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Enhancing Students' Career Growth through an Interactive Aptitude Learning Platform

Shahanaz Begum, Boobathi, Duraimurugan, Govardan, Guhan
M.I.E.T Engineering College, India

Abstract: ***E-learning platforms typically assume that the participants are in position of advanced self-regulated learning (SRL) capabilities. However, research indicates that students are found with insufficient autonomy and SRL competencies frequently abandondigitaleducationprogramsbeforecompletion[3],[4]. Numerous digital learning environments have incorporated frameworks whose working based on Zimmerman's SRL model [12], [42] to focus on strengthening e-learning skills. This investigation specifically targets the enhancement of aptitude competencies of an individuals who seeks positions in MNC's. This study identified significant gaps in existing e-learning solutions [16], [17], particularly in the direction of providing organized practice steps, interactive engagement opportunities, and synchronous collaborative features. This website is developed as a solution in filling the above gaps including the following features in strengthening problem solving efficiency through competitive real-time challenges, providing community-based discussion forums, and team-oriented assessment activities resulting in higher performance rankings[29],[30]. The technology stack introduced in this work employes React.js with Zustand for creating frontendinterfaceandstatecoordination,Express.jsonNode.js for backend servicem anagement, MongoDB and Supabase for data persistence, and WebSocket technology for instantaneous communication capabilities. The system was evaluated with 60final-yearComputerSciencestudents from an Engineering college, and it was evident that utilizing this e-learning platform their SRL capability was improved. [40], [55].***

Keywords: "Online education" - As Wang [6] notes, "digital learning environments require structured support mechanisms to maintain engagement and progression."

"Aptitude learning" - John and Smith [57] define this as "systematic skill development targeting domain-specific problem-solving capabilities essential for professional assessments."

"Self-regulated learning (SRL)" - Zimmerman [42] describes this as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to attain personal educational goals."

I. INTRODUCTION

Many online learning platforms have been developed by researchers, who expect learners to complete online courses independently and autonomously. As noted by Lin et al. [1], "self-regulated learning is crucial for success in online environments where direct supervision is minimal." These platforms provide learning materials in various forms, such as videos,animations,onlinetextbooks,handouts,andslides,and discuss the contents of each learning unit. Students' understandingofeachlearningunitcanbeevaluatedtomeasure thelearningoutcomes.However,accordingtoLinandTsai[2], "some students do not possess high autonomy or a self- regulated learning ability" and "such students are expected to quitin-betweenthelearningschedule,negativelyaffectingtheir learning outcomes."

Alraimietal.[3]observedthat"completionratesforMassive Open Online Courses (MOOCs) were significantly lower compared to traditional lecture-based learning." Jordan [4] further quantified this issue, reporting that "on average, fewer than10%ofstudentsenrolledinMOOCsactuallycompletethe course."

Aptitudetestsarekeycomponentsofacademicassessments, competitive exams, and job placements. However, many students struggle with self-paced learning because of the lack of structured resources and interactive engagement. As Kumar andGupta[59]pointout,"traditionalonlinelearningplatforms primarily offer static question banks or video-based courses, which often fail to address real-time doubts or foster peer collaboration." This study introduces Aptec, a web-based aptitude learning platform that enhances learning through the following:

- Organizing a structured collection of aptitude questions with detailed solutions
- Planning for weekly contests simulating real exam conditions
- Creating a real-time comment system for interactive discussions (while the learner is in the learning activity);
- The introduction of a group test feature enables multiplestudentstocollaborateinaparticularsession.

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A. Promoting SRL Ability

SRL ability is positively correlated with online learning outcomes [1], [2], [55], [56]. According to Lin et al. [56], "studentspossessingahighSRLabilityontheirowncanselect suitable learning tasks and follow a step-by-step procedure to reach their goals, shoulder the responsibility for their own learning, monitor their own learning process, and have self- motivation to learn."

Narciss et al. [5] assert that "it is expected from learners to havehighSRLability,"andasWang[6]notes,"themajorityof learners encounter difficulties in maintaining positive SRL behavior throughout the learning phase." Various SRL models havebeendevelopedasdocumentedbyPanadero[52].Thetop- ratedandmostwidelyusedSRLmodelsarethosedevelopedby Zimmerman [12] defined SRL as "self-generated thoughts, feelings,andactionsthatareplannedandcyclicallyadaptedto the attainment of personal goals."

Pintrich[10]emphasizedthat"SRLisanactive,constructive processwherebylearnerssetgoalsandthenattempttomonitor, regulate, and control their cognition"

WinneandHadwin[53],whoproposedanSRLmodelbased on"fourphases:taskdefinitionphase,goal-settingphase,phase for enacting study tactics, and one phase for adapting study."

