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EDITORIAL

Dear Readers,

JOURNAL OF STRIDES IN EDUCATION (JSE), a biannual, peer-reviewed multidisciplinary journal published by SNM Training College, Moothakunnam highlighting research papers in the realm of education. In the rapidly evolving landscape of education, the need for innovative approaches to teaching, learning and research has become more evident and essential than before. JSE stands as a testament to the commitment of educators and researchers to explore new avenues and myriads of ways that can transform traditionaleducational paradigms. This issue of JSE presents six thematic and research papers on diverse themes under Education, Humanities, and social sciences. The first paper is titled Innovative Instructional Design to address Digital Divide through Flipping Mathematic Class Rooms. This paper tries to discuss the need and importance of innovation and provide a sample for flipping with some selected tools. The second article is titled Relationship between Mental Imagery and Creativity of Secondary School Students. This paper emphasizes that there is a significant positive relationship between mental imagery and creativity of the secondary school students. Third paper entitled Collaborative Learning; A Technique to enhance Academic Efficacy discuss about the features of collaborative learning and the various ways in which collaborative learning can be applied appropriately to classrooms. The fourth paper is titled Teacher as a Techno Pedagogue in Copyleft paradigm and attempts to articulate the current perception of ICT, scope and potentials of FOSS tools, which need to empower teachers as techno pedagogues with the creative commons, resulting in the designer, developer and incubator of future sustainable learning and knowledge ecosystem. The next paper titled as Towards a Gender-just modern society: A Kerala Model in Higher Education discuss a giant leap towards a modern society where all the genders are represented in a way they are ought to be represented to ensure gender equity and the last research paper is an attempt to suggest that employing Self-assessment rubrics is effective to enhance the achievement in Mathematics among Upper Primary students.All articles are shaped with remarkable efforts and offer valuable insights to the reader. We are hopeful that this issue will provide some insights to all our readers.

With warm and kind regards.

Editorial Board

ABOUT THE JOURNAL

JOURNAL OF STRIDES IN EDUCATION (JSE), a biannual, peer-reviewed multidisciplinary journal published by SNM Training College, Moothakunnam highlights research in the broad area of education. Original contributions, as well as review articles in important areas of Education, Humanities, and Social sciences, that contribute to the development of knowledge across the broad field of education, are relevant to this journal. The Journal started in 2022 and is published twice a year. One issue is from May to November, and another issue is from December to April

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INNOVATIVE INSTRUCTIONAL DESIGN TO ADDRESS DIGITAL DIVIDE THROUGH FLIPPING MATHEMATIC CLASS ROOMS

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Abstract

Mathematics has been considered a foundational knowledge and skill-based discipline. The teaching of mathematics revolves around this concept, and learners find it difficult as most teachers fail to localise and connect to real life. Appreciating mathematics concepts and applications needs to focuson foundational and numeracy skills. Focusing on these would bring the complaint about the curriculum overload and time factors. Uncovering the syllabus is more important than covering the syllabus, such that mathematics teachers can adopt the inputs from instructional designs without diluting the achievement of learning outcomes. Innovating teaching methodologies are compelled by the recent experiences of the stakeholders. Since the mathematics concepts are the same, dealing according to the needs ofthe learners through innovative and interactive ways would be needed. The methodology of teaching mathematics can be strengthened and enhanced with the adequate use of technologytools, allowing teachers to adopt innovative designs. While innovating, the existing digital divide also needs to be considered instead of blind adaptation of technology tools. Flipping mathematics classrooms is possible through both offline and online tools. This paper tries to discuss the need and importance of innovation and provide a sample for flipping with some selected tools.*Keywords***:** Innovation, engagement, instructional design, flipped learning.

Introduction

The world witnessed a variety of divides in terms of those who have and have not. In every phase of development, this divide is imperative. Efforts were immense to address social, cultural, economic and even political divides. These kinds of divides affected education in all these times. When the shift happened methodologically and content-wise, these divides disrupted attaining the educational aims.

Digital divide is a reality even with the widespread of the internet and advanced technologies. Digital natives and digital migrants were the kinds of digital divide that were discussed a lot and accelerated efforts to bridge the gap. Digital migrants including the teachers equipped through various attempts to synchronise with the digital natives. When extensively depending on the internet and cyberspace, a new divide in terms of digital residents and digital visitors is brought into discussion.

Innovativeness in instructional design is anchored in the methodology of integrating varieties of resources or media in the teaching-learning as well as objective and informed assessment strategies focusing on the formation of learning.

Teachers usually focus on the teaching method which helps them cover the syllabus in the easiest ways. Curricular load is been discussed as an excuse for not trying thealternatives or revised methods of teaching. Without any attempts, teachers blindly either ignore or avoid certain best methodologies of teaching in Mathematics. Speer M. Natasha (2005) argues about the misfit between professed and attributed beliefs. This case could be easily in Mathematics teaching, especially using methodologies. Since the learners of the dayare digital natives or digital residents, teachers are compelled to embrace technology and bring varietyto teaching.

Various efforts are been made by mathematics teachers to integrate technology. The integration mostly becomes for the sake of using technology rather than a planned integration of technology with the method of teaching. The majority of them are sacrificing theirteaching styles and even their assessment. In this background, it would be better to discuss the innovativeness that should address the digital divide.

There are lots of concerns that at the teacher level, one may not be able to address, like access to digital gadgets, uninterrupted power supply, stable network bandwidth andeven support from the parents, who are supposed to be partners in their wards' learning. Agreeing on these, teachers would work on the areas where they can bring innovation, like designing teaching-learning experiences, formative assessment and support mechanisms.Instructional design ideas always support teachers who are interested in integrating technology into themathematics classroom. Various instructional design models give enough opportunities for the teachers to design the teaching and learning. Content competency and pedagogic competencies of the teachers are crucial in thinking of innovation. When the focusof teaching teaching-learning process is on content coverage rather the foundational knowledge, teachers fail in their design.

Instructional Design to Innovate

Teachers need to explore the various components of instructional design like analysing learner, content, context and tasks including the assessment. Their confidence inthe area can be falsified based on their experiences and cases. Deliberate attemptsto analyse the content by the teacher would set up the base for the instructional design. Nature and type of content flavoured with the experience of the teacher would help in designing smartoutcomes. Once the smart outcomes are designed with appropriate cognitive, affective or psychomotor processes, it will be easy to design the learning experiences.

While involved in the content analysis, teachers' conceptualisation of mathematics as a mere body of knowledge and skill may not be helpful. Going beyond the foundational knowledge and skill are indeed needed. Considering Greek mathematics as the fundamental and maximising the coverage may not be appropriate (Devlin, 2021). This would be why the student feels that mathematics is tough. Exploring the connection between localised knowledge and real life and simplifying the learner's language without deviating from mathematics syntax and semantics may help the teachers address this concern. Historical methods and allowing the learners to appreciate the history behind each mathematic also support in order to create interest among them. The content analysis process needs to be rigorous such that comprehensiveness in attaining mathematisationis made easy.

The content analysis helps anchor the design of specific learning outcomes and meaningful and constructive teaching-learning experiences. Teachers resort to activity-based approaches, and if the activities are pedagogically designed, the learners and teachers fail in the entire process; rather, simple activity completion would be done. While designing the learning experiences, the teachers' digital literacy and technological competencies correlated with the effectiveness of the instructional design that supports technology integration. Teachers may use the task analysis or even design a flowchart leading to an algorithm for teaching learning. In the decision-making, teachers may take up the technology tool analysis, exploring their pedagogic values appropriate for Mathematics. Finding room for applied reasoning, verification, higher-level analysis, and even observation of the mathematics concepts and processes generally missed in a regular classroom. Wrap and weaving of mathematics teaching-learning would be aligned to the mathematisation. How the learning experiences feel by the learners in the classroom would be a question to be raised by the teachers. Teachers need to move ahead with the content analysed to the analysis of tasks and contexts.

