

# MULTICULTURAL PSYCHOLOGY IN LEARNING

**Editor**

**Dr. A. Catherin Jayanthi**

Assistant Professor

Department of Education, Alagappa University  
Karaikudi, Tamilnadu.



  
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Chief Editor

**Dr. P. Pachaiyappan**

Professor, Department of Education, GRT College of Education, Tiruttani,  
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உலக நாடுகளிலிருந்தும் பல்வேறு மாநிலங்களிலிருந்தும் இக்கருத்தரங்கில் கட்டுரையாளர்களும், கருத்தாளர்களும், கல்வியாளர்களும், தமிழ் ஆர்வலர்களும் பங்கேற்று எண்ணற்ற உயிர் சிந்தனைகளையும் அனுபவத்தையும் பகிர்ந்து இக்கருத்தரங்கிற்கு வளம் சேர்த்திருப்பது போற்றத்தக்கது.

III

உயர்கல்வி மேம்பாட்டுக்கு வழிவகுக்கும் தமிழ் கற்பித்தல் முறைகளும் நவீன ஆய்வு நுட்பங்களும் • கட்டுரைகள் • தொகுப்பு : முனைவர் த. சிவசுப்பிரம், தமிழ் பல்கலைக்கழகம், தஞ்சாவூர்-613010 • பதிப்பு பெப்ரவரி 2023 • வெளியீடு : அன்றிம், எண். 845, புதித வீட்டு வசதி வாரியம், தஞ்சாவூர் • பக்கம் XIV +594 • வடிவமைப்பு மற்றும் அச்சாக்கம் : சீரிய கிராபிக்ஸ், தஞ்சாவூர். டைபேசி : 9443476740.

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அன்றிம்

உதாரணமாக, தேர்வு தொடர்பான அறிவிப்பை பாடப்பிரிவு என்பவற்றைக் குறிப்பிட வேண்டும். பிறகு வல்பக்கம் மேலிருந்து கீழாக கிரிய குறியீடுகள் காணப்படும். அனாவதான் நாம் 'படிவம்' உருவாக்குவதற்கான மூலங்கள் இதில் முதலில் உள்ள 'பிளஸ்' குறியீடுதான் கேள்விகளை உருவாக்குவதற்கானது. அதைத் தொட்டவுடன் கேள்விகளை உருவாக்க ஒரு 'பட்டியல்' வரும். அதன் வலதுபுறத்தில் 'பல்விடைத் தெரிவு' என்று ஒரு 'சிறிய 'பட்டியல்' இருக்கும். அதைக் கொண்டு நம் கேள்விக்கான விசயங்களை உருவாக்க வேண்டும்.

'பல்விடைத் தெரிவு' இலிருக்கும் மேல் இரு வாய்ப்புகளைத் தெரிவு செய்து கிரிய, பெரிய கேள்விகளை அமைத்துக் கொள்ளலாம். கேள்விக்கான படங்கள், வீடியோக்களை இணைத்துக் கொள்ளும் வசதியும் உள்ளது. மேலும் ஒரு கேள்விக்கு கண்டிப்பாக விடையளிக்க வேண்டும் என்பதை கிழே 'Required' உள்ள பிரிவை ஆன் செய்ய வேண்டுமென்பது இப்படியாக நமக்குத் தேவையான கேள்விகளைப் பதில்களையும் ஒருவிடைத் தெரிவு நிலையில் பெற முடியும்.

இந்த 'கூகுள் படிவத்தில் உள்ளீடு செய்த விபரம் அனைத்தும் மின்னஞ்சல் வழி பெற்றுக்கொள்ளலாம்.

இங்ஙனம் பேராசிரியர்களும் மாணவர்களும் தான் உள்ளிட்ட பிறவற்றைக் கற்றல், கற்பித்தலை எளிதாக்குவதென்றே பல செயலிகளும் இணைய மூலங்களும் உண்டாவனவே இந்த 'டிஜிட்டல்' நூற்றாண்டைப் பயன்படுத்தி கற்பித்தலை மேம்படுத்தலாம்.

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1. <https://www.bloggerlessons.com>
2. <https://anydesk.com>
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## Innovative Pedagogies in the 21st Century Education

**Dr. P. Pachaiyappan**

Professor, Department of Education,  
GRT College of Education, Tiruttani,  
Tiruvallur District - 631 209, Tamilnadu.

### Abstract

Pedagogy of the twentieth century differs from the pedagogy of the twenty-first century in drastic ways. From rote learning to learner centric approaches, from theoretical knowledge to practical hands-on experiences, from teacher oriented to student oriented, from memorization to innovation, we have come a long way. The new century has led to substantial changes in teaching methods and didactics. The educational space is expanding beyond the classroom; the fact that students are able to access almost any information at any time from an early age changes the structure of mnemonic processes. This has occurred due to flexible use of digital media as opposed to traditional media, the ability to multitask, and use of intellectual ICT tools as compared to pure mental performance, use of one click internet searches as against limited textbook content, working on screen and extended networking rather than the limited classroom interactions. All this has led to a scenario where knowledge acquisition has taken the shape of knowledge creation. To keep such an audience engaged is a herculean task for the teachers and so there is no other option but to innovate the pedagogy and teaching methods as per the requirements of the students of new generations.

Key words: Innovative Pedagogy, Modern Teaching Strategies, 21st Century Education,

### Introduction

*Today's competitive world, the learning needs of students has undergone a complete metamorphosis. This has led to educa-*



**தமிழ் இலக்கியங்களில்  
பன்முக ஆளுமை**

  
PRINCIPAL  
GRT College of Education  
Tirutani - 631 209.

முனைவர் சு. அராங்கநாதன்  
முனைவர் வி. சங்கர நாராயணன்



## தொல்காப்பியத்தில் புறத்திணை பாகுபாடு

வா.க.கவிதா

முனைவர் பட்ட ஆய்வாளர், தமிழியல் மற்றும் பன்னாட்டுப் புலம், தமிழ்நாடு திரைத்திரைப் பல்கலைக்கழகம், சென்னை

தமிழ்நாடு கிடைத்த நூல்களில் தொன்மையான இலக்கண நூல் தொல்காப்பியமும் இதில் எழுத்திலையும், நின்றபு முதல் குறிப்பிலுமுள்ளபின் வரையும், சொல்லில்காத்திலி, கிணைவியாகக்கம் முதல் சொல்லியல் வரையும், பொருளில்காத்திலி, அகத்திணை முதல் மரபியல் வரை பகுக்கப்பட்டுள்ளது. புறத்திணையியல் என்பது போர் பற்றிய செய்திகளைக் கொண்டு, இயற்கையிலேயே நிகழ் வரலாறு பெற்ற ஒருவன் குறைந்த தன்னோடு வாயுப் பிறரைப் பாதுகாத்தல் தன் கடன் என்று கொள்வதற்குமுள்ளதாக அமர்தல் எனப்படும் நிலையையும் தன் வணக்கமையும் பயன் கொண்டு அடங்கியபலரை அத்தனியொருவன் ஆட்படவைக்கத் தொடங்கிய அத்தொன்று ஊர்த்தில் தொடரும் கொண்டு இதே இப்போர்.

