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2. Exploring Teacher Development Through the ICT

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"Technology will never replace great teachers, but in the hands of great teachers, it's transformational." – George Couros.

Abstract:

The use of ICT is particularly inevitable for the development of today's society because we are at present comfortable doing paperless work. Therefore, from school to research, from teacher to businessman, everyone needs knowledge about ICT. ICT has helped to bring the current universe into the dwelling. Therefore, those who will give knowledge about the use of ICT need to be trained first. So, standing in the digital era, find out how it is possible to enrich the teacher with ICT, this is the topic of the study.

The objective of the study is to find out the ICT tools for Teacher Development and use of ICT Initiatives in Teacher Development as per NEP 2020. This research is a qualitative study.

Herein, by looking at the literature review of various researchers and doing its Meta analysis, it has been concluded that that role of ICT tools in the development of teachers in the AI era is undeniable. And to move forward in that direction, the Government of India has taken various initiatives related to ICT, but for its proper application, more workshops, seminars and campaigns are needed. It is also necessary to launch different courses related to ICT.

Keywords:

Teacher development, ICT, ICT tools (software and hardware), ICT initiatives in India.

2.1 Introduction:

Education is the vertebral column of society, and it is the responsibility of teachers to keep that spine straight. And to develop the teacher well, proper training is wanted according to web 2.0 and web 3.0 eras which is a special need in today's creation. There is a need to enrich teachers with ICT which will act as teacher AI in future generation advancement. Therefore, it can be said that in the current web 2.0 and 3.0 world, teachers have exceptional need for digital media in the teaching and learning process, which will easily reach all the

students in the universe. In the digital age, the use of digital technologies to teach digital learners is particularly necessary. According to the psychology of the students, as a result of teaching-learning through the use of ICT, as well as giving them emotional satisfaction, a teacher's confidence in teaching rises many times, this also helps the self-evaluation of the teacher. According to Swami Vivekananda says, "Education is a personal contact with the teacher." He also said that the teacher should be a friend, philosopher, guide and a *tyagi* for creating a real man.

Information and Communications Technology (ICT) is the use of computing and telecommunication technologies, systems and tools to facilitate the way information is created, collected, processed, transmitted and stored.

It includes computing technologies like servers, laptop computers and software applications, as well as the wired and wireless communication technologies that support telephones, the Internet, the Internet of Things (IoT) and the metaverse (Margaret Rouse, 2023).

According to Anyakoha (1991), information technology is "the use of manmade tools for the collection, generation, communication, recording, re-management, and exploitation of information. It includes those applications and commodities, by which information is transferred, recorded, edited, stored, manipulated or disseminated". ICT is a means that has changed many aspects of the way we live.

Teacher education needs to orient and sensitize the teacher to distinguish between critically useful, developmentally appropriate and the detrimental use of ICT. In a way, ICT can be imaginatively drawn upon for professional development and academic support of the pre-service and in-service teachers (Radha Mohon, 2019).

The **1986 NEP** emphasized the need to employ **educational technology** to enhance the quality of education. It recognized the potential of ICT in transforming teaching and learning processes.

The **1992 modification** built upon the foundation laid by the 1986 policy. It continued to stress the importance of integrating technology into education.

The **NPE 2020** recognizes the crucial role of technology in education. Teacher professional development through platforms like **DIKSHA** and **SWAYAM** will be better integrated.

ICT enables teachers to keep up to speed on new information and skills needed to utilize new digital tools and resources. Teachers in India have begun to use technology into the classroom.

Laptops, LCD projectors, desktop computers, EDUCOM, Smart classrooms, and memory sticks are all increasingly commonplace in teacher education. So, in the twenty-first century, we should integrate information and communication technology in teacher education since instructors are the only ones who can provide kids a bright future (Bhattacharjee & Deb, 2016); (Jagdeep Singh & Mamta Kumari, 2022).

A. Significance of the Study:

The significance of the study is as follows:

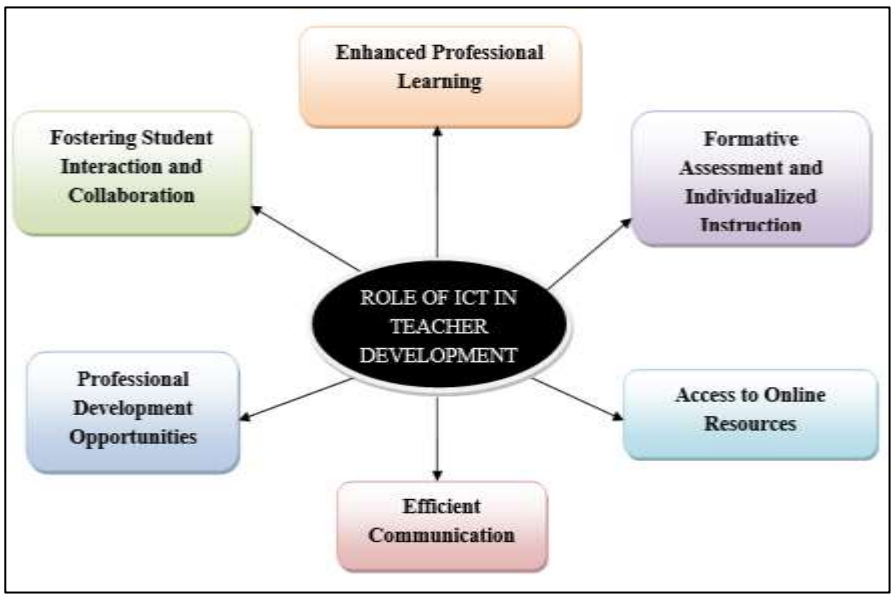

Figure 2.1: Role of ICT in Teacher Development

B. Statement of the Problem:

Teacher is the best member in the world for social change. So that is necessary to educate the teacher in modern digital education. So, the problem is -

"Exploring Teacher Development through the ICT"

C. Objectives:

- To find the ICT tools for Teacher Development.
- To use of ICT Initiatives in Teacher Development as per NEP 2020.

2.2 Review of Related Literature:

Singh. J and Kumari .M (2023), talked about positively the use of ICT. ICT can bring about major changes from the teacher to teaching-learning process to students. Internet and interactive multimedia are two ICTs that are obviously a primary focus for future education and must be properly incorporated into formal teaching and learning system.

A.P, Shamim, M and Rao, K. A (2023) stated that the ICT is the primary driver behind the efficient delivery of value education in higher education. ICT helps to improve the quantity and quality of higher education at all levels.

Kumar, S and Priyanka (2023), this paper began by investigating the adoption of digital learning platforms, blended learning models, and online assessment tools in higher education settings.

It delves into the role of ICT in facilitating personalized and interactive learning experiences, promoting student engagement, and fostering critical thinking skills. This work adds to the current conversation on how higher education is changing in the digital age and provides useful suggestions for instructors, administrators, and legislators who want to maximize the use of ICT in the classroom.

Mahato, S and Omkar, P. (2022), they explored e how to trace ICT in Teacher Education effectively to strengthen the Discipline in India.

Kalla, N (2021), highlighted the importance, Role, benefits and challenges of ICT in the development of skills in higher education of India. The role of ICT in higher education continues to advance in the 21st century.

Singh, P, Saroj, S and Shastri, K.R (2021), discussed how the ICT help to promote and transform the higher education in India.

Gavinolla, R.M, Swain, K.S and Livina, A (2021), they studied that the progress of digital education research in India has increased over the years the research output published in top-tier journals was limited. Authors who have been affiliated to Indian universities contributed the most. Major research themes were E-learning, distance education, digital literacy, medical education, mobile learning, digital India, simulation, virtual labs, MOOCS, and COVID 19 pandemic.

Sridevi, J, Krishnan, B.C. and Kumar, S.K (2017), they discussed about the advantages and disadvantages of ICT enabled education to everyone.

Petare, Amin, U. N. S (2013), explained that the literature review of many researchers regarding the use of ICTs in education was provided. He also talked about the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. The adoption and use of ICTs in education have a positive impact on teaching, learning, and research.

Mondal, A. and Mete, J (2012), the paper addressed the opportunities and challenges posed by integration of ICTs in various aspects of higher education in the present scenario.

2.3 Research Methodology:

In order to see how ICT has been linked to teacher education in India, various secondary data collection related to ICT was done by looking at the literature review of various researchers. In particular, how ICT can be used for teacher development was described through Meta analysis. Investigator also described the initiatives taken by the Government of India to use ICT for teacher development.

2.4 ICT Tools for Teacher Development:

We can prosper teachers only when we improve teacher education. Digitization is a special need in teacher education to develop teachers. The teacher education curriculum should include methods of training on the rules of using ICT tools which will help in future teacher development. Therefore, ICT tools requisite for teacher development are as follows:

- **Hardware Tools:**

i. Computer/ Laptop:

A teacher must first acquire computer knowledge. One should know about the usage of computer from the field of teaching to evaluation of education.

Computer is not carriageable, but laptop is carriageable, and both have the same function.

Figure 2.1: Computer/laptop

ii. Projector:

Now, the use of projectors can be seen from school education to higher education. Teaching can be made much more interesting through the use of projectors. Therefore, it is essential to include methods of its usage in teacher education.

Figure 2.2: Projectors for Schools

iii. Smart Board:

Instead of projectors, SMART board is now trend used in many education sectors. Students can be informed about the usage of SMART board in teacher education; they will be ahead of the path of improvement as future teachers.

Figure 2.3: Smart Board for Schools

- **Software Tools:**

Teacher education curriculum needs to incorporate the following tools to help teachers adapt to the digital era.

i. Video Conferencing Platforms:

The role of these video conferencing platforms has increased exponentially since COVID 19.

a. Zoom: Zoom video communication is a communication technology company headquartered in Downtown San Jose, California, United States. It has brought the whole universe together at one place through video conferencing.

Figure 2.4: Zoom App Icon

b. Google Meet: Google formally launched Meet in March 2017.

Figure 2.5: Google Meet App Icon

ii. Learning Management System:

a. Canvas: Canvas LMS is built to make teaching-learning easier for everyone, from youngest learners to college faculty to business leaders.

Figure 2.6: Canvas App Icon

b. Moodle: It is a free – open-source learning management system. It is used for blended learning, distance education, flipped classroom and other online learning projects in schools, universities, workplaces and other sectors.

Figure 2.7: Moddle App Icon

c. Blackboard Learn: It is a learning Management system and educational technology for teaching- learning. It's headquarters in Boca Raton, Florida.

Figure 2.8: Black Board App Icon

iii. Interactive Classroom and Classroom Presentation:

a. Microsoft PowerPoint: It is a presentation program. It is helping the teacher will be able to easily teach the students through slide presentation in an attractive manner.

Figure 2.9: Microsoft Power Point App Icon

b. Coursera: It is a For-profit massive open online course which headquarters in Mountain View, California, U.S. It is an online education platform.

Figure 2.10: Coursera App Icon

c. Cue Think: It is a digital solution that helps teachers capture student thinking, conduct formative assessment and plan next instructional steps.

Figure 2.11: Cue think app icon

d. Can Figure It Geometry: It is an interactive tool and work space for exploring and learning about geometry proofs. This tool, developed to help promote problem solving skills and logical thinking, provides immediate feedback to student responses.

Figure 2.12: Can Figure It Geometry App Icon

e. Kahoot: This is a powerful tool that significantly contributes to **teacher development** by enhancing engagement, promoting active learning, and providing valuable insights. It allows teachers to create interactive quizzes, surveys, and discussions. Kahoot offers free resources for teachers, including presentations, guides, and video tutorials.

Figure 2.13: Kahoot App Icon

f. Empressr: Empressr is a web-based presentation tool that allows teachers to create multimedia-rich presentations, teachers can enhance their communication during lessons, teachers to organize information logically, teachers can assess student understanding during or after a lesson. Empressr provides flexibility in designing presentations.

Figure 2.14: Empressr App Icon

g. Cacoo: This is versatile online whiteboard software, offers valuable benefits for teachers and educators. Teachers can start with Cacoo's templates or design their own lesson plans.

Figure 2.15: Cacoo App Icon

h. Yammer: Teachers, students, and staff can connect, share ideas, and collaborate seamlessly.

Figure 2.16: Yammer App Icon

i. Socrative: This tool empowers teachers by streamlining assessment, enhancing engagement, and providing valuable insights into student learning.

Figure 2.17: Socrative App Icon

j. Spread sheets: These offer valuable benefits for teachers in various aspects of their work. **Teachers can design spreadsheet exercises that promote critical thinking and problem-solving**. Teachers can create grade books using spreadsheets, tracking student performance and calculating averages, teachers can create scenarios quickly, helping students grasp concepts intuitively, Teachers can use spreadsheets for lesson planning, organizing resources, and managing schedules.

Figure 2.18: Spread Sheet App Icon

k. Genially: As a teacher, **genially** can be your versatile ally in creating engaging and interactive learning materials for your students. Genially simplifies content creation, enhances student engagement, and supports personalized learning experiences. It's time to make your teaching materials truly **genial.**

Figure 2.19: Genially App Icon

l. Dropbox: Dropbox connects with best-in-class learning management systems like **Blackboard**, **Canvas**, and **Moodle**. It also integrates with communication tools like **Microsoft Teams**, **Slack**, and **Zoom**. This empowers teachers by facilitating collaboration, enhancing productivity, and ensuring secure data management within educational institutions.

Figure 2.20: Dropbox App Icon

m. We Transfer: We Transfer is a versatile platform that can be beneficial for teachers in various ways. Teachers can share easily large files such as presentations, documents, or multimedia resources with students, colleagues, or parents. Teachers can use We Transfer's **Collect** app to collect assignments, projects, or creative work from students. File organization, collaboration and feedback also work in this tool.

Figure 2.21: we transfer app icon

n. Mindomo: Mindomo Teacher is a valuable tool for teachers, librarians, and paraprofessionals. The tool enables teachers to **adapt the curriculum** to meet individual student needs. Mindomo facilitates creative teaching, critical thinking, and personalized learning experiences for both educators and students.

Figure 2.22: Mindomo app icon

o. Trello: Trello is a visual tool that empowers teams to manage projects, workflows, and tasks effectively Trello website.

Figure 2.23: Trello app icon

p. Feedly: Feedly helps teachers to discover new teaching strategies, classroom management techniques, and innovative tools through their personalized feeds, to find **relevant and engaging content** for their students, to develop **lesson planning, project ideas** or **current events, to d**iscover resources that enhance their curriculum, to make **informed decisions** about their teaching methods and classroom strategies, to **follow educational research** and evidence-based practices.

Figure 2.24: Feedly App Icon

q. Clippings: Clippings helps to provide **free clipart** that you can incorporate into your teaching materials, to add colorful and relevant illustrations to your lesson plans, to **customize** your teaching materials, to create eye-catching bulletin boards, posters, or interactive displays in your classroom, to make your teaching materials more visually appealing, encouraging active participation, to specific themes (such as seasons, holidays, or science topics) can enrich your thematic units, to illustrate stories, fables, or poems. Visual cues help students understand the narrative and engage with the content, to create their own stories using clipart as inspiration, to design their own greeting cards, bookmarks, or posters, to interactive whiteboards or digital platforms, incorporate clipart into your presentations.

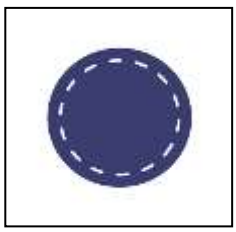

Figure 2.25: Clippings App Icon

r. Edmodo: Edmodo also known as "Facebook for school," is a premier social media and learning platform designed for teachers and students. Edmodo serves as a versatile tool, benefiting teachers, administrators, students, and parents alike. Whether managing classes, connecting globally, or ensuring student safety, Edmodo is a valuable asset in K-12 education.

Figure 2.26: Edmodo App Icon

iv. Google System:

a. Google Classroom: Google Classroom can significantly enhance your teaching experience. