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Student-teachers' attitude and interest in team teaching

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Team teaching is an instructional strategy where teachers work together regularly. In this strategy, a group of two or more teachers working together to plan, conduct and evaluate the learning activities for the same group of learners. The main focus of the study is to find out the level of attitude and interest in team teaching of student-teachers. For this study, the Normative-survey method was followed. Team Teaching Attitude Scale and Team Teaching Interest Inventory were used to gather the data. The researcher applied Random Sampling Technique to select the sample. In Tiruchirappalli District, 802 student-teachers were taken as sample. The appropriate statistical techniques were employed to analyze the data. The main findings are: (i) The student-teachers' attitude towards Team teaching is moderately positive. (ii) The student-teachers' interest in Team teachings moderate. (iii) The student-teachers' attitude and interest in Team Teaching have moderate positive relationship with one another. The recommendations are further discussed by the investigator.

Key words: student-teachers, attitude, interest and team teaching

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Introduction

The Team teaching Idea originated in USA in 1954 and it found its way to develop courses. It is good innovation in teaching strategies. In simple words, team teaching strategies are simplest form where all teachers of a subject collectively teach a class in that subject. Team teaching is also called collaborative teaching or co-teaching strategy. It is a type of instructional organization involving teaching personnel and the students assigned to them in which two or more teachers are given responsibility, looking together, for all or a significant part of the instruction for some group of students.

Need for the study

Team teaching is a form of organisation in which individual teachers decide to pool resources, interest and expertise in order to device and important a scheme of work suitable to the needs for their pupils and the facilities of their school. It improves teacher's competency and methods of teaching. Today's student-teachers will become a future teaching community. Student-teachers' attitude and interest in Team Teaching will reflect in their teaching in future. Therefore, it is necessary to study the student-teachers' attitude and interest in Team Teaching at the level of School Education.

Objectives

1. To assess student-teachers' attitude and interest in Team Teaching at the level of School Education.
2. To examine if there is any significant difference in the mean score of student-teachers' attitude and interest in Team Teaching at the level of School Education on the basis of gender, age, subject discipline and levels of education.
3. To examine if there is any relationship between student-teachers' attitude and interest in Team Teaching at the level of School Education.

Hypotheses

1. The student-teachers' attitude towards Team teaching is not positive
2. The student-teachers' interest in Team teaching is not high.
3. The mean score of student-teachers' attitude and interest in Team teaching does not significantly differ based on gender.
4. The mean score of student-teachers' attitude and interest in Team teaching does not significantly differ based on age.
5. The mean score of student-teachers' attitude and interest in Team teaching does not significantly differ based on subject discipline.
6. The mean score of student-teachers' attitude and interest in Team teaching does not significantly differ based on levels of Education.
7. The student-teachers' attitude and interest in Team Teaching do not have any relationship with one another.

Method

The Normative-survey method has employed in the investigation.

Variables

Attitude towards Team teaching and interest in Team teaching were adopted as the main variables and gender, age, subject discipline and levels of education are adopted as the sub-variables.

Sample

In Tiruchirappalli District, from various Colleges of Education 802student-teachers have taken by using Random Sampling technique.

Tools

1. Team Teaching Attitude Scale

The investigator has designed and standardized the scale. The scale comprises of 45 items in which 24 are positive and 21 are negative

statements. The reliability is constituted by Split-half technique. The content validity of the scale has established.

2. Team Teaching Interest Inventory

This investigator was designed and standardized the Inventory. The inventory comprises of 61 items in which 32 are positive and 29 are negative statements. The reliability is constituted by Split-half technique. The content validity of the inventory has established.

Statistical techniques

The obtained data have been analyzed by applying suitable statistical measures such as mean, standard deviation, 't'-test, 'F'- test and Correlation.

Results and Interpretation

Table 1

Score	No. of samples	Mean value	S.D value
Attitude towards Team Teaching	802	121.5714	11.2514

As per the above table, the mean is found to be 121.5714 which is more than 50% (54.0317 %) and therefore it is determined that the student-teachers' attitude towards Team teaching is moderately positive.

Table 2

Score	No. of samples	Mean value	S.D value
Interest in Team Teaching	802	38.1561	14.5178

As per the above table, the mean is found to be 38.1561 which is more than 50% (62.5510) and therefore it is concluded that the student-teachers' interest in Team teaching is moderate.

Table 3

Team Teaching	Gender	No. of samples	Mean value	S.D value	df	t	Significant level
Attitude	Male	385	120.5612	11.4471	800	2.0948*	Significant (5% level)
	Female	417	122.2462	11.3082			
Interest	Male	385	40.0134	20.9726	800	0.2299	Not Significant
	Female	417	39.7024	16.9315			

The value (t) which is calculated in the above-mentioned table (2.0948) is not less than 1.96 (table value) at 5% significant level. Thus, it is significant. It is denoted that the mean score of student-teachers'attitude towards Team teaching differs significantly based on gender. It is also inferred that the female student-teachers have more positive attitude than male student-teachers.

The value (t) which is calculated in the above-mentioned table (0.2299) is less than 1.96 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers'interest in Team teaching does not significantly differ based on gender.

Table 4

Team Teaching	Age	No. of samples	Mean value	S.D value	df	t	Significant level
Attitude	Below 25 years	267	121.7254	10.4128	800	0.5248	Not Significant
	25 years and above	535	121.3419	8.2714			
Interest	Below 25 years	267	40.5716	21.2114	800	0.8846	Not Significant
	25 years and above	535	39.2439	17.4223			

The value (t) which is calculated in the above-mentioned table (0.5248) is less than 1.96 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers'attitude towards Team teaching does not significantly differ based on age.

The value (t) which is calculated in the above-mentioned table (0.8846) is less than 1.96 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers'interest in Team teaching does not significantly differ based on age.

Table 5

Team Teaching	Subject Discipline	No. of samples	Mean value	S.D value	df	t	Significant level
Attitude	Arts	588	120.9526	11.3221	800	2.6049*	Significant (5% level)
	Science	214	123.2813	11.1521			
Interest	Arts	588	39.4123	16.4561	800	1.1160	Not Significant
	Science	214	41.2331	21.7055			

The value (t) which is calculated in the above-mentioned table (2.6049) is not less than 1.96 (table value) at 5% significant level. Thus, it is significant. It is denoted that the mean score of student-teachers'attitude towards Team teaching differs significantly based on subject discipline. It is also inferred that the student-teachers those who belongs to science discipline have more positive attitude than the student-teachers those who belongs to arts discipline.

The value (t) which is calculated in the above-mentioned table (1.1160) is less than 1.96 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers'interest in Team teaching does not significantly differ based on subject discipline.

Table 6

Team Teaching	SV	SS	df	MVS	F	Significant level
Attitude	Between group	1033.579	2	516.7895	2.2425	Not Significant
	Within groups	184128.270	799	230.4484		
Interest	Between group	552.163	2	276.0815	1.0918	Not Significant
	Within groups	202041.501	799	252.8680		

The value (F) which is calculated in the above-mentioned table (2.2425) is less than 3.00 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers' attitude towards Team teaching does not significantly differ based on levels of Education.

The value (F) which is calculated in the above-mentioned table (1.0918) is less than 3.00 (table value) at 5% significant level. Thus, it is not significant. It is denoted that the mean score of student-teachers' interest in Team teaching does not significantly differ based on levels of Education.

Table 7

Correlation			
		Attitude towards Team Teaching	Interest in Team Teaching
Attitude towards Team Teaching	Pearson correlation	1	0.692*
	Sig(2-tailed)		0.000
	N	802	802
Interest in Team Teaching	Pearson correlation	0.692*	1
	Sig(2-tailed)	0.00	
	N	802	802

*- Significant (5% level)

The value (r) which is calculated in the above-mentioned table (0.692) is not less than 0.062 (table value) at 5% significant level. Thus, it is significant. It is denoted that the student-teachers' attitude and interest in Team Teaching have moderate positive relationship with one another.

Conclusion

In the domain of education, team teaching is a prominent instrument that can remarkably strengthen the learning environment. In accordance with a study in the Journal of Educational Psychology, schools that applied team teaching saw a 15% increase in student achievement scores. Therefore, implementing team teaching can be a influential strategy for schools focusing to improve the quality of the education and foster a more collaborative and dynamic learning environment.

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The role of online learning in promoting student creativity.

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The pivotal role of online learning in fostering student creativity. As traditional educational paradigms evolve, digital platforms offer dynamic environments conducive to unleashing creative potential. This paper examines how online learning tools, interactive content, and collaborative platforms empower students to think critically, problem-solve innovatively, and express themselves creatively. Insights are drawn from research on the impact of technology-enhanced learning on student engagement and the development of key creative skills. The abstract concludes by highlighting the significance of integrating online learning strategies into educational frameworks to cultivate a generation of agile and imaginative thinkers.The importance of incorporating online learning methodologies into educational frameworks to develop a generation of quick-witted and creative thinkers is highlighted as the article finishes.

Key words: online learning, creativity, problem solving, digital platforms

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Introduction

Online learning, also known as e-learning, refers to the use of digital technologies to deliver educational content and facilitate learning outside of traditional classroom settings. This mode of learning has gained prominence due to its accessibility, flexibility, and scalability. Students can engage with course materials, participate in discussions, and complete assignments through internet-based platforms. Online learning encompasses various formats, including video lectures, interactive modules, and virtual classrooms. It caters to a diverse range of learners, offering opportunities for self-paced study and enabling individuals to access education from virtually anywhere. While presenting numerous advantages, such as increased accessibility and convenience, online learning also poses challenges, including the need for reliable internet connectivity and self-discipline. This dynamic educational approach continues to evolve, shaping the future of learning in an increasingly digitalized world.

Roles Played by Online Learning

E-Learning is a broad term and may be defined as "The use of any electronic technology to aid in the acquisition and development of knowledge and understanding in order to demonstrable and positively influence behaviors." There are many terms used to describe 'online delivered learning via the internet' e.g. distance education, computerized electronic learning, online learning, internet learning and many others. Student-centered instruction has currently benefited many new technologies by using the internet and other advanced technological tools to share, transfer, and extend knowledge" (Hancock, 2002). Online learning has become a part of the 21st century as it makes use of online platforms. E-learning is defined as using online platform technologies and the Internet to enhance learning and provide users with access to online services and services (Ehlers and Pawlowski, 2006).The advantages of online learning are as follows: flexibility, easy access, and interaction between learners and their professors (Strayer University, 2020).

Access to Education

One of e-Learning's biggest benefits is its capacity to remove barriers to education. In the context of traditional education, people may not be able to access high-quality learning opportunities due to resource constraints and geographic distance.Exact to the opposite, eLearning eliminates these constraints by providing access to education anytime, anywhere. Online courses, educational platforms, and virtual classrooms enable learners from all corners of the globe to engage in learning, irrespective of their physical location. In addition to fostering inclusivity and fair opportunity for all, this democratization of education has given previously excluded people new prospects.

Flexibility and Convenience

E-learning meets the many demands of contemporary learners with unmatched flexibility and ease. Students in traditional schooling are frequently constrained by set schedules and little options. But with e-learning, students may personalize their education by selecting the time, location, and mode of interaction with course materials.Education is now more accessible to working adults and non-traditional students thanks to this flexibility, which allows people to balance their educational goals with responsibility to their families, careers, and other lives.

Personalized Learning

E-Learning empowers learners with personalized learning experiences, catering to their unique needs, interests, and learning styles. Artificial intelligence (AI) algorithms, data analytics, and adaptive learning technologies allow eLearning systems to collect data on learners' strengths and weaknesses as well as their development. This personalized approach enhances engagement, motivation, and learning outcomes, enabling learners to reach their full potential.

Interactive and Engaging Content

Traditional educational resources frequently find it difficult to hold students' attention and attract them. However, eLearning makes use of gamification, interactive simulations, multimedia tools, and virtual reality (VR) to produce attractive and immersive learning environments.Through the stimulation of curiosity, creativity, and critical thinking abilities, these interactive aspects provide enjoyment to the learning process. eLearning accommodates a range of learning styles and improves understanding and memory of material by utilizing multimedia elements including graphics, videos, and animations.

Collaborative Learning

Through the promotion of online communities, discussion boards, and virtual group projects, e-learning promotes collaborative learning. Through connections with peers, experts, and instructors worldwide, learners may foster a global interchange of viewpoints and ideas. Collaborative learning enhances social interaction, teamwork, and communication skills, preparing learners for the interconnected world they will navigate in their personal and professional lives.

Continuous Learning and Lifelong Learning

E-Learning enables individuals to engage in continuous learning, acquiring new knowledge and skills throughout their lives. Learners may keep current in their disciplines, expand their areas of interest, and upgrade their abilities with the wealth of online courses, webinars, and self-paced learning modules available.For people in various phases of life and professions, lifelong learning is now possible because to eLearning's affordability and accessibility.

Cost-Effectiveness

Traditional educational establishments frequently have expensive tuition, travel costs, and supplies and textbook costs. However, these costs are greatly decreased with eLearning.In general, online courses and learning

environments are less expensive, and students can save money on related expenses like lodging and transportation. Additionally, eLearning makes education more accessible and cheaper for students around the world by enabling institutions to reach a bigger audience without the need for substantial physical infrastructure.

Up-to-Date and Relevant Content

E-Learning content can be updated in real-time, ensuring that learners have access to the most current and relevant information. Webinars, interactive modules, and online materials can all be updated often to take advantage of new developments in technology, research, and emerging trends.This ensure that students acquire current and reliable information, equipping them to meet the needs of the modern world.

Tracking and Assessment

E-learning systems offer thorough tracking and evaluation tools that let teachers and students keep an accurate check on student development. Students are able to monitor their progress, get feedback, and identify areas that need work.

Environmental Sustainability

E-Learning contributes to environmental sustainability by reducing paper usage and minimizing the carbon footprint associated with commuting. Educational institutions may encourage environmentally responsible behavior and help create a more sustainable future by implementing eLearning.

Creativity

The learning process requires students to have thinking skills. One of the thinking skills that students must have is creative thinking skills (Chakra, 2016; Mumford et al., 2012). Creative thinking directs students to be imaginative, think inventive, come up with new ideas, and think out of the box

(Glaveanu, 2014).Online learning can enhance student creativity by providing diverse resources, interactive platforms, and opportunities for self-directed exploration, fostering a more flexible and personalized learning environment.

Online learning offers various benefits that can contribute to improving student creativity:

Diverse Learning Resources

Online platforms provide access to a wide range of multimedia resources such as videos, interactive simulations, and virtual labs. This diversity can stimulate different learning styles and inspire creative thinking.

Collaborative Tools

Virtual collaboration tools enable students to engage with peers globally, promoting the exchange of ideas and perspectives. Collaborative projects and discussions encourage creativity through teamwork and shared insights.

Flexibility and Autonomy

Online learning often allows students to learn at their own pace, fostering autonomy. This flexibility can provide more time for reflection and exploration, enhancing the creative process.

Problem-Solving Opportunities

Online platforms can offer real-world problem-solving scenarios and case studies. Encountering and tackling complex challenges stimulates critical thinking and creativity as students find innovative solutions.

Customized Learning Paths

Adaptive learning technologies tailor content based on individual progress, addressing specific strengths and weaknesses. This personalized approach can help nurture creativity by catering to each student's unique learning needs.

Access to Experts

Virtual guest lectures, online forums, and expert webinars bring professionals from various fields directly into the virtual classroom. Exposure to real-world expertise can inspire creative thinking and provide valuable insights.

Multidisciplinary Learning

Online courses often integrate content from different disciplines, encouraging students to approach problems from various perspectives. This interdisciplinary approach can stimulate creativity by connecting seemingly unrelated concepts.

Immediate Feedback

Online assessments and quizzes provide instant feedback, allowing students to understand their mistakes promptly. This iterative process fosters a growth mindset, encouraging creative problem-solving without the fear of failure.

Conclusion

Online learning can significantly promote student creativity by providing diverse resources, fostering collaboration, and encouraging self-directed exploration. The flexibility of online platforms allows students to engage with various multimedia materials, collaborate with peers globally, and tailor their learning experiences, ultimately enhancing their creative thinking skills. Additionally, online learning offers personalized feedback and assessment methods, allowing students to receive constructive criticism that can further fuel their creative growth. The accessibility of online courses also democratizes education, reaching a broader audience and unlocking creative potential across diverse backgrounds. While challenges exist, such as digital equity issues, the overall impact of online learning on student creativity is substantial.

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Cissus quadrangularis L. Leaf Extract Used in the Green Synthesis of Copper Nanoparticles

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A nanoparticle is a microscopic particle with a size between 1 - 100 nm. Green synthesis refers to the use of plant resources in the production of nanoparticles. Due to the ecologically friendly, biocompatible, and non-toxic properties of green plant extract-derived nanoparticles, they have significant relevance for effective biomedical use in the field of nanotechnology. This study describes the green synthesis used to create copper nanoparticles from Cissus quadrangularis L. Visual observation (the creation of brown or black colour when NaOH is applied) was followed by ultraviolet-visible spectrum and Fourier Transform infrared [FT-IR] to firmly imply the formation of copper nanoparticles. According to this research, Cissus quadrangularis-derived copper nanoparticles can be made into a medicine substitute that doesn't have any negative side effects.

Key words: Copper nanoparticle, *Cissus quadrangularis*, Green Synthesis, UV-Vis and FT-IR.

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Introduction

The fundamental building blocks of nanotechnology are nanoparticles (Annamalai *et al.,* 2011). For the synthesis of nanoscale particles, nanotechnology is a reliable and beneficial method that is also environmentally friendly (Mohanpurai *et al.,* 2008). Recently, researchers from many other disciplines, including biotechnology, physics, engineering, and medicine, have been interested in nanotechnology (Lanje *et al.,* 2010; Yang *et al.,* 2012).Compared to other biological methods, using plants to make nanoparticles can be advantageous since it avoids the laborious process of maintaining cell cultures and can be scaled up appropriately for large-scale nanoparticle production (Shankar *et al.,* 2004). Green synthesis refers to the process of producing nanoparticles using plant-based materials.