All these pre-phase activities are either neglected or avoided, claiming the years of experience of teaching with the same contents. Teachers feel that this could be revived in the light of technology integration. Selection and improvisation of the technology tools can be justified with a detailed analysis. Maximum time has been spent delivering the foundational knowledge and skills, and teachers may get exhausted in scaffolding the learners to the higher levels of learning. These complaints can be easily resolved when a teacher tries to innovate the teaching-learning.

There are various technology tools that each teacher may be aware of. They try some of the tools out of curiosity and mostly stop using them. The detailed analysis of the same tool's pros and consis not taken seriously. Researchers also try to bring simple to most advanced technology tools' application in mathematics teaching, but the case studies on the success or failure of the technology integration are seen as missing in most of the literature. It is a result of a misconception that any research should statistically signify positively.

The race is behind blended, m-learning, and flipped learning with technology integration. Various researchshows these strategies' effectiveness, but in actual practice, the effectiveness depends on how best the teacher designs the same. Technological and Pedagogical Content Knowledge (TPACK) helps to set up the sage for designing instruction in any of these strategies. The following section tries to explain some of the technology tools that could be used to flip the mathematics classroom, intending to innovate and address the digital divide.

Ideas to Flip the Mathematics Classroom

Learning is conceived generally as multi-dimensional, but teachers address the same as if it is uni-dimensional. The multi-dimensional learning modelallowed the teachers to plan the mathematics classrooms' flipping. Flipped Learning is seen as a teaching-learning strategy that can flip those learning tasks carried out in a regular classroom with those learning activities assigned to the learners as either extended orhomework. The flippedlearning strategy opens up the opportunities of flipping with the requirement of a flexible learning environment, intentional content, learning culture and professional educator, as the Flipped Learning Network (FLN) suggested.

The flexible learning environment need not be as a multi-purpose room as suggested; the learners should be able to explore their learning flexibly. Intentional content selected by the teacher, though students doubt sharing/ doubt corner post box with enriched content, can

take the learners to higher levels of learning. Learning culture would be challenging in our classroom as teachers and learners are habituated toteacher-led classrooms, where the teacher supports learning. Flipping the learning culture can include self-learning, peer learning, and group-based learning. Allowing the varieties of learner-centred activities and objective in diagnosing and remediating needsa professional outlook by the teacher.

Active and engaging learning experiences result in better learning. With this focus on mathematics as a subject of applied reasoning logical and critical thinking, flipping would be appropriate (Wilson, 2013; Cronhjort et al., 2018; Lo & Hew, 2021). Researchwas carried out on different dimensions of engagement, like behavioural, emotional, and cognitive engagement, which a flipped classroom can provide.

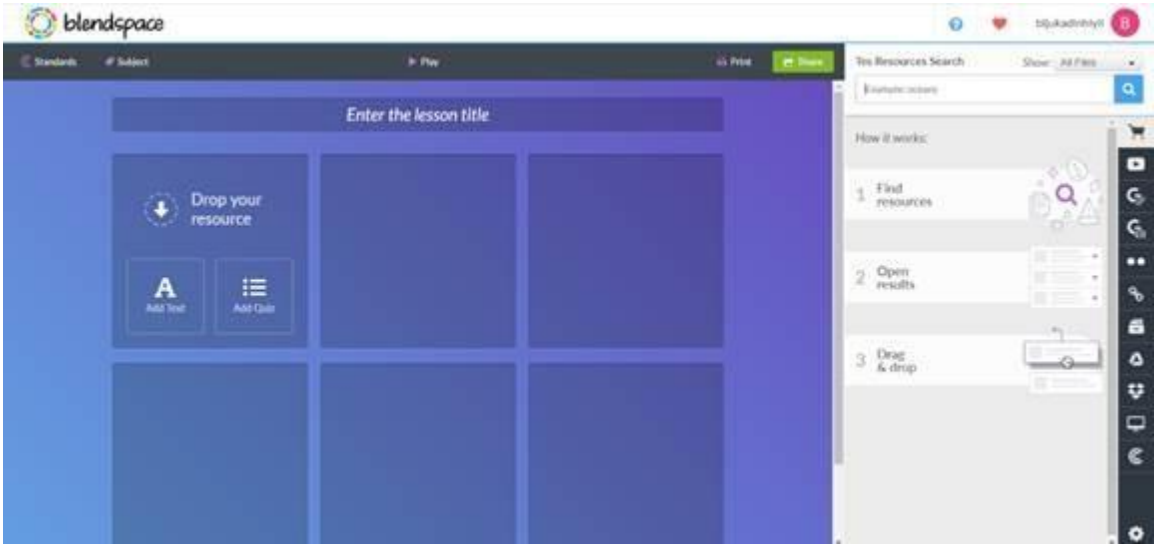
Flipping of Mathematics classrooms can be achieved in different ways. Literaturesuggests that teachers share pre-recorded videos with the learners based on the designed outcomes, allowing them to explore the content and supporthigher-level interactions in the classroom. The other way would be designing a course based on a learningmanagement system (LMS) or a content management system (CMS) and sharing the resources for self-exploration followed by problems/questions to solve. Higher dependency on technology tools may raise doubts among the teachers because they are experiencing the challenges of learners' active participation in the online mode. Dependency on technology tools need not be confined to web-based online resources; teachers can act as the course designers, which could be accessed even without the internet.

Offline access to the content, designed in a detailed course structure, would be a solace for learners from remote areas who are divided digitally in terms of access. Content authoring tools like exe from exelearning.net can help teachers easily design enriched content in international standards like IMS and SCORM. The course or content designed in exe based on the selected learning outcomes can be easily embedded into any HTML-based pages, which can benefit the teachers.

As in the classroom, there is heterogeneity; web services like https://www.blendspace.com/ or https://nearpod.com/ or https://info.flipgrid.com/ or https://spiral.ac/help the teacher to arrange verities of resources, either teacher-made or browsed contents such as address varied needs. Readymade applets like Geogebra applets help the learners explore mathematical concepts at home, prepare sketches, and explore verification and higher-level analysis. Learning Management Systems like

https://new.edmodo.com/ or https://canvas.instructure.comhelpwith similar functionality but allowharnessing for other dimensions of learning management, including assessment.

Blendspace



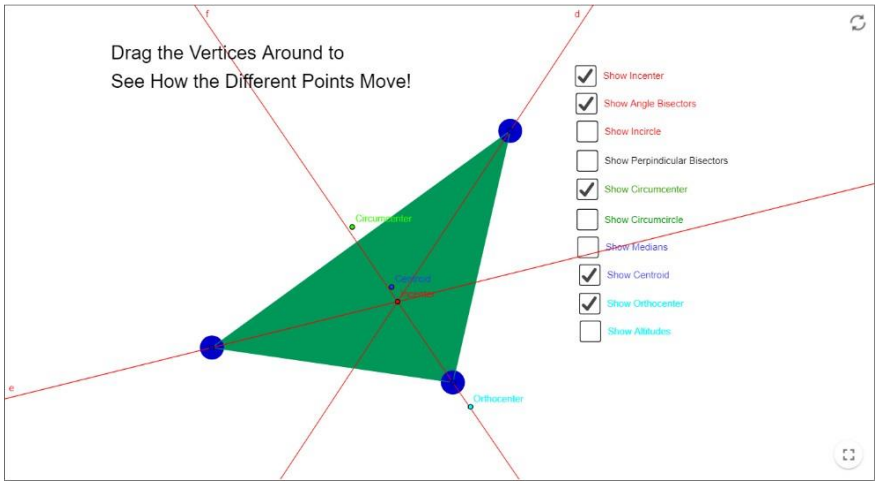
Blendspace allows one to create an account and then one can create a lesson. In order to design the lesson, one will have the different tiles where different resources can be placed from various platforms. Thus, a mathematics teacher can create lesson tiles in the blendspaceand share to the learners with the link. Learners at home can explore the resources and prepare the foundational knowledge. In the class,the teacher can take the doubt clarifications and further discussion or demonstrations and take the learners to higher levels of learning. Inside the classroom, the teacher can design various activities like puzzles, infographics or mind maps in order to confirm the higher-level learning mapping to the designed outcomes.

GeoGebra

Geogebra, free and open-source software, can be installed on the learners' gadgets. Mathematics teachers can create basic sketches of triangles and share them with the learners. By exploring the predesigned Geogebra sketch, learners will be able to clarify the basic concepts associated with triangles. Inside the classroom, the teacher will be able to demonstrate the following sketch: the incentre, ortho centre, centroid and circumcentre in a single sketch. Since Geogebra is an interactive app, the learners will be able to observe the behaviour of the different centres and infer the following:

1. Which are the centres always lie inside the triangle?
2. The position of different centres according to the type of triangles.
3. The condition where all the centres join in a single point.
4. Euler's line and theorem.

In a traditional class room, all the above inferences used to state to the students whereas by flipping the mathematics class room a teacher is able to take the learners to higher levels of analysis, verification and conclusion.



(Source: https://www.geogebra.org/m/BfVXWKGh)

Conclusion

Technology tools need to be selected based on pedagogic values that provides to the mathematics teaching rather according to the availability and accessibility. Instructionaldesign must be the heart of innovation, which can be assured using appropriate and comprehensive technology tools. This paper attempted to provide some insights intointegrating technology tools in teaching mathematics, which can be realigned with innovative methodologies.

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Relationship between Mental Imagery and Creativity of Secondary School Students.

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Abstract

Mental imagery and creativity have a strong relationship, as the former plays an important role in stimulating the latter. Mental imagery is the ability to create vivid, sensory experiences in one's mind without the presence of external stimuli. Meanwhile, creativity refers to the ability to come up with new and innovative ideas or solutions to problems. Research has shown that individuals who are capable of generating rich mental images tend to be more creative than those who struggle with this ability. This is because mental imagery allows individuals to visualize and manipulate various elements, which can lead to novel connections and ideas. The present study attempts to find out the relationship between mentalimagery and creativity of secondary school students. The study was conducted on a sample of1200 secondary school students. The study concluded that there is exists a significant positiverelationship between mental imagery and creativity of the secondary school students. *Keywords:*Mental imagery, creativity

Introduction

Mental imagery is a representational medium for providing researchers access to thoughts, symbolization, and combination of elements, possibly facilitating the emergence of new ideas and creativity. In this direction, different aspects of mental imagery were considered which could increase or explain the emergence of creativity: daydreaming styles (common forms of imagination that involve spontaneous thoughts unrelated to the context, Zedelius and scholar); imagination of activities over a long period, relevant especially for actual creative achievements in science and writing (Jung et al); as well as 'looking at nothing'and blinking behaviours, that do not necessarily involve visual imagery (Salvi and Bowden). In addition, we explored the relationships between different creative objects' production and artistic drawings with other mental imaging processesi.e., generation, inspection and transformation,(Palmiero et al.,2012).

We also collected studies that investigated distinct and peculiar aspects of creativity and its cognitive components, such as the equal-odds rule of divergent thinking, Interestingly,

the relationships between convergent thinking involve insight and intelligence and working memory updating (maintenance of items in working memory and binding of the incoming information, One of how mental imagery and creativity are connected is through the use of visual metaphors. Visual metaphors use imagery to represent an idea or concept and can be a powerful tool for generating creative insights. For example, a chef struggling to develop a new recipe might imagine the flavours and textures of different ingredients and then combine them in novel ways.

Another way in which mental imagery can enhance creativity is through the use of mental simulations. Mental simulations involve mentally rehearsing or visualizing a particular task or activity. This can help individuals generate new insights or solutions to problems, as they can imagine various scenarios and how they might play out.

Objectives

1 To find out the relationship between mental imagery and creativity of secondary school students in the total sample.

2 To find out the relationship between mental imagery and creativity of secondary school students in the subsamples based on gender.

Hypotheses

1 There exists a significant positive relationship between mental imagery and creativity of secondary school students in the total sample.

2 There exists a significant positive relationship between mental imagery and creativity of secondary school students in the subsamples based on gender.

Research Methodology

The normative survey method was used for the study. The study was conducted on a sample of 1,200 secondary school students. A stratified random sampling technique was used to collect the data where due representation was given to the gender of the subjects. The tools used in the study were a test of imagery administered: the Vividness of Visual Imagery Questionnaire (VVIQ) [D.F. Marks, 1973] and Torrance's Suppose Test (Suppose) [E. P. Torrance, 1974].. The Vividness of Visual Imagery Questionnaire, or VVIQ, is a self-report rating of the vividness of one's ability to visualize situations [D. F. Marks, 1973]. (For example, "Visualize a rising sun. Consider carefully the picture that comes before your mind's eye.") Subjects rate their internal images on a scale from me (clear) to 5 (unclear). The score on this instrument represents the sum of ratings on sixteen items. The Just Suppose

Test represents the novel divergent response dimension [E. P. Torrance, 1974]. In this task, the subject is given an improbable situation and is asked to list as many imaginative consequences of that situation as possible in five minutes. (For example, "JUST SUPPOSE a great fog was to fall over the earth, and all we could see of people would be their feet. What would happen? How would this change life on the planet? List your ideas and guesses below.") The statistical technique used to analyse the data was Carl Pearson's product- moment correlation coefficient. **Analysis and Interpretations**

The study aimed to investigate the relationship between mental imagery and creativity among secondary school students in the overall sample and within subgroups based on gender. To analyse this relationship, the researchers employed Carl Pearson's productmoment coefficient of correlation, which measures the strength and direction of linear correlation between two variables.

The obtained correlation coefficients reflect the degree of association between the students' mental imagery scores and creativity scores. These coefficients provide insights into whether the two variables have a positive, negative, or negligible relationship.

The correlation coefficient between mental imagery and creativity scores was calculated in the total sample. This value indicates the overall relationship between the ability to generate mental images and the level of creativity exhibited by secondary school students. Additionally, the researchers performed subgroup analyses based on gender. For male and female students, correlation coefficients between mental imagery and creativity scores were determined separately. This approach allowed the researchers to explore whether the relationship between mental imagery and creativity differed between genders.

The correlation coefficients, when interpreted, can provide insights into the strength and nature of the relationship. A positive correlation suggests that higher mental imagery scores are associated with higher creativity scores, meaning that students with better mental imagery skills tend to demonstrate higher levels of creativity. A negative correlation, on the other hand, would indicate an inverse relationship, where higher mental imagery scores are linked to lower creativity scores. A correlation close to zero indicates a weak or negligible relationship between the two variables.

By examining the correlation coefficients within the total sample and across genderbased subgroups, the researchers can conclude the nature of the relationship between mental imagery and creativity for secondary school students. This information contributes to

our understanding of how mental imagery abilities might impact creativity levels and whether these relationships differ based on gender.

A. Relationship between* Mental imagery and creativity *for the total sample

Statistical indices relating to coefficient of correlation between scores of Mental imagery and creativityfor the total sample are presented in table 1.

Table 1

Coefficient of correlation between Mental Imagery and Creativity for the total sample

N	r	SEr	Confidence interval
1200	0.560	0.020	0.509-0.611

Table 1 shows that the coefficient of correlation obtained are 0.560. It is significant at 0.01 level and the confidence interval is from 0.509 to 0.611.

B. Relationship between Mental imagery and creativity ***for boys***

Statistical indices relating to coefficient of correlation between scores of adjustment and achievement motivation for boys are presented in table 2.

Table 2

Coefficient of correlation between Mental Imagery and Creativity for boys

N	r	SEr	Confidence interval
530	0.468	0.034	0.381-0.556

Table 2 shows that the coefficient of correlation obtained are 0.468. It is significant at 0.01 level and the confidence interval is from 0.381to 0.556.

C. Relationship between Mental* imagery and creativity *for girls

Statistical indices relating to coefficient of correlation between scores of adjustment and achievement motivation for girls are presented in table 3.

Table 3

Coefficient of correlation between Mental Imagery and Creativity for Girls

N	*r*	*SEr*	*Confidence interval*
670	0.617	0.024	0.55-0.679

Table 3 shows that the coefficient of correlation obtained are 0.617. It is significant at 0.01 levels and the confidence interval is from 0.555 to 0.679.

Interpretations

The tables above indicate that there is significant positive relationship between mentalimagery and creativity of secondary school students. Both boys and girls possess significant positive relationship between mental imagery and creativity. The result reveals that creativity has a significant influence in determining mental imagery of secondary school students. Since it appears that some strategies improve the productivity of mental images(Antinietti & Martini, 2000), one may conclude that imagery can be proposed as an educational methodology for the development of creative thinking in childhood. His spontaneous use of imagery in preschool playing behaviour is predictive more creative skills in older children and adults (Singer &Singer, 2006). The link between imagery and creativity also appears to be in the opposite direction: creativity induces a more frequent and complex use of mental imagery (Saracho, 2002).

Educational implications of the study

Encouraging mental imagery: Teachers can encourage students to use mental imagery to enhance their creativity. This can involve asking students to visualize different scenarios or to create mental images of an idea they are trying to develop. Teachers can help students generate new and innovative ideas by encouraging mentalimagery.

- Integrating visual and creative art: The study suggests that mental imagery and creativity are closely linked. Therefore, incorporating visual and creative arts into the

curriculum can help students develop their mental imagery skills and boost their creativity. Arts classes, drama, and music can help to promote mental imagery.

- Promoting interdisciplinary learning: The study highlights the importance of multidisciplinary education in enhancing creativity. Teachers can encourage students to explore different subjects and fields of study, which can help to expand their mental imagery and creative abilities. For instance, students can use their science knowledge to create artistic representations of scientific concepts or use their understanding of history to write imaginative stories in different historical periods.
- Providing opportunities for divergent thinking: mental imagery is closely related to divergent thinking, which involves generating multiple ideas and solutions to a problem. Teachers can create opportunities for divergent thinking by asking openended questions with multiple possible answers, encouraging brainstorming and collaboration, and providing students with opportunities to experiment and explore different approaches to problem-solving.
- Visual imagery plays a vital role in student's creativity. Mental imagery is effective in limiting stress and anxiety for creative thinking. Imagery creates the mood or setting for the study. Students are much more likely to remember concepts of multiple perspectives if they have rich visual imagery. With a bit of reflection and time, instructors can create visual imagery for the most complex concepts in their classes. Mental imagery is a performativity medium for providing researchers access to thoughts, symbolization and a combination of elements, possibly facilitating the emergence of new ideas and creativity.

Recommendation:

Based on the current findings, the following recommendation is offered

- Encourage teachers and teacher educators to use mental imagery with physical training to increase students' performance for better outcomes.
- Conduct series training workshops to increase awareness and positive attitude of teachers and teacher educators about mental imagery strategy as an innovative student centred approach method of teaching.

Conclusions

Overall, the relationship between mental imagery and creativity is complex and involves various cognitive processes. Enhancing our ability to create rich mental images can open new

avenues for creative thinking and problem-solving. As such, mental imagery is essential for individuals who want to cultivate their creativity and reach their full potential. In addition to these approaches, research has shown that mental imagery can help individuals overcome creative blocks. When individuals are stuck on a particular problem or idea, mental imagery can provide a fresh perspective and help them see the problem in a new way. This can lead to new insights and solutions that might not have been apparent otherwise. The mental imagery of secondary school students is positively correlated with their creativity. A positive relationship exists between mental imagery and imagery of secondary school students in the subsamples based on gender. Mental imagery significantly influences secondary school students' creativity.

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COLLABORATIVE LEARNING; A TECHNIQUE TO ENHANCE ACADEMIC EFFICACY

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Abstract

In a collaborative learning environment, students work in groups to investigate important questions or produce worthwhile projects. Collaborative learning can take many forms, such as students from various schools working together virtually on a shared assignment or a group of students debating a lecture. It entails the creation of cooperative communities where individuals or groups engage in problem-solving and learning activities. The learning process can be enhanced by the atmosphere that collaborative learning offers. With the assistance of collaborative partners, a collaborative learning system focuses on improving and integrating students' subject knowledge and learning process. This paper discusses the characteristics of collaborative learning, the stages involved in creating instructional materials for it, the different kinds of collaborative learning, and the numerous applications for it. the benefits and drawbacks of group education.

Key words Collaborative Learning, Brain storming, Jigsaw

Introduction

When two or more students learn anything together, it's referred to as collaborative learning. In contrast to solitary learning, students participating in cooperative learning make use of one other's abilities and resources by exchanging ideas, asking for information,assessing each other's work, and so on. More precisely, collaborative learning is predicatedon the idea that knowledge can be produced within a population whose members actively engage in role-playing and experience-sharing. Stated differently, approaches and settings forcollaborative learning involve students working together on a project where everyone is responsible for and dependent upon one another. These include in-person interactions as wellas online forums, chat rooms, and online forms. Conversation analysis and statistical discourse analysis are two techniques for analysing the collaborative learning process.

Thus collaborative learning is commonly illustrated when groups of students work together to search for understanding, meaning, or solutions or to create an artefact or product of their learning. Furthermore, collaborative learning redefines the traditional student-teacher relationship in the classroom which result controversy over whether this paradigm is more beneficial than harmful. Collaborative learning activities can include collaborative writing, group projects, joint problem solving, debates, study teams and other activities. This technique is closely related to cooperative learning.

Learning through collaboration is one of the most effective forms of learning. Teaching and learning in isolation are very restrictive and hinder progress. Learning in groups enhances the scope of learning and develops critical thinking. Technologies plays a big role in developing all of these characteristics for modern classrooms. These classrooms enhance the learning experience and prepare students for higher education and work force. The prominent social media for teacher's classrooms are Facebook, twitter, Pinterest, blogger, you tube and so on

By collaborative learning, we mean that the majority of students will study in groups the majority of the time, regardless of where they are in the world. These kinds of groups are probably completely virtual, meaning that their constituent members might never really meet. Members of the group will be heavily dependent on one another for the calibre of their learning, but they are also very real in all other ways. Such a group may be official or informal, tiny or vast, homogeneous or heterogeneous, depending on the situation. When learning occurs primarily through group interaction, the instructor's role is likely to be more of that of a facilitator than an active knowledge provider.

- Common learning objectives and results inform the design of a group learning assignment.
- Teams consisting of high, average, and low achievers who are mixed-race and sexual orientation study together to understand academic courses.
- Small group learning occurs in groups of three to five students.
- Cooperative behaviour includes trust-building exercises, collaborative planning, and an awareness of team support.
- Reward systems are more group-cantered than individually oriented.

Instructional phases of Collaborative Learning

There are five phases for designing instruction for collaborative learning

1 Engagement

2 Exploration

3 Transformation

4 Presentation

5 Reflection

Types of collaborative learning

1 Informal collaborative learning group

2 Formal collaborative learning groups

3 Problem based learning

4 Collaborative base group

5 Think pair share

6 Jigsaw collaborative learning

Ways of applying collaborative learning

There are various ways in which collaborative learning can be applied.

They are

Brain storming

The brain storming describes a group process of creative problem solving. It facilitates generation of ideas quickly. It stimulates fresh and enable participants to break loose from fixed ways of responding problem

Four basic rules of brain storming are

- Criticism is forbidden and adverse judgements of ideas must be withheld until later
- Freewheeling is welcomed every response is accepted without discussion or judgement
- Welcome as many responses as possible, quantity is wanted, for greater the number of ideas, the greater the likelihood of devising solution to problems
- Combination and improvement are sought.

Steps

1. presentation of the problem
2. Provide relevant information

3. Record ideas put forth by the participants

4. Combine similar ideas

5. Evaluate each ideas/solution

Task group

1. A task is identified

2.Small groups are formed

3.Each group of class is assigned a specific task to be completed within a time frame

4.Task of each group is evaluated by the other group

5.Completion of task is responsibility of all

Think pair share (Consider pair sharing).

Think, pair, share is a cooperative learning approach where students cooperate to find a solution or respond to a query regarding a given assigned reading. In order to use this strategy, students must consider a problem or provide a solution on their own, then present their views to their classmates. Students answer questions in pairs and exchange their answers with one another.The class is then encouraged to hear the students' comments.

Jigsaw (Puzzle Pieces)

Jigsaw is a cooperative learning method that helps students practice gathering, reviewing, and debating new information in an informed manner. There is the development of interdependence and status equality. The approach is

- Every team member becomes an expert in one area
- Members of other teams are allocated to the expert group
- Upon returning to their teams, each member instructs the group in turn.
- Every student receives feedback on every facet of the subject.

Advantages of Collaborative Learning

- Enhance problem solving
- Inspire cultural Thinking
- Improves social interaction and supports diversity
- Aids the development of self-management skills

- Development of oral communication skills
- Increased cognitive analysis and problem solving skills
- Collaborative learning is more students centred
- There is sharing of authority and acceptance of responsibility
- Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves
- Collaborative learning is connected to the constructivist's view that knowledge is a social construct
- Enhancing student satisfaction and promoting positive attitude
- Improved verbal skills
- Improved cross cultural understanding
- Collaborative Learning increases student retention

Disadvantage of Collaborative Learning

The teacher's power is diminished.Students take up the reins of authority. Consequently, some educators can feel like losing their cool.

The lack of qualified teachers to facilitate cooperative learning;

Inadequate supervision of the group's work

- Not every student is actively engaged in their education.
- Some pupils dominate collaborative learning
- An untrained teacher may find it challenging to check and recheck the work of all the groups working simultaneously; and meaningful learning necessitates extremely careful planning
- A number of factors must be taken into account, including the requirements, talents, and interests of each student as well as the activity's scope, the subject to be addressed in the group, group dynamics in the classroom, and classroom management.

Conclusion

Collaborative learning enhances students' academic performance, social skills, and class relationships. It encourages active participation, allowing students to learn strengthsand weaknesses, and develop new problem-solving techniques. Successful integration into teaching plans enhances the learning process and brings students happiness.

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Teacher as a Techno Pedagogue in Copyleft Paradigm

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Abstract

In a knowledge-driven society, addressing its stakeholders with the paradigm shifts iscrucial. The resources and their utility have been controlled by various forces, which inhibited the democratization of knowledge. Access and freedom to use have been defined by socio-political-economic forces. As history repeats, the alternatives have already taken their role. The GNU and Free Software movement has transformed into a philosophical movement in knowledge management. The Creative Commons and Copyleft are its offshoots. It would be the best time to think of redefining and realigning the role of teachers and learners when we started discussing and debating new education policies. The present paper attempts to articulate the current perception of ICT, scope and potentials of FOSS tools, which need to empower teachers as techno pedagogues with the creative commons, resulting in the designer, developer and incubator of future sustainable learning and knowledge ecosystem.

Keywords: Copyleft, Democratization, Teacher, Pedagogy, FOSS, Creative Commons

Background

"Why do I need a teacher when I've got Google?" is a question Ian Gilbert has described more authentically in his book, posed by digital natives in classrooms. In this cyborg time, paradigm shifts in the role of teachers need to be addressed instead of labelling teachers as techno-pedagogues. From being consumers of technology tools, there is a shift to producers of content by the teachers in multiple formats.

Technology integration or technology enrichment in the classroom is a debatable question. Another argument is, is technology for teachers or teachers for technology? The

technology converts teachers into mere operators if it has not been treated as a pedagogy tool. 21st-centuryclassrooms become live with the digital natives as learners and teachers as digital migrants. The digital divide has become the topic for national and internationalrecurring reports. As technology invades all walks of life, present classrooms need to addressdigital residents and digital visitors. Blended or infused modes of technology integration cannot be ignored, as the recent pandemic situations compelled teachers and learners to shift from traditional methods to technology-integrated modes.

Information Communication Technology (ICT) as Perceived

ICT is considered mere information communication technology, which most stakeholders still believe is a replacement for teachers instead of exploiting its potential in the education system. As our education system suffers from clichés and jargon, ICT and related competencies are still not uncovered to most of the populace. The fear towards the use of different ICT tools puts them as consumers. Capital hegemony influences society,and consumerism still has stronger roots in our education system. The more significant challenge in education is coping with accelerated developments in the field of technology, recently with artificial intelligence, which will continue.

Most of the time, locating knowledge and customizing is happening with the stakeholders rather than authoring. Plagiarism has grown like an intellectual cancer, even in academia itself, which has affected dangerously. Though cyber laws and moralities have been propagated, the results are not so appreciable today.

Products were dumped into the education sector to make their users the consumers. The readymade tools and contents were pumped such that the productivity in the education sector has been influenced drastically. Along with the other socio-political forces, access to knowledge was restricted, resulting in the divide between those who can and cannot. The corporate world has taken all its arms for entering into education and started dominating the knowledge capital- in its creation, delivery and management. This scenario necessitates the importance of alternatives for the proprietary forces and emphasises creating open access avenues.

Current Momentum

National and international attempts are giving some direction in integrating ICT tools into education. The essence that 21st-century teachers need to preside over the

democratisation of learning in a democratised knowledge society is re-emphasized now and then. Redefining the role of teachers with the meaningful and judicial integration of ICT tools has started.

Free and Open-SourceSoftware (FOSS) is opening up tremendous opportunities in the education sector, such that with no cost or low cost, teachers and students can become prosumers to begin with and producers to continue.

"Grasping the opportunity to move away from the hegemony of content to a focus on skills and competencies will contribute to increased commitment to learning if done well. 'Whatever the subject I'm in, I'm developing skills and attitudes to help me get a better job. Therefore, all lessons are important would be an important shift". (Ian Gilbert, p,20)

The opportunities are opened up because of the GNU platforms and FOSS tools.Teachers and learners have plenty of resources available and accessible easily regarding utilities and software. Open Educational Resources (OER) and Massive Open Online Courses (MOOCs) need to be leveraged in various forms. There are attempts to produceopen content and increase access among the stakeholders.

FOSS Tools for Education

The knowledge super high way unveils varieties of FOSS tools for all dimensions of education. The stakeholders are allowed to use them without any power concerns, but the condition is that users need to find them out and start using them. The hallmark of free and open-source software is reuse, remix and distribution, which is an excellent sign of the democratisation of knowledge.

"Free software" means software that respects users' freedom and community. Users**can run, copy, distribute, study, change and improve the software**. Thus, "free software" is a matter of liberty, not price. To understand the concept, you should think of "free" as in "free speech," not as in "free beer". We sometimes call it "libre software" to show that we do not mean it is gratis (from https://www.gnu.org/philosophy/free-sw.html retrieved on 3rd Jan 2015).

A program is free software if the program's users have the four essential freedoms:

- The freedom to run the program as you wish, for any purpose (freedom 0).

- The freedom to study how the program works and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies to help your neighbour (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). Doing this gives the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

The following concept map explains the different FOSS tools that could be used in education.

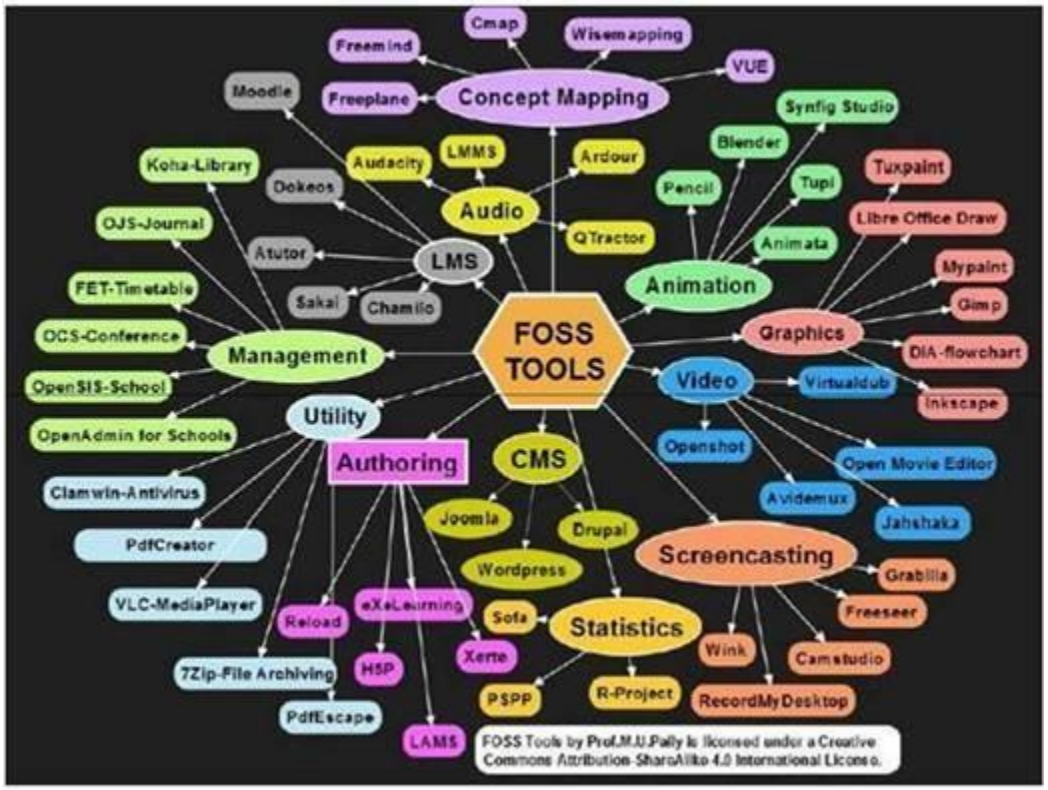

Figure 1: FOSS Tools in Education; Credits: Prof M U Paily.

As FOSS tools open up user opportunities to design and develop, licensing and attributions are crucial. Acknowledging the information or knowledge used as an intellectual morality is the need of the hour. This value dimension takes us to talk about the different licensing of the knowledge products.

Copy Left Paradigm

Until recently, we used copyrighted materials or resources without proper permission. This restricts the use of ICT resources since most of the resources are digitized and available on the Web. It's a kind of slavery to theft from the users' part as deliberate or by chance. Copyrights and intellectual property rights alienate the use of most tools, though they are user-friendly and attractive, as the consumer economy does. However, the GNU revolutions have become robust even to challenge the content hegemony by the corporates. Since the creative works and content creation need to be acknowledged, the GNU licensing system paved the path to the concept of Copyleft, an alternative to Copyright.

"Copyleft is a strategy of utilizing copyright law to pursue the policy goal of fostering and encouraging the equal and inalienable right to copy, share, modify and improve creative works of authorship. Copyleft (as a general term) describes any method that utilises the copyright system to achieve the goal above. Copyleft as a concept is usually implemented in the details of a specific copyright license, such as the GNU General Public License (GPL)and the Creative Commons Attribution Share-Alike License. Copyright holders of creative work can unilaterally implement these licenses for their works to build communities that collaboratively share and improve those copylefted creative works" (as seen at https://copyleft.org/)

"Copyleft is a general method for making a program (or other work) free and requiring all modified and extended versions of the program to be free. The simplest way to make a program free software is to put it in the public domain, uncopyrighted. People can share the program and their improvements if they are so minded. But it also allows uncooperative people to convert the program into proprietary software. They can make many or few changes and distribute the result as a proprietary product. People who receive the program in that modified form do not have the freedom the original author gave them; the middlemanhas stripped it away.

"Copyleft also helps programmers who want to contribute improvements to free software get permission. To Copyleft a program, we first state that it is copyrighted. We add distribution terms, a legal instrument that gives everyone the right to use, modify, and redistribute the program's code or any derived program, but only if the distribution terms are unchanged. Thus, the code and the freedoms become legally inseparable" (taken from https://www.gnu.org/copyleft/)

Creative Commons

Creative Commons (CC) is the offshoot of the GNU project and Copyleft movement. This allows for licensing the knowledge products or tools with meaningful and solid legal impacts. When teachers and learners become the producers of knowledge products and tools, with the democratisation of knowledge philosophy, it would be better to go for CC licensing, resulting in a robust learning or knowledge ecosystem that can be sustained.

Most of the time, when we deal with FOSS, the common misconception is that it is free to use. As a techno pedagogue, it's the basic morality to propagate the message of attribution and licensing to uphold civic values and morals. The following table explains the different CC licenses.

License	Details
 **Attribution CC BY**	This license lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered and recommended for maximum dissemination and use of licensed materials.
 **Attribution-Share Alike CC BY-SA**	This license lets others remix, tweak, and build upon your work, even for commercial purposes, as long as they credit you and license their new creations under identical terms. This license is often compared to "copyleft" free and open-source software licenses. All new works based on yours will carry the same rights, so any derivatives will also allow commercial use. Thisis the license used by Wikipedia and is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects.
 **Attribution-No**	This license allows for redistribution, commercial and non-commercial, as long as it is passed along

Derivatives **CC BY-ND**	unchanged and in whole, with credit to you.
 **Attribution-Non-Commercial** **CC BY-NC**	This license lets others remix, tweak, and build upon your work non-commercially, and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.
 **Attribution-Non-Commercial-ShareAlike** **CC BY-NC-SA**	This license lets others remix, tweak, and build upon your work non-commercially as long as they credit you and license their new creations under identical terms.
 **Attribution-Non-Commercial-No Derivatives** **CC BY-NC-ND**	This license is the most restrictive of our six central rights, only allowing others to download your works and share them with others as long as they credit you, but they can't change them in any way or use them commercially.

Table: Creative Common Licenses (Source: https://creativecommons.org/licenses/)

Conclusion

It's high time for the education stakeholders to use the opportunity to build a sustainable learning and knowledge ecosystem. The national initiatives in this line, such as e-pathshala (http://epathshala.nic.in) and NROER (http://nroer.gov.in), need focus and active participation. As a national initiative, there is an appeal to teachers, students and parents to contribute and use reuse resources. Now, we may find an answer to the question asked by Ian Gilbert, "Why do I need a teacher when I've got Google?" stating that teachers, as the designers, developers and incubators of the future, are essential pillars of education with redefined roles and responsibilities. Improving the instructional designs by infusing the FOSS tools, emphasising content creation with open licenses, sharing available resources

through institute repositories, exploring the open courseware, and collaborative course creations would be way ahead for teachers to be techno-pedagogues.

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TOWARDS A GENDER-JUST MODERN SOCIETY: A KERALA MODEL IN HIGHER EDUCATION

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Abstract

The Department of Higher Education in Kerala has issued a pro-women order to implement menstrual and maternity leaves for students in universities that function under the department, and thereby ensuring an environment that promotes social equity and gender justice. Such a pro-women step by the government, the very first of its kind in the entire country is an indication of the state government's commitment to ensure gender justice in society. It is a giant leap towards a modern society in its truest sense where all the genders are representedin a way they are ought to be represented to ensure gender equity.

Keywords: pro-women, menstrual and maternity leave, gender justice, modern society, gender equity, transgender, LGBTQIA+, inclusion

The progress of a nation is often reflected in the progress in the field of education of that nation. Equal and inclusive education has been the highlight of a progressive modern society. In India, equal education is ensured by the Constitution. In the current scenario of India women have been the majority in the field of education in general and higher education in particular. In spite of the fact that women are the majority in higher education, they still face several challenges as the inhabitants of a male dominated world. The paper titled 'Towards a Gender-just Modern society: A Kerala Model in Higher Education' explores the women centered reforms in the field of higher education in Kerala to ensure gender equity and thereby establish gender justice in the state.

The Kerala higher education department's pro-women maternity and menstrual leave order sparked contentious discussions throughout the state. This order will benefit female students

by reducing the minimum attendance requirement to appear in exams from the current 75% to 73%. Maternity leave, up to sixty days in duration, will also be available to female students who are over eighteen (18). The order stated that the universities were directed to adopt the necessary amendments to their rules to implement such provisions.

For female students enrolled in universities and colleges under the Department of Higher Education, this is the first time a State government has made such a decision in the nation. This move of women's emancipation by the government, which is the first of its kind in the entire country, is a sign of the government's commitment to ensure gender justice in the society.

While the menstrual cycle is a natural biological process, the Department of Higher Education has recognised that it causes significant psychological distress and physical discomfort for women. Therefore, the department has decided to relax the attendance requirement of female students by two percent in the mandatory requirement of attendance. The Ministry of Higher Education has also decided to allow maternity leave of up to 60 days for female students who have reached the age of 18. With this reform, the state of Kerala has again set a model for the entire nation.

The Department of Higher Education has chosen to introduce menstrual leave in all State universities under its jurisdiction, imitating the Cochin University of Science and Technology (CUSAT) which already offers the benefit to its students. The university's students' union had made a representation before the CUSAT made its decision. The university had authorised an extra two percent of female students' absences per semester, in consideration of the students' long-standing demand.

Previous to that, in order to allow female undergraduate and graduate students who are 18 years of age or older to finish their studies without interruption, Mahatma Gandhi University, Kottayam decided in December 2022 to offer maternity leave of 60 days. In a momentous decision made earlier in 2018, the Kerala government mandated that transgender students be given two extra seats in all courses offered by state universities and affiliated colleges. Better opportunities for transgender students in higher education and ensuring their integration into mainstream society were the main goals of the order.

When we consider that the female students' individuality or identity is represented and accepted through it, the recent pro-women order is remarkable. This suggests that Kerala is

significantly ahead of its peers in developing into a contemporary society that values gender equity and justice. The historical background of women's individual identity development and the length of time it took to achieve gender parity in society must be considered when analysing this.

In the Middle Ages, 'identity' was 'corporate', that is, it was defined by the group to which one belonged: priest, monk, nobleman, serf, merchant, Roman, etc. During the Renaissance, the emphasis was on individualism; this emphasized the importance of an individual's personality and uniqueness. Renaissance individualism knew self-consciousness; the recognition, acceptance of being unique and different. Individuality was considered as the desire and ability to stand out from the norm, to draw attention to one's self. Individual thought and expression that separated itself from the masses in terms of ideas and creations were encouraged and highly valued. Thus, the Renaissance marked the development of the individual identity. The individual became increasingly important. However, it was the Renaissance man who was represented and not the woman. The concept of the man evolved and again it was the masculine which was projected and the feminine was conveniently ignored which was very normal then.

It again took ages for the women to establish their identities as women, that too with the advent of modernity and feminism. There had been mass movements by women to claim their identities in the male dominated world around the globe. It is a truth that women have been subjected to prejudice and various forms of deprivation throughout the world. Women have always been denied access to basic rights like literacy and voting rights, dating back thousands of years. Over the past few decades, efforts to integrate women into society have grown increasingly widespread due to this growing global concern. These efforts haveprimarily taken the form of socio-economic initiatives that aim to empower women and eventually restore gender equality. There have been many turning points in the history of women's liberation, and society has advanced significantly. Despite years of hard work and struggle, they have succeeded in carving out a distinct identity for themselves. Women's empowerment and liberation can be beneficial.

The condition of those who belong to non binary genders is even worse than that of the females in the country. Even after 76 years of Indian independence, the LGBTQIA+ community is still fighting in our country for their basic rights. We should view the steps

taken by the department of higher education in Kerala to ensure inclusion as significant initiatives towards gender equity. Such steps like providing opportunities for learning to students from transgender communities are positive ones. However, it is a fact that the state still has to go a long way when it comes to ensuring the inclusion of the LGBTQIA+ community in its complete sense. The institutions of higher education are not yet ready to practice this.

A society can be termed as modern only when it is gender-just, in addition to the other characteristics of a developed society. Equal status of all the genders is the need of the society. Unlike olden times, people from all the genders are highly educated and work parallel to each other in different walks of life. They are given due importance and share in decision making and resource sharing. In a modern society one's individuality, irrespective ofthe gender, is addressed.

The aim of education is said to be the overall development of the individual. The prime focus of education is on the individuality of the learners. But the voice of the students are not heard and neglected often in the system of education prevalent in our country. Even though there are claims that there are various student centered reforms in the higher education, the realityis that the students are often under represented and even marginalized in our country. There lies the relevance of the pro-women order issued by the government of Kerala because it has placed the female students at the forefront reflecting the gender equity policies of the government. The order had taken into consideration the individuality of the female students which is a characteristic of a modern society. The government had addressed an issue which was once considered as a taboo and impurity by the society. With this phenomenal stepKerala has geared up the pace of its evolution towards a modern society where everyindividual is well represented irrespective of the class, caste, gender etc. The State of Kerala has yet again set a model for the nation through the decision. The move has reaffirmed the state government's commitment to realize a gender-just modern society and the decision is bound to bring relief to a large number of students.

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INFLUENCE OF SELF ASASESSMENT RUBRIC ON ACADEMIC ACHIEVEMENT IN MATHEMATICS OF UPPER PRIMARY PUPILS.

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Abstract

The self-assessment honors the crucial role of feedback in learning. Research has clearly shown that feedback promotes learning and achievement. This study explores the impact of rubrics on the academic achievement of upper primary pupils in Mathematics. The study involves a sample of 86 students, drawn from two intact class divisions of standard VII at S N D P Higher Secondary School, Aluva, Ernakulam District. The experimental group comprises 43 students, taught Mathematics using Rubric and the control group also consists of 43 students, taught through existing method. The results suggest that employing Self assessment rubrics for teaching Mathematics proves more effective than the traditional conventional approach.

Key words: Self Assessment, Rubrics.

Introduction

In today's landscape of standards-focused education, student self-assessment emerges as a key factor in enhancing student motivation, engagement, and learning outcomes. When executed effectively, student self-assessment fosters intrinsic motivation, self-driven effort, a focus on mastering skills, and deeper comprehension. Its significant influence on student achievement, evident in both classroom evaluations and broader standardized tests, empowers students to take ownership of their learning journey and grasp the benchmarks for measuring their progress.

Even though young students typically possess the ability to evaluate their own work, they may not always do so, often due to the absence of certain necessary conditions. For self-assessment to be effective, students require an understanding of its importance, access to transparent assessment criteria, a specific task or performance to evaluate, examples of self-

assessment, guidance and support in the process, ample practice opportunities, cues for appropriate timing, and chances to refine their work. While this might seem like a challenging set of requirements, student self-assessment is both achievable and happening in numerous educational settings worldwide. Many of the essential conditions mentioned, such as modeling, guidance, direct instruction, and practice, are already commonly integrated into classroom routines. Addressing the need for clear assessment criteria, for instance, can be facilitated by introducing a rubric.

A rubric typically consists of one or two pages detailing criteria and delineating different levels of performance, ranging from excellent to poor, for a particular assignment. While many educators utilize rubrics primarily for grading purposes, their optimal useextends beyond evaluation to encompass teaching as well. An effective rubric not only assesses but also instructs. It not only outlines common errors students might make but also highlights exemplary work. By providing students with clear insights into the task ahead and removing ambiguity about learning objectives or standards for high-quality work, a well- crafted rubric becomes an invaluable tool for enhancing understanding and performance.

Students are inclined to adopt rubric-based self-assessment for several reasons tied to their academic progress and drive. Research findings have shown that students view rubric-based self-assessment as beneficial, yet they also express the need for guidance and regular practice to fully harness its advantages.

Need and Significance of the Study.

Student performances encompass focused tasks that culminate in a product or an overarching learning achievement. These products may encompass various forms of student work aimed at specific skills. Rubrics serve as a tool for teachers to assess and evaluate student performance or competency in a given task, relative to the final product or learning objective. Consequently, rubrics offer valuable insights into the extent to which a student has accomplished a predefined learning outcome, based on explicit criteria that establish the evaluation framework.

Statement of the Problem.

Present investigation intends to test the influence of rubrics on academic achievement in Mathematics of upper primary pupils. The problem under present investigation has been

entitled as "INFLUENCE OF RUBRICS ON ACADEMIC ACHIEVEMENT IN MATHEMATICS OF UPPER PRIMARY PUPILS."

Objectives Of The Study.

The present study has the following objectives:

1. To develop self assessment Rubric for the pupils at upper primary class for mathematics learning.
2. To develop a standardized achievement test in Mathematics for the pupils of class VII
3. To find out the extent of influence of self assessment on academic achievement in mathematics among upper primary pupils.

Hypotheses Of The Study

The hypotheses framed and tested for the present study is as follows:

1. There is no significant difference in the academic performance in mathematics between experimental group and control group of total sample.

Methodology

The influence of rubrics on academic achievement in Mathematics of upper primary pupil is experimented in this study. In the present study the experimental design used is pretest- posttest non equivalent group design. The experimental group is taught Mathematics using Rubrics and the control group is taught through existing method. Sample, tools and statistical techniques used for the present study are briefly given here:

Sample

For this research, 86 students were chosen from two intact class divisions of standard VII at S N D P Higher Secondary School in Aluva, located in the Ernakulam District. The experimental group comprises 43 students, while the control group also consists of 43students.

Tools used

In this study, the researcher utilized the following instruments:

1. Rubrics
2. A standardized achievement test in Mathematics for standard VII
3. Lesson transcripts based on teaching using rubrics.
4. Lesson transcripts based on existing method.

Statistical Techniques

The statistical techniques to be employed for the analysis of data in the present study are the following.

1. Descriptive statistics like mean, median, mode, standard deviation, skewness and kurtosis.
2. Test of significance of difference between means.
3. Single factor analysis of covariance (ANCOVA).

Analysis and Interpretation

Table1: Descriptive statistics calculated for the pre-test scores of achievement of the experimental and control groups

Measures Calculated	Experimental Group	Control Group
Sample size (N)	43	43
Mean	5.62	5.45
Median	6	6
Mode	5	4
Standard deviation	2.52	1.81
Skewness	0.2460	0.8011
Kurtosis	-0.5953	-0.825

The mean score obtained in the experimental and control groups are 5.62 and 5.45 respectively. The median and mode for the experimental group is 6 and 5.Median and mode for the control group is 6 and 4 respectively. This shows that the students in both groups did not achieve high scores in pre-test. This indicates that the two groups had only limited knowledge on the topic selected for the study.

The standard deviation for both the group is 2.52for experimental group and 1.81 for control group respectively. The standard deviation for both experimental and control groups are not high.The skewness values of experimental group and control group are 0.2460 and 0.8011and kurtosis values are -0.5953 and -0.8259

Table 2: Descriptive statistics calculated for the post-test scores of achievement in Mathematics of the experimental and control groups

Measures Calculated	Experimental Group	Control Group
Sample size (N)	43	43
Mean	21.41	17.57
Median	20	18
Mode	19	16
Standard deviation	6.23	5.66
Skewness	0.3868	0.2774
Kurtosis	-1.244	-1.375

The mean of post-test score for the experimental group is 21.41, while for the control group, it is 17.57.In control group; the mean value is lower than that of experimental group. The values of median are 20 and 18 and mode are 19 and 16 respectively for the experimental and control groups. This indicates that the pupils in the experimental group attained scores when they learnt using Self assessment rubrics than the pupils who learnt by prevailing method of teaching. When the results were analyzed, it is clear that the distribution is approximately normal as the measures of central tendencies are more or less same.

The standard deviation of post-test scores for the experimental group is 6.23 and the control group is 5.66. These values are not high showing that the scores obtained by pupils in both the groups are not very much scattered.

The values of skewness obtained for the post-test scores for the experimental group and control group is 0.3868 and 0.2774 respectively. This indicated that the distribution is slightly positively skewed. The value of kurtosis is -1.2443 and -1.3755 respectively for experimental group and control group.

Table 3: Data and result of the t-test for the mean scores of post-test in achievement between experimental and control groups for the total sample

Group	No. of pupils	Mean	S.D	t- value	Level of significance
Experimental Group	43	21.41	6.23	2.7727	Significant
Control group	43	17.57	5.66		

The table above indicates that the obtained t-value of 2.7727 for the post-test is statistically significant at both the 0.05 and 0.01 levels of significance. The results suggest that there is a significant difference in the mean performance between the experimental groupand the control group on their post-test scores.The experimental group's higher mean score indicates its superiority over the control group in terms of post-test scores.

Table 4: Summary of Analysis of Variance (ANOVA) of pre test and post test scores in the experimental group and control group.

Source of variation	df	SSx	SSy	MSx	Fx	MSy	Fy
Means-among	1	0.49	272.5	0.49	0.10	272.49	7.89
Groups-within means	84	347.89	2552.0	4.83		35.44	

At the 0.05 level of significance, the table value of F is 3.96, and at the 0.01 level, it is 6.95. The calculated value of Fx was 0.10, which is not significant at either level. Therefore, it's evident that the two groups do not differ significantly in their pre-test scores. Conversely, the calculated value of Fy was 7.89, which is significant at both the 0.05 and 0.01 levels. This indicates a significant difference between the two groups in the post-test scores.

Table 5: Summary of Analysis of covariance (ANCOVA) of pre test and post test scores in the experimental group and control group.

Source of variation	df	SSx	SSy	SSxy	SSyx	MSyx or Vyx	SDyx	Fyx
Means-among	1	0.49	272.5	11.51	227.86	227.86	4.02	14.10
Groups-within means	84	347.89	2552.0	699.03	1147.43	16.16		

The computed Fyx ratio was 14.10. At the 0.05 significance level, the table value of F is 3.96, and at the 0.01 level, it is 6.95. This indicates a significant difference between the two final means, influenced by the experimental and control variables, after the application of treatments, at both the 0.05 and 0.01 levels. This difference persists even after adjustingfor initial disparities. Consequently, the null hypothesis is rejected at both levels.

Major Findings

The effectiveness of teaching Mathematics using self-assessment rubrics surpasses that of the current conventional teaching method. This assertion is substantiated by the subsequent findings.

i. A statistically significant difference was observed when comparing the post-test scores of students in the experimental and control groups. The obtained t-value of 2.7727 is significant at both the 0.05 and 0.01 levels of significance. The mean score for the experimental group was 21.41, whereas for the control group, it was 17.57.

ii. Analysis of covariance on the pre-test and post-test scores of students in both the experimental and control groups revealed a significant disparity between the two groups. The computed Fxy value, with degrees of freedom 1/84, was 14.10, significant at both the 0.05 and 0.01 levels of significance. The adjusted mean score for the experimental group was 21.24, compared to 17.73 for the control group. These results indicate that the experimental group outperformed the control group in terms of achievement.

Suggestions for further research

The researcher proposes the following promising avenues for future investigation. It is anticipated that this study will pave the way for exploring new areas of research.

- Similar studies can be conducted at other levels of education such as high school, higher secondary and other levels too entitled as

  "A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at high school level",

  "A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at higher secondary level".
- The study can be extended to other subjects like physics, chemistry, language, arts etc and can be entitled as

  "A study on effectiveness of self assessment rubrics on achievement in Physics of pupils at upper primary level",

  "A study on effectiveness of self assessment rubrics on achievement in Chemistry of pupils at upper primary level",

  "A study on effectiveness of self assessment rubrics on achievement in English of pupils at upper primary level",

  "A study on effectiveness of self assessment rubrics on achievement in Social science of pupils at upper primary level",
- Replication of the study with different experimental designs can be done.
- The study can be extended to different medium of instruction and can be entitled as

  "A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at Malayalam medium upper primary level"
- The study can be extended to one academic year.
- In this study only achievement is treated as dependent variable. Effectiveness of this new method on other variables can also be taken. Such as,

  "A study on effectiveness of self assessment rubrics on intelligence and achievement in Mathematics of pupils at upper primary level"
- It can be applied for other educational research purposes.
- A study on attitude of teachers and students towards self assessment can be conducted.

The researcher would be pleased if the outcomes of this study contribute to a deeper comprehension of the teaching-learning process and inspire further investigations in this field.

Conclusion

The current study aimed to explore the impact of self-assessment rubrics on both self-esteem and academic performance in Mathematics among upper primary students. Drawing from the study's findings, the following conclusions have been reached:

The research uncovered that employing self-assessment rubrics in teaching Mathematics proves more effective than the conventional approach. Additionally, utilizing self-assessment with these rubrics enhances the self-esteem of upper primary students. Furthermore, the study revealed no correlation between self-esteem and academic performance in Mathematics among upper primary pupils.

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