தொடக்கத்தில் இவ்வாறு தொடங்குகொண்ட போரை அப்போர்க்களம் அடங்கியுள்ளதும் கருதி ஒருக வகையிலுத்தி விளக்கியுள்ளார் தமிழ்நாட்டின் வரலாற்று ப.க.கண வரைந்து காட்டும் உயிர் ஒலியப்பலவரம் ஒலியப் பெரும்புகழ் தொடங்கியபலவர். அனை, வெட்சிப் போர், வந்தியிலி, உழிவெழுப் போர், தும்பையிலி, வாகையிலி, காஞ்சிப்போர், பாடாண் என்று ஏழாகக் கூறுகின்றார். பன்னிரு ப.க.கண அடிமைத் தழுவிய வெண்பா மரையும் தொல்காப்பியிலும் வேறுபடுத்தி நினைப்பதற்குப் பெருநி, கர்த்தை, வந்தி, கருநி, தொச்சி உழிவெழு, தும்பை, வாகை, பாடாண், அகக்கிணை, வெருத்திணை என பன்னிரண்டாக வெறுகின்றார் ஐயாளர்தான்.

வீரசேழிப்போர், பன்னிரண்டுத் திணைகளில் வகக்கிணை, பெருத்திணை என்று இரண்டெழுத்து பத்தி எனப்புகுக்கிறது. தொல்காப்பியத்தை ஒப்பித் திணை வகுத்த இலக்கண விளக்கம், திணைகள் ஏழே என்று கூட்டினும் ஒழிப்பதில் பன்னிருபலம் கூறிய பொதுவியல், வகக்கிணை, பெருத்திணை என்று திணைகளையும் அகக்கி கூறுகின்றது இவ்வாறு புறத்திணைப் பாகுபாடுகள் மட்டும், பொதுவியல் பெருமைகள் புறத்திணை பாகுபாடுகள் அடங்கிய அபிமானம்.

பாகுபாடுகள் அடிப்படை

அகத்திணைப் பாகுபாட்டிற்கு அடிப்படை காதலே ஆகும். வெண்பொருள்களையே சிவ நம்புவினா ஒழிக்க வீரமனே கலங்கியவையாக, திணைகளாக விளக்கப் பெற்றன. அது மோவ புறத்திணை பகுப்பிற்கு அடிப்படை. பாதுகாப்பை என்று தமிழ்க் காதல் ஆதிரை வ. ச.ப. மனங்கொண்டார் கூறுகிறார்.

புறத்திணைகளும், வெட்சி, கர்த்தை, வந்தி, காஞ்சி, தொச்சி, உழிவெழு, தும்பை எனவரை முழுக்க முழுக்க வீரத்தொழிக்கும் போர்த்திணைகளாக, வாகையிலையும் வீரத்தை ஒரு கூறாக வீறுடன் கொண்டுள்ளது. பாடாண் திணையும் அத்தொழைய போர் உடையவீத எனவே, இத்திணைகள் இரண்டும் போர்த்திணைகளே என்பது.

மேலும் ஐயாளர்தான் தொழிலைத் திணையிலும் வீரத்தொழிபுத் துறைகள் வகுத்தனார். இக்கணம்கப் புறத்திணையின் அடிச்சாடக விற்ப் பொருள்கள் வீரமே புறத்திணைக்கு அடிப்படை எனவரை.

அடிப்படியில், புறத்திணை என்ற பெயருக்கு மராக வீரத்திணை அல்லது போர்த்திணை என்றல்லவோ பெயர் ஒப்புவிப்பார் தெரிவித்தார். மேலும் புறத்திணையையும்; புறம், புறப்புறம், அகப்புறம் ஏற்று பிரிவுகளை உள்ளகப்படுத்தும் இதில் புறம், புறப்புறம் என்ற இரு பிரிவுகளை வெண்பா மனவரை குறிப்பிடுகின்றார். அகப்புறம் என்ற பிரிவை கர்த்தை உழிவெழு குறிப்பிடுகின்றார். எனவே, புறத்திணை வீரத்தின் தொடர்ந்து அடிப்படைப் பிரிவையும் கொண்டு அவர்கள் புறத்திணைப் பாகுபாட்டிற்கு விற்ப் அடிப்படை பற்றி என்பது முனைவிற்கு.

தொல்காப்பியமும் ஏழு அகத்திணைகளில் ஒரு புறத்திணைகள் என்ப பகுத்து விளக்கியுள்ளார். எனவே, அகத்திணை பாகுபாடு புறத்திணைப் பாகுபாட்டிற்கு அடிப்படைப்பாற்றி ஏற்று இரண்டினாலும் நச்சிளங்கியபாகும் கருதுகின்றனர்.

அகத்திணையும் புறத்திணையும் ஒரே வடி ஒப்புமை உடையன என்ற கருத்திலுள்ள அகத்திணையியலின் இறுதியில் புறத்திணைப் பற்றியும் புறத்திணையியலில் தொடக்கத்தில் அகத்திணை குறிக்கும் நூற்பாக்களில் கூறியுள்ளார் தொல்காப்பியர், அனை.

"புறத்திணை மறுவிலிப் பொருத்தில் அல்லது அகத்திணை மறுவிலிச் சளவுதல் இவளே அகத்திணை கருவிலிச் சர்தல்து உரைத்தோர் புறத்திணை இலக்கணம் திறப்புக கிளப்பின்" 1

தொல்காப்பிய நூற்பாக்கள் அவை முறையும் இவர்களின் அவையப் முறையும் அகத்திணை புறத்திணை இவற்றைத் தொடர்பை ஸம்பந்தப்படுத்துகிறது. மேலும், 'வெட்சி தாணை குறிப்பியு புறமே' என்ற தொல்காப்பியத் திணை விளக்கங்களில் வெட்சி, வந்தி, உழிவெழு, தும்பை, வாகை, காஞ்சி, பாடாண்



## 27. திருக்குறள் பன்முகப்பார்வை

திரு. வி.கே. கவிதா, எம்.ஏ., எம்.பி.எ., எம்.எட்.  
ஜி.ஆர்.டி. கல்விபியல் கல்லூரி,  
திருத்தணி.

இரண்டடி குறள் வெண்பாவால் ஆனது. திரு என்று அடைமொழி பெற்று திருக்குறள் என பெயர்பெற்றது. பதினெண்மீழ்க்கணக்கு நூல்களுள் ஒன்று. திருக்குறள் அறம், பொருள், இன்பம் என்று முப்பாலாகவும், ஒன்பது இயலாகவும் பகுக்கப்பட்டுள்ளன. மனித வாழ்க்கைக்குத் தேவையான அனைத்து செய்கிலையும் பெற்ற ஒரு நூல் திருக்குறள். இதை உலகப்பொதுமறை அறவிலக்கியம் தமிழர் திருமறை மனித வாழ்வியல் தெற்கினையும் மனித நாகரிகம் பிறநாடுகளில் தோன்றுவதற்கு முன்னரே, வகுத்துக்காட்டிய நூல். எனவே, தான் உலக மொழிகள் பலவற்றில் விவிவியத்திற்கு அடுத்தபடியாக அதிகமாக மொழிபெயர்க்கப்பட்ட நூலாக உள்ளது. இதன் பன்முகத்தன்மையை ஆராயலாம்.

“ஆலும் வேலும் பல்லுக்குறுதி  
நாலும் இரண்டும் சொல்லுக்குறுதி”  
பழகு தமிழ்ச் சொல்லருமை நாலிரண்டில்

என்னும் பழமொழியில் நால் என்பது நாலடியாரையும், இரண்டு என்பது திருக்குறளையும் குறிக்கும். இந்நூலின் பெருமையைத் திருவள்ளுவமாரை நன்கு விளக்குகிறது.

என்றும் புலரா தியாணர்நாட் செல்லகிலும்  
நின்றலத்தது தேக்பிலிற்ரும நீசமையதாய்க் -ஞன்றாத  
செந்தநிர்க் கற்பகத்தின் தெய்வத் திருமலர்போன்ற  
மன்புலவன் வள்ளுவவாய்ச் சொல்

- திருவள்ளுவமாரை

என்று இறையனார் கூறியுள்ளார். திருக்குறளின் அழியாத தன்மையைப் பறைச்சாற்றுகிறது. வள்ளுவன் தன்னை உவகினுக்கே தந்த வாய்புகழ் கொண்ட தமிழ்நாடு என்று பாரதியும். வள்ளுவனைப் பெற்றதால் புகழ் வையகமே என பாரதிதாசனும் புகழ்ந்துள்ளனர்.

திருக்குறளுக்கு தருமர், மணக்குடவர், தாமத்தர், நச்சர், பரிமேலழகர், திருமலையார், மல்லர், பரிப்பெருமான், காளிங்கர் என பதினமர் உரைவகுத்துள்ளார்கள். இவரில் பரிமேலழகர் உரையே மிகச் சிறந்த உரையாகும். இந்நூலில் கல்வியின் சிறப்பை அணுகலாம்.

கல்வி

கல்வியின் சிறப்பினைப் பாடாத ஏதில்லை. சங்க இலக்கியமான எட்டுத்தொகையில் இடம்பெற்றுள்ள புறநானூற்றில் ஆரியப்படை கடந்த நெடுஞ்செழியன்

உற்றுழி உதவியும் உறுபொருள் கொடுத்தும்  
பிறறைதிலை முனியாது கற்றல் நன்றே - புறம்:183

என்று கல்வியின் சிறப்பினை அழகாக எடுத்துச் சொல்லியுள்ளார். கற்கும் முறை

நூல்களை குற்றமற்ற முறையில் கற்கவேண்டும் கற்றபின் நூலில் சொல்லப்பட்ட நெறியில் நிற்க வேண்டும் என்பதை

கற்க கசடற கற்பவை கற்றபின்  
திறக அதற்குத் தக (குறள்:391)

கல்வியின் சிறப்பு

கண் பார்க்கப் பயன்படும் உறுப்பு, அது கற்றவர்க்கு மட்டும் தான் பயன்படும். நல்லது கெட்டது பகுத்து அறிய படிப்பறிவு அற்றவர்க்கு கண்களால் அவ்வாறு பகுத்து பார்க்க உதவாது எனவே கல்வாதவர்களுக்கு இருப்பது இரண்டு புண்கள் தான் என்பதை

கண்ணுடையோர் ரென்பவச் கற்றோர் முகத்திரண்டு  
புண்ணுடையோர் கல்லா தவர் (குறள்-393)



## **ENLIGHTENMENT OF DIGITAL AWARENESS AMONG STUDENTS- AN ANALYSIS**

**G.Sangeetha**, Assistant Professor, GRT College of Education, Tiruttani

### **Abstract**

The digital world is drastically piercing in the field of education and chops sphere area with rearmost technology gradationally being used to deliver education, knowledge and chops in a new and innovative ways. This penetration is coupled with unborn changes to the mode and pattern of work, shifts and pedagogy. Given the inordinate operation of fast changing digital technologies in education, new chops, requirements, methodologies and pedagogies have surfaced. The use of these technologies has contributed to transubstantiating literacy and chops development into a lifelong process. Learners now have to continue developing and refresh their chops and knowledge in order to keep abreast with the constant inventions and new developments in the digital world. It's estimated that technology chops have to be streamlined constantly in order to have continued applicability. Digital technologies stylish support every learner, thinker and practitioner in the ocean of knowledge to develop their chops demanded to attain maximum benefit from the use of technology throughout their life.

*Keywords* Digital, Technology, Learners, Awareness, Enlightenment, Chops, Development.

### **Introduction**

The ultramodern thinkers viewed education as commodity that should look forward, looking for new information, not simply learning and reciting the old information of the elders. scholars and preceptors moment live in a world with further information available to them than at any time in the history of the world. In the medieval period, books were rare and only an elite many had access to education openings. Schoolteacher and scholars relations directly, with books as supplemental tools to further enhance one's knowledge. With the invention and proliferation of the internet, knowledge is no longer limited to the select many. moment, we live in a world where," Huge electronic libraries similar as Project Gutenberg offer scholars over,000 free books, and dependable online references similar as Britannica give rich multimedia and interactive information from anywhere and anytime. But technology can also be a great equalizer, allowing scholars that might not have access to as important as fat seminaries and scholars the same access to information and openings to ameliorate and exceed in their education.