A dicotyledonous flowering plant, *Cissus quadrangularis*, is a perennial plant from the Vitaceae family. Its common names include Devil Black Bone and Veldt Grape (Mishra *et al.,* 2010). Green plant-derived nanoparticles are highly relevant for effective biomedical usage in the field of nanotechnology since they are environmentally friendly, biocompatible, and non-toxic.

Plant-based nanoparticle production is dependent on phytochemical substances and their therapeutic potential. This observation describes the eco-friendly and economically advantageous green production of copper nanoparticles using *Cissus quadrangularis* leaf extract.

Materials and Methods

Fresh leaves of *Cissus quadrangularis* from the Kanyakumari region were used to synthesize nanoparticles. To get rid of the dust on the leaf surface, the collected leaves are first cleaned with running tap water and then with distilled water.The leaves are dried in oven andcrushed to powder.

Description

Cissus quadrangularis

Synonyms: *Cissus tetraptera*, *Vitis quadrangularis*

Cissus quadrangularis L. Leaf Extract

Vernacular Name: Pirandai

Native: Tropical Asia, Arabia, and Africa

Distribution

Global Distribution

Widespread in the drier parts of Africa, Arabia, and Indo-Malesia

Indian distribution

State- Assam, Kerala, Odisha, Madhya Pradesh, Tamil Nadu, Uttar Pradesh

Description

A climber with stout stem, fleshy, quadrangular and contracted on the node. Branching is dichotomous. White flowers are in a cymose inflorescence. Globular, mature fruit turns red. The climber is armed with lengthy tendrils. Rambling, succulent, glabrous, deciduous shrubs; stem four-angular, winged or ridged at angles, constricted at nodes; tendril plain.

Leaves 2-5 x2-5 cm, ovate sub-orbicular or sub-reniform, base truncate, margin distantly spinulose-crenate, apex obtuse, thick-coriaceous; petiole to 1 cm long.Flowers are arranged in leaf-opposed, peduncled, umbellate cymes. Calyx-tube in obscure 4-lobed, 2 mm long, reddish. Petals are around 2.5 mm long, oval, sharp, greenish-yellow, and recurved. 4 stamens; filaments up to 2 cm long; anthers yellow disk yellow, 4-lobed. Berry is around 7 mm wide and sub globose. Seeds are black, plain.

Leaf Extract Preparation

To make the broth solution, 2 g powder of *Cissus quadrangularis* leaves was mixed with 200 ml of distilled water in a 250 ml beaker. Then vigorously stirred the solution and cooked it for 20 minutes at 80 ° C. Whatman No.1 filter paper was used to filter the extract. The resulting filtrate was refrigerated for future investigations.

Copper nanoparticlecharacterization by visual observation

In a 250 ml flask, 20 ml of the leaf extract was added to 20 ml of 20 mM $CuCl_2$ solution while vigorously stirring. After 15 minutes, the green colour of the solution turned brown or black after being placed in an oven at 80 ^{0}C for 25 minutes. The emergence of the brown or black colour showed that the $CuCl_2$solution had been completely reduced and that copper nanoparticles had formed. The resulting copper nanoparticles were filtered using Whatman No.1 filter paper and allowed to dry before storage.

Visual observation, followed by ultraviolet-visible [UV-Vis] spectrum and Fourier transform infrared, clearly suggested the development of copper nanoparticles (FT-IR).

Copper nanoparticle characterization UV-Visible spectroscopy

Cissus quadrangularis leaves extract was used to characterize copper nanoparticles using a UV-Vis spectrophotometer Systronics 118 at the wavelength range of 200-600 nm, and absorption peaks at 216- 268 nm regions were observed due to the excitation of surface plasmon vibrations in the Cupper nanoparticles solution, which is identical to the characteristic UV-visible spectrum of metallic iron, and it was recorded.

Characterization of copper nanoparticles by Fourier Transform Infrared spectroscopy (FT- IR)

The dried copper nanoparticles synthesized from the leaves of *Cissus quadrangularis* were subjected to FT-IR analysis in 1: 100 ratios using the Potassium bromide pellet (FT-IR grade) method, and the spectrum was recorded in the Nicolet Impact 400 FT-IR Spectrophotometer using diffuse reflectance mode.

Cissus quadrangularis L. Leaf Extract

Results and discussion

Visual Analysis

The initial confirmation of nanoparticles was supported by observing the solution's colour change. After the NaOH is added, the colour shifts from greenish blue to black. According to prior research by Mulvaney (1996), this could be caused due to the excitation of Surface Plasmon Resonance of the biosynthesized Copper nanoparticles.

UV - Vis Analysis

A trustworthy technique for determining whether metallic nanostructures are present is UV-Vis spectroscopy (Panacek *et al*., 2006). The size, shape, concentration, aggregation state, and refractive index close to the nanoparticle surface all affect the distinctive optical properties of nanoparticles (Fatma *et al*., 2017).

The *Cissus quadrangularis* leaf extract-derived nanoparticles were examined using the UV-Vis spectrophotometer Lambda 35. The range of absorbance from 250 to 800 nm was used to analyse the impact of the reaction duration on the production of copper ions.

The existence of biosynthesized copper nanoparticles in the reaction mixture is shown by the UV spectral analysis of synthesized copper nanoparticles, which revealed the greatest absorbance at 400 nm.This absorbance spectrum was also in coincidence with the earlier findings of Fatma *et al*. (2017) in *Passiflorafoetida* leaf extract at 350nm.

3FT-IR Analysis

The existence of some functional groups and the dual function of the Cissus quadrangularis leaf extract as a capping and reducing agent were both confirmed by FT-IRanalysis. In Figure, 1: FR-TR Spectrum of Synthesized Copper Nanoparticles, analysis was showed.

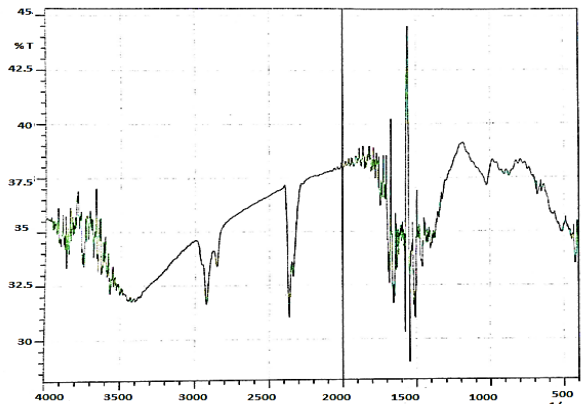

Figure 1: FR-TR Spectrum of Synthesized Copper Nanoparticles

Copper nanoparticles' FT-IR measurements revealed maximum absorption at 1600. The existence of amides that are being stretched by C=O is indicated by the high peak at 1600 cm-1.show the presence of protein/peptide is indicated by broad IR bands at 1652 cm-1, which also function as a stabilizing and reducing agent (Gopiath *et al .,* 2013).

The reduction of Copper nanoparticles is confirmed by the FT- IR spectrum of these Copper nanoparticles, which shows a declining peak intensity of O-H phenolic compounds. This shows that the extract contained water-soluble components including polyphenols and terpenoids (Fatma *et al.,* 2017).

Conclusion

The aforementioned study has shown that *Cissus quadrangularis* leaf extract can produce copper nanoparticles with the proper stability in UV-VIS and FT-IR wavelengths. According to the aforementioned study, copper nanoparticles made from Cissus quadrangularis leaf extract exhibit proper stability in UV-VIS and FT-IR investigations. Therefore, the environmentally friendly copper nanoparticle pattern can be employed to produce tablets without side effects.

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Innovative Methods of Teaching English Language

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This paper analyses the innovative and exciting methods to teach English language. Teaching English is not an easy task. To make it simple and better specific important methods are needed. The author tries to convey different, creative, attractive techniques to teach the English language easily. The purpose of this paper is to evaluate the traditional methods of teaching as well as a modern way of teaching and to suggest other useful teaching methods that can attempt in imparting knowledge to the students. Teaching must include two major components sending and receiving information. Ultimately, a teacher tries his best to impart knowledge as the way he understood it. So, any communication methods that serve this purpose without destroying the objective could considered as innovative methods of teaching. The use of innovative methods in educational institutions has the potential not only to improve education but also to empower people, strengthen governance and galvanize the effort to achieve the human development goal for the country.

Key words: Innovative, Teaching, Methods, English and Language

Introduction

The purpose of education is not just making a student literate but adds rationale thinking, knowledge ability and self-sufficiency. That's why teaching nowadays must include innovative methods that impart knowledge. Some innovative methods of teaching could be multimedia, the combination of various digital media types such as text, images, audio and video, into an integrated multi-sensory interactive application or presentation to convey information to an audience.

Importance of English Language

English, the official language of the entire world is a very tricky language to teach. Every language varies to teach. English is an ancient language and has undergone many forms of changes from Proto English derived from the Latin and the German culture to Modern English, which established after in the post Renaissance period. Each version was more straightforward than its previous. Present-day English is the most straightforward adaptation of an ancient language. Yet, it is still difficult to teach this language effectively, especially to those who speak English as a second language. To improve the communicative skills of learners, innovative teaching methodologies should be used or introduced to make the learning process enjoyable. Creativity is a prime factor of any student to develop her/ her lateral thinking in terms of learning a language. An English learning classroom should be created using interesting teaching methodologies to mesmerize and encourage students to learn the second language explicitly and implicitly.

Innovative Teaching

Innovative Methodologies in Teaching English Teaching materials, teaching techniques should be updated to the interest of the second language learners. Innovative teaching means creativity and novelty of the teacher who changes the style and method of teaching. All over the world, educational institutions implementing new ideas, methods, technology-based innovations to enhance the students' knowledge. Innovative teaching is necessary for the present and future of education to help students to reach their full potential. Innovative teaching is a necessity for all teachers to meet the educational needs of the new generations. Innovative methodologies like the use of games, role play, reading a newspaper, watching TV, referring to a dictionary, etc., should be used as tools in the classroom. Skill-based learning, knowledge-based learning is essential for the growth and development of students. The focus of learning a second language should improve the employability skills of the learners. However, teachers' competency for innovative teaching is a crucial factor influencing innovative teaching performance.

Innovative Methods of Teaching English

1. Enacting the Stories

Stories form a very integral part of teaching a language. The students can enact the stories of the plays. In this way, the students are personally engaged with the stories. They can bring their interpretation of the character to life. It is exciting for the students to understand the characters and put themselves in their positions. It engages their creativity by allowing them to create the entire set, assign the characters and play it out according to what they had imagined. It helps them in learning the language. It will leave a deep impression on their mind. It also leads to personality development and helps them work as a team player and all the way the student was learning the language. For example, if Julius Caesar is taught using traditional methods of question and answer, students never understand the deep emotions of Brutus, the cunningness of Cassius, the loyalty of Antony, the tragedy of war, the brilliance in Antony's speech and many other such aspects of the story for which Shakespeare wrote the story of Julius Caesar. It has many benefits besides being a very effective method of teaching the language, and it helps to preserve the literature. At the end, the student will be able to answer questions without even preparing for it as an exam, besides the entire process is fun and not at all boring. Hence it ensures the learning process is complete.

2. Mnemonics Words - Words to Words Approach

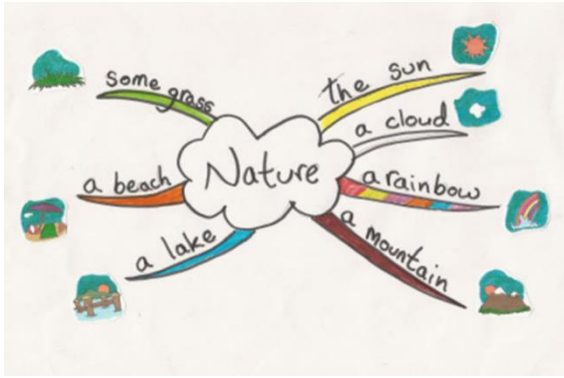
Here the teacher is not supposed to talk on a particular concept for a quite long time. But to make it clear to the students, he can just go on saying mnemonics or its associated meaning in words. Here he goes on saying only words instead of a sentence, and once they come to a basic understanding of the meaning of a particular concept, then the teacher will explain in sentences. For example, in teaching language courses, this technique can be used as an effective medium by the teacher to develop word power.

- Word power increases.
- Dictionary must use widely.
- A teacher also gets to know many words on a particular concept.

3. Mind Map

Another innovative teaching method is Mind Maps. Mind maps were developed in the late 60s by Tony Buzan as a way of helping students make notes that used only keywords and images. It is a simple technique for drawing information in diagrams, instead of writing it in sentences. The diagrams always take the same basic format of a tree, with a single starting point in middle that branches out and divides again and again. The tree was made up of words or short sentences connected by lines. The lines that connect the words are part of the meaning. They engage much more of the brain in the process of assimilating and connecting facts than conventional notes. A mind map can be used by teachers to explain concepts in an Innovative way. They are much quicker to make and much easier to remember and review because of their visual quality. The key is to build up mind maps that make the most of these things building on our creativity, thinking and cross-linking between ideas that exist in our minds. As the recent research point that any particular information explained with the help of graph charts make a high impact in the minds of the people and keeping this as the core aspect, the teachers may try to picture the concepts and show the same to the students.

Example of Mind Map on Nature



It would bring a very high impact on the minds of the students about a concept:

- Creates a clear understanding
- Improves Innovative thinking
- Enhances Creative Problem Solving

4. Teaching through conversations

Conversations are by far the most useful ways of teaching language. When a child learns his or her mother tongue by listening to the conversations made by others, the child is never taught the language but is still able to percept the meaning and learns it automatically to use it in day-to-day life. No one ever teaches the kid the characters of the language or how to make sentences or the grammar of that language. The conversations alone teach the children. Hence conversations form a significant part of the teaching process. The sentence construction and grammar are not something that can be entirely taught by rules. They have to teach intuitively. That can only happen through a lot of reading and a lot of listening. It can be taken care of quickly as every conversation needs a topic. The topic can be given to the students in the form of written documents, which they have first to read, then form an opinion, and then have a conversation about it, or it can speak out. Then they can listen, understand, and also take part in the conversation.

5. Teaching with Sense of Humour – "Humour an Effective Medium of Teaching"

The sense of humour can also be an innovative teaching method. Everyone loves a teacher with an infectious sense of humour. Being humorous is a challenge. Using humour in teaching is a handy tool for both the teacher and the student. Humour strengthens the relationship between student and teacher, reduces stress, makes a course more exciting, and, if relevant to the subject, may even enhance recall of the material. Students always like lively and delightful personalities, and that's natural. This method involves learning through delight. For example, games like word-Antakshari, Spin-a-yarn, Role-

Playings, etc. are beneficial in developing their linguistic competence. Humour can relax people, reduce stress and tension, and thereby create an atmosphere conducive for learning and communication. It is easy to create humor in the classroom by reading books of jokes and to listen to professional comics. Observe reality and exaggerate it - much humour lies in observations about real life and truthful situations. If this method is used correctly, language-learning becomes more exciting and more comfortable. In conclusion, humour not only plays an essential role in the healing process but is also very important in education.

6. Newspaper

A newspaper is a valuable tool to teach students in the classroom. Reading English newspapers should be developed as a habit among students that will help them to improve their vocabulary and love for the language. Though the newspaper's primary purpose is to provide news to the public, for students, it teaches about the nuances of the language through the news. A unique component of the newspaper is that it can be used and read according to the interest of the readers. Every reader's interest is fed by different columns like film, sports, cuisine, politics, ecology, and science. Students will get a wide choice of selecting and reading a newspaper according to their top interests. Rixon's (2011) investigation showed that an integral part of teaching should be in teaching activities.

7. Using the Multimedia

Multimedia sources like songs, movies, TV series, magazines, newspapers play a very vital role in improving our language. Multimedia helps the students to improve their language. This source is beneficial as it does not feel like education. It is something that the students will do in their spare time. The songs are the best way to communicate how to use a language to express our feelings. Movies are a widespread past time, but apart from that, most of the time, they are also very instructional and educational. Also, this method appeals to the students most of the time. They can connect with songs and movies. It helps them to understand the meaning of expressions, usage of tools of the language like comparisons, personifications, etc. These sources help them understand why such tools are necessary and also help them understand their usage. Hence this method is again very effective in teaching the language when traditional methods like reading newspapers, books, novels modified

along with some innovative ideas the entire learning and the teaching process is enriched and guarantees inefficient success learning.

8. Creative Assignments

This creative method assignments require effort on the teacher's part. Assignments help the students learn something on their own, and most of the time, they have to research something than write something upon it. In languages, the students should give assignments in which they have to modify something that already exists. The students should be given the base knowledge and data and then ask them to modify the data. For example, the students can be given a base story and then ask them to modify a part of it. It engages their creativity and also helps them overcome their difficulty in writing. Above all, it lifts the pressure of creating entirely new. The students can do it wholeheartedly and hence complete the learning experience that can gained from the assignment.

9. Teaching through Games

It is an exciting method of teaching. Students and children generally tend to like games and want to play them more and more. Traditional methods dictated for study and games to be separate, but the fact remains that the students tend to be more interested in playing games rather than sitting down to study. Any logical reasoning would dictate us to combine the two aspects to solve the problem. The games part of learning would help the students keep their interest as the desire to win is very strong. It keeps us going, and when included with different aspects of learning, the learning process would continue almost throughout the day without the children getting tired or bored of studying.

