generally, if the % of correct answer is @90% then instructor assumes learning has happened and switch over to the next topic, otherwise peer discussion and revision take place.
- Debate: is a method of formally presenting an argument in a disciplined manner.
- Jigsaw: Teacher divides the entire class into batch around 4. These will be the original groups. Next team breaks up into specialised expert group so that they can study a single lesson component. The expert group works together to gain a better understanding of their specific topic. Students return to their original group and teach their topic to their peers.
- Problem-based learning: Problem-based learning (PBL) is a student-cantered pedagogy in which students learn about a course through the experience of solving an open-ended problem.)
- Team-Pair-Solo: In Team Pair Solo, students are put into teams and each person in the team is given their own problem. They then work together and help each other figure out their problem. After that, each person finds a partner and they help each other figure out their problems. Then each student is to work on their own and figure out their problem. It is designed to motivate students to tackle and succeed at problems which are initially beyond their ability. Students learn to interact and help fellow classmates. In this strategy students help each other because their weaknesses and strength are supportive to each other.

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[<https://318cooperativelearning.weebly.com/team-pair-solo.html>]

Role play is also active learning strategy in which students present the real life example explaining the technical concept in the play. In the current study we consider the animated role play for explaining the topic: Scheduling Algorithm of the course Operating System of Third Year Computer Science and Engineering. The objectives of conducting this study are:

- To examine aRPiGDs as an innovation in role play.
- To analyze the response of students to their teaching-learning process after role-play.

2. Related Work

Role play is an important and effective tool for the teaching-learning process. Role play is used in various fields like Nursing (José Ramón Martínez Rier1, Juan Luis Cibanal, María Jesus Pérez Mora), Agricultural Economics (Steven C. Blank), Construction Education (Suchismita Bhattacharjee, Somik Ghosh), Geography (Oberle), Telecommunication Engineering (Giralt-Mas, R., Pala-Schonwalder, P., del-Aguila-Lopez, F., & Bonet-Dalmau, J.), History (Morris) etc.

There are different ways to teach the course Operating System: SOsim Simulator with visual facilities (Maia, L.P. and Pacheco, A.C., 2003, 2005), Address translation simulator (Robbins, S., 2005), instructional operating system (Charles L. A., Nguyen, M., 2005), FBL (Free Open Source Software based Learning) (S.N.Deshpande and Sunita M Dol, 2017), multithreaded programming to strengthen an operating systems course (Ching-Kuang Shene, 2002), a perspective based in constructivism (David Jones and Andrew Newman), visualization technique (Naps, T.L., et. al., 2002), etc.

Think- Pair-Share (TPS) activity is an active learning strategy and consists of three phases: Think, Pair and Share. Think-Pair-Share is a suitable strategy to use for instructors who intend to incorporate active learning techniques in their courses [Aditi Kothiyal et. al., Susan Ledlow, Carss and Wendy Diane, Sunita M Dol]. This activity is suitable to teach the Operating System (Komal R. Pardeshi, 2016).

In the present study, aRPiGDs (Animated Role Play Immediate Group discussion and Sharing in the classroom) activity is considered for this course Operating System.

3. Methodology

A. Role Play

Role play is also an active learning strategy. A role-playing game is a game in which the participants assume the roles of characters and collaboratively create stories. This technique is an excellent tool for engaging students and allowing them to interact with their peers as they try to complete the task assigned to them in their specific roles. Students are more engaged as they try to respond to the material from the perspective of their character.



Fig 1: Role Play

[Source: <http://www.actionactors.co.nz/wp-content/uploads/main-pane-rp.gif>]

B. Advantages and Disadvantages of Role Play

1) Advantages of Role Play

- Students immediately apply content in a real world context.
- Students can transcend and think beyond the confines of the classroom setting.
- Students see the relevance of the content for handling real world situations.
- The instructor and students receive instant feedback with regard to student understanding of the content.
- Students engage in higher order thinking and learn content deeply.
- Role play delivers complex concepts in a simple manner.
- Learning retains for a longer period.

2) Disadvantages of the Role Play

- Teachers have to do-preparation for setting up the background, contexts, and learning goals for the role play activities.
- Data and background information about the role played character may need to be prepared and distributed to the students to help them with the assigned roles.
- It may be quite difficult to assess the proficiency of the students in role play performance.
- Participants often find it difficult to perform role play.
- If role play is not performed properly, it may turn into fun and not a learning experience.

C. Animated Role Play

Animated role play is a video prepared using facility of power point presentation and video making software which states the real life example through role play which explains the technical concept.

The following are the four role plays along with their respective links for animated role play:

- First Come First Serve Scheduling Algorithm: https://www.youtube.com/watch?time_continue=37&v=JHIA2a9DDpE
- Shortest Job First Scheduling Algorithm: https://www.youtube.com/watch?time_continue=7&v=TFj_m8me8Fg
- Round Robin Scheduling Algorithm: <https://www.youtube.com/watch?v=bmLgiHESXkM>
- Priority based Scheduling Algorithm: https://www.youtube.com/watch?v=g_rhl7PvVIM

Some snapshot from the videos are given below:

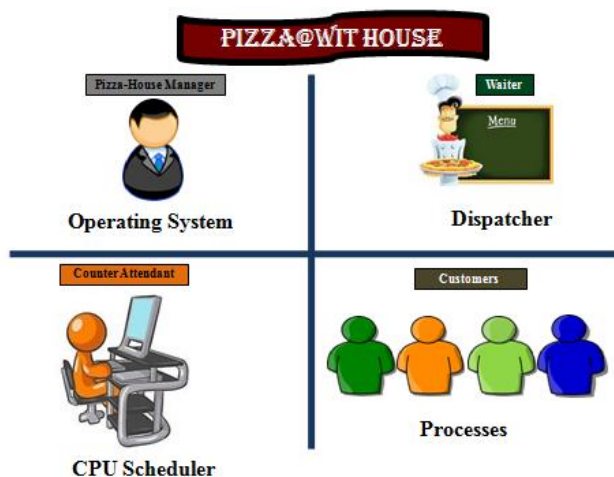


Fig.2: Terms in Animated Role Play

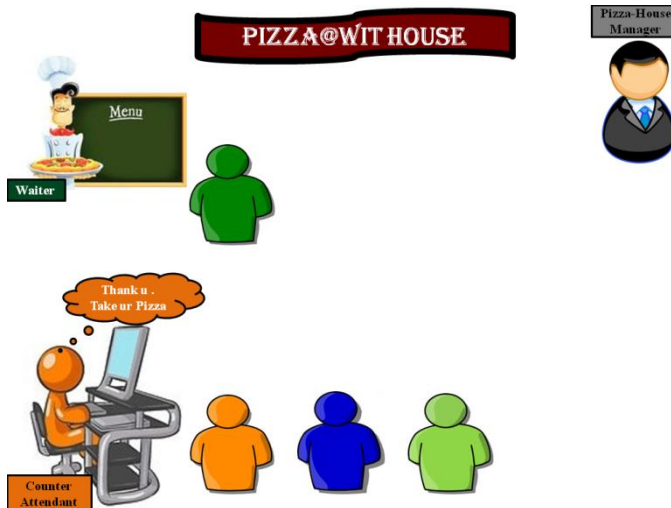


Fig. 3: First Come First Serve Scheduling algorithm

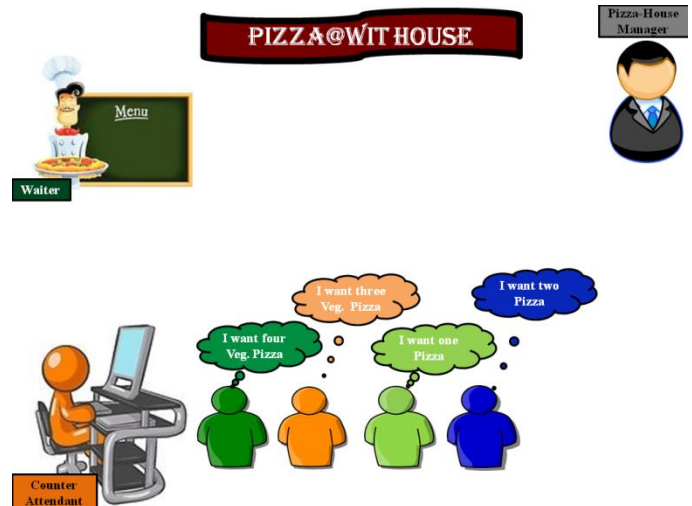


Fig. 4: Shortest Job First Scheduling algorithm

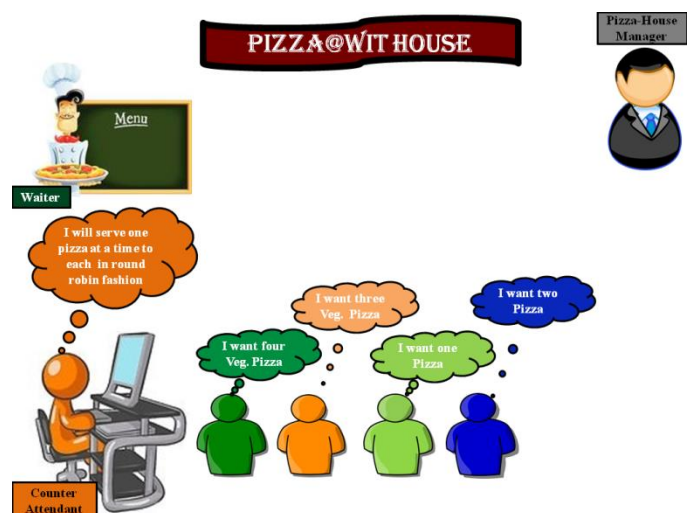


Fig. 5: Round Robin scheduling algorithm

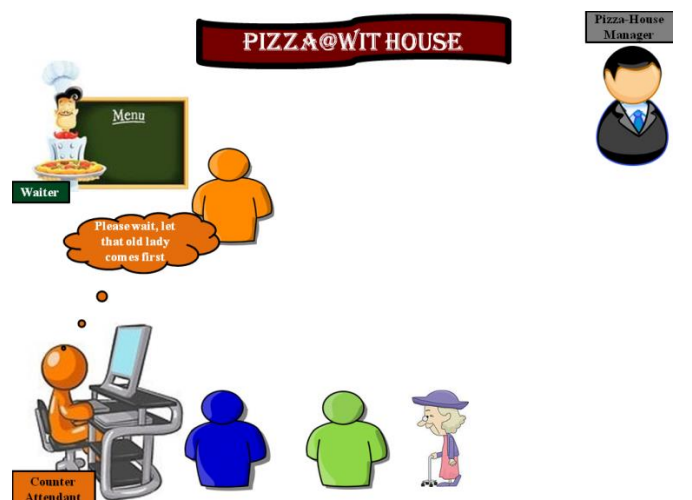


Fig. 6: Priority based Scheduling algorithm

These four scheduling algorithms are also available on following webpage:

<https://sunitadolwit.wordpress.com/study-material/operating-system-os/animated-role-play/>

Example of Pizza shop is considered to explain these four scheduling algorithms.

Consider a pizza house where three persons are there- counter attendant, waiter and pizza-house manager. In the following example, First Come First Serve Scheduling Algorithm with working of algorithm and disadvantages of it are considered.

First Come First Serve Scheduling Algorithm Script:

- **Situation1**
- ✓ **Customer 1** enters in the pizza house and orders one veg. pizza
 - ✓ **Customer 2** enters and wait in a queue
 - ✓ **Customer 1** get served and leaves the pizza house
 - ✓ **Customer 3** enters and waits in a queue
 - ✓ **Customer 2** & customer 3 move forward
 - ✓ **Customer 2** orders one veg. cheese pizza
 - ✓ **Customer 4** enters the pizza house and waits in a queue
 - ✓ **Customer 2** gets served and leaves the pizza house
 - ✓ **Customer 3** & **Customer 4** move forward
 - ✓ **Customer 3** orders one cheese pizza
 - ✓ **Customer 3** gets served and leaves
 - ✓ **Customer 4** orders one chicken pizza
 - ✓ **Customer 4** gets served and leaves the pizza house

- The customer who is standing first in the queue is served first. This is how the **First Come First Serve CPU Scheduling** algorithm works.

First the customer enters and places the order with the counter attendant. After paying the bill at the counter, customer goes to waiter and asks for pizza. After collecting the pizza, customer leaves. If any complaint or suggestion is there from a customer then counter attendant handles that problem. If the problem is not handled by counter attendant then it is handled by the manager.

How this algorithm works is shown in Figure 6. In the figure,

Pizza-house manager: Operating System

Counter attendant: CPU Scheduler

Waiter: Dispatcher

Customers: Processes

are also shown.

- **Situation2**
- ✓ **Customer 1, Customer 2, Customer 3 & Customer 4** enter in the pizza house
 - ✓ **Customer 1** places the order, "I want four veg. Pizzas"
 - ✓ **Customer 2** places the order, "I want three veg. Pizzas"
 - ✓ **Customer 3** places the order, "I want two veg. Pizzas"
 - ✓ **Customer 4** places the order, "I want one veg. pizzas"
 - ✓ **Customer 1** gets served and leaves pizza house
 - ✓ **Customer 4** says, "Even if I need only one pizza, I have to wait in the queue. I think counter attendant is purposefully wasting my time. I don't like this arrangement. I am leaving" and **customer 4** leaves the pizza house.
 - ✓ **Customer 3** says, "I want only two pizzas, I cannot wait this long. I am leaving" and **customer 3** leaves the pizza house.
 - ✓ After 20 minutes **customer 2** gets served and leaves the pizza house.
 - ✓ The restaurant manager realize that he is losing the customer & sees the need to change the way service is provided

- This is the disadvantage of **First Come First Serve CPU Scheduling** algorithm works

Fig. 6: Working of First Come First Serve Scheduling algorithm

E. aRPiGDs Activity

It is an animated role play followed by immediate discussion and sharing in the class. In this activity, instructor prepares animated role play video using facilities of power point presentation and plays that video in the class. Then, the students in the class are divided into groups of 7-8 students. Students discuss the role play and find the pro and cons of each method.

After discussion, each group shares the purpose of the role play and pros and cons of the role play representing the topic. This activity is shown in Figure 8.

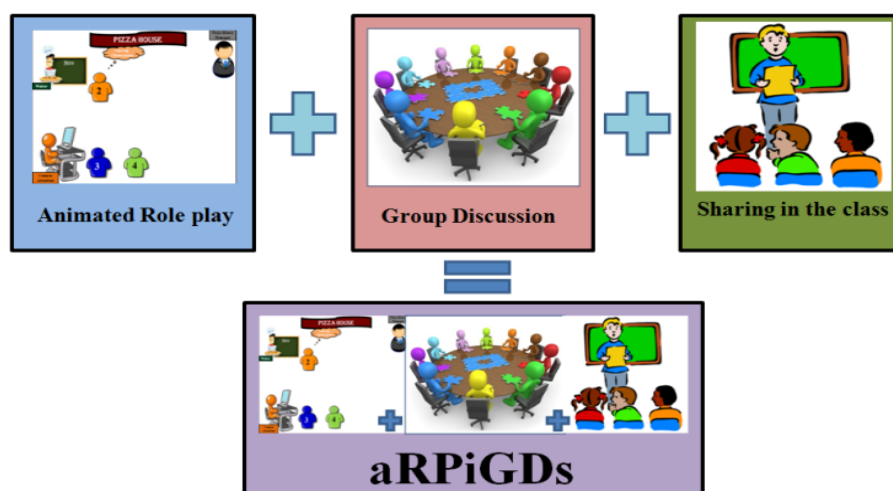


Fig. 8: aRPiGDs Activity

F. Advantages of aRPiGDs

- Available for all time use. Learner has flexibility in planning .
- Saves time of instructor as well as students
- Students gain confidence when sharing their ideas with the whole class
- Group discussion helps in:
 - ✓ Enables the students to think in divergent directions to generate more points
 - ✓ More minds discussing on a topic of the course, generates good questions and find their relevant answers
 - ✓ peer learning assist in enhancing students' knowledge
 - ✓ Encourages learners to exchanges their own experiences, thereby making learning more active
 - ✓ Facilitates deeper understanding of topics
- Group discussion and Sharing in the class improves communication skills

G. Feedback

We also conducted the feedback at the end of this activity using Likert's scale to know the perception of students about this activity. From the feedback, it is found that 100% students appreciated this activity from learning perspective. The feedback of the students is also available on <https://youtu.be/cvtr7ec-Ahw>

Table 1: Students Feedback about aRPiGDs

Sr. No.		Strongly Disagree	Disagree	Agree	Strongly Agree
1	The activity improves the understanding about the topic.	0%	0%	0%	100%
2	The activity is effective for the given topic.	0%	0%	37%	63%
3	Animated role play delivered the content correctly.	0%	0%	25%	75%
4	The activity aRPiGDs kept you engaging.	0%	0%	50%	50%
5	Group discussion at the end of animated role play was useful	0%	12%	13%	75%
6	Group discussion at the end of animated role play helps to clear the concept.	0%	0%	37%	63%
7	Did you like this activity?	Yes-100%			

4. Conclusions

From the activity aRPiGDs that is animated role play immediate group discussion and sharing in the class, it is

found that this activity engages the students for higher order thinking.

- Animated role play requires at least 50% time in comparison with live role play leading to time saving.
- Students can apply content in a relevant and real world context.
- It enriches students' learning substantially.
- This activity can be extended for real life case study or role play of any course.

Thus, instructor can prepare the animated role play video using the facility of Power point presentation, play this animated role play in class, conduct the immediate group discussion activity and ask students to share the solution in the class.

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