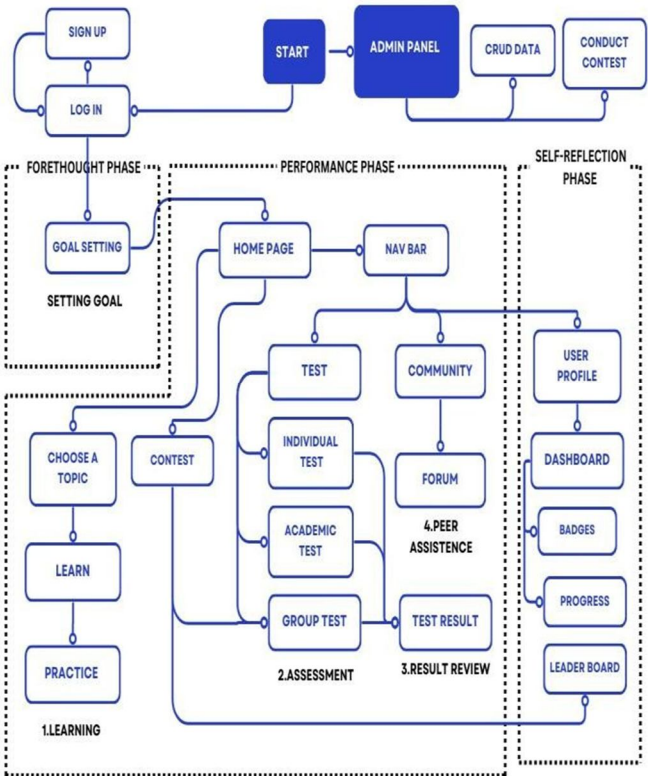


Fig.1ArchitectureDiagram

StudieshaveshownthatSelf-RegulatedLearning(SRL)can betaught,trained,andenhanced(Linetal.[1],LinandTsai[2], Wang [6], and Dabbagh and Kitsantas [14]); Zimmerman's model [12] stands out as particularly practical and well-structuredforpromotingtheseskills.AsZimmermandescribes in his work [12], "self-regulated learning involves a cyclical process through three phases: forethought, performance, and self-reflection." This three-phase model was adopted as the foundation for Aptec platform design (Figure 1).

Aptec is an innovative approach to aptitude learning that incorporates features specifically designed to address the limitations of traditional e-learning platforms. As John and Smith [57]pointout,"Effective aptitudedevelopmentrequires more than static content—it demands interactive engagement and structured practice." Our platform addresses these needs through four key components: a comprehensive repository of aptitudequestionswithdetailedsolutionpathways,competitive weekly challenges that simulate examination conditions, an interactive commenting system supporting real-time discussions,andcollaborativetestingenvironmentsthatenable peer learning.

TheimplementationofZimmerman'smodelinAptecbegins with the forethought phase, in which students establish personalizedlearningobjectivesrelatedtodevelopingaptitude, logical reasoning, and technical competencies. Bandura[47] says that "setting goals gives you direction and gives you reasons to keep going until you reach your goals." During the performance phase, learners work with structured materials on different aptitude topics. This makes them more likely to take part in practice sessions. Lastly, the self-reflection phase included finishing the assessments and carefully judging the results of the learning. As noted by Schraw [51], "This cyclical process, when repeated consistently, gradually transforms external regulation into internalized self-regulation."

Previous studies have provided valuable insights into this field. Hwang et al. [15] developed a computer-assisted SRL system that enhances students' self-regulation by providing scoresbased on confidence, regularity, and spontaneity. These metrics help learners to monitor their progress and adjust their strategiesaccordingly.Inasimilarvein,Shihetal.[16]created an SRL system enabling learners to "set personal goals, customize learning paths, and review previous performance records." However, as Lin et al. [55] and Lin et al. [56] observed, these systems still largely depend on students independently navigating SRL phases—setting goals, completing tasks, self-reviewing, and self-reflecting—without sufficient structured guidance or collaborative support.

B. Group Awareness tools in a Computer-Supported Collaborative learning environment

TheconceptofGroupAwareness(GA)toolshasemergedfrom efforts to visualize collaborative activities within learning environments.ResearcherslikeBodemerandDehlernotedthat these tools were "designed to make information about collaborative members' activities visible to all participants" (Bodemer & Dehler [25]). Early implementations focused on displaying interactions, such as question posting, response patterns, and message exchanges among peers in Computer- Supported Collaborative Learning (CSCL) environments.

ThesevisualizationtoolspresentwhatKimmerleandCress[26] describe as "objective details of group participation," allowing students to see how their engagement compares with others. This transparency helps learners gauge their involvementrelativetothegroupnorms. Shihandcolleagues

[16] found that such comparative information "significantly influenced students' motivation to participate more actively in collaborative tasks."

The basic idea behind GA tools is to create what DiMicco et al. [27] called a "shared understanding of the collaborative context." This mutual awareness opens up lines of communication, makes exchanges more meaningful, and helps ideas move more quickly between participants. These practical benefits have led to widespread use of many CSCL platforms. Janssen et al. [30] and Sangin et al. [31] are two examples of how these platforms have improved peer interactions. Beyond facilitating collaboration, these tools serve dual learningpurposes.AsLinandTsai[2]discoveredintheir2016 study, "collaborative activities not only motivate task completion but provide critical moments for strategy reflection.".Their research showed that both motivational boostsand reflectiveopportunitiessupportthe developmentof self-regulated learning behaviors. This connection between collaboration and self-regulation has been documented by several researchers (Wang [6]; Kitsantas [19]; Paris & Paris [20]).

Based on these findings, Lin et al. [1] integrated Zimmerman'sthree-phaseSRLmodelintoateam-basedCSCL platform. Their system specifically highlights collaborative activities within teams to enhance teamwork quality and individualself-regulationabilities.Asonestudentintheirstudy remarked,"seeingothers'activitiesmademoreawareofmy own learning approach."

C. Role-ModelGA

A foundational framework for understanding the development of self-regulatory competence is Zimmerman's multilevel modelofself-regulatedlearning[37]–[39],[52].Thismodel delineates four progressive stages in which learners typically cultivate these skills.

- Observation: Initially, learners acquire skills indirectly by "observing a proficient model engaging in the desired learning behavior or task."
- Emulation: Following observation, learners attempt to"imitatethestyleandstrategiesdemonstratedbythe model while performing the skill themselves."
- Self-control: With practice, learners begin to "demonstrate the skill independently, without direct relianceonthemodel,exercisinginternalcontrolover their performance."
- Self-regulation: In the final stage, learners achieve adaptivemastery,enablingthemto"flexiblyapplyand modify the skill across varying environmental conditions and contexts."

Theutilityofpeerrolemodelsinthisdevelopmentalprocess isunderscoredbyresearchsuchasMuir's[45],whichsuggests that "exposure to proficient peers demonstrating effective strategies for problem-solving significantly enhances learners' self-efficacy and subsequent performance, such as mathematical accuracy on post-tests." This exposure is crucial because it "allows learners to witness, hear, or read about successfulstrategiesinpracticalapplication"[45].Buildingon this, Bandura [47] posited that "when individuals observe others perceived as similar to themselves successfully performing tasks, their own belief in their capacity to master comparablechallengesisstrengthened."Witnessingamodelof comparableabilitytoachievesuccesscultivatesanexpectation of personal success in observers, which, in turn, can substantiallyboosttheirtaskmotivation[17],[18],[48],[51],
[52].

Learners often find inspirational peer role models, particularly compelling, because these individuals offer "tangible, real-life examples of success that are perceived as more relatable and achievable" [27], [28], [45]. Because these models have already attained the goals towards which the learners are striving, they represent "motivational targets that possess both credibility and attainability" [27], [28], [45].

Consequently, this study introduces an extension of the traditionalGroupAwareness(GA)concept,termedrole-model Group Awareness (RM-GA). The system developed in this study,Aptec,distinctivelyintegratesbothZimmerman'sthree-phaseSRLtrainingmodel(forethought,performance,andself- reflection) and the novel RM-GA. This integration is designed to"allowlearnerstoobserveandgaininsightsfromthelearning context and processes of a designated group of role models during each phase of their SRL training." Ultimately, the system aims to systematically guide learners through the four developmental levels of Zimmerman's multilevel model (Observation,Emulation,Self-control,andSelf-regulation), thereby fostering enhancement of their self-regulatory competence [40].

D. ResearchAims

Many conventional e-learning platforms require learners to complete learning tasks independently without the collaborative elements found in Computer-Supported Collaborative Learning (CSCL) environments. As Wang [6] notes, "successful engagement with these platforms requires significant self-regulatory capabilities," since learners must autonomously navigate through materials such as online readingsorinstructionalvideos.Narcissetal.[5]andKauffman
[8] confirmed thathigh Self-Regulated Learning (SRL) ability is essential for maintaining learning effectiveness in these environments. Although numerous e-learning platforms incorporate elements of Zimmerman's SRL model in their design,theytypicallylackmechanismstosupportcollaborative or group-based learning.

This study proposes a methodology that addresses this limitation by integrating Zimmerman's SRL training model withRole-ModelGroupAwareness(RM-GA) tools[53],[54], [55]. As Winne and Hadwin [53] emphasize, "providing strategic exemplars enhances metacognitive awareness and regulatory behavior adoption." The RM-GA information embedded in our platform reveals the learning context and activities of successful peer models during each SRL training phase, demonstrating how these individuals effectively complete various tasks. According to the social cognitive theory, learners who observe comparable peers who successfully complete tasks are likely to experience enhanced confidence and motivation. As Bandura [47] explains, "perceivedsimilaritytomodelsincreasesthepersuasivenessof demonstrated successes," potentially leading learners to emulate these productive behaviors.

These motivational characteristics encourage sustained engagementwithlearningactivities,fosteringthedevelopment of SRL abilities within conventional e-learning environments [2], [10]. Research by Muir [45] and Murphy and Arao [46] indicates that "exposure to peer role models can significantly benefitlearnerswithinitiallylower motivationandconfidence levels."Linetal.[56]furtherdemonstratedthatsuchmodeling can acceleratethedevelopmentofself-regulatory competence.

OurproposedmethodologydiffersfromthatofLinetal.[1] in two respects. First, whiletheir method applies SRL training and GA tools within a collaborative CSCL environment, our approach is specifically designed for conventional e-learning platforms, where learners typically work independently. Second, as Lin et al. [1] explained, their GA information primarily " focused on collaborative activities among team members"inaCSCLcontext,whereasourRM-GAinformation emphasized the learning behaviorsand strategiesemployedby successful role models during each phase of SRL training. We conducted an experimental evaluation of this system, with the results indicating increased student engagement throughout the learning process and corresponding improvements in achievement outcomes. The primary contributionofthisresearchisthedevelopmentofaneffective e-learning platform that, as Wang [41] suggests, "supports the gradual development of self-regulatory behaviors while enhancing persistence in online learning environments." This approach shows promise for improving learning efficiency while addressing the common challenge of learner attrition in conventional e-learning contexts [40], [42].

II. PROPOSED METHOD

Figure 1 illustrates the architecture of the proposed method, wheretheRole-ModelGroupAwareness(RM-GA)mechanism is integrated within Zimmerman's SRL training model. As Zimmerman[43]explains,"effectiveself-regulationrequiresa cyclical process involving anticipation, performance, and reflection." In our system, role models are defined as learners who successfully assess a particular learning unit. The leaderboard functions as a visualization of role model performance by displaying learners who have excelled in the assessments.

An additional function of the system is peer assistance facilitated by the community forum. This forum enables students to seek help with challenges encountered during the learningprocess.AccordingtoLinandTsai[2],"collaborative problem-solving environments significantly enhance learning motivation and persistence." English and Duncan-Howell [17] furthernotethat"digitalforumscreateopportunitiesforjust-in- timesupportthatmaintainsmomentuminself-directedlearning activities." Thus, peer assistance through the community module plays a crucial role in fostering collaboration and supporting learners throughout their journey.

Thefollowingsectionsdescribethefunctionofeachphasein Zimmerman's SRL training model and thecorresponding RM- GA roles within the proposed system [43], [44].

A. Fore Thought Phase

1) Settingthe Goal

In this initial phase, learners begin their learning journeyby signinguporloggingintoaplatform.Theycanthensetspecific learninggoalsusingthe"GoalSetting"feature.AsBandura

[43] emphasizes, "goal setting provides direction to one's effortsandcreatesincentivestopersistuntilthegoalis reached." Once the goal is set, the system guides them to the next step: selecting a topic.

Thesystemdirectstheusers to

- Choose a Topic: Learners select from a variety of aptitude sections (e.g., Speed, Time & Distance).
- EntertheLearningModule:Herereaddetailedexplanations and view solved examples to build their foundational knowledge.
- Proceed to Practice: After engaging with the learning content, userssolverelevant practice problemstoreinforce their understanding before moving on to tests or contests.

This structured method helps students set clear goals and gives them the tools they need to interact with the material in a meaningful way. Schraw [51] says that "strategic planning and goal setting are basic metacognitive processes that make self-regulation possible."

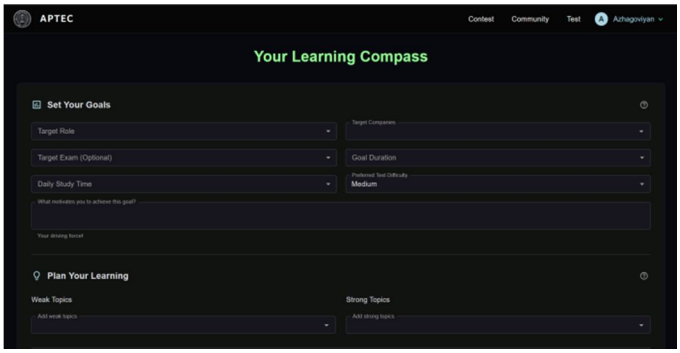


Fig.2GoalSettingModule

Figure 2 shows the goal-setting phase, which is an important step in getting ready for the proposed system. During this phase, learners are systematically directed to "plan and set clear intentions," a process recognised in existing literature as crucial for "fostering motivation before engaging with the learning material" [21]–[23], [33]. Consequently, the primary objective of this structured methodology is to "assist learners in elucidating their objectives, thereby ensuring they are mentally equipped and concentrated on their educational goals" before engaging with subsequent instructional modules.

B. Performance phase

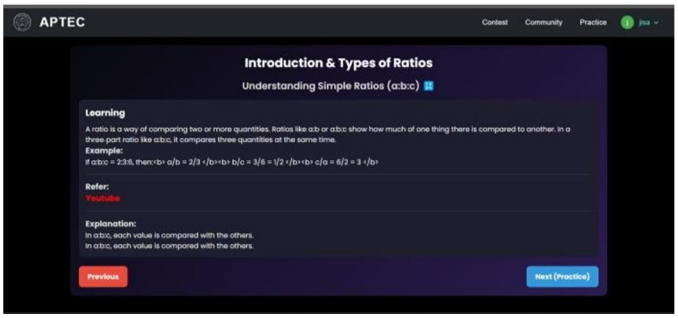


Fig.3aLearningModule

Fig. 3a illustrates the learning workflow integral to the aptitude preparation website, characterized by a design where "each topic is designed to integrate both explanations and problem-solving exercises." Within this structured approach, learners commence by "studying a detailed explanation of the concept." This foundational learning is subsequently reinforced through "a series of example problems," which are strategically included to "help them understand the practical application of the material," a pedagogical principle well-supported by research on effective learning strategies [37], [38], [49].

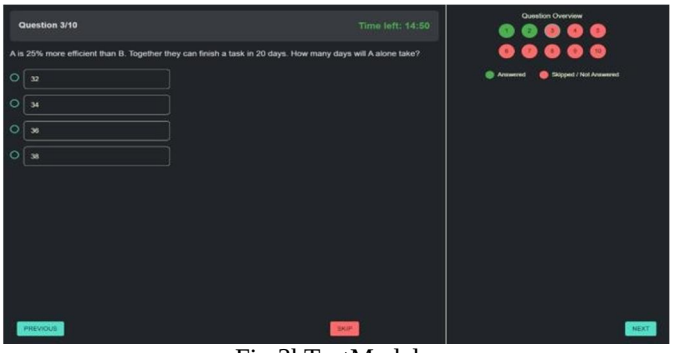


Fig.3bTestModule

Fig.3b gives a picture of the next step in the learning process, which is "after finishing the learning section, users must solve a set of practice problems." These problems have a specific purpose: they "are specifically designed to test their understanding of the topic." Moreover, progression is restricted: "The learner may only advance to the next topic after successfully answering the requisite number of questions." The goal of this design is to "make sure that learners fully understand each concept before moving on," which is a basic rule for structuredlearning[47],[48],[58].

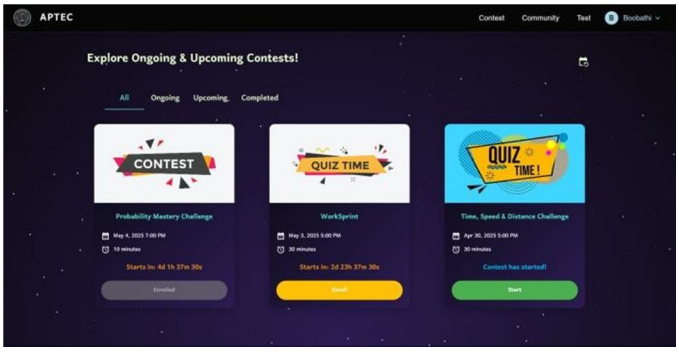


Fig.3cContestModule

Figure 3c shows the system module that lets users "participate in different contests, which lets them test their skills against those of others."Users can join different contests based on their level or topic of interest. After they finish a contest, they get instant feedback on how well they did,includingdetailedresultsandrankings."Testresultsare"storedintheuser'sprofile,allowing for performance comparison over time".

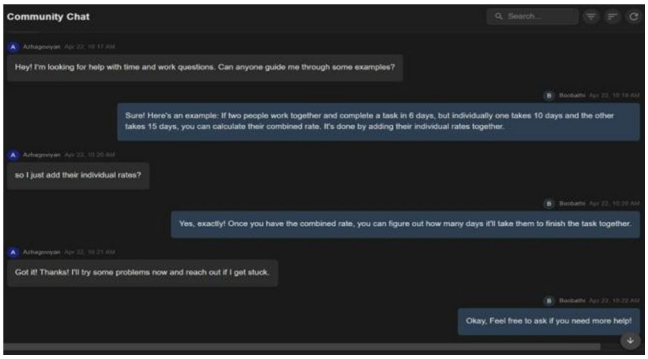


Fig.3dCommunityModule

Fig. 3d showcases the platform's dedicated community feature, designed to encourage users to connect, collaborate, and grow together as they share insights, learning strategies, andproblem-solvingapproaches.Byfosteringopendiscussions and peer-to-peer support [1], [29], this interactive space cultivatesacollaborativelearningenvironment[17],[34].This transformation of potentially isolated study into a shared journeyisintendedtoenhanceunderstandingandsignificantly promote motivation, continuous improvement, and a stronger sense of connection among learners [14], [39].

C. Self-ReflectionPhase

1) Self-ReflectionPhase–ProgressTracking&Motivation

After completing tests and practice sessions, users enter the reflection stage, where they can review their performance, identify areas of improvement, and stay motivated [30], [31], [32].

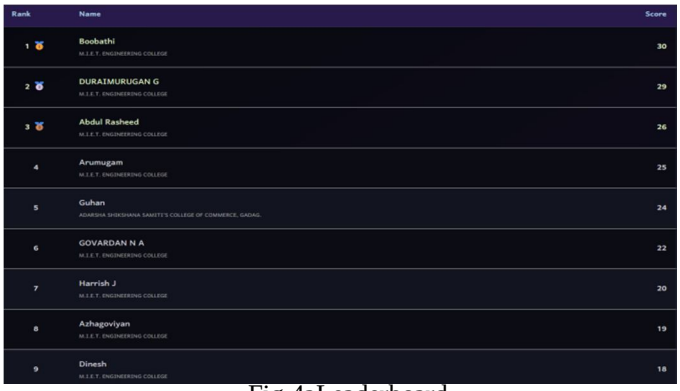


Fig.4aLeaderboard

Top scores show up live in Figure 4a, ranked by results plus how steady users are. The setup plays more like a game because of it, nudging people to push a bit harder without pressure. For many users, this acts as a strong motivator to stay consistent, push harder, and improve their rankings [39], [57], [59].

2) User Profile & Dashboard

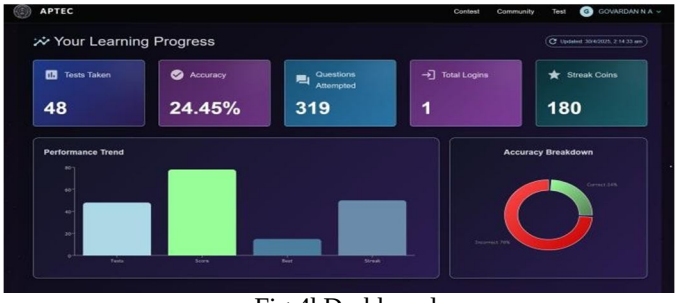


Fig.4bDashboard

Fig.4b Each learner has a personal dashboard that tracks their progress across topics, shows completed practice sets, teststaken,scores,andimprovementovertime.Thishelpsusers reflectontheirlearningpatternsandadapttheirstudystrategies.

This structured self-reflection process, supported by the aforementioned tools, is further enhanced by the Role-Model Group Awareness (RM-GA) information integrated into the platform. The system is designed to allow learners "to assess their performance and compare it with that of the role-model group," as revealed by the RM-GA data. Beyond potentially "boostinglearners'effectiveness,confidence,andmotivation," the RM-GA information serves a critical function by highlighting "the difference between learners' achievements when working independently and when guided by the role model group." By "providing insights into their learning strategies," the RM-GA information is thus engineered to actively "encourage self-reflection, which can positively influence their future learning behavior" [14], [34]–[36], [50].

III. EXPERIMENT

A. *Participant Profile*

Experimental evaluation involved final-year Computer ScienceandEngineering(CSE)studentsfromanengineering institution in TamilNadu. Asnoted by Adalier [54],"subject homogeneity in educational technology studies enhances internalvaliditywhenmeasuringinterventioneffects."Given their common academic background and similar placement preparation status, the participantswere presumed to possess comparable baseline aptitude knowledge levels.

Before starting the lessons, learners got basic info about how the platform works and when it could be used. Right after, they began working through topics one at a time, much like what Johnson and Smith once detailed in their earlier work. Each student had to reach strong results on quizzes prior to moving forward - a method tied by Kumar and Gupta to deeper understanding and real-world application of skills. Access stayed open during training, so users interacted freely without limits. That openness shaped routines resembling genuine study habits.

B. *Study Workflow*

Starting off differently, the trial class builds key abilities by diving into practical subjects. Instead of theory alone, real-world tasks shape how students learn what matters most. Thesetopics,eachinvolvingpracticalproblemsolving,wereas follows:

1) NumberSystem
2) Percentages
3) TimeandWork
4) ProfitandLoss

A particular set of tools shaped how this system came together. Built piece by piece, it relied on chosen methods behind the scenes.

- React.js with Zustand for frontend development and state management,
- Node.jscoupledwithExpress.jsforbackendAPIhandling,
- MongoDBandSupabaseforuserdatastorageandquestion database management, and
- (4) WebSocketstofacilitatereal-timecommunication.

When learners try jumping ahead, the system steps in. Before moving on, they must show they understand what came before. Skipping isn't allowed until mastery is clear. Progress depends on proof of grasp, not speed. Only after showing skill does the next part open up.

After finishing the earlier part, participants moved back to the last SRL stage they had skipped. Once the testing time ended, everyone took a follow-up test. The goal of that check was to measure how well students learned when using the new method versus those taught through standard ways. Researchers also held talks meant to collect personal insights about each person's journey, especially looking at how individuals handled questions from examiners in real or practice job interviews

C. *Evaluation Criteria and Tools*

Most questions on Aptec came straight from real placement exams, carefully picked over time. Because of this, learners faced problems much like the ones seen in actual tests. One topic led to another, each built from genuine exam patterns. Exposure grew naturally, shaped by repeated practice with true-to-life challenges.

Every time someone used the platform, their actions got recorded automatically. These records formed a set of detailed traces showing how people moved through the interface. Each person's activity included specific measurements tracked over sessions.

Patterns began to appear once all entries were reviewed together.

- Number of logins:Thetotalfrequencyofuserlogins in the system.
- Duration of Learning Sessions: The aggregate time spent by the user actively engaged in each learning session.
- Number of Topics Completed: The total number of learning topics successfully concluded by the user.
- Assessment Scores: ThePerformance scoresrecorded for each test or quiz attempt by the user.

This mix of data later helped check how steadily every learner kept up with their study times, giving a hint about their skill in managing their own learning. Though gathered in different ways, the pieces together showed patterns in who stayed on track without needing reminders or outside pushes.

IV.CONCLUSIONANDFUTUREWORK

Learners find their footing here by setting targets, diving into tasks, then looking back on how far they've come - this flow comes straight from Zimmerman's view of self-driven growth. Phases loop naturally : planning kicks off, action follows, reflection wraps it up, forming a rhythm that adapts as users do. Old-school online courses lose people fast ; this one holds attention differently.
Built-in stages guide each step forward, others join in through shared activity, game-like elements nudge continued effort.
Progress sticks because the design keeps minds engaged across time.

ComparisonTable:BaseReferenceSystemvsOurSystem

Component	BaseReferenceSystem	Our System	Advancements
SRL Framework	Zimmerman's3-phaseSRL model [1], [12]	IntegratesZimmerman+ RM-GA model at each learning phase	Role-modelsupportboosts SRL skill development
Collaboration	PeerawarenessinCSCL [25], [26]	Real-timediscussion+ group tests	Promotessoloandpeer-basedlearning synergy
GoalSetting	Minimalorbasic[16],[24]	Structuredgoalmodule: topic-wise path + progression control	Enhancesfocus,autonomy, and planning
InteractiveLearning	Staticmaterialsordelayed feedback [59]	Explanations,examples, timed practice modules	Encouragesdeeper conceptuallearning
AssessmentFlow	Isolatedquizzes[16],[59]	Gatedprogressionafter mastering prior topics	Ensures complete understandingbefore moving forward
Gamification	Rarelyusedorsuperficial [41], [58]	Leaderboards,badges, weekly contests	Boostslearnermotivation through engagement
Feedback System	Limitedordelayed[5],[16]	Instant results + performancedashboard	Supports continuous reflectionandimprovement
GroupAwareness(GA)	Teaminteractionsonlyin CSCL [1], [25], [30]	RM-GA:Viewrolemodel actions per SRL phase	Enables aspirational benchmarkingeveninnon-collaborative setups
TechnologyStack	GenericLMSsetups	Full MERN: React, Zustand,Node,Express, MongoDB, Supabase, WebSockets	Real-time,scalable,and modern architecture
ApplicationScope	GeneralSRLinblended learning [1], [15]	Targetedaptitudetraining for placements	Highindustryrelevance, skill-focused design

One part of the system stands out - the community forum, a space where people ask questions, swap ideas, among work together. Research by Cho et al. [34] shows social links inside learning settings shape how info spreads plus affect ways problems get solved.

To keep activity going, alerts reminded members to join current talks. Such spaces build something English and Duncan-Howell [23] call digital groups offering emotional backing while cutting loneliness during independent study.

Not far off from watching someone good at a task,

peer involvement shows learners what effort looks like when ithits the mark. According to Lin and team [55], seeing how youstack up against others pushes subtle shifts in approach almostwithout thinking. Bright badges, points that add up, small rewards woven in to the design kept people moving forward.

Surprisingly,Wang[41] points out that using gamelike tools in learning pushes students to join more often while staying involved lo nger. Those who do well get small rewards, like digital badges, showing their growth clearly on screens they can check anytime

Theleaderboardservesasamotivationaltoolbyshowcasing topperformers. From Patel[57], competitive parts in learning tools make success more visible, which fuels drive by showing clear signs of progress. When users see how they measure up, it nudges them to think harder about their own growth. Recognition tied to these markers strengthens habits linked to strong performers. Over time, repeated exposure shapes behavior in subtle but meaningful ways.

One hour after logging in, users began showing clearer signs of self-directed learning. Studies by Barnard and team point out how organized practice with control methods sharpens thinking about thinking - especially online. Help from others in the group popped up faster here compared to standard digital classrooms. Quick chats and shared tasks opened windows into goal tracking most students usually miss. Support didn't fade over days - it stuck around, built momentum.

Starting with React.js up front, the system uses Zustand to keep track of changes. Instead of traditional methods, it pairs Node.js with Express.js behind the scenes. Data sticks around thanks to both MongoDB and Supabase doing their part. Communication happens instantly because WebSockets link everything together. Responsiveness stays strong on every device in play.

One step ahead, the system will grow into areas like spoken skills and hands-on subjects .Enhanced gamification should be implemented to increase engagement and promote consistency As Kumar and Gupta[59] emphasize, "effective web-based learning platforms must balance structured content with interactive elements that maintain momentum across extended learning periods. Improving these features helps learners take more control of their progress while building skills that match real job needs. A clearer path unfolds when practice connects directly to goals people actually have.

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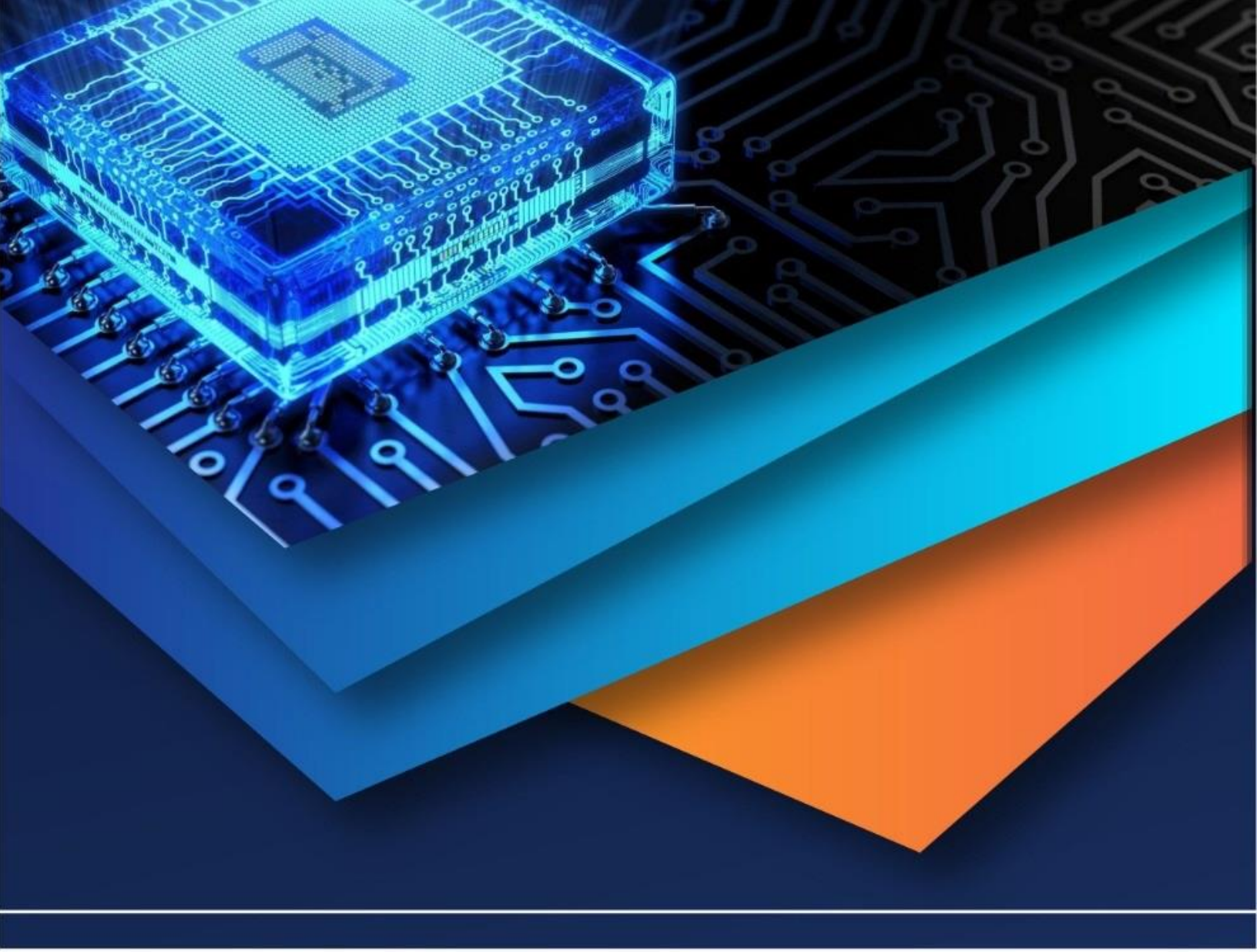
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