10. Word Games

An essential part of any language is vocabulary. To understand the meaning of the words and to use them in day-to-day life is a challenging task and games can help the students overcome this difficulty. Games like scrabble, housie, etc. have been designed for this specific purpose. These games are just based on words and help the students develop their vocabulary. In addition to these elementary games can be played to help improve the word database of the students, such as simple dictation competitions, synonym competitions,

words puzzle, anagrams, and hangman. All these games are very addictive and help a lot in improving our vocabulary as whenever the student hears a new word the first question that comes up is "what is its meaning?" and in this way the vocabulary improves and most of the times, we don't even have to consult the dictionary.

ll. Debates and Elocutions

Most of the time, competitions like debates and elocutions also help the students a lot in learning the language as the aspect of the competitions keeps them at best in conversations. It forces them to use the best possible construction of sentences to put forward their opinions and to use proper vocabulary etc. It is a vital tool in helping them learn the language. Also, these competitions help them address large crowds, which is a very important part of personality development.

Conclusion

Krashen and Tarrell (1983) are of the view that 'Language acquisition can take place only when people understand messages in the target language.' Through understanding the level of students' learning abilities and capabilities, teachers can focus on providing a variety of activities to students to develop their language learning skills. A teacher should create a friendly atmosphere in the classroom in which learners would feel comfortable being a part of the learning process. The teacher should encourage and welcome ideas from the students without any prejudice. A teacher should give enough private space to students to allow them to think critically and develop their lateral thinking for their better future. Using innovative methodologies in teaching English in the classroom will pave a positive way for students to learn the language meaningfully. Students will understand the significance of learning English as a second language without any fear, which will help them to equip with the power of confidence and achievement. Teachers should involve wholeheartedly while designing tasks for students, as every student in the classroom should be involved and benefited. Teachers should also concentrate on providing active curriculum development for students with learning-driven nature instead of an examination-driven nature scenario.

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Game-Based Teaching: Creative Method for Education

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The present paper discusses the Game-Based Teaching as a creative method for Education. The paper concludes that, the value of game-based teaching lies in its ability to foster meaningful learning experiences that empower students to thrive in the digital age, and it is imperative for educators, policymakers, and researchers to embrace and invest in its continued exploration and implementation.

Key words: Game based teaching, creative method, technology, gamification

Introduction

Teaching involves guiding, instructing, and facilitating learning experiences to help individuals acquire new understanding and abilities by imparting knowledge, skills, and values, typically in a structured setting such as a classroom or educational institution. To instruct students using various methods, creative teaching plays a vital role in this field.

Creative teaching methods involve innovative approaches to instruction that engage students in active learning, stimulate their curiosity, and encourage critical

thinking. These methods can include interactive activities, project-based learning, problem-solving tasks, role-playing, gamification, multimedia presentations, and incorporating real-world examples into lessons. The goal is to make learning enjoyable, meaningful, and memorable for students while fostering their creativity and enhancing their understanding of the subject matter. I intend to continue my paper presentation by focusing on game-based teaching as the optimal topic to explore further, particularly in relation to the current scenario.

Contextualization in Game-Based Teaching

Game-based teaching draws upon a rich theoretical framework to optimize learning experiences. Constructivism, a foundational principle, posits that learners actively construct knowledge through interaction with their environment. In game-based teaching, this manifests as students engaging in problem-solving, critical thinking, and decision-making within the game's context, leading to deeper understanding and retention. Engagement theory underscores the importance of learners' active involvement and emotional investment in the learning process. Games inherently facilitate this by offering challenges, rewards, and feedback mechanisms that sustain motivation and focus on learning objectives.

Additionally, gamification principles, such as setting clear goals, providing progression, and offering immediate feedback, enhance engagement and motivation by structuring the learning experience within the game environment. By integrating these theories, game-based teaching creates immersive and interactive learning environments that promote learning through active participation, foster intrinsic motivation, and elevate student engagement and achievement.

The theoretical framework in game-based teaching integrates the principles of Constructivism, Engagement Theory, and Gamification. It emphasizes active participation, meaningful interactions, and intrinsic motivation within immersive game environments. The framework recognizes that learners construct their understanding through hands-on experiences, collaboration, and problem-solving, fostering critical thinking and knowledge retention. This approach enhances engagement, motivation, and deeper learning outcomes by

utilizing game elements and mechanics to create enjoyable and rewarding learning experiences aligned with learners' cognitive development and socio-cultural contexts.

Games facilitate learning by providing interactive experiences, immediate feedback, and intrinsic motivation. They offer progressively challenging tasks that promote mastery and skill development. Social interactions within games foster collaboration and communication skills. Personalization options cater to individual preferences, increasing engagement. Overall, games create dynamic learning environments that motivate students to actively participate and excel.

Types of Educational Gaming Experiences

Different categories of educational games offer versatile learning experiences across various subjects. Serious games like "Foldit" engage players in scientific problem-solving, applicable in healthcare, business, and environmental science. Simulations such as "SimCity" provide hands-on experience in city-building, relevant for economics, physics, and history education. Puzzles like "Portal" enhance problem-solving skills in mathematics, logic, and computer programming. Interactive fiction games like "Zork" immerse players in narratives, beneficial for language arts and history. Augmented reality games like "Pokemon Go" bring virtual elements into the real world, useful for geography, biology, and art education. Role-playing games such as "Classcraft" integrate gamification into classrooms, supporting language learning, social studies, and character education. These diverse educational game categories cater to varied learning styles and objectives, offering engaging and effective ways to reinforce concepts and skills across disciplines.

Different categories of educational games along with examples and potential applications in various subject areas includes:

Serious Games

Serious games are designed with a primary purpose other than pure entertainment, such as education, training, or social change. These games often simulate real-world scenarios and allow players to make decisions and see the consequences of their actions. Example: "SimCity" allows players to build and

manage their own virtual cities, teaching concepts of urban planning, resource management, and environmental sustainability. Potential applications: Serious games can be used in subjects like civics, economics, environmental science, and engineering to simulate complex systems and promote critical thinking and decision-making skills.

Simulations

Simulations replicate real-world processes or situations and allow players to interact with them. They provide hands-on learning experiences in a safe and controlled environment. Example: "Flight Simulator" allows players to pilot various aircraft and experience realistic flying conditions. Potential applications: Simulations can be used in subjects like aviation, medicine, engineering, and business to provide experiential learning opportunities and practice skills in a risk-free environment.

Puzzles

Puzzle games challenge players to solve problems or complete tasks by using logic, strategy, and spatial reasoning. They often require critical thinking and problem-solving skills to progress. Example: "Portal" is a puzzle-platform game where players use a portal gun to create portals and navigate through levels. Potential applications: Puzzle games can be used in subjects like mathematics, logic, computer science, and language arts to reinforce problem-solving skills and logical reasoning.

Interactive Fiction

Interactive fiction games, also known as text adventures, present players with a narrative and allow them to make choices that influence the outcome of the story. Players engage with the game through text-based commands or choices. Example: "Zork" is a classic interactive fiction game where players explore a fantasy world and solve puzzles to progress the story. Potential applications: Interactive fiction games can be used in subjects like literature, history, creative writing, and ethics to engage students in storytelling, decision-making, and exploring ethical dilemmas.

These categories of educational games offer diverse opportunities for learning across various subject areas, catering to different learning styles and interests. Integrating these games into educational settings can enhance

engagement, promote critical thinking, and provide immersive learning experiences for students.

Exploring Diverse Success Stories: Game-Based Teaching Initiatives in Various Educational Environments:

Few examples of successful game-based teaching initiatives across different educational settings

a. DragonBox

DragonBox is a series of educational math games designed for children. One case study involved a primary school in Norway where DragonBox was integrated into the curriculum for 7th-grade students. The game was used to teach algebra concepts. Students reported increased motivation and engagement with math, and their performance on algebra assessments improved significantly compared to traditional teaching methods.

b. Foldit

Foldit is an online puzzle video game about protein folding. Researchers at the University of Washington developed it to crowdsource solutions to complex scientific problems. Foldit has been used in undergraduate biology courses to teach students about protein structure and function. Students worked collaboratively to solve protein folding puzzles, leading to deeper understanding of biological concepts and improved problem-solving skills.

c. MinecraftEdu

MinecraftEdu is an educational version of the popular game Minecraft. One case study involved a high school in Sweden where MinecraftEdu was used in history and social studies classes. Students recreated historical events and periods within the game, fostering creativity and critical thinking. Teachers reported increased student engagement and enthusiasm for learning history, and students demonstrated improved understanding of historical concepts.

These examples showcase how game-based teaching initiatives can be successfully implemented across various educational settings. Key insights

include the importance of aligning game content with curriculum objectives, providing opportunities for collaboration and problem-solving, and integrating feedback mechanisms to track student progress and adjust teaching strategies accordingly. Overall, these initiatives demonstrate the potential of game-based teaching to enhance student learning outcomes and foster a positive learning environment.

Positives of Game based teaching

Using games in education offers several advantages

i. Increased Student Engagement

Games capture students' attention and motivate them to actively participate in learning activities, leading to higher levels of engagement and enthusiasm for learning.

ii. Improved Retention of Information

Interactive and immersive gameplay experiences help students retain information more effectively by providing memorable and meaningful learning experiences.

iii. Development of Problem-Solving Skills

Games often present challenges and puzzles that require critical thinking and problem-solving skills to overcome. By engaging in gameplay, students can develop and enhance these essential cognitive skills.

iv. Opportunities for Personalized Learning

Games can be tailored to individual student needs, allowing for personalized learning experiences that cater to different learning styles, paces, and preferences.

Overall, incorporating games into education can foster a more dynamic and effective learning environment, where students are actively engaged, motivated to learn, and empowered to develop essential skills for success.

Obstacles and Factors to take into Account

Addressing common challenges associated with implementing game-based teaching requires proactive strategies:

a) Access to Technology

Not all students may have access to the necessary technology or devices. To overcome this, schools can provide access to computers or tablets during class time, offer alternative offline game-based activities, or leverage low-tech options such as board games or card games.

b) Time Constraints

Integrating games into an already packed curriculum can be challenging. Teachers can strategically incorporate short, focused game-based activities into lessons, utilize games as formative assessment tools, or designate specific class time for game-based learning to ensure it aligns with learning objectives.

c) Assessment and Accountability

Assessing learning outcomes from game-based activities can be less straightforward than traditional assessments. Teachers can design rubrics or scoring guides tailored to specific game-based tasks, integrate game performance data into overall assessment metrics, or use reflective activities to encourage students to articulate their learning experiences and insights gained from gameplay.

d) Teacher Training and Support

Many educators may feel unprepared or hesitant to incorporate game-based teaching methods. Providing professional development opportunities, resources, and support networks can empower teachers to confidently integrate games into their teaching practices and leverage their potential effectively.

e) Equity and Inclusion

It's essential to ensure that game-based learning experiences are accessible and inclusive for all students. This includes considering

factors such as language barriers, cultural relevance, and diverse learning needs when selecting or designing games. Additionally, fostering a supportive and inclusive classroom culture can help create an environment where all students feel valued and engaged in the learning process.

By addressing these challenges and implementing strategies to overcome them, educators can maximize the effectiveness of game-based teaching and create engaging and impactful learning experiences for their students.

Optimal Methods

When incorporating games into teaching practice, educators should consider factors such as alignment with learning objectives, appropriateness for diverse learners, and relevance to the curriculum. When selecting or designing educational games, prioritize those that offer engaging gameplay while reinforcing targeted concepts or skills. Integrate games strategically into lesson plans by clearly articulating their connection to learning objectives and providing clear instructions to students. Encourage collaboration and discussion during gameplay, and differentiate instruction to accommodate diverse learning needs.

Assess student learning outcomes through a variety of methods, including observations, reflections, and in-game tasks, and provide timely and constructive feedback to support ongoing learning and growth. Reflect on the effectiveness of game-based teaching practices and iterate as needed to enhance student engagement and achievement. Additionally, seek out professional development opportunities to further develop skills in game-based teaching methods and stay informed about best practices in the field. Some practical tips and best practices for educators interested in incorporating games into their teaching practice:

Align games with learning objectives

Ensure that the educational games you choose or design align closely with the learning objectives of your curriculum. Identify specific concepts or skills you want students to learn or reinforce through the game.

Select appropriate games

Choose games that are age-appropriate, relevant to your subject matter, and engaging for your students. Consider factors such as complexity, theme, and interactivity when selecting games for different grade levels and learning styles.

Provide clear instructions

Before introducing a game to your students, provide clear instructions on how to play, the learning goals of the game, and any rules or guidelines they need to follow. Clarify expectations and encourage active participation.

Integrate games into lesson plans

Integrate games into your lesson plans as supplemental activities or as part of larger learning units. Design activities that seamlessly incorporate game-based learning experiences into your existing curriculum.

Facilitate reflection and discussion

After students play the game, facilitate reflection and discussion to help them make connections between the game and the concepts they learned. Encourage students to share their experiences, insights, and strategies.

Assess student learning

Use a variety of assessment methods to evaluate student learning during and after game-based activities. This can include quizzes, discussions, written reflections, or performance-based assessments that demonstrate understanding of the concepts covered in the game.

Provide feedback

Offer timely and constructive feedback to students to help them understand their progress, identify areas for improvement, and celebrate their achievements. Use feedback to reinforce learning objectives and encourage continued engagement with the game.

By following these tips and best practices, educators can effectively incorporate games into their teaching practice, creating engaging and meaningful learning experiences for their students.

Future direction

The future of game-based teaching holds immense potential with emerging technologies reshaping educational game design. Artificial intelligence (AI) is poised to revolutionize personalized learning experiences within games by adapting content, difficulty levels, and feedback mechanisms to individual student needs and learning styles. AI-driven tutors embedded within educational games can provide real-time assistance and personalized guidance, enhancing student engagement and comprehension.

Furthermore, virtual reality (VR) technologies offer immersive and interactive learning environments, allowing students to explore complex concepts in three-dimensional space. VR-based educational games can simulate realistic scenarios and environments, providing hands-on learning experiences that are otherwise inaccessible in traditional classrooms. As these technologies continue to advance, the integration of AI and VR into game-based teaching is likely to become more widespread, leading to more personalized, engaging, and effective learning experiences for students.

Additionally, gamification elements such as badges, leaderboards, and quests are increasingly being incorporated into educational games to motivate and incentivize learning. These gamification techniques can promote healthy competition, collaboration, and goal-setting among students, further enhancing their learning experiences. Furthermore, mobile technologies and cloud-based platforms enable seamless access to educational games across different devices and locations, making learning more flexible and accessible to students worldwide.

As the field of game-based learning continues to evolve, interdisciplinary collaborations between educators, game designers, psychologists, and technologists will play a crucial role in developing innovative solutions that address diverse learning needs and preferences. Ultimately, the future of game-based teaching holds promise for transforming education by harnessing the power of emerging technologies to create engaging, immersive, and personalized learning experiences for students.

Artificial intelligence (AI) will play a central role, enabling games to dynamically adjust content and challenges based on individual student performance and learning preferences. Virtual reality (VR) and augmented

reality (AR) technologies will continue to revolutionize game-based learning by offering immersive, interactive environments that provide unparalleled opportunities for experiential learning and real-world simulations.

Additionally, advancements in data analytics and machine learning will enable educators to gain deeper insights into student learning patterns and tailor game-based interventions more effectively. Furthermore, the integration of gamification elements into non-game contexts and the use of game-based learning platforms will further expand the reach and impact of game-based teaching across diverse educational settings and learner demographics. Overall, the future of game-based teaching holds immense promise for transforming education by fostering engagement, enhancing learning outcomes, and catering to the individual needs of every learner.

Conclusion

This paper highlights the transformative potential of game-based teaching as a pedagogical approach, emphasizing the increasing immersion, adaptability, and personalization of game-based learning experiences due to advancements in educational game design and technology, including artificial intelligence (AI), virtual reality (VR), and augmented reality (AR). It underscores the importance of leveraging these innovations to foster engagement, improve learning outcomes, and cater to diverse learner needs. For educators, policymakers, and researchers, embracing game-based teaching offers opportunities to enhance teaching effectiveness, address educational equity, and drive educational innovation.

I have explored the transformative potential of game-based teaching as a pedagogical approach. I highlighted the advantages of using games in education, including increased student engagement, improved retention of information, development of problem-solving skills, and opportunities for personalized learning. Through case studies and examples, I illustrated successful implementations of game-based teaching initiatives across various educational settings, showcasing its effectiveness in enhancing student learning outcomes. Furthermore, I discussed emerging trends in educational game design and technology, such as artificial intelligence and virtual reality, and their potential to revolutionize the field of game-based learning.

The implications of game-based teaching extend beyond the classroom, impacting educators, policymakers, and researchers alike. Educators can leverage game-based teaching to create dynamic and interactive learning environments that cater to diverse student needs and preferences. Policymakers can support the integration of game-based teaching into educational curricula by providing resources and infrastructure to facilitate its implementation. Researchers can further explore the effectiveness of game-based teaching through empirical studies and interdisciplinary collaborations, advancing our understanding of its pedagogical benefits and best practices. Ultimately, the value of game-based teaching lies in its ability to foster meaningful learning experiences that empower students to thrive in the digital age, and it is imperative for educators, policymakers, and researchers to embrace and invest in its continued exploration and implementation.

Recommendations for further exploration and implementation include investing in teacher training and professional development in game-based teaching methods, promoting collaboration between educators and game designers, and conducting rigorous research to assess the impact of game-based learning on student outcomes. Ultimately, embracing game-based teaching holds promise for revolutionizing education and preparing students for success in the 21st century.

[1]

[1] "Game based teaching refers to the integration of games into educational practices to enhance learning outcomes. [^1] This approach leverages the inherent engagement and motivation that games provide to create dynamic learning experiences [^2], fostering active participation and deeper understanding among students."

[^1]: Gee, J. P. (2007). *What Video Games have to teach us about Learning and Literacy.* Palgrave Macmillan.

[^2]: Squire, K. (2006). *From Content to Context: Videogames as Designed Experience*. Educational researcher, 35(8), pp.19-29.

Brain Mechanics' Influence on Learning

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The brain and spinal cord make up the central nervous system, of which there are two subtypes: the somatic nervous system (SNS) and the autonomic nervous system (ANS). Peripheral nerve fibres, which receive sensory information from the central nervous system (CNS), and motor fibres, which provide information to skeletal muscle, make up the peripheral nervous system (PNS). The smooth muscles of the glands and viscera are controlled by the autonomic nervous system (ANS). More than 100 billion neurons make up the mature human brain, which mediates language, movement, perceptions, emotions, thinking, memory, and task-evoked responses. The three main brain areas are the brainstem, cerebellum, and cerebrum. The left and right hemispheres of the cerebrum are separated by folds and convolutions.Cerebellar peduncles connect the cerebellum to the brainstem, where it regulates posture, balance, and motor coordination. The 20–25-year neurulation process starts in the ectodermic zone of the embryo. Grey matter shrinks and white matter expands with age; between the ages of three and eighteen, the corpus callosum grows by around 1.8% every year. Throughout adolescence and the early stages of adulthood, the structural growth of the grey matter in the frontal lobes slows down after reaching its maximum volume between the ages of 11 and 12.In addition to short- and long-term

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memory, the brain stores knowledge in various ways. While the five senses are at work, it collects and organises sensations of the outside world, allocating some to conscious attention and grouping others into a set of continuously refreshed mental representations. The brain transmits both chemical and electrical impulses, with potassium, sodium, and chlorine being the most commonly involved ions in reopened channels. The communication of the brain is also significantly influenced by calcium channels, particularly those found in the presynaptic boutons of axons. All of these intricate organisations support human participation in active learning, which entails the synchronisation and integration of the aforementioned elements. This article discusses the spatial area, mechanism, and complexity of learning in relation to brain function.

Keywords: Brain, Sensory information, neurons, organises, chemical and electrical impulses, axons and learning.

Introduction

The central nervous system is made up of the brain and spinal cord (CNS). The somatic nervous system (SNS) and the autonomic nervous system (ANS) are two subtypes of the peripheral nervous system (PNS). Peripheral nerve fibres that gather sensory data from the central nervous system (CNS) and motor fibres that transmit data from the CNS to skeletal muscle make up the peripheral nervous system (SNS). The sympathetic nervous system (SNS), parasympathetic nervous system (PaNS), and enteric nervous system (ENS) make up the autonomic nervous system (ANS), which regulates the smooth muscle of the viscera and glands. Numerous head and body parts are connected to the brain by nerves, which results in a variety of voluntary and involuntary actions. Basic ANS functions include breathing, digesting, sweating, and shaking, which are all unconscious processes. The most neurochemically varied branch of the PNS, the ENS supplies the gastrointestinal system with intrinsic innervation.

Over a hundred billion neurons, or information-processing cells, make up the mature human brain, making it undoubtedly the most intricate biological system. The brain is a component made of nerve tissue that mediates movement, senses, emotions, language, thought, memory, and task-evoked response. The cerebrum, cerebellum, and brainstem are the three primary regions of the human brain. The cerebrum, which makes up the majority of the brain, is separated into the left and right hemispheres. Its surface is covered in folds and convolutions; the ridges between the folds are referred to as gyri, and the valleys between the gyri are referred to as sulci (plural of sulcus). The sulci are referred to as craters if they are deep. The cerebral cortex, an exterior layer of grey matter, and the inner subcortical white matter of both cerebral hemispheres are present. The cerebellum, which is situated above the foramen magnum in the posterior cerebral fossa, is primarily responsible for controlling posture, balance, and motor coordination. It consists of the deep cerebellar nuclei and the cerebellar cortex, the latter of which has three layers: the granular, Purkinje, and molecular layers. Through cerebellar peduncles, the cerebellum is connected to the brainstem. The medulla, pons, and midbrain are located in the brainstem. It is situated between the spinal cord and the base of the cerebrum, anterior to the cerebellum.

The Formation of the Human Brain

The neurulation process, which begins in the embryo's ectodermic zone and spans an average of 20 to 25 years to mature, is the beginning of human brain development. Beginning with the neural tube creation in the third or fourth week of gestation, it happens in a methodical and sequential order. The cerebral cortex folds to expand in size and surface area, resulting in a more complex structure, as a result of cell migration and proliferation that follows. Failure of this migration and proliferation results in lissencephaly, a smooth brain devoid of gyri and sulci. The brain's overall design is nearly complete at birth, and by the time a child reaches five years old, their brain's volume has grown to roughly 95% of that of an adult. Overall, as one ages, the grey matter shrinks and the white matter grows. Between the ages of three and eighteen, the corpus callosum, the most noticeable white matter structure in the brain, grows by about 1.8% annually. Higher-order cognitive abilities can advance because the corpus callosum conjugates the activity of the left and right hemispheres. The frontal lobes' grey matter continues to grow structurally until it reaches its maximum volume between the ages of 11 and 12, at which point it slows down during adolescence and the early stages of adulthood.

Similar to this, the grey matter in the temporal lobe develops in stages, peaking in size between the ages of 16 and 17 and then slightly declining.

How is the Brain Functioning?

The brain consumes 20% of the body's oxygen overall, 15% of the heart's output, and 2% of the body mass of an individual. 20% of the energy supply to the body is used by the brain while it is at rest. The energy consumption of the brain improves by an additional 5% when it is performing a task, indicating that intrinsic functions account for the majority of the brain's energy consumption. Glucose is the primary energy source for the brain. The brain's main energy source in low-glucose conditions is ketone bodies. The brain can use lactate as an energy source when exercising. Neurons in the developing brain form a circuit between neurons that will remain in place throughout adulthood by responding to molecular cues from regulatory cells such as astrocytes to decide where to be, what kind of neurotransmitter to release, and which other neurons to communicate with. Developed neurons in the adult brain grow axons and dendrites to connect with nearby neurons, fitting in their proper locations. Neurotransmitters released into the 20–50 nm synaptic space allow neurons to communicate with one another. The presynaptic neuron is the neuron that releases the neurotransmitter into the synaptic space, while the postsynaptic neuron is the cell that absorbs the neurotransmitter. When a presynaptic neuron experiences an action potential, calcium enters the synaptic gap, causing neurotransmitters to be released from their storage vesicles. Next, the neurotransmitter moves to the postsynaptic neuron, where it attaches itself to receptors to modify the neuron's activity. Enzymes quickly clear the synaptic area of neurotransmitters. Myelin is produced by the oligodendrocytes in the brain. To enable quick electrical impulse passage across axons, myelin surrounds them with insulating sheaths. The nodes of Ranvier are openings in the myelin sheath that permit sodium to enter an axon and assist sustain the electrical impulse's velocity as it passes through the axon. This process of "jumping" electrical impulses from one node to another is known as saltatory nerve conduction. It guarantees that electrical signals can travel great distances without signal degradation and do not lose their velocity.

Chemical and Electrical Signals: How do they Work?

The brain retains knowledge in forms other than short- and long-term memory. The brain gathers and arranges perceptions of the outside world all the while the five senses are working, assigning some to conscious attention and gathering others into a set of constantly refreshed mental images. Even though we rarely recognise the entire scope of these mental images or investigate them closely, they are extremely significant to our cognitive processes and our capacity to perform even the most basic planned action or predictive step—such as tracking a rapidly moving target with our eyes. Our abstract brain processes, concepts, and thoughts are all based on these mental representations. There are two types of signals that are actually transferred throughout the brain, viz., chemical and electrical. The synapse, where chemicals can change the electrical conditions outdoors and outside the cell membrane, is where the two interdependent forms meet. A vagrancy- whams cell's membrane is considered to be polarised when it has a little negative charge (about -70 millivolts, or thousandths of a volt, mV), relative to the outside. There is a truly minor fat of negatively charged molecules inside the cell, which is the source of the membrane's negative charge and resting implicit. positively charged sodium ions (Na) can't move through a membrane when it's at rest; but, when a membrane is actuated, it curtly becomes passable. The membrane shortly reverses its opposition, with a lower positive charge inside than outside, as a result of the Na ions flowing in and being drawn in by the internal negative charge. The sodium channels near formerly further after this brief phase, which lasts lower than a millisecond. positively charged ion flux is reversed when potassium channels (K) open and K ions pass through the membrane. (These channels are both appertained to as voltage-gated, which means that variations in electrical charge across the membrane beget them to open or close.) The membrane gests a brief hyperpolarization during three milliseconds, reaching a charge of roughly -80 mV, before returning to its sleeping eventuality. The membrane is in the refractory phase throughout this time, and the sodium channels stay unrestricted. As long as the sodium channels are closed, an action implicit — a truly brief pulsation of positive membrane voltage is transferred forward down the axon and can't propagate backward. still, a fresh impulse may arise to elicit an action implicit once the membrane has recovered to its sleeping eventuality, at which point the cycle can renew. Sodium, potassium, and chlorine are the most constantly involved ions in restarted channels, which are current throughout the nervous system and affect in the simultaneous passage of ions in and out of the cell membrane. also significant are calcium channels, especially in the presynaptic boutons of

axons. positively charged calcium ions (Ca^2) outside the cell considerably overbalance those outside when the membrane is at its sleeping eventuality. On the other hand, calcium ions submerge the cell upon the appearance of an action eventuality. A near vagrancy- whams cell receives the signal from the release of neurotransmitter into the synaptic split, which is caused by an influx of calcium ions. Neurotransmitter molecules are released into a synaptic split, where they attach to particular receptor spots on the postsynaptic side (the dendrite or dendritic spine), changing the postsynaptic membrane's ion channels in the process. Certain neurotransmitters affect in the opening of sodium channels, which permits the entry of Na ions and a reduction in the negative charge within the cell membrane. A vagrancy- whams impulse can be transmitted if a significant number of these capabilities are entered in a brief period of time, as this will depolarize the membrane sufficiently to beget an action eventuality.

The excitatory neurotransmitters are the mixes that have the capability to produce this. In distinction, other chemical substances induce the opening of potassium channels, which increases the release of K ions from the cell and reduces the liability of excitement; these neurotransmitters are appertained to as inhibitory. A single neuron can admit signals from multiple excitatory and inhibitory synapses at formerly due to the large number of spots that are available on its dendrites and cell body. These signals constantly amount to a rough balance; a specific neurotransmitter is only considered to be acting when the net eventuality of the membrane in a particular position change noticeably from its resting state. It's interesting to note that in the overall balance distance of the membrane, the significance of a given synapse varies with its contiguity to the point at which the axon exits the vagrancy-whams cell body. This means that multiple inhibitory capabilities closer to the soma may stamp multiple excitatory capabilities at the ends of the dendrites. Other kinds of synapse regulate the release of neurotransmitters into the synaptic split, where they go on to affect the postsynaptic channels as described over. Once believed to be fairly small, the list of recognised neurotransmitters keeps expanding as farther chemicals are discovered to be produced by neurons, trapped in presynaptic boutons, and bound by particular receptors on the postsynaptic membrane. further than two dozen substances have been designated as neurotransmitters despite strict criteria, and several farther promising contenders are being considered. Indeed, a casual examination of the mortal brain can inspire amazement at the multitudinous connections, intricate structure, and complicated processes all kept alive on

bitsy fibres just a numerous millionth of a metre in fringe. still, a slightly near relationship with this three- pound organ inside our heads — one that is predicated on seeing the brain function and learning the principles that bolster it — can produce commodity further fulfilling than awe the sense of mastery and fulfilled curiosity that comes with appreciation.

Terms Related to Learning

Operating memory: The capacity to retain information while addressing an issue is known as operating memory. Teachers must give directions to young children one at a time. Instructions can be provided to late elementary school students in a condensed set of steps. Asking kids who struggle with this to repeat the instructions helps ensure they understand what is expected of them. Steps should be listed on the chalkboard for added convenience. Working memory issues are associated with issues related to concentration and/or disorientation.

Organisational skills: The abilities known as organisational skills enable a person to assess the situation, go over the actions taken, and decide on a new course of action. Children with strong executive function abilities are able to comprehend past events and adapt their behaviour to suit current circumstances. Story maps and exercises that question "what do you think may happen next in the story?" are two ways teachers can support the development of executive function in their students.

The brain's capacity to synthesise information is accompanied by the development of the ability to plan and organise. These abilities grow gradually as one gains experience and grows. Instructors can help foster these skills by first having students consider the processes involved in finishing a job. It's also beneficial to teach the child problem-solving techniques.

- What should you teach them first?
- What should you do next?

Direct instruction in outlining can help older kids with their writing. Students might also benefit from using day planners and calendars to schedule the completion of longer assignments.

Areas of Learning

The child's development of motor abilities, visual-motor coordination, language, reasoning, social comprehension, and memory occurs in the early elementary years. Concepts come together into coherent units that can be used at a later time as learning is integrated into neural networks. This is the beginning of the ability to generalise and abstract, which lasts until adulthood. The youngster picks up social skills and perspective-taking at this period as well. Establishing suitable relationships with others requires the ability to recognise one's place in society. These abilities are intimately linked to the development of the right hemisphere's tracts as well as the limbic system, which is the brain region responsible for processing emotions. Connecting one area of the brain to another, a tract is often made up of axons that are insulated by myelin. White matter is the aggregate term for tracts. The child's brain activity is mostly focused on the posterior regions of the brain, which are where the areas for auditory, visual, and tactile functioning intersect, during the later elementary and early middle school years. This junction, known as the brain's association area, often houses previously learned and stored information.

In adolescence, the frontal lobes start to fully develop. During adolescence and adulthood, the maturation process continues. The human brain's frontal lobes are a relatively recent evolutionary development that enable behaviour evaluation and adaptation depending on prior experiences. Additionally, it is believed that empathy and social comprehension are located in the frontal lobes. About the age of twelve, the frontal white matter tracts start to form more finely and continue until the twenties. The development of formal procedures, proper social behaviours, and higher cognitive abilities all depend on this area of the brain. These tracts appear to develop in an orderly manner, with experience seemingly aiding in subsequent development. Some teenagers' brain growth corresponds with our expectations for their education. Others believe that there is a mismatch between biology and education and that the two do not correspond. In this situation, the teenager is frequently unable to comprehend concepts that are more complex and is unable to get the most out of their education. Even though learning difficulties can be the result of immaturity, they can also be a sign of more severe attentional or learning issues. With the development of increasingly sophisticated connecting tracts in the frontal lobes, teenagers are expected to "think" about and modify their actions.

Regretfully, teenagers are more impulsive and prone to risk than adults during this period. This propensity is somewhat associated with both changes in the brain and variations in hormonal development.

The way the Brain Executes Learning

Important alterations occur in the brain during learning, including the formation of new neuronal connections. We refer to this process as neuroplasticity. Your brain's capacity to form, strengthen, break, or otherwise modify connections between neurons. These connections get stronger the more we practise. The messages (nerve impulses) are sent faster and more efficiently as our connections get stronger. That's how we improve at whatever we learn, be it reading, art, sports, or anything else. The connections between our neurons degrade and may eventually be removed or trimmed when we stop practicing something. That's why, if you haven't read all summer, it could feel really hard to pick up reading again when classes resume. Nonetheless, certain neural networks may become so powerful that the connections never fully break. The brain is dynamic (plastic); it changes and is not static, as seen by the way learning rewires our neurons. Learning occurs when our neurons are continually activated by practicing or rehearsing. These alterations begin throughout a person's pregnancy and continue throughout their lifetime.

Repeatedly activating the neurons

Engaging in a lot of practice, attempting to recall knowledge by answering questions on tests or explaining ideas to a buddy, Repetition of activation is a key strategy because stronger and more efficient connections between neurons require several activations. The "trail" between neurons is established through repeated exercise. A baby cannot learn to walk and talk in a single day; they would have needed a lot of practice. It's crucial to remember, though, that merely reading or quickly scanning maths tables won't do much to link the neurons. We must extract the arithmetic tables from our memory in order to establish connections between the neurons. To put it another way, in order to make connections, we need to make an effort to remember the response. Scientists believe that because the challenge signals that we are creating new connections, this "struggle" enhances learning. In addition, making mistakes when trying to recall what we have learnt might assist to fill in any gaps in our knowledge and show us which areas still require improvement. Exams and assessments can aid in learning retention more effectively than merely studying. In order to complete the exams, we must

retrieve the data from the neurons that store it. This will activate the connections and fortify them.

Aligning the neurons' activation

Practicing more quickly but more frequently. Studying for four periods of thirty minutes spread over a few days, for instance, allows your brain to take breaks and sleep, which improves your memory over time. This is an alternative to studying for two hours straight. Learning requires the recurrent activation of neurons, which entails knowledge retrieval. Researchers that examine how the brain learns have found that sleep and breaks in between learning sessions improve retention and reduce learning errors. Therefore, it would appear preferable to retrieve frequently during spaced practice periods rather than engaging in massed practice, which involves doing a task nonstop without a break.

For example, rather of dedicating three hours to studying or homework, which would likely leave us feeling weary nevertheless, we could divide this learning period into three one-hour slots or even six half-hour slots. To put it succinctly, we enable our brain to create stronger connections throughout practice sessions by spacing out the retrieval practice. Nerve impulses, or electrical signals, are received by the receptors from other neurons, much like electric outlets. Our neurons can communicate with other neurons more easily when they take a rest, which improves their performance. Lastly, we really gain from a free retrieval practice session throughout the night we sleep since during that time our brain reconnects the connections between the neurons that are active during the day. Similar advantages might also be obtained by napping.

Conclusion

Since learning takes place in the brain, maintaining neuronal activity throughout class or study sessions is essential. The two suggested learning strategies may improve our ability to learn by fostering the ideal environment for fortifying and solidifying the connections between our neurons. By spacing out our exercise and using the "trails" in our brains frequently, memory improves. We can now assist our brain in learning more effectively thanks to our growing understanding of how it functions and the use of supportive learning techniques. Early elementary school is where concepts start to come

together coherently in terms of motor skills, visual-motor coordination, language, reasoning, social comprehension, and memory. This time frame is associated with the limbic system, which processes emotions, and the tracts of the right hemisphere. The posterior regions of the brain, which are where auditory, visual, and tactile functions converge, are the main centres of brain activity. The frontal lobes begin to fully develop in adolescence, allowing for the assessment and modification of behaviour. Adolescents' developing brains and hormones make them more impulsive and take chances than adults. The creation of new neural connections is a result of neuroplasticity in the brain. Learning depends on this mechanism because it enables the brain to create, maintain, sever, or alter connections between neurons. Key learning mechanisms include matching neuronal activity and repeating activation. Retention is increased and learning errors are decreased with sleep and intervals between learning sessions. Hence, the entire brains coordinated and comprehensive functioning is involved in the learning mechanism.

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Role of Teacher in Promoting Employability of Graduates

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This study thoroughly examines the role of faculty in promoting graduate employability. However, students and teachers should be familiar with a broader knowledge and understanding of employment. The quality of the university curriculum and its supportive learning environment should be such that students' skills are enhanced. Also, universities are encouraged to take various initiatives to produce employable graduates. And collaborative learning helps graduates develop employability. Teachers play an important role in helping students develop these skills. The solution to this is imparting employability skills from a young age.

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Key words: Employability, Students Development, Collaborative learning, Skills

Introduction

Employability is: "a set of achievements – skills, understandings and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy."

Education is what unites all in India. Education is essential in everyone's life. Current educational system is completely different from the tradition. Quality and quantity of Indian education system and students' abilities, Based on that, teachers and students play a major role in this. All categories are there to inspire and enhance the skills of students and teachers. Currently, the use of technology has created major changes in the field of education. Here, students need to be inculcated with vocational education knowledge from an early age, because that is what determines the future in my opinion. Career oriented guidance and counselling should be provided to students in schools, colleges and universities. And teachers have an important role in developing practical skills in students. Everyone has to work hard for this and teachers have to adapt their learning and teaching methods accordingly. Thus the quantity and quality of education will be completely improved.

Employability Skills

Employability skills refer to a slew of practical skills that are required at a workplace. These may include the core skills the candidate would need to be employable at the company as well as secondary skills that are required to make them useful in the workplace outside of their professional capacity. A few of these skills are discussed below:

- *Communication Skills:* Employers often look for candidates who have above-par communication skills, mainly because they want seamless complication-free communication among different levels of management. This can be achieved only when the majority of the candidates have at least an average level of communication skills. However, communication skills are not just restricted to oral communication; it also includes written communication skills, listening skills, and interpersonal skills.
- *Teamwork:* Teamwork is, without a doubt, one of the most important skills one must possess in a corporate environment. Today, projects, especially ones that involve a multi-faceted approach to them, require a lot of hands from different departments, so if the employee is not a team player, they would not be an asset to the team. Skills required here include collaboration, conflict management, reliability, professionalism, and managing expectations.

- *Critical Thinking:* This is a skill without which no one can survive in the corporate world for long. It basically refers to the set of skills one needs to comprehend, analyze, and interpret the information provided to them and come up with a fast, cost-effective, and easy-to-implement solution to the problem as fast as possible. The faster and more reliable a person is at coming up with a solution, the better will be their critical thinking ability. These skills include problem-solving skills, creativity, analytical skills, deductive reasoning, and inductive reasoning.
- *Ethics:* Ethics refers to a person's moral code of conduct. It refers to an employee's capability to adhere to a certain set of moral principles that they will follow irrespective of the situation they are in. Readiness of compliance, integrity, discernment, and empathy all come under ethics.
- *Computer Skills:* Even though most people today have this, having adaptable computer skills is a definite plus when it comes to employability. The more computer applications you are familiar with, the better will be your chance of landing the job you desire.

How Teachers Can Help Students Develop These Skills

Hence, as it is clear from the things mentioned above, employability skills are vital in today's ever-evolving world of technology and innovation. Students, at an impressionable age, can be molded to become efficient and employable, but it depends on the teacher's skills as well. So here are a few tips that can help teachers cultivate and improve employability skills in students.

- *Conduct Debates in the Classroom:* Conducting debates in the classroom can help foster and improve several communication skills in one go, which include critical thinking, communication skills, teamwork as well as integrity. Good-natured well organized civil debates bring about a lot of nuanced character development in a person which is essential in their life to improve their character in the future.
- *Conducting Fun Activities:* Any type of activity that promotes the participation of students can essentially help in developing employability skills because it creates a sort of toned-down version of a corporate environment. A few students will automatically assume leadership roles while some others will be more submissive and good

at interpreting and executing instructions effectively. So, the more teachers organize and promote such activities, the better their employability will be in the future.

- *Promoting Professional Behavior in the Classroom:* As they say, old habits die hard. The younger they start behaving professionally in the classroom, the better. This does not mean that they should not be allowed their fair share of mischief in class. Small things like showing up to class on time and being respectful of each other are behaviors that can be applauded or even rewarded so that they continue to do so in the future as well. A small step in the right direction can go a long way.
- *Active Learning:* Active learning can help students develop leadership skills. Leadership is not a quality that a person is born with. It needs to be cultivated slowly over the years, learning from failures and improving on them through repeated attempts. Of course, some people are naturally more inclined towards leadership roles than others, but with enough practice, anyone can be an efficient leader. Teachers can help students take up leadership roles by making them the captain of a group project or the leaders of a group activity, which will not only help them, improve their leadership skills but also help them, improve their self-esteem. Click on the link to read more about how beneficial active learning can be.

Develop graduate employability through collaborative learning

Collaborative learning is a powerful pedagogical approach that can help improve student employability in higher education. A teacher can use collaborative learning to increase student engagement in these ways (Barkley, 2018; Harland & Deeler, 2016; Holmes & Hillier, 2018; Liu, Xiaohui & Cheng, 2020).

- *Encourage teamwork and collaboration:*
  Encourage students to work in teams and collaborate with each other on projects, assignments, and discussions. This helps them develop interpersonal and communication skills, which are highly valued by employers.
- *Develop leadership and management skills:*

Collaborative learning provides opportunities for students to take on leadership roles, delegate tasks, and manage group dynamics. These experiences can help them develop leadership and management skills, which are highly valued in the workplace.

- *Foster critical thinking and problem-solving skills:*
  Collaborative learning provides an opportunity for students to explore diverse perspectives and solve problems together. This helps them develop critical thinking and problem-solving skills, which are essential in many job roles.
- *Promote creativity and innovation:*
  Collaborative learning can inspire creativity and innovation by encouraging students to share ideas, experiment, and take risks.

Conclusion

Although employability seems to receive considerable attention and scholarly debate in the literature, there are still notable gaps around evidence that links successful attainment of work-ready skills to the impact graduate employability and employment, including the long-term career implications. There are few availability longitudinal studies exploring employability. Furthermore, there is a need to consider curriculum redesign with employability foundational to the curriculum, where students can identify and explicitly link to their learning activity to a desirable graduate competency. Advancing the education provided to post-secondary students is integral to effectively preparing them for a life-long career in their chosen field. Therefore, it is likely that employability, despite the considerable discussion already in the literature, will remain a key research direction and focus of scholarly debate for some time yet.

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Effectiveness of Metacognitive Strategies in Biology among High School Students

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This study investigates the effectiveness of metacognitive strategies in enhancing biology learning among high school students. Metacognitive strategies, encompassing planning, monitoring, and evaluating cognitive processes, are increasingly recognized as powerful tools for fostering deep understanding and academic success. The research employs quantitative analysis of post-test scores of controls and experimental groups. High school students are exposed to metacognitive interventions tailored to biology learning tasks, with a focus on self-regulation, reflection, and goal-setting. Results indicate significant improvements in students' biology knowledge, critical thinking skills, and self-efficacy following the implementation of metacognitive strategies. The study contributes to the growing body of research on metacognitive pedagogy and highlights its potential to enhance biology education, empowering students to become self-directed learners and proficient problem solvers in the field.

Key words: Metacognitive strategies, critical thinking, goal-setting and self-directed learning

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Introduction

In recent years, educators and researchers alike have turned their attention to the role of metacognitive strategies in enhancing student learning outcomes across various academic disciplines. This trend is particularly evident in the field of biology education, where fostering deep understanding and critical thinking skills is paramount. Metacognitive strategies, which involve planning, monitoring, and evaluating one's cognitive processes, offer a promising avenue for achieving these goals. This study delves into the effectiveness of such strategies specifically within the context of biology learning among high school students. This research aims to provide a comprehensive understanding of how metacognitive interventions tailored to biology tasks can positively impact student learning. Through this investigation, we seek to contribute valuable insights to the growing body of research on metacognitive pedagogy and its potential to transform biology education, ultimately empowering students to become self-directed learners and proficient problem solvers in the field.

Meaning And Definition of Metacognition

Metacognition, a fundamental concept in cognitive psychology and educational theory, refers to the ability to monitor, regulate, and control one's own thinking processes. At its core, metacognition involves an individual's awareness and understanding of their cognitive abilities, strategies, and limitations. It encompasses a range of mental activities, including planning, goal-setting, monitoring progress, evaluating outcomes, and reflecting on one's learning experiences. In essence, metacognition enables individuals to become active agents in their own learning process by consciously engaging in strategies to enhance comprehension, problem-solving skills, and overall academic performance. In the context of biology education among high school students, an understanding of metacognition is essential for effectively implementing strategies that promote deep understanding, critical thinking, and self-directed learning. This section of the journal paper will provide a comprehensive exploration of the meaning and definition of metacognition, laying the foundation for the subsequent discussion on the effectiveness of metacognitive strategies in biology learning.

Need of the Study

In the realm of education, particularly in the field of biology, there exists a pressing need to enhance students' learning experiences and outcomes. High school students often encounter challenges in comprehending complex biological concepts, applying critical thinking skills, and effectively problem-solving within the discipline. Metacognitive strategies offer a promising avenue for addressing these educational challenges. By empowering students to become more aware of their cognitive processes, strengths, and areas for improvement, metacognition can facilitate deeper understanding, enhance problem-solving abilities, and foster a greater sense of agency in the learning process. However, while the theoretical framework supporting the use of metacognitive strategies is well-established, there remains a need for empirical research to explore their effectiveness in specific academic domains, such as biology.

This study seeks to address this gap by investigating the effectiveness of metacognitive strategies in biology learning among high school students. By examining the impact of metacognitive interventions on students' biology knowledge, critical thinking skills, and self-efficacy, this research aims to provide valuable insights into the practical applications of metacognition in the context of biology education.

Objectives

1. To find the significant relationship between metacognitive awareness scale and post test scores of control group.
2. To find the significant relationship between metacognitive awareness scale and post test scores of experimental group.

Hypotheses

1. There is no significant relationship between metacognitive awareness scale and post test scores of control group.
2. There is no significant relationship between metacognitive awareness scale and post test scores of experimental group.

Review of Related Literature

Rajkumar (2010) conducted a study to analyse the role of metacognitive skills involved in the process of problem solving in physics among higher secondary students. The results of the study revealed that there was continuous and steady increase in the mean scores of the experiment group students in pre-test, post-test 1 and post-test 2 in all metacognitive skills. This showed that changing the learning environments; conducting group discussions and laboratory activities enhance the problem-solving skills in physics among higher secondary students.

Rahman et al (2011) conducted a study on the impact of some students' related factors on their metacognitive awareness. Results of the study revealed that metacognitive awareness was significantly correlated with internet use and library habits. Further the study revealed that children of highly educated parents were highly metacognitive aware than the children of less educated parents. Results further indicated that there was no significant difference in the metacognitive awareness of male and female students.

Lavinia et al (2011) conducted a study on the role of metacognition in reading comprehension of students in reading texts from science textbooks. A group of 137 pupils enrolled in ninth grade at three public schools was involved in the study. Participants completed a scale generated from the junior metacognitive awareness inventory and answered to three open questions. Results suggested that pupils generally, use various metacognitive strategies in reading science texts.

Research Instruments

1. A Biology lesson on the topic 'Transport in Plants' using metacognitive strategies was constructed and validated by the investigator and guide. (2023)
2. Metacognitive awareness scale-A Scale was adopted for the study which was standardized by Dr. M. Kanmani (2020).

Hypothesis: 1

There is no significant relationship between metacognitive awareness scale and post test scores of control group.

Table:1 Relationship between metacognitive awareness scale and post test scores of control group.

metacognitive awareness scale Vs Post test scores of Control Group	N	df	Calculated 'r' value	Remarks at level 5%
	30	29	0.54	S

(for df 29 the table value of 'r' is 0.35, S – Significant)

From the above table 1, it is inferred that the calculated 'r' value (0.54) is greater than the table value (0.35) for degree of freedom 29 at 0.05 level of significance. Therefore, the null hypothesis (H_0) is rejected. Hence it is concluded that there is significant relationship between metacognitive awareness scale and post test scores on achievement in Biology of control group students.

Hypothesis: 2

There is no significant relationship between metacognitive awareness scale and post test scores of experimental group.

Table:2 Relationship between metacognitive awareness scale and post test scores of experimental group.

metacognitive awareness scale Vs Post test scores of Experimental Group	N	df	Calculated 'r' value	Remarks at level 5%
	30	29	0.41	S

(for df 29 the table value of 'r' is 0.35, S – Significant)

From the above table 2, it is inferred that the calculated 'r' value (0.41) is greater than the table value (0.35) for degree of freedom 29 at 0.05 level of significance. Therefore, the null hypothesis (H_0) is rejected. Hence it is concluded that there is

significant relationship between metacognitive awareness scale and post test scores on achievement in Biology of experimental group students.

Major Findings

1. The calculated 'r' value (0.54) indicates that there exists significant relationship between metacognitive awareness scale in enhancing high school students' performance in biology assessments and post test scores of control group.
2. The calculated 'r' value (0.41) indicates that there exists significant relationship between metacognitive awareness scale in enhancing high school students' performance in biology assessments and post test scores of experimental group.

Conclusion

The findings of this study underscore the significant impact of metacognitive strategies on biology learning among high school students. The results show that there exists significant relationship between metacognitive awareness scale in enhancing performance in biology assessments and post test scores of control and experimental groups. This shows that these two groups have some relationship with their post test scores with respect to metacognitive strategies, but when comparing the 'r' value of control group and experimental group, the 'r' value of control group is greater than the experimental group. Through the implementation of tailored metacognitive interventions, students demonstrated notable improvements in biology knowledge, critical thinking skills, and self-efficacy. These findings corroborate existing research highlighting the effectiveness of metacognition in enhancing student learning outcomes across various academic disciplines. By embracing metacognition as a cornerstone of pedagogical practice, educators can foster a culture of lifelong learning and equip students with the skills they need to thrive in an ever-changing world.

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Flipped Learning: An Emerging Pedagogical Approach to Revamp Education

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Flipped learning is gaining prominence as a pedagogical approach in higher education, where traditional teaching methods are re-imagined in the digital age. This study explores students' perceptions of flipped learning and its impact on their learning experiences at the higher education level. The data for the study has been collected from 200 college students using random sampling techniques. A self-prepared tool has been utilized to assess students' perceptions of flipped learning. This scale measures perception across five key dimensions: Motivation scale, Autonomous learning, Critical thinking, Attention capacity, and Self-assessment. Statistical analysis is carried out using SPSS, and the t-test, was used to assess significant differences in students' perception of flipped learning between groups belonging to different genders, and types of institutions. The study's findings reveal that most students have moderate to strongly positive perceptions towards flipped learning with a minority holding strongly negative perceptions towards flipped learning. Notably, no significant difference has been found for dimensions like Autonomous Learning, Attention Capacity, Critical Thinking, and Self-Assessment as well as for overall scores in relation to gender.

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However, a significant difference has been observed in the motivation dimension with male students exhibiting higher levels of motivation as compared to female counterparts. Furthermore, the type of institution has a significant impact on students' perception, as students from government colleges showed higher scores in the Motivation Scale, Autonomous Learning, Attention Capacity, Critical Thinking, and Self-assessment as well as for overall scores as compared to students from private colleges.

Keywords: Flipped learning, higher education, student perceptions, pedagogical approach, academic disciplines, gender differences, type of institution, motivation scale, autonomous learning, critical thinking, attention capacity, self-assessment.

Introduction

The advent of educational technologies has made it possible for student-centered instruction to flourish in the ever-changing landscape of education. Research has emphasized the advantages of student-centered methods, especially the recently popularized flipped classroom style. With this method, students engage with course materials prior to class and use that time for instructor-led interactive activities, which turns the usual teaching process on its head (Yarbro, Arfstrom, McKnight, & McKnight, 2014). The flipped classroom is a cutting-edge teaching method that aims to provide richer learning experiences in an age of globalization and technology growth (Berrett, 2012). Students can interact with course material at their own pace and get prompt response from teachers by utilizing technology, such as video recordings (Bergmann & Sams, 2012). This approach to active learning mixes different learning styles, fosters collaborative learning environments, and increases student participation. Beyond only delivering knowledge, flipped learning gives students the ability to take charge of their education and develop their capacity for autonomous problem-solving (Roach, 2014). Teachers are essential facilitators; they help pupils on an individual basis and create situations that are favorable to learning. According to O'Flaherty et al. (2015), this method not only improves the caliber of classroom interactions but also helps students develop critical thinking and lifetime learning abilities. According to Aşıksoy and Ozdamli (2016), the flipped classroom is a flexible pedagogical approach that can be customized to match the various learning

needs of students. To sum up, flipped learning shows promise as a revolutionary pedagogical strategy to transform education.

Four Pillars of Flipped Learning

The Flipped Learning Network comes with the mission of providing educators with the knowledge, skills, and resources to implement Flipped Learning successfully.

Flexible Environment

Flipped Learning allows for a variety of learning modes Instructors often physically rearrange their literacy spaces to accommodate an assignment or unit, to support either group work or independent study. They produce flexible spaces in which scholars choose when and where they learn. Likewise, teachers who flip their classes are flexible in their prospects of pupil timelines for literacy and in their assessments of pupil literacy. Intentional Content Flipped Learning preceptors continually suppose about how they can use the Flipped literacy model to help scholars develop abstract understanding, as well as procedural ignorance. They determine what they need to educate and what content scholars should explore on their own. Preceptors use purposeful Content to maximize classroom time in order to borrow styles of pupil-centered, active literacy strategies, depending on grade position and subject matter.

Learning Culture: In the traditional teacher-centered model, the teacher is the primary source of information. By discrepancy, the Flipped literacy model designedly shifts instruction to a learner-centered approach, where in-class time is devoted to exploring content in lesser depth and creating rich literacy openings. As a result, scholars are laboriously involved in knowledge construction as they share in and estimate their literacy in a manner that's personally meaningful

Professional Educator: The role of a Professional teacher is indeed more important, and frequently more demanding, in a Flipped Classroom than in a traditional bone. During class time, they continually observe their scholars, furnishing them with feedback applicable in the moment, and assessing their work. Professional preceptors are reflective in their practice, connect with each other to ameliorate their instruction, accept

formative review, and tolerate controlled chaos in their classrooms. While Professional preceptors take on less visibly prominent places in a flipped classroom, they remain the essential component that enables Flipped Learning to do.

Review of Related Literature

Shih and Tsai (2017) conducted a study on students' perceptions of a flipped-classroom approach to facilitating online project-based learning in marketing research courses. Data was collected from 67 students of Kaohsiung City, Taiwan. Mixed methods research was employed along with questionnaires, semi-structured interviews, online learning notes, and online discussions. Results demonstrated that FC-OPBL significantly enhanced learning effectiveness, motivation, and interest among students. The combined strategy not only improved comprehension of marketing research concepts but also spurred higher levels of engagement and proactive learning behaviours. Moreover, it encouraged diverse development, catering to varied learning styles, while fostering teamwork through collaborative online projects. The findings of the study's provided valuable insights into students' perceptions, subsequently offering suggestions for refining flipped classroom methodologies in diverse educational contexts. Ultimately, the findings underscored the positive impact of FC-OPBL on learning outcomes and student engagement while illuminating pathways for further instructional enhancements and research in flipped classroom practices.

Aljaraideh (2019) examined students' perceptions of flipped classrooms studying in private universities in Jordan. Data was collected from 495 students of all private universities in the Northern province of Jordan. The analytical descriptive approach was employed in this study. Data was analyzed using *t*-Test, and One-Way-ANOVA. The study revealed a strong positive reception of the flipped classroom model among students with high agreement on its efficacy in enhancing learning. Notably, male students exhibited better perceptions of the flipped classroom compared to their female counterparts. However, no significant differences emerged concerning students' perceptions based on study year or university type.

Musdi et al. (2019) carried out a study on students' perception toward flipped classroom learning. Data was collected from X-grade students from west Sumatra, Indonesia. Semi-structured interviews and questionnaires

were used to reveal students' perceptions toward flipped classroom learning. Data was analyzed through a qualitative method. The findings of the study showed that students are interested in this approach. It happens because students can learn the material whenever and wherever they want.

Onojah et al. (2019) studied perception of undergraduate students on the utilization of flipped classrooms for learning in South-West Nigeria. Data was collected from 1800 undergraduate students of south-west Nigeria. A cross-sectional survey was adopted in this study. The findings of the study showed that undergraduate students perceived flipped classrooms to be useful and easy to use for learning. It was then recommended that stakeholders in education should procure necessary equipment for flipped classroom

Colomo-Magaña et al. (2020) conducted a study on university students' perception of the usefulness of the flipped classroom methodology. Data was collected from a sample of 123 students from the Faculty of Educational Sciences of the University of Málaga (Spain). Data were analyzed by using the non-parametric Mann–Whitney U test. The result of the study indicates that there is a significant difference in the usefulness of the flipped classroom for the promotion of autonomous learning. Moreover, the flipped classroom is a methodological alternative to promote learning that has a positive evaluation from the students that made up the sample.

Kazu &Kurtoglu (2020).Carried out a research of flipped classrooms based on students' perceptions. Data for the study was collected from 745 students from five different secondary schools in Elazig. Survey method was adopted for this descriptive study. Data were analyzed using SPSS Program Version 22.0. The finding of the study revealed that flipped classroom readiness has a positive impact in general. Students who have a computer and those who perceive themselves as competent at using technological devices have more positive opinions on the flipped classroom.

Halili et al. (2021) studied student perceptions towards the use of the mobile flipped classroom approach. International Journal of Web-Based Learning and Teaching Technologies (IJWLTT). Data was collected from 40 undergraduate students in Malaysia. The collected data was analyzed using descriptive analysis (percentage, means and standard deviations). The result showed that students had positive perceptions in terms of students' motivation, learning and engagement in multimedia and animation courses using a mobile flipped classroom approach.

Maidin & Shukor (2021) investigated students' perceptions of using flipped classroom approaches in their Communicative English classroom. The participants of this study were 106 students at Taiping Community College. This study employed a quantitative research design via survey. Results of the study revealed that most students had positive perceptions towards the use of flipped classrooms were highly motivated to learn and had positive attitudes towards the implementation of the flipped classroom approach.

Aziz (2022) carried out a study on Bangladeshi students' perceptions of flipped classrooms: A case study. The study has been conducted on 314 students of different ages, different educational levels, and different places in Bangladesh. It is quantitative research based on a survey method using a questionnaire as a tool. The result of the study showed that a maximum number of students felt secure with the usage of the flipped study room, and a maximum number of students could recommend flipped getting to know exclusive guides and other students concerning the feedback from the students.

Need and Significance of the Study

The study on flipped learning: an emerging pedagogical approach to revamp education is important because it can provide valuable insights into the effectiveness of this approach in enhancing students' learning outcomes, motivation, and engagement. The study can also reveal the potential of flipped learning in promoting autonomous learning and Motivation, as well as developing students' critical thinking. The findings from the studies (Shih & Tsai, 2017), Aljaraideh (2019), Musdi et al. (2019), Onojah et al. (2019), Colomo-Magaña et al. (2020), Kazu and Kurtoglu (2020), Halili et al. (2021), Maidin & Shukor (2021) and Aziz (2022) underscore the widespread positive impact of flipped classrooms on students' learning across various countries and disciplines. They consistently highlight enhanced learning effectiveness, motivation, interest, and engagement among students. The flipped classroom approach fosters autonomy, encourages active participation, and allows flexible learning schedules, which significantly contribute to students' positive perceptions and experiences. Additionally, it promotes a secure learning environment and readiness among students while showcasing the potential for broader adoption and recommendation of this approach within educational settings. While existing studies have delved into the effectiveness of flipped learning, there remains a gap in understanding how students in higher

education perceive this pedagogical approach. This research aims to bridge this gap by investigating students' perceptions, shedding light on their motivation scale, autonomous learning, attention capacity, critical thinking, and self-assessment within the context of flipped learning. The research outcomes will provide actionable insights for various stakeholders, including teacher educators, teachers, administrators, policymakers, parents, practitioners, and field workers. Understanding students' perceptions of flipped learning will guide these stakeholders in creating supportive and effective educational environments.

Statement of the Problem

"FLIPPED LEARNING: AN EMERGING PEDAGOGICAL APPROACH TO REVAMP EDUCATION"

Operational Definitions

Flipped Learning

In the present study, "flipped learning" is defined as an instructional strategy in higher education where traditional in-class activities (such as lectures) are moved outside the classroom through pre-recorded lectures, readings, or other materials. Class time is then utilized for interactive, application-based activities, discussions, or collaborative learning experiences facilitated by the instructor.

Pedagogical Approach

In this study, "pedagogical approach" refers to the method used by educators to guide learning, while "flipped learning" describes the inversion of traditional teaching methods, emphasizing pre-class content delivery and in-class active engagement.

Objectives of the Study

- To examine the overall perception of students towards flipped learning in higher education across five dimensions (*Motivation Scale,*

Autonomous Learning, Attention Capacity, Critical Thinking, and Self Assessment) on the *Flipped Learning Perception Scale.*

- To study the difference in the student's perception of flipped learning across five dimensions on the flipped learning perception scale in relation to the type of institution (Government/Private).
- To study the difference in the students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to their gender.
- To explore variations in students' perception of flipped learning across different disciplines concerning the five dimensions on the flipped learning perception scale.

Hypotheses

- There is no significant difference in students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to the type of Institution (Government/Private).
- There is no significant difference in students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to their gender.
- There is no significant difference in students' perceptions of flipped learning across different disciplines concerning the five dimensions on the flipped learning perception scale.

Method

In the present study, a descriptive method of research has been employed.

Population of the Study

The population of the present study consisted of 193624 students enrolled in government and private colleges of Jammu & Kashmir. (AISHE Report 2020-21)

Sample of the Study

The present study employed a random sampling technique to gather data from a sample of 200 students of the Jammu division only. Only those participants were selected who had been taught by their teachers at least once through flipped learning.

Tool Employed and its Description

For the present, the investigator employed a self-developed tool namely the *Flipped Learning Scale*. This scale consists of 30 items divided into five dimensions viz., *Motivation Scale, Autonomous Learning, Attention Capacity, Critical Thinking, and Self-Assessment.* Every item has to be rated on a five-point rating viz. Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. The Split-Half Reliability for the Flipped Learning Perception Scale is 0.809.

Delimitations of the Study

- The current study is delimited to students enrolled in higher education institutions in Jammu division only.
- One self-prepared tool namely *Flipped Learning Scale*
- The present study looks solely at a sample of 200 students from different higher education institutions within the Jammu division.

Results

The resulting data have been analyzed using the statistical technique *t*-test and one-way ANOVA. Data after scoring was analyzed using SPSS

Research Objective 1

To examine the overall perception of students towards flipped learning in higher education across five dimensions on the flipped learning perception scale.

In order to accomplish objective no. 1, the number and percentage of students having strongly Positive, Positive, Moderate, Negative, or strongly negative levels of perception on different dimensions of the *flipped learning perception scale* namely Motivation Scale, Autonomous Learning, Attention Capacity, Critical Thinking, and Self Assessment of *Flipped Learning Scale* have been computed as shown in tables 1.

Table 1

Range of z-scores, Frequency, and Percentage of Students having different Levels of Perception on Flipped Learning Dimension of Flipped Learning Scale

Sr No.	Range of z-scores	Level of Perception	Frequency (N) of Students	Percentage of Students
2	+1.26 and above	Strongly Positive	11	5.5%
3	+0.51 to +1.25	Positive	51	25.5%
4	-0.50 to +0.50	Moderate	87	43.5%
5	-0.51 to -1.25	Negative	28	14%
6	-1.26 and below	Strongly Negative	23	11.5%
Total			200	100%

Table 1 depicts, 11 students (5.5%) demonstrated a strongly positive perception, 51 students (25.5%), the largest segment, constituting 87 students (43.5%), fell within the moderate perception category, 28 students (14%) and 23 students (11.5%) exhibited negative and strongly negative perceptions, respectively.

Research Objective 2

To study the difference in the students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to the type of Institution (Government/Private).

In order to study the difference in the students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to the type of Institution (Government/Private); values of Mean, Standard Deviation (SD), Standard Error of Mean, *df, t* and Cohen's d were computed for data collected through *Flipped Learning Perception Scale* as shown in table 2.

Table 2

Values of Mean, Standard Deviation, Standard Error of Mean, df and t for Difference in perception of Students on flipped learning in relation to their type of institution

Dimensions	Type of Institution	N	M	SD	SE_M	*df*	*t*	Level of sig.	Cohen's d
MS	Govt.	128	17.50	2.30	0.20	198	3.04	0.01	2.40
	Pvt.	72	16.43	2.54	0.30				
AL	Govt.	128	15.98	2.90	0.26	198	3.41	0.01	2.69
	Pvt.	72	14.62	2.27	0.27				
AC	Govt.	128	16.62	3.51	0.31	198	3.70	0.01	3.28
	Pvt.	72	14.83	2.83	0.33				
CT	Govt.	128	17.23	3.12	0.27	198	3.04	0.01	2.97
	Pvt.	72	15.90	2.68	0.31				
SA	Govt.	128	16.31	3.34	0.29	198	4.20	0.01	3.33
	Pvt.	72	14.25	3.32	0.39				
Total	Govt.	128	83.62	11.26	0.99	198	4.70	0.01	10.99
	Pvt	72	76.04	10.48	1.23				

MS: Motivation Scale, AL: Autonomous Learning, AC: Attention Capacity, CT: Critical Thinking, SA: Self-Assessment Govt.: Government, Pvt.: Private

Table 2 presents statistical values related to the students' perception of flipped learning a with respect to the type of Institution (Government/Private); the t-values (3.04, 3.41, 3.70, 3.04, 4.20, 4.70) for Motivation Scale, Autonomous Learning, Attention Capacity, Critical Thinking, and Self Assessment dimensions of Flipped Learning Scale are significant at 0.01 level of significance. The effect size (Cohen's d) for the Motivation Scale is 2.40, indicating a large effect favoring government institutions. Likewise, for Autonomous Learning, the effect size is 2.69, showing a significant preference for government institutions. Attention Capacity reflects an effect size of 3.28, demonstrating a substantial advantage for government institutions. Critical Thinking and Self-Assessment also present large effect sizes of 2.97 and 3.33, respectively, indicating considerable preference towards government institutions. Across all scores, the effect size is 10.99, signifying a very large effect favoring government institutions. Overall, across all dimensions, government institutions consistently exhibit significantly higher mean values compared to private institutions, with large effect sizes suggesting substantial differences in students' perceptions of flipped learning between the two types of institutions. The level of significance (p=0.01) indicates high confidence in these differences. It is evident from the mean values that students in government institutions tend to hold more positive perceptions of flipped learning than their counterparts in private institutions.

Hence, Hypothesis No. 1 stating no significant difference in students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to the type of Institution has been rejected.

Research Objective 3

To study the difference in the students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to their gender.

In order to study the difference in the students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to their gender; values of Mean, Standard Deviation (SD), Standard Error of Mean, *df,* and *t* were computed for data collected through *Flipped Learning Perception Scale* as shown in table 3.

Table 3

Values of Mean, Standard Deviation, Standard Error of Mean, df and t for Difference in perception of Students on flipped learning in relation to their gender.

Dimensions	G	N	M	SD	SE_M	*df*	*t*	Level of Sig	Cohen's d
MS	M	68	17.73	2.65	0.32	198	2.62	0.01	2.40
	F	132	16.79	2.27	0.20				
AL	M	68	15.47	3.87	0.34	198	0.07	NS	2.77
	F	132	15.50	2.71	0.23				
AC	M	68	16.38	3.71	0.45	198	1.21	NS	3.38
	F	132	15.77	3.20	0.28				
CT	M	68	16.94	2.96	0.36	198	0.62	NS	3.04
	F	132	16.66	3.07	0.27				
SA	M	68	15.98	3.94	0.48	198	1.22	NS	3.47
	F	132	15.36	3.20	0.28				
Total	M	68	82.51	12.84	1.56	198	1.41	NS	11.52
	F	132	80.08	10.79	0.94				

NS: Not Significant; MS: Motivation Scale, AL: Autonomous Learning, AC: Attention Capacity, CT: Critical Thinking, SA: Self-Assessment M:Male, F:Female

Table 3 presents statistical values related to the student's perception of flipped learning in relation to their gender. The t-values (2.62, 0.07, 1.21, 0.62, 1.22, 1.41) for Autonomous Learning, Attention Capacity, Critical Thinking, and Self Assessment of *Flipped Learning Perception Scale* in relation to the type of Institution has shown no significant difference with respect to their gender. However, the t-values (2.62) for the dimensions Motivation Scale has shown a significant difference with respect to their gender. The effect size (Cohen's d) for the Motivation Scale is 2.40, indicating a large effect favoring males. Additionally, effect sizes of 2.40 for Autonomous Learning, 0.07 for Attention Capacity, 1.21 for Critical Thinking, 0.62 for Self-Assessment, and 1.22 for the overall perception, while not statistically significant, suggest moderate to large effects favoring males across these dimensions. However, these differences lack statistical significance, indicated by a level of significance ($p>0.05$), possibly rendering them statistically unreliable. In summary, the table shows mixed results. While significant gender-related differences are observed in the Motivation Scale, there are no significant differences in Autonomous Learning, Attention Capacity, Critical Thinking, Self-Assessment, and Total Perception. However, in each case where no significance is found, there appears to be a moderate to large effect in favor of males, as indicated by Cohen's d. The level of significance ($p>0.05$) suggests that these gender-related differences may not be statistically reliable. From the mean values, it is clear that male students exhibit significantly higher motivation levels compared to their female counterparts. From the mean values, it is clear that male students exhibit significantly higher motivation levels compared to their female counterparts.

Hence, Hypothesis No. 2 stating no significant difference in students' perception of flipped learning across five dimensions on the flipped learning perception scale in relation to their gender has not been rejected for the dimensions of namely Autonomous Learning, Attention Capacity, Critical Thinking, and Self Assessment. However, it is rejected for the dimension namely the Motivation Scale showing a significant difference in this dimension based on differences in gender.

Conclusions of the Study

The major findings of the present study are reported in the following section.

- Students' perceptions of flipped learning varied across dimensions, with the majority falling into the moderate perception category

(43.5%). The analysis revealed 5.5% strongly positive, 25.5% positive, 43.5% moderate, 14% negative, and 11.5% strongly negative perceptions.

- The students in government institutions held more positive perceptions towards flipped learning as compared to students in private institutions. Students studying in government institutions expressed heightened motivation towards engaging with pre-recorded instructional material, attributing it to an increase in curiosity and interest. They firmly believed that flipped learning stimulated their independent thinking and problem-solving abilities, empowering them to establish and accomplish their academic goals. Furthermore, they highlighted how flipped learning facilitated independent thinking and honed their problem-solving skills. They felt empowered to set and achieve their goals through this approach. Additionally, they perceived flipped learning as a catalyst for personalized learning, enabling them to concentrate on areas requiring more attention. This personalized focus allowed them to assess their learning at their preferred pace while aiding in the identification of gaps in their knowledge and understanding.

- While no significant gender differences were observed in most dimensions, male students perceived flipped learning as highly motivating than their female counterparts.

Discussion

The current study highlights a variation in students' perceptions of flipped learning across different dimensions. A majority of students fell into the moderate perception category (43.5%), indicating a nuanced reception of this learning approach. This finding aligns with Colomo-Magaña et al. (2020) and Kazu & Kurtoglu (2020), showcasing a diverse spectrum of opinions among students regarding the flipped classroom model. However, it differs from Musdi et al. (2019) and Aljaraideh (2019), where the majority of participants exhibited strong positive perceptions toward flipped learning. One significant contrast emerged in the current study between students from government and private institutions. Government institution students showed more positive perceptions toward flipped learning compared to those in private institutions. This aligns partially with Onojah et al. (2019),

where federal institution students favored flipped learning more than private institution students. However, it contradicts Aziz (2022), where the preference for flipped classrooms during crises was irrespective of institution type. The current study indicated no significant gender differences in most dimensions of flipped learning perceptions. This resonates with findings from Aljaraideh (2019), Onojah et al. (2019), and Pablo-Lerchundi et al. (2023), where gender did not significantly influence perceptions toward flipped classrooms. However, the observation that male students perceived flipped learning as more motivating than their female counterparts contrasts with the general trend observed in the previous studies. The current study's findings reflect a mixed perception of flipped learning among students, aligning with some previous studies while deviating from specific aspects such as the impact of institution type on perceptions and the observed gender differences in motivation levels. Understanding these nuanced variations is crucial for refining the implementation of flipped classroom methodologies across diverse educational contexts.

Educational Implications

The significant difference in students' perceptions between government and private institutions suggests that educators and administrators should consider the institutional context when implementing flipped learning. Strategies and support systems may need to be tailored to address the specific needs and preferences of students in different types of institutions.

The observed gender-based difference in motivation levels indicates the importance of considering gender-specific factors in the design and implementation of flipped learning. Educators should explore ways to enhance motivation, particularly among female students, to ensure an inclusive and equitable learning environment.

Recognizing variations in students' perceptions across disciplines underscores the need for discipline-specific approaches to flipped learning. Educators can leverage these insights to customize instructional strategies and resources, taking into account the unique characteristics and requirements of different academic disciplines.

The study highlights the potential of flipped learning in promoting autonomous learning and critical thinking. Educators and curriculum designers should capitalize on these aspects by incorporating activities and assessments that foster independent thinking, problem-solving skills, and self-directed learning.

Suggestions for Further Studies

A study can be conducted to Investigate the relationship between students' perceptions of flipped learning and their academic performance. This can help determine the effectiveness of flipped learning in enhancing students' learning outcomes.

A study can be conducted to investigate the perspectives of teachers and instructors regarding their experiences with flipped learning.

A comparative study can be conducted between flipped learning and traditional teaching methods to assess differences in student perceptions, engagement, and academic performance.

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Metacognition in the classroom: strategies and Benefits

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One of the principal objectives which education must cover is helping our students become autonomous and effective. Students' ability to use strategies which help them direct their motivation toward action in the direction of the meta-proposal is a central aspect to keep at the front of our minds when considering education. This is where metacognition comes into play—knowledge about knowledge itself, a component which is in charge of directing, monitoring, regulating, organizing, and planning our skills in a helpful way, once these have come into operation. This article summarises benefits and strategies of metacognition in the classroom.

Key words:metacognition, strategies, benefits, critical thinking

Introduction

The term metacognition refers to an individual's ability to plan, monitor, evaluate, and make changes to their own learning behaviours in order to confront challenges more effectively. It is defined as 'thinking about thinking', but the elements of active monitoring and modifying of thought processes make it much more than this. It is also a form of self-regulation, involving self-awareness, critical analysis skills, and the ability to problem-solve. Metacognition helps form autonomous students, increasing consciousness about their own cognitive processes and their self-regulation so

that they canregulate Metacognition was initially introduced by John Flavell in the early 1970s. He affirmed that metacognition, on one side, refers to "the knowledge which one has about his own cognitive processes products, or any other matter related with them" and on the other, "to the active supervision and consequent regulation and organization of these processes in relation with the objects or cognitive data upon which they act" (Flavell, 1976; p. 232). Based on this, we can differentiate two components of metacognition: one of a declarative nature, which is metacognitive knowledge, referring to knowledge of the person and the task, and another of a procedural nature, which is metacognitive control or self-regulated learning, which is always directed toward a goal and controlled by the learner their own learning and transfer it to any area of their lives.

For students, having metacognitive skills means that they are able to recognise their own cognitive abilities, direct their own learning, evaluate their performance, understand what caused their successes or failures, and learn new strategies. It can also help them learn how to revise. This is because it optimises their basic cognitive processes, including memory, attention, activation of prior knowledge, and being able to solve or complete a task. It makes them learn more efficiently and more effectively, and so they are able to make more progress.

For example, a student with metacognitive skills might:

- Recognise that they have trouble applying formulas in maths.
- Think about the maths problems they have solved before, and the strategies they used.
- Apply these strategies, assessing whether they are working or not.
- Try a different strategy if the one they are using is not effective.

Strategies of metacognition

1. Self-Questioning

Self-questioning involves pausing throughout a task to consciously check your own actions. Without self-questioning, we may lack humility and awareness of our own faults. Most importantly, we

would not be able to improve because we never took the time to ask ourselves important questions like:

- Is this the best way to carry out this task?
- Did I miss something? Maybe I should check again.
- Did I follow the right procedure there?
- How could I do better next time?
- Am I looking at this task the right way?
- How can I do a better job at thinking about what I'm doing?

2. Meditation

Meditation involves clearing your mind. We could consider it to be a metacognitive strategy because meditators aim to:

- Clear out the chatter that goes on in our heads.
- Reach a calm and focused state that can prime us for learning.
- Be more aware of our own inner speech.

Meditation for children is becoming increasingly popular in schools because educators can see the value of this task for helping students achieve greater self-awareness in the classroom.

3. Reflection

Reflection involves pausing to think about a task. It is usually a cyclical process where we reflect, think of ways to improve, try again then go back to reflection.

4. Awareness of Strengths and Weaknesses

Central to metacognition is a person's capacity to see their own strengths and weaknesses. Only through looking at yourself and making

a genuine assessment of your weaknesses can you achieve self-improvement.

5. Awareness of Learning Styles

Learning styles theories such as Gardner's Multiple Intelligences theories argue that different people learn in different ways.

For example, you may feel you are better at learning through images than reading. Some common learning styles include:

- Visual: A visual learner learns best through images, graphics, TV documentaries and graphs. They are good at identifying patterns and matching complementary colours.
- Auditory: A visual learner learns best through listening rather than watching or reading. They enjoy being read stories and listening to podcasts.
- Kinesthetic: A kinesthetic learner learns best through movement. They like to learn by doing things rather than reading or listening. They are active rather than passive learners.
- Logical-Mathematical: People who are logical-mathematical learners are good at using reasoning to find answers. They are good with numbers but may struggle with subjective issues in the humanities.
- Interpersonal: An Interpersonal learner loves learning through social interaction. They're good at group work, have high emotional intelligence, and can compromise to get their job done.
- Intrapersonal: An intrapersonal learner is someone who likes to mull things over in their own heads. They're happy to learn in silence and isolation and may find working with others to be a distraction.

6. Mnemonic Aids

Mnemonic aids are strategies you can use to improve your information retention. They involve using rhymes, patterns, and associations to remember. They work by adding context (additional or surrounding information) to a fact to help you to recall it.

7. Graphic Organizers

Graphic organizers, also sometimes called cognitive tools, help us to consciously improve our thinking processes. They assist us in:

- Organizing our thoughts.
- Creating connections between things we know.
- Thinking more deeply about something.
- Visualizing processes and procedures.

Examples of graphic organizers include: Mind maps

- Flow charts.
- Spider diagrams.

The ideal graphic organizer will allow us to spill our thinking out onto a sheet or screen and shuffle and sort our thoughts to help us organize our minds better. By using a graphic organizer, we are more effectively thinking about our thinking.

8. Regulation Checklists

A regulation checklist can either be task-based or generalized. A task-based regulation checklist is usually created before a task begins. It will:

- List the thought processes required to succeed in the task.

- List the observable outcomes of higher order thinking linked to the task.
- List the checkpoints during the task where people should pause to reflect on their thinking.

A general regulation checklist provides regulation strategies that can be used across any normal task, such as:

- Reminders to pause and reflect-in-practice at regular intervals.
- Prompts to remind students to think about what strategies they are using and whether they are appropriate for the task.
- Self-questioning prompts to remind students to question their choices.

II. Active Reading Strategies

Active reading strategies are strategies that ensure you are concentrating while you read and actually comprehend the information. Examples of active reading strategies include:

- Underlining text: Underline key or important bits of information to highlight their importance in your mind.
- Using a ruler to read: place a ruler under the sentence you're reading to help you focus on that line.
- Questioning: Ask yourself questions or ask your friends questions to check comprehension.
- Summarizing: Try to sum up the page you just read in one or two sentences to check for comprehension before moving on.
- Predicting: Try to predict how a story will go by looking at the pictures on the cover.
- Clarifying: Ask for clarification from friends or a teacher when you don't understand rather than just moving on.

9. Active Listening Strategies

Active listening strategies are strategies students use to ensure they are listening attentively. Some examples of active listening strategies include: Turning your body to directly face the speaker, Asking questions, Nodding when appropriate, repeating what was said to you. Teachers can directly teach and model active listening strategies to help students develop these metacognitive skills and internalize them for future use.

10. Planning Ahead

When we plan ahead, we often have to think about how we'll go about a task. We might call it our "plan of attack".

- Deciding what strategies you'll use when your task, competition or activity begins.
- Tossing up a range of different thinking skills you might use when approaching a task.
- Reminding yourself not to make the same mistakes you made last time.
- Preparing some tools that will help you keep your thinking on track, such as preparing graphic organizers.

Why is Metacognition Beneficial in Student Learning?

The potential benefits of metacognition in learning are as follows:

- Higher achievement levels for the students. Metacognitive practices can also compensate for any cognitive limitations that a student might have.
- Increased ability to learn independently. Being able to monitor their own progress lets them take control of their own learning, inside and outside the classroom.

- Improved resilience. Identifying their successes and failures, and which strategies work best for them – or which have failed – increases students' perseverance in getting better at their work.
- It aids disadvantaged students. According to research by the EEF, teaching in a way that supports metacognition is beneficial for students who are at a disadvantage to their peers.
- Cost-effectiveness. This method of teaching does not require specialist equipment, nor any other large purchases – it only requires teachers to be trained in the method effectively.
- Transferable knowledge. Metacognition helps students to transmit their knowledge and understanding across tasks and contexts, including reading comprehension, writing, mathematics, memorising, reasoning, and problem-solving.

- Effective for all ages of students. Research has looked at both primary and secondary students – and even those who have not yet started school – and found benefits in all cases.

Who benefits from the use of metacognitive strategies

All students, regardless of their age, background or achievement level, benefit from the use of metacognitive strategies. The sophistication of the metacognitive skills students can master increases as they progress through education. Students can start with the ability to monitor progress towards the achievement of learning goals negotiated with the teacher. This negotiation and monitoring plays an important role in the learning of all students, regardless of their background or previous achievement. Metacognitive strategies can also be differentiated to bolster the achievement of specific cohorts of students. They can be used to extend the learning of gifted and high achieving students, as well as a support strategy for low achieving students.

Metacognition and critical thinking

Critical Thinking is a concept without a firm consensus, as there have been and still are varying conceptions regarding it. Its nature is so complex that it is hard to synthesize all its aspects in a single definition. While there are numerous conceptions about critical thinking, it is necessary to be precise about which definition we will use. We understand that critical thinking is a knowledge-seeking process via reasoning skills to solve problems and make decisions which allows us to more effectively achieve our desired results. Thinking effectively is desirable in all areas of individual and collective action. Reasoning is used as the fundamental basis for all activities labelled as thinking. In a way, thinking cannot easily be decoupled from reasoning, at least if our understanding of it is "deriving something from another thing." Achieving our ends depends not only on the intellectual dimension, as we may need our motor or perceptive activities, so it contributes little to affirm that critical thinking allows us to achieve our objectives as we can also achieve them by doing other activities. It is important for us to make an effort to identify the mental processes responsible for thinking and distinguish them from other things.

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A Study on Game Based Learning and Achievement in Mathematics among Primary School Students

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The purpose of this study was to evaluate the effects of game-based learning and achievement in mathematics among primary school students.The results from the investigation revealed that Game based learning has a positive impact in helping to improve the quality of teaching and learning of Mathematics.

Keywords: game based learning, achievement, mathematics, primary school students

Introduction

It is said that the term game based learning was originally used by Clark Abt in 1970 in his book "serious games". As a matter of fact, game-based learning can actually be considered a system of serious games that focus on applications with vividly stated learning outcomes. Active engagement and interaction are key components of game-based learning. Studies indicates that students are not being sufficiently engaged by current teaching techniques

. Game based learning as teaching tool provides an additional support for the teachers.

Research shows that games help students integrate their discipline-based knowledge. Studies proved that mathematical knowledge was increased using games. There are benefits and disadvantages, depending on the types of game involved. As educators, it is crucial to create pedagogy that reduces the disadvantages to the maximum. In Mathematics learning, the application of game based learning is seen to have many benefits in helping to improve the quality of the teaching and learning process. Setting clear learning objectives in line with curriculum requirements with student-centered implementation has made game based learning more effective (Farber, 2015).

Game based learning will help improve student achievement in Mathematics because while playing students will apply basic math concepts and skills, reading skills, problem solving skills to ensure that assignments are successfully completed. Game based learning helps to stimulate interest and engagement with mathematics among students. Game based learning has a potential to enhance the experience of learners by providing context and live examples of curriculum content in the classroom. Therefore, the application of learning approaches such as game based learning will encourage students to feel the need to complete the play activities and thus influence their goals they want to achieve.

Significance of the Study

Many students continue to struggle at the primary level in mathematics. Learners need to be supported with equitable instruction that provides enrichment, remediation, and intensive intervention. Math curricula must incorporate strong evidence-based, supplemental intervention curriculum programs so each student is well prepared for success in secondary Mathematics. Games provide students with opportunities to drive their own learning, develop problem solving skills, and receive immediate feedback. Game based learning is one of the techniques of learning that can engage students in mastering Mathematics. Effectiveness of Game based learning has been proven by its potential for improving student achievement and confidence, fostering

positive creativity and motivation, and increasing student engagement in Mathematics.

However, teachers' teaching methods still retain conventional. This teaching technique will only encourage students to passively learn with high levels of dependence on teachers. This has led to teacher-centered approach which most of it using chalk and talk. This will cause students to lose focus during the learning process and not master the concepts and skills taught. As a result, students are not able to answer Mathematics questions well and hence lead to the low Mathematics achievement. Therefore, teachers' teaching methods need to be adapted to the latest techniques and learning methods that contribute to the greater impact of Mathematics learning.

Objectives

(i) To find out the level of achievement in Mathematics of primary school students in pre-test.
(ii) To find out the level of achievement in Mathematics of primary school students in post test.
(iii) To find out the significant difference between pre-test and post test scores of primary school students on game based learning.

Hypotheses

1. The level of achievement in Mathematics in pre-test of primary school students is average.
2. The level of achievement in Mathematics in post test of primary school students is average.
3. There is no significant difference between pre-test and post test scores of primary school students on game based learning.

Methodology

Single group pretest - post test experimental design method was used in the present study.

Tools Used

(i) Game based learning module for primary school students.
(ii) Achievement Test in Mathematics (ATM) for primary school students.

Sample

A sample of 30 primary school students from Thuckalay block in Kanyakumari District, Tamil Nadu were selected for the study.

Statistical Techniques Used

- Descriptive analysis (Mean, Standard Deviation, Percentage Analysis)
- Differential analysis (t test)

Analysis Of Data

Descriptive Analysis

Hypothesis 1

The level of achievement in Mathematics in pre-test of primary school students is average.

Table - 1 Levels of achievement in Mathematics in pre-test

Sample	Size	Mean	SD	Low level		Average level		High level	
				N	%	N	%	N	%
Primary school students	30	9.93	2.007	17	56.7	13	43.3	0	0.0

The mean score of the pre-test for the primary school students is 9.93 and the standard deviation of the total sample is 2.007. From the table, 56.7 percentage of the primary school students have low level of achievement in Mathematics in pre-test, 43.3 percentage of the sample has average level of achievement in Mathematics in pre-test and none of the sample has high level of achievement in Mathematics in pre-test.

Hypothesis 2

The level of achievement in Mathematics in post test of primary school students is average.

Table - 2 Levels of achievement in Mathematics in post test

Sample	Size	Mean	SD	Low level		Average level		High level	
				N	%	N	%	N	%
Primary school students	30	24.03	2.321	0	0.0	2	6.7	28	93.3

The mean of the post test scores for the primary school students is 24.03 and the standard deviation of the sample is 2.321. From the table, none of the primary school students have low level of achievement in Mathematics in post test. 6.7 percentage of the sample has average level of achievement in Mathematics in post test and 93.3 percentage of the sample has high level of achievement in Mathematics in post test.

Differential Analysis

Hypothesis:

There is no significant difference between pre-test and post test scores of primary school students on game based learning.

Table - 3 Comparison of pre-test and post test scores on game based learning

	N	Mean	SD	t value	p value
Pre-test	30	9.93	2.007	35.589	0.000
Post test	30	24.03	2.321		

In the table 3, since the p-value is less than 0.01, the null hypothesis is rejected at 0.01 level of significance. Hence, it is concluded that there is significant difference between pre-test and post test scores on game based learning of primary school students. The mean scores show that the post test scores are greater than the pre-test scores of primary school students. Hence Game based learning has a positive effect on achievement in Mathematics of primary school students.

Findings

The important findings that have emerged from the present study are listed below:

1. 56.7 percentage of the primary school students have low level of achievement in Mathematics in pre-test.
2. 93.3 percentage of the primary school students have high level of achievement in Mathematics in post test. The result shows that the treatment given in accordance with game based learning module is an effective one.

3. There is significant difference between pre-test and post test scores on game based learning of primary school students. The mean score of the post test is greater than the pre-test. This leads to the major inference that Game based learning has a positive effect on achievement in Mathematics of primary school students.

Educational Implications

Educational Implications emerged from the results of the study are presented below:

Game based learning serve as effective method for learning the fundamental as well as deep concepts in Mathematics. Hence these methods should be used by the learners for acquiring a sound base in Mathematics learning. Thus, Mathematics learning becomes easy, flexible ad interesting. This module will provide an atmosphere which motivates the students to learn Mathematics. Game based learning serves as a better instructional strategy for Mathematics teaching. So, teachers should select suitable Mathematical games, analogies and activities in their teaching – learning process according to the needs and standards of their students.

The curriculum planners should include innovative strategies in the curriculum like Game based learning for the effective curriculum transaction. The administrators should provide necessary facilities for the effective implementation of these methods. The teacher education programmes should be modified with the changes of the present educational scenario. The student teachers should be given proper training in Game based learning so that they can transact the Mathematics curriculum effectively in the schools.

Conclusion

The application of innovative strategies in the teaching and learning process is in line with the needs of nowadays' students. The present investigation revealed that the primary school students in Kanyakumari district of Tamilnadu, were found to have a low level of achievement in Mathematics before treatment and a high level of achievement in Mathematics after treatment using game based learning module. The results from the

investigation revealed that Game based learning has a positive impact in helping to improve the quality of teaching and learning of Mathematics. Therefore, the usage of Game based learning in Mathematics needs to be explored in order to impact the quality of teaching and learning of Mathematics.

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A Study on Techno Pedagogical Skills and Teaching Competency

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Present study aims to compare techno-pedagogical skills and teaching competency among teachers. From the study it is concluded that without technical education talents, no electronic transmission can achieve outstanding results

Keywords: techno pedagogical, skills, teaching competency

Introduction

The teacher education programme needs to integrate numerous skills and competencies. India has one of the largest systems of teacher education around the world. Besides the university departments of education and their affiliated colleges, government and government-aided institutions, private and self-financing colleges and open universities are also engaged in teacher education. The NCF (2005) and XIIth five-year plans (2011) emphasized providing connectivity, valuable content and low-cost computing devices to all the Institutions of higher learning in the country. Teacher's use of technology has an important role in education in the 21st century. The education system is now spectator a paradigm shifts from the traditional chalk-and-talk teaching methodology to digitizing the pedagogical approach through technical devices. Every teacher should know how to use digital technology, techno-pedagogy and subject area content effectively in their virtual classroom teaching. Teacher training course in India is designed for aspiring teachers to learn interactive

and better ways of teaching to make a subject interesting. Teacher Education for preparing humane and professional teachers needs to be global. There is a need to integrate techno-pedagogical skills such as media- message compatibility, media designing, integration of message media and modes, realizing proximity of message forms, media language proficiency, media choice, message authenticity and media credibility, media automation, media integration and media acculturation.

Pedagogy

Pedagogy refers to the theory and practise of learning and how this process influences and is influenced by the social, political and psychological growth of learners. According to Merriam-Webster, pedagogy is the "art, science or profession of teaching; especially, education.

Even while pedagogy covers a wide range of topics, at its core, pedagogy is concerned with how students are taught. There are many moving parts to pedagogy, including instructional approaches, feedback and assessment.

Pedagogical Skills

A grasp of how students learn in a certain subject area is essential to pedagogical abilities, which include the ability to organize, lead and promote education and teaching overseas. Pedagogical skills can include the ability to connect classroom instruction to relevant research.

Knowledge of representations of subject matter (content knowledge), knowledge of students' conceptions of subject matter (learning and teaching outcomes), and general knowledge of pedagogy are all essential components of pedagogical skills (or teaching strategies). Other factors included: (4) curriculum knowledge; (5) educational context awareness; and (6) educational objectives.

Meaning Of Techno-Pedagogy

Literally, "Pedagogy" refers to the Science and Arts of teaching and "Techno" refers to the art skill in handcrafting, derived from the Latin word "Texere" which means to weave or fabricate or construct. Here, 'Techno' is a qualifier, it intersects or crosses the meaning of 'Pedagogy" with its own content. Techno-pedagogy refers to weaving the techniques of the craft of teaching into the learning environment itself. Education Technology provides approximate designing learning situations, holding in view the objectives of the teaching and learning bring the best practices/ means of instructions which affect on learning.

Techno-Pedagogy: Three Areas of Knowledge

- Content (C) is the subject matter that is to be taught.
- Technology (T) encompasses modern technologies such as computer, internet, digital video and commonplace technologies including overhead projectors, blackboards and books.

Pedagogy (P) describes the collected practices, processes, strategies, procedures and methods of teaching and learning. It also includes knowledge about the aims of instruction, assessment and student learning.

Meaning of Teaching Competency

Teacher competence refers to the set of knowledge, skills, attitudes, abilities and beliefs, a teacher possesses and brings to a teaching situation. Competence also refers to concept and skill which are flexible and applicable into wide variety of situation.

Definition of Teaching Competency

According to B.K. Passi M.S. Lalitha (2021) "Teaching Competency means an effective performance of all observable teacher behavior those beings about desired pupil outcomes"

According to Venkatesh S. (2020)M.K. Passi: "Teaching Competency is any single knowledge, skill or professional expertise which a teacher may be said to possess and the possession of which is believed to be relevant to the successful practice of teaching".

Teacher Competencies

Teacher competencies are an outcome based method for assessing teacher performance. They define key characteristics for successful teachers without prescribing any specific curriculum or instructional practices

1. Content area knowledge
2. Pedagogic capabilities
3. Communication skills
4. Professionalism

Some of the teacher competencies are:

1. Subject competencies
2. Pedagogical competencies
3. Technological competencies

Subject Competencies

A teacher competent in her profession has a through knowledge of subject matter or knowledge of contents. The teacher who has command over subject matter can provide more and more information to the students in the classroom. Knowledge of key concepts, inquiry tools and structures and its implication are essential for combined part and lesson planning for the class. For the development of reliable cross curriculum linkages, the teachers must have adequate knowledge sharing about subject matter of the subject being taught in the class. Further, through integrated lesson planning the class teachers are capable of an authentic knowledge sharing and teaching learning

strategies which are helpful to strengthen student learning and development of creative thinking.

A teacher not only knowledge of contents is required but she also required learning about the intersection and its re-organizational knowledge of content and pedagogy. For fundamental elements of pedagogical content knowledge are:

1) Knowledge of demonstration of subject matter

2) Knowledge of student's learning of the subject

3) Knowledge of teaching strategies or teaching methodologies

4) Curriculum knowledge

5) Knowledge of educational contexts

6) Knowledge of purpose of education

Knowledge of subject matter theory enquires about the value of knowing everything about a subject if a teacher does not have firsthand knowledge about the subject matter how students will learn how his teaching method would be the best instructional strategies, if his teaching strategies cannot deliver high quality subject matter knowledge. Ultimately existing professional development principles guide the process of teaching learning in such direction that supports knowledge of subject matter.

Pedagogical Competencies

Pedagogical competence includes awareness of alternative instructional methods or technologies. Pedagogical competence requires that instructors actively think about and interrogate their own practices in the classroom, being aware of the possible strategies for engagement and actively choosing the methods that best fit their goals and topics.

It is competence to:

1. Teach

2. Identify areas that require change

3. Plan, initiate, lead and develop and teaching

A competent teacher needs both content mastery and pedagogical competency. Pedagogy is the art of teaching and brings effectiveness in teaching learning.

Technological Competencies

The teacher technology competencies are a set of technology standards that defines proficiency in using computer technology in the classroom. The competencies consist of computer related skills grouped into four general domains:

1. Basic technology operation
2. Personal and professional use of technology tools
3. Social, ethical and human issues
4. Application of technology in instruction

Each domain consists of a subset of specific skills; these are sequenced from simple to complex so that mastery of the skills is cumulative.

The International society for Technology in Education (ISTE) has actively addressed the technology isolation problem and has recently released a set of revised teacher technology standards. Developed through a rigorous process of expert and lay-person input, the NETS-T Project (National Educational Technology for Teachers) explicitly describes what competent teachers should know and should be able to do with technology in the context of broader teacher competencies. The NETS-T standards are categorized as follows:

1. Technology operations and concepts
2. Planning and designing learning environments and experiences
3. Teaching, learning and the curriculum
4. Assessment and evaluation
5. Productivity and professional practice

6. Social, ethical, legal and human issues

In a learning environment where technology is truly integrated and not and adjunct, students and teachers use technology tools to enhance all areas of the teaching and learning process.

Effectively managing a classroom where students engage these activities in a manner that improves academic achievement requires a teacher with expertise in the sophisticated and increasingly complex field of instructional technology. The teacher technology competencies are designed to give teachers this expertise to select and use the technological resources that not only meet student's learning needs but also equip them with appropriate skills for the future.

Types of Teaching Skills

The different types of teaching skills are:

Introducing the Lesson

The teacher has to perform set induction to introduce the lesson to the students by asking questions and testing the previous knowledge of learners' creativity.

Questioning

Because interaction is highly important while teaching, during Micro-teaching, teachers are exposed to interactive skills through interacting with learners by asking them questions, prompting them and solving their queries.

Stimulus Variation

Teachers need to keep moving around the class to ensure every student is paying attention to which stimulus variation is involved in Micro-teaching.

Reinforcement

Reinforcement is highly essential in teaching so that learners can feel motivated enough to learn. Hence, teachers have to employ reinforcement in Micro-teaching.

Illustration

The teacher gives a thorough explanation of the topic that is being taught in the classroom so that the learners can have clarity and comprehension of the lesson.

Recapitulation

To make sure the learners have understood everything, the teacher revises the lesson, asks some questions and gives them a home assignment.

Importance of Techno Pedagogic Skills for Teacher

The emergence of new technology has influenced every aspects of human life. Today, a classroom without technology and techno pedagogic skills of teacher is inconceivable. Due to these developments and evolution, standards of learning would be higher in the 21st century than it has been in the 20th century. In order to prepare the students to navigate the 21st century world they must be exposed to technology based instruction in the classroom. To be able to survive and be successful in the future school environment, teachers would need to acquire additional knowledge of techno pedagogic skills and both general and specific skills, Teachers play a vital role in realizing the educational goals of a dynamic society.

In a 1995 study, the office of Technology Assessment (OTA) found that teachers are reporting little use of technology and most teachers lack confidence to use technology effectively even though there is a greater availability of technologies in schools (Koehler, Mishra & Yahya, 2004). As for realizing the many previous research studies related to importance of techno pedagogical skills, the present paper insists the importance of techno pedagogical skills for teacher in the classroom.

Review of Related Studies

Beri & Sharma (2019) had conducted a study to measure the technological pedagogical and content knowledge (TPACK) competencies of teacher-educator in teacher training institutions of Punjab. In their study they used a rating scale for data collection and Sample of the study were 200 teachers-educators teaching in various teaching-training institutions in of Punjab. The random sampling technique was used for sample selection. The finding of the study indicated that the teacher-educators of Punjab have high technological, pedagogical and content knowledge competencies. The outcomes of the study indicated that there was significant difference found between male and female, rural and urban, science and arts, government and private teacher-educators on their competencies.

Jai Prakash & Hooda (2020) conducted their study to compare techno-pedagogical competency of public and government senior secondary teacher of Haryana state. The study conducted on 200 teachers was selected from 20 private schools and 20 government schools of Harayana state. Sample was selected through simple random sampling techniques. Descriptive survey method was used in this study, the outcomes of the study showed that private school teachers are better than the government school teachers in techno-pedagogical competency. Also found that urban teachers have more techno-pedagogical competency then rural higher secondary school teachers.

Singaravelu (2013) studied Techno-Pedagogical Competencies of Higher Secondary School Teachers. Normative survey method has been used in the study. Random sampling technique has been used in the selection of the sample. 300 teachers working in higher secondary schools were used for the study. The findings of the study shows that majority of the higher secondary school teachers were having an average level of perceived techno-pedagogical competency. It is found that there no significant difference is found in their perceived techno-pedagogical competency based on gender, locale, type of management and marital status.

Gloria (2014) examined the Techno-Pedagogical Skills in Teacher Education. This paper discusses and outlined the importance of developing Techno-pedagogical skills in Teacher Education. Teacher Education is to learn to teach and teach to learn. Recent evidence indicates that reforms of teacher education creating more tightly integrated programs with coursework on

learning and teaching produce more effective and more likely to enter and stay in teaching. An important contribution of teacher education is development of teacher's abilities to examine teaching from the perspective of learners who bring diverse experiences and frames of reference to the classroom. It is important to recognize that, Teacher Educators and Training Graduates are becoming more knowledgeable of Information and Communication Technology outcomes (ICTs), they continue to have knowledge or skill with which to integrate those technologies into their teaching practice.

Thakur (2015) examined A Study on Implementation of Techno-Pedagogical Skills, Its Challenges and Role to Release at Higher Level of Education. In this paper he concluded that in higher education, techno-pedagogical skills facing some challenges such as; destitute infrastructure of ICT, scarce competence on English language and online content, calamity and lack of incentives and awareness of teachers, evils on research and development, hitch of using software, limited techno-pedagogical resources, lack of coordination among the departments, frequent power outages and fluctuations. These challenges can be way-out by the bumping of infrastructure, enhancing competence on English language and online content, dissolving the crisis of teachers, comprising of incentives of teachers, resolution on research and development, encompassing of awareness of existing techno pedagogical services, using of licensed software, eternal techno-pedagogy supportive resources, improving coordination among the departments, removing of frequent power outages and fluctuations, developing e-content and web page for techno-pedagogical skills, developing Computer Based Learning Resources Management Systems, increase publicity about existing ICT services.

K.K., (2017) conducted a research on Techno-Pedagogical Skills of Secondary Teacher Education Students. The purpose of this study was to find out the techno-pedagogical skills of secondary teacher education students. The survey method was adopted for the study. The sample consisted of 75 secondary teacher education students, among them 37 are male students and 38 are female students. The sample was selected by using stratified random sampling technique. Techno-Pedagogical Skill Assessment Scale developed by Sibichen and Dr. P. Annaraja (2009) was used for collect the data. For analyzed the collected data arithmetic mean, standard deviation, t-test &

ANOVA were used. The results of the study reveals that there is significant difference between graduate and post-graduate secondary teacher education students in their skills in implementing instructional strategy and guidance. Results also reveal that there is significant difference between secondary teacher education students who have attended computer course and who have not attended computer course in their skill in learning, evaluation and techno-pedagogical skills.

Marthal and Vadivu (2017) studied Techno Pedagogical Skills among Teacher Educators. The objective of the study is to find out whether there is any significant difference in their techno pedagogical skills with regard to gender, locale and stream of study. The survey method was used for the present study. The investigator used random sampling technique. The sample consists of 300 teacher educators of Madurai District. Techno Pedagogical skills inventory was used to collect data. Results showed that there is no significant difference between male and female teacher educators in their techno pedagogical skills. Also there is significant difference between urban and rural, arts and science teacher educators in their techno pedagogical skills.

Sathya and Venkateswaran (2017) studied the Techno-Pedagogical Skills of B. Ed. Students. Survey method was adopted in the present study. To find out the significant difference in techno-pedagogical skills among B.Ed. Students in terms of subject and attended any computer course. The objective of the study was to find out the significant difference in techno-pedagogical skills in terms of subject and attended any computer course. 300 B. Ed. Students were selected as sample by random sampling technique from Government, Self-finance colleges in Salem District. 'Techno Pedagogical Skills Assessment Scale' by Sibichen and Annaraja (2010) was used for data collection. Findings showed that there is no significant difference in techno-pedagogical skills of B. Ed. Students in terms of subject, and there is significant difference in techno-pedagogical skills of B. Ed. Students with regard to attended any computer course.

Abdul Rahim Hamadan (2010) conducted a study of "Teachers competency among Malaysian school teachers". The study revealed that there existed a significant relation of gender, teaching experience and specialization with their competency whereas academic qualification had no significant influence on their teaching competency.

Passi B. K. and Sharma S. K. (1982) conducted a study entitled "A study on teaching competency of secondary school teachers". They found male and female teachers did not differ in competency. They found that there was a significant positive co-relation between teaching competency liking of their pupils of their teaching behaviour.

Syag. R. N. (1984) studied that "Teaching competence of pre-service and in-service teachers trained through different treatments of Microteaching" and suggested that:

1. Microteaching approach should be made an integral part of the student teaching programme.

2. At least two periods (continuous) should be allotted for practicing skills in a micro teaching setting.

3. Teacher training institutions may use either peer feedback and or peer cum audio tape feedback during micro teaching treatment.

4. Instructional materials on various teaching skills should be developed.

Operational Definitions of the Key Terms

Techno-Pedagogical Skills

Techno-Pedagogical Skills refer to the skills needed to use technology for pedagogical reasons and competence to integrate technology into teaching. The techno-pedagogical skills are the set of components of learning, preparing a lesson plan, preparing learning material, implementing instructional strategy, communicator, evaluation and guidance. This scale was modified and validated by the investigator under the guidance of the research supervisor based on the Techno-Pedagogical Skills Assessment Scale developed by Sibichen and Annaraja, 2009.

Teaching Competency

Teaching competencies are the skills and knowledge that help a teacher be successful in teaching. To enhance student learning, teachers must have expertise in a wide range of teaching competencies so that they are able to deal with every student having different learning styles.

Conclusion

The best educators bring different experiences and reference outlines to the classroom. In today's situation, educators who use innovation in teaching and learning play a vital role. Technology has improved learning, making teaching and learning more curious. Therefore, it is necessary to further expand the lecture's technical teaching ability so that the technical teaching method has a positive attitude. The technical teaching method may be the key choice of the meta teaching cross-method. Finally, innovation can never replace high-quality education. Without technical education talents, no electronic transmission can achieve outstanding results.

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