### **Digital Awareness**

Digital mindfulness can also allow people to use technology more safely, as it can pose a threat to internal and cerebral health. Championing for better digital mindfulness promotes the safe, controlled, and occasion-rich application of ultramodern technology. The move to an decreasingly digital terrain gives scholars numerous new ways of expressing themselves and of finding and penetrating different information and views.

### **Digital Awareness in 21st century**

Digital mindfulness in the 21st sense of experience, comfort capability, and proficiency needed for introductory technology operation. To be apprehensive of how digital platforms or bias work is an essential skill of the 21st century, because so important of the world now relies on it for instigation. also to digital knowledge, digital mindfulness aims to homogenize the use of technology.



## **STRENGTHENING THE LEARNING ABILITY OF SCHOOL STUDENTS BY USING DIGITAL COMMUNICATION-HYPOTHETICAL VIEW**

**Dr. Radhika Vidyasagar**, Principal, GRT College of Education, Tirutanni

### **Abstract**

Students and instructors in today's classroom have the capacity to speak, collaborate and percentage with others past the partitions in their faculty building, the verbal exchange that happens in our everyday lifestyles is with inside the shape of signals. A upward push of notable generation gear and apps that sell verbal exchange and collaboration; Students and instructors often use generation with inside the lecture room to beautify learning, and additionally they use it as a way of verbal exchange. It is critical that instructors version suitable use of virtual verbal exchange and accurate their college students once they use generation inappropriately. This is a lifelong ability this is beneficial in all factors of an individual's lifestyles, each private and professional, and consequently it's far critical that scholars study the right manner to speak the use of generation. decide the diploma to which decided on verbal exchange gear utilized by instructors who educate on line are undoubtedly perceived via way of means of their college students in enhancing emotions of self-efficacy and motivation, and which gear can be appeared to be considerably greater powerful than the others. Computer-mediated verbal exchange creates several advantages for college students. These consist of greater verbal exchange among college students, greater considerate verbal exchange, and greater pleasure at the part of the learners.

**Keywords:** *Digital, Communication, Technology, Students, Ability, Strengthening.*

### **Introduction**

In the new setting, the educator is at this point not the sole caretaker of learning. As per a new report, understudies are currently more engaged through computerized correspondence. They learn inclining further toward their own than with their actual instructors. Accordingly, understudies have become more independent and responsible, implying that they are better prepared for the gig market. Other than this, there are different benefits that accompany this sort of learning. Remembering that web-based assets are pointed toward moving the understudy's capacity to think fundamentally, independent gaining from web sources assist understudies with becoming more intelligent. All alone, they can distinguish that the new thing is to learn. This occurs nonstop whenever the timing is ideal. Dissimilar to conventional learning, computerized learning guarantees that each understudy is offered the chance to learn at his/her own speed. Data open through computerized correspondence is adjustable to suit unique advancing requirements and capacities. Savvy showing opens up schooling. Understudies are not qualified for just what is shown in the homeroom. A new report shows that understudies procure a normal of 65-70% of their insight from the web.

### **Digital Communication**

Digital Communication additionally proves to be useful external the study hall. Certainly involving visual substance for deals and quest for new employment, the pitch has been broadly taken on. It is presently conceivable to draft resumes and recommendations on the web and make them accessible to each selection representative any place they are. These signs, like sound signs, for the most part, are simple in nature. At the point when the correspondence should be laid out over a distance, then, at that point, the simple transmissions are sent through wire, involving various strategies for successful transmission.



**Mr.K.G.Boopathy**, Assistant Professor in English, GRT College of Education, Tiruttani-631209

### **Abstract**

The purpose of this article that as quality education is one of the pedestal of support in the Unified Countries 2030 Plan for Manageable Turn of events, which expects to guarantee comprehensive and fair quality training and advance deep-rooted learning potential open doors for all, in this review the job of instructive innovation in educating is inspected utilizing a survey which investigated the job of data and correspondence advancements in educating and feasible turn of events. The consequences of the review demonstrated that the reactions of the understudies showed that the utilization of innovation in training assists with further developing the instructive cycle likewise to accomplish the supportable improvement objectives. The concentrate additionally emerged on certain suggestions to help in the coordination of instructive innovation.

**Keywords:** Educational Technology; Sustainable Development and communication technology

### **Introduction**

There is an extraordinary dependence on innovation to tackle natural issues all over the planet today, in view of a practically general hesitance by legislatures and the people who encourage them to make the social and political changes that would be important to diminish development underway and utilization. However such mechanical changes that would be important to stay aware of and check the developing natural harm brought about by expansions underway and utilization would need to be genuinely emotional. The innovative fixes of the past won't do. Furthermore, this has yet to be addressed, might such an emotional and revolutionary upgrade of our innovative frameworks at any point happen without causing significant social changes and will it happen without a reexamining of political needs? Innovation isn't free of society either in its forming or its belongings. At the core of the discussion over the likely viability of maintainable improvement is whether or not innovative change, regardless of whether it tends to be accomplished, can decrease the effect of monetary advancement adequately to guarantee different sorts of progress won't be essential. Supportable improvement arrangements look to change the idea of monetary development instead of breaking point it. Data innovation is a main impetus for instructive change, as well for of advancing shared information in the public eye for the most part. To see a critical expansion in instructive efficiency, you really want to roll out key primary improvements upheld by innovation rather than simple "Developmental Fiddling", the innovation transformation in schooling can never again be caught essentially by checking out at PCs in the classroom.

### **Sustainable Development**

In the creating scene, there are many individuals who don't approach essential conveniences for carrying on with a very much noble existence. In spite of the fact that it is said that advancement and globalization are important for social turn of events yet individuals contradicting them are frequently of the view that the advantages acquired through these occasions are caught simply by some while those having a place with the powerless segment are forgotten about. Other than these, fast improvement in various regions is negatively affecting the climate with merciless consumption of non-sustainable assets.

One is should imagine that this kind of advancement won't be maintained. Then the inquiry emerges, what is manageable turn of events? It is a kind of improvement which streamlines the social and financial advantages on a persistent premise having an evenhanded base. Today the principal issues looked by our significant waterways are contamination and



to those who are already confidential, as it has been argued in a diversity of MOOC literature. However, taking some MOOCs within the *constant education* program may indirectly contribute to the *open get in touch with* program if the MOOCs taken help the continuous learners expand competencies required designed for opportunity constructive higher education. During the modern study, two MOOCs were established to have the potential to make such an indirect involvement.

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#### Activating modern and technical strategies during the classes for sustainable development

Mrs.R.Sumathi, Assistant Professor in Mathematics, GRT College of Education, Tiruttani.

#### Abstract

The purpose of this article, the issues tormenting our planet is the consumption of regular assets and environmental change, making new calamities, and worldwide difficulties. The worldwide local area has communicated its agony and worry for these issues through a few global discussions and settlements. As a reaction, Training for Economical Improvement is a program that plans to teach students on these issues. Teaching supportability to youthful alumni should be all encompassing and pluralistic in nature. Talks and modules on supportability help in making them maintainability cognizant which will improve the capabilities of individuals and assist them with living and act in a more economical manner. This paper has a few parts composed by scholastics across the globe who have spoken about their experience of integrating supportability into their educational program and taking on different instructive methodologies that has assisted their students with learning and grasp the subject. Maintainability has been important for the educating and learning as a rule, and as a component of the executives, designing, clinical, and configuration courses, for example. This paper assists us with understanding how such teaching and learning systems can be made more powerful for students.

**Keywords:** Sustainable development, Technical strategies, Economical improvement and students.

instruction purposes. Without dependable learning measures, contest among understudies won't do a lot to work on the nature of educating, and candidates will have no chance of knowing which colleges offer the best teaching.

Online learning doesn't focus on conveying content, and duplicates the fundamental educator focused and transmissive up close and personal model. Courses offer arranged material, exchange, input, and potential open doors for instructors to adjust, yet the gamble of calamity is high and a lot of students' misery is undetectable. The convoluted monetary situations related with the on the web model cover the preparation that residents should be prepared to take care of new issues. Clever instructional method is a training approach that utilizes innovation to further develop the opportunity for growth. Models incorporate the utilization of Learning Examination to assist mentors with planning educational programs and backing understudies in dealing with their learning, and the imaginative utilization of advances like virtual and expanded reality in learning and educating.

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### STRATEGIES OF DIGITAL LITERACY AND DIGITAL CITIZENSHIP TRAINING FOR STUDENTS AND TEACHERS - AN ANALYSIS

**I.THENMOZHI**, Assistant Professor In Biological Sciences, GRT College of Education, Tiruttani

#### ABSTRACT

The digitalization in education; although there are no specific studies for education departments in the private sector in the literature, it has been seen that the goods of digitalization are analogous. It argues that an ICT classes that's enforced with purpose and support produces



## **Developing Digital Awareness at School: A Fundamental Step for Cyber security Education**

**S.Suthakar, Ph.D Scholar, GRT College of Education**

### **Abstract.**

The theme of cyber security regards people in primes, considering that everyone uses digital technologies both in professional and private life, and that people's behaviour plays an important role in the occurrence of cyber threats. The human factor has therefore to be recognized as an essential element to be considered for developing an effective cyber security, and education is the key driver. However, since children access online activities at an early age, it is wise to develop interventions to promote digital awareness from first years at school, focusing on the responsible use of digital technologies. Becoming conscious of the risks they are exposed to is an important step for children to move safely on the Internet and to understand the different cyber-risks they have to face. This activity represents hence a fundamental step for cyber security education. In this paper we present a study investigating Italian school teachers' perception of their students' digital awareness and their evaluation of the actions needed for its development. Answers were provided by 1500 teachers from all over the Tamil Nadu belonging to primary and secondary schools, participating in a national project whose goal are to spread computer science and to sensitize students to a proper use of digital technologies. The results confirm the high sensitivity of teachers towards digital awareness issues. Indeed, students should be prepared to recognize risks when they use digital technologies: not only cyber bullying, they should pay more attention to the protection of their personal data, and to the reliability of news on social media. Moreover, teachers declare the need for themselves to receive specific training on digital awareness, and to be supported in their activities.

**Keywords:** Digital awareness · Cyber security · Education

### **Introduction**

The cyber-world is involved in increasing connectivity among people across the globe. Data theft has been a critical concern to governments, organizations, and individuals as a result of interconnected information systems. Additionally, in today's business ecosystem, social engineering has emerged as a trending cyber security concern. A social engineering attack can be defined as a set of psychological and analytical techniques that are used with the motive of manipulating the human element of organizations [2-4]. The main path through which social engineers invade organizations is the exploitation of psychological vulnerabilities of employees. Unfortunately, many victims of social engineering attempts purposefully or inadvertently grant social engineers access to critical information or sensitive data that may cause harm to their organization. Researchers in the field confirm that endusers overestimate their detecting capability, which makes them the weakest link in the security chain. Promoting digital awareness among employees plays a major role in covering the knowledge gap of staff members. Awareness programs not only increase the internal immunity of an organization but also tend to bring changes in their behavioral as well as cultural aspects [6]. Over time, adopting traditional safety awareness methods has helped organizations to raise the level of awareness among their employees. However, today, with the increase in the intensity of cybercrimes, modern organizations have shifted their focus to state-of-the-art awareness programs that help their employees to recognize and detect such attacks beforehand [7]. This study reviews relevant esteemed papers from a cyber security perspective to discover best practices and what has been



Those who learn use e-learning platforms retain their lessons more than those who don't. Through the method of e-learning, learners have no pressure on them and this helps them remember what they studied. Technology is something that a lot of learners love to use when they study as it provides them with the choice to study as per their comfort.

### **2. Availability of a vast information pool**

E-learning enables the learners to access a vast information pool anytime and anywhere. Since updated information is available for different topics, learners seldom face doubts. In addition to that, learners get deep insights on the subjects at hand that they would have not gained otherwise by studying in traditional classrooms.

### **3. Provides a digital learning environment**

Important mediums such as computer-based learning, virtual classrooms, web-based learning, and mobile-based learning form part of e-content for school education. It enables both the teacher and student to teach and learn in a digital learning environment.

### **CONCLUSION**

Provides educators with state of the art tools to personalize, control and monitor each student's learning program. The CMLS controls and monitors the software installed on a computer or network and tracks the use of that software by each student. Reduces travel time and travel costs for off-campus students. Students may have the option to select learning materials that meets their level of knowledge and interest. Students can study anywhere they have access to a computer and Internet connection.

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## **Physical Health and Mental Wellness in Digital Education**

**Dr. V. K. Kavitha, Assistant professor, GRT COE, Tiruttani**

### **Abstract**

The coronavirus has shut down all schools and universities over the globe. With the idiosyncratic upsurge of online literacy, presently, instruction is accepted ever on digital platforms by the use of laptops and mobile phones. Numerous types of probing have shown that the inordinate or prolonged use of defenses can impact internal and physical health. The internal and physical affections include stress, depression, sleep diseases, impact on sight, postural pain, hand disabilities, and musculoskeletal ailments.

**Keywords:** Physical health, mental wellness, Digital education

### **Introduction**

To secure the physical and mental safety of our children, easy access to internal health services and support in schools is the first step. The dimension of internal health must encompass the emotional, behavioral, and social well-being of a child. The most important point of internal health is 'rigidity', the capability to manage with diurnal life challenges effectively. Giving a protected Territory to kids in theological schools is significant hence. Easy access, well-being, and rigidity must be aligned together to produce a comprehensive system in an academy.

## **COMPUTER TECHNOLOGY IS AN INTEGRAL PART OF MODERN LIFE- AN ANALYSIS**

**Dr.P.KARNAN**, Associate Professor, GRT College of Education, Tiruttani

### **Abstract**

In the present period of information and communication, there's revolution in information and communication technologies which offer unknown openings to enhance effectiveness and expand access to high quality education. Information Technology is a new medium, a new way of representing communication and working with information. It's both an important area of study in its own right and a tool that's being integrated into everyday life of further and further people. ICT greatly grease the accession and immersion of knowledge, offering developing countries unknown openings to enhance educational systems, ameliorate policy expression and prosecution, and widen the range of openings for business and the poor. One of the topmost rigors endured by the poor, and by numerous others, who live in the poorest countries, is their sense of insulation. The new dispatches technologies promise to reduce that sense of insulation, and to open access to knowledge in ways unconceivable not long still, the reality of the Digital Divide- the gap between those who have access to and control of technology and those who do not- means that the preface and integration of ICT at different situations and in colorful types of education will be a most grueling undertaking. Failure to meet the challenge would mean a farther widening of the knowledge gap and the deepening of being profitable and social inequalities.

**Keywords:** *Information Technology, Communication, Digital, Human Life, Integral.*

### **Introduction**

Globalization and technological change- processes that have accelerated in tandem over the once fifteen times have created a new global frugality "powered by technology, fueled by information and driven by knowledge." The emergence of this new global frugality has serious counteraccusations for the nature and purpose of educational institutions. As the half- life of information continues to shrink and pierce to information continues to grow exponentially, seminaries cannot remain bare venues for the transmission of a specified set of information from schoolteacher to pupil over a fixed period of time. Rather, seminaries must promote "learning to learn," i.e., the accession of knowledge and chops that make possible nonstop literacy over the continuance. "The illiterate of the 21st century," according to visionary Alvin Toffler, "will not be those who cannot read and write, but those who cannot learn, forget, and relearn".

### **Educational Technology**

Educational Technology is a broad sense, an each- pervasive conception including both tutoring and educational technologies, emphasizing the methodical problem working aspects of the field. It has been defined as a methodical way of designing, carrying out and assessing the total process of literacy and tutoring in terms of specific objects grounded on exploration in mortal literacy and communication and employing a combination of mortal and non-human coffers to bring about effective instruction. Its primary part is to increase the effectiveness and effectiveness of the entire tutoring- literacy process through a system approach putting to use ultramodern communication technologies and the media. Advances in Educational Science on the one hand and in Optical and Electronic Technologies on the other have handed an excellent script for a new range of developments in order to make the tutoring literacy process more effective. Educational Technology has stimulated preceptors to introduce in the area of School



## **Developing Digital Security Awareness among School students**

**B.Venkatarathanam** , Research Scholar, Dept. of Educational Technology, TNTEU

**Dr.V.Sharmila**, Assistant Professor, Dept. of Educational Technology, TNTEU

### **Abstract**

Digital security has one of the most critical issues defying Schools in this century. Computer security is an essential instrument for guarding children, but 1- 12th standard schools are considered one of the most seductive targets for data sequestration crimes frequently due to the less-than effective digital security practices in Schools. The mortal factor is the beginning reason why numerous attacks on academy computers and systems are successful because the uninstructed computer stoner is the weakest link targeted by cyber culprits using social engineering. Formal cybersecurity mindfulness is needed to alleviate the exploitation of mortal vulnerabilities by computer hackers and bushwhackers.

### **Introduction**

Today's world is now in cyberspace and cybersecurity has come a massive issue with numerous angles of seminars. Children moment spends a substantial quantum of time online for either educational purposes or entertainment. The internet offers numerous openings and poses several risks. Given their age, it has delicate for them to assess the openings and risks of using the internet and digital systems, indeed as further and further of their lives are digitally recorded, potentially creating long-term goods on their sequestration and safety. Occasionally, they do not realize the troubles or pitfalls until it has too late. Therefore, they can fluently fall victim to online abuses. Along with specialized counter measures, security mindfulness and practices can help druggies help or alleviate losses from digital security pitfalls. While security practices calculate on several factors, one is the degree to which people are apprehensive and suitable to assess threat and apply knowledge to alleviate threats.

As a result of the recent rush to e-learning, the field has been exposed to an increase in cyberattacks; cybercriminals are chancing openings to defraud academics, locate ransomware schemes to wring capitalist. In fact, a public service advertisement by the FBI's Internet Crime Complaint Center lately advised that assaulters are taking advantage of the transition to online literacy due to COVID- 19 through increased targeting of virtual surroundings, including those employed by seminars. While online literacy provides so numerous positive openings for learners and preceptors likewise, it's more important than ever to strengthen cybersecurity defenses to deal with new and arising attacks. This composition is designed to help give preceptors, parents and scholars with the information they need to identify common cyber pitfalls, as well as tips on cybersecurity stylish practices to help you safely ease into the new academy period.

### **Digital Security**

Digital security is the collaborative term that describes the coffers employed to safeguard your online identicalness, data, and another fortune. These tools contain web services, antivirus software, Smartphone SIM cards, biometrics, and guarded patented affinity.

### **Types of Digital Security**

As you can sustain, there's a property that can go mistaken if your digital data is ventured. Fortunately, safeguarding in the digital world comes in multiple forms, giving a wide choice of security strategies. These contain:



## **Digital Resources Improves the user's knowledge in Teaching and learning Climate**

**D.Sathish**, Assistant Professor in Physical Science, GRT College of Education, Tiruttani-631209.

### **Abstract**

The purpose of this research paper is sharing assets is just dividing library assets by specific partaking libraries among them based on the rule of participation. This is pertinent while sharing records, work, administrations, space and gear. This report principally features what are you sharing assets? Why share assets? Structures, means and techniques: definition, Goals, needs, areas of collaboration and trade of assets, parts, prerequisites, Idea, benefits, analysis, obstruction, moves toward advance the trading of assets through the network, Library Consortium and its sorts and works. Benefits and detriments.

**Keywords:** Digital resources, Knowledge, Teaching and learning

### **Introduction**

The digital resources of this era are evolving quickly. With the fast improvement of electronic distributing, libraries not just procure perusing materials such as print books and magazines, yet in addition arrange admittance to different learning assets in electronic structure. Web assets furthermore, the utilization of the web as a device are significantly having an impact on the way clients see every challenge as a potential opportunity. During the underlying stage, the Internet was predominantly utilized for push applications to give data furthermore, assets for clients, the advancement of Web 2.0 and the spread of open source and the idea of sharing fixated on client produced content and shared applications. This prompted the fast turn of events and dissemination of electronic assets. Computerized assets are involving a significant piece of world writing. They allude to data sources in electronic structure. The various kinds of assets are electronic books, electronic magazines, data sets and Compact disc ROMs, and so on.

### **Digital Resources**

Digital Resources can be characterized as materials that have been considered and made carefully or by switching simple materials over completely to a computerized design. The Library's Advanced Assets assortments envelop online assets that are facilitated somewhere else, actual organization distributions, computerized media documents and conceived computerized assets.

A Digital Resources is characterized as an asset that requires access to the PC or any electronic item that gives a assortment of information, be it text alluding to full-message data sets, electronic diaries, picture assortments, other interactive media and media-based items. Mathematical, realistic or worldly values, for example, a financially accessible title that was distributed with the end goal of commercialization. These can be followed through on CD ROM, on tape, over the Web, and so on. In late years, various related strategies and guidelines have been fostered that permit you to make and circulate records carefully. Thus, to adapt to the ongoing circumstance, administrators are moving to new ones methods for correspondence, that is, advanced resources for their improvement of accumulation of reports from clients who are better fulfilled. Advanced resources in attractive and optical media significantly affect the assortments of college libraries.

### **Digital resources are implemented in Teaching and learning environment**

Conventional learning happens in an in-person homeroom setting where an educator conveys information to their understudies. Customary learning classroom anticipated that their



## **DIGITAL KNOWLEDGE IN TEACHER EDUCATION IN INDIA- AN OVER VIEW**

**Dr.R.VADIVELU**, Associate Professor, GRT College of Education, Tiruttani

### **Abstract**

Digital knowledge of the preceptors means capability to use information and dispatches technologies safely and critically for work, both on a particular as well as on social position. The main features of this 21st century knowledge are the using of computers for the purpose of finding, assessing, creating, displaying and participating information over the Internet. In order to bring about long lasting effective changes at the classroom position, it's important that the preceptors follow a authority of constant training. As a schoolteacher plays an integral part in education, enhancement in their knowledge and chops is imminent to develop their digital knowledge in order to use new styles in the classroom. The preceptors Acquiring knowledge and chops in the field of ICT is one of the prerequisites for successful social addition in contemporary society and the labor request in civic India, while the digital knowledge is one of the necessary capabilities of a ultramodern Indian in civic as well as pastoral societies. thus, in order to achieve quality education, these two generalities have come part of the frame of the public educational system.

*Keywords: Digital, knowledge, preceptors, Technology, ICT, Society, Chops, Quality.*

### **Introduction**

The digital world offers tremendous benefits to us all. It provides platforms that allow us to connect and unite. It opens up openings to learn about new and important issues, and empowers invention in ways that were unconceivable just a many times. The advancement of technology has percolated every aspect of our lives. Employers anticipate their pool to have the chops demanded to live, work, and thrive in a digital society. knowledge means reading and writing chops. There was a time in history when we were formulating programs and working for knowledge. Still, we've some further distance to travel before we achieve our thing of 100 knowledgeable India. Suddenly a tremendous development passed in the Information and Technology sector, and now with the arrival of the internet and with globalization, a certain member of this massive population has tread forward and is motivated to be digitally knowledgeable. The word digital turned before knowledge, changes the meaning. 'Digital' is an elaborate content, but in short, it's commodity that deals with technology. Ultramodern scholars who have access to an internet connection and indeed a Smartphone can find answers to all kinds of questions, whether simple or complex. But they may not understand the answers. They're also not apprehensive of the fictitiousness of the information or the source. It's the digitally knowledgeable schoolteacher's responsibility to guide the scholars regarding which sources are authentic and which are streamlined regularly or whether there are other useful spots linked to the subject and, more importantly, the piece of information is written in prejudiced language or ideal.

### **Digital knowledge**

Digital knowledge is about being suitable to make sense of digital media. This occurs through meaningful and sustainable consumption and duration patterns that ameliorate an existent's eventuality to contribute to an authentic community. This includes the capability to dissect, prioritize, and act upon the innumerable digital media 21st century citizens encounter on a diurnal base

**Significance of Digital knowledge:** to the preceptors combines the systems of education and technology by enforcing digital knowledge in the classroom. Digital knowledge focuses on the



## **INFUSION OF DIGITAL ETIQUETTE IN 21ST CENTURY EDUCATION**

**C. Thiagarajan**, M.Ed Scholar, GRT College of Education, Tirutani.

**Dr.P.Pachayappan**, Assistant Professor, GRT College of Education, Tirutani.

### **ABSTRACT**

*Communication is the process by which information is exchanged between individuals through a common system of symbols, signs, or behavior. Many researchers argue that communication in most cases rely on non-verbal methods such as eye contact, facial expressions, gestures, postures, and body language rather than verbal or written method. For the past few decades digital platform has been playing an important role in communication. COVID-19 pandemic hit the world in the beginning of 2020. It has changed the whole world and affected many lives. With the available communication and technology in hand, we had to rely on digital platform for all our day-to-day activities including communication processes. Even though we were moving towards the digital age in a slow and steady phased manner, the pandemic made the shift instant and inevitable. Apart from facing health concerns during this pandemic, we were also much concerned about the future generation in imparting education. Most of the students had to use digital technology in their daily life for education. Such students do not have the required knowledge and awareness of how to use the technology in an appropriate way. As a result of the inappropriate use or misuse of digital platform we are in a situation to regulate such problems. Therefore, digital etiquette has emerged as one of the key components of digital citizenship. This paper deals with an introduction to digital etiquette (netiquette), Digital etiquette in teaching and learning process, Importance of Digital Etiquette in 21<sup>st</sup> Century Education, Thumb Rules for Digital Etiquette, Etiquettes concerning different digital platforms, and concluding remarks on rules for proper online behavior for the purpose of education.*

**Key words:** Digital etiquette, Internet, Netiquette, Teaching and Learning, Digital citizenship, Digital Education, Online Behavior.

### **Introduction**

Etiquette is a set of guidelines about how to behave politely and respect others. Through the lens of digital citizenship, people can judge how they and other people use technology. A good digital citizen asks other people what they think about how they use technology and then changes their own habits based on what they hear. As members of a digital society, we are expected to do what is best for the whole group. To do this, we need to think about how our use of technology affects other people. As a result of digital revolution millions of people indulge in digital platforms such as social networking sites, e-learning platforms and chat rooms etc. The development of multimedia smartphones has shrunk the world within our hands in a 6-inch smartphone. People use their smartphones in their daily life for communicating, education, networking, banking, shopping, etc. COVID-19 pandemic hit the world in the beginning of 2020. With the available communication technology in hand, we had to rely on digital platform for all our day-to-day activities including education. During the pandemic, education system shifted drastically to accommodate the needs of both students and teachers. Although we have many positive impacts, the negative effects are increasing rapidly while using digital platform.

Everybody who uses digital platform is affected as most of them are not able to cope up with the rate of technology development. Most of the students use digital technology in their daily life for education, be it a mobile phone, tab, Internet, or platforms like google meet, Zoom meet, Microsoft Teams, etc. Such students do not have the required knowledge and awareness of how to use the technology in an appropriate way. As a result of the inappropriate use or misuse



students and has provided them the support for better clarity on the topics which will be helpful to them clear the entrance examinations in a simpler and interesting way by a single click of the mouse along with a travel free experience and has given them the freedom to learn at their own pace. Therefore, it has solved a huge problematic scenario where a student has to pay the fees demanded by the tutor. In most of the cases, the student either cannot afford the fee to attend these classes or feels unsatisfied by the teaching quality of the tutors.

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### Challenges and barriers of Access to Digital Learning Resources for the Students

**Mr.M.Swamidoss**, Assistant Professor in History, GRT College of Education, Tiruttani

#### Abstract

The purpose of this article that as some great growing experiences in school education are unthinkable without the utilization of innovation and technology, especially taking into account its effect on the advancement of capacities and abilities for the 21st-century. Moving from a paper asset to a digital format empowers users with various access and use choices. In any case, simultaneously, a few different difficulties arose which incorporate the quality, cost, life, legitimacy and validity of digital contents. This research work is an itemized portrayal of the difficulties/obstructions facing by the scientists while getting to computerized data assets. The consequences of this examination concentrate on laid out various issues and difficulties that users looked while getting to online library data sets and other computerized assets like limited admittance to advanced assets, an absence of users information, shakiness of data, incapable data set designs, data the board, unfortunate web download rates, and information security. Innovation/esteem: This exploration has given a significant commitment to ID, comprehension of the difficulties while utilizing and getting to of library online computerized assets by specialists of Indian advanced education organizations. The administration of scholarly foundations can gain from the discoveries and proposals.

**Keywords:** Challenges and barriers, Electronic library resources, online library databases, Digital libraries, digital resources access.

#### Introduction

Computerized learning resources incorporate carefully designed, instructive materials like; illustrations, pictures or photographs, sound and video, reproductions and liveliness

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## **DIGITAL TRANSFORMATION INITIATIVES: A BOON FOR INDIAN EDUCATION**

**Dr. P. Pachaiyappan**, Professor, GRT College of Education, Tiruttani, Tamilnadu.

**S. Swarnasree**, M.Ed Scholar, GRT College of Education, Tiruttani.

### **ABSTRACT**

Digital age has made strong impact on people's life in all spheres. Teaching and learning in digital era has also grown beyond the boundaries of classroom and books. Today's learners have exposure to various e-learning resources and plenty of information is available at click of mouse. Digital Education is the way of learning under which technology and digital tools play a vital role. This broad and ed-tech model of education helps the student to learn from any part of the globe. Government has proposed several channels for extensive sources of digital education through its different initiatives. The Government of India has taken decisive digital initiatives to carry out large-scale digital reforms in higher education. While technology-enabled initiatives or platforms in line with Massive Open Online Courses such as Swayam have seen the use of technologies and Diksha, a platform that aids teachers with digital and tech-based teaching solutions, the Government is also emphasizing on boosting the use of tools such as virtual lab, a virtual reality enabled classrooms or curated online content for both students and teachers. In this way the paper highlights the various digital initiatives in Indian education system.

**Key words:** *Digital Education, Swayam, Digital Initiatives in Education, Digital learning-teaching, e-learning platforms, Digital Learning Environment.*

### **Introduction**

Digital Education is an evolving area which is primarily concerned with the teaching and learning process using digital medium. This has evolved from activities such as sharing of text resources and students submitting assignments online to availability of various types of content such as audio, video and multimedia resources. The continuous advancement in the field of Information and Communication Technology (ICT) and the internet (with virtually unlimited supply of digital resources) has made multiple modes of digital education possible. India's higher education is evident with the increasing use of ICT, Cloud Computing, Artificial Intelligence, and Virtual Reality in day-to-day practices. The Government of India has committed itself by prioritizing advanced uses of ICT to bring phenomenal changes such as Revitalizing Infrastructure and Systems in Education (RISE) scheme. While technology-enabled initiatives or platforms in line with Massive Open Online Courses (MOOC) such as Swayam (for teachers' education) have seen the use of technologies, the Government is also emphasizing on boosting the use of tools such as virtual lab, virtual reality (VR)-enabled classrooms or curated online content for both students and teachers. Swayam, an online life-long training platform developed with the help of Microsoft, or Diksha, a platform that helps teachers with digital and tech-based



- ❖ **Learner- generated-learning content:** Digital knowledge can develop an online learner's performance. Encouraging them to showcase their work by creating-blogs and virtual donations will impel them to probe using online tools

#### Conclusion

Technology now enables us to make a wide variety of effective literacy surroundings that can differ significantly from the traditional classroom. But technology alone isn't enough. Numerous technology grounded literacy surroundings are bereft of some of the crucial factors that make an effective literacy terrain. An effective literacy terrain needs to include the other factors for learner success. This isn't to say that tone- managing learners cannot make their own effective, particular literacy surroundings, but they need to consider the other factors as well as the technology. The literacy terrain needs to be applicable for the environment in which scholars will learn. still, before indeed beginning to design a course or program, we should be allowing of what this literacy terrain could look like. Whatever the literacy terrain, however, the learners must do the literacy. We need to make sure that learners are suitable to work within an terrain that helps them do this. In other words, our job as preceptors is to produce the conditions for success.

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## CONCEPTUAL PERSPECTIVES TOWARDS DIGITAL TECHNOLOGIES AND MATHEMATICS EDUCATION

G.Mahadevan, Assistant Professor, GRT College of Education, Tiruttani

#### Abstract

Digital technology is essential in tutoring and literacy mathematics to understand the introductory conception and the way of problem working fashion. A primary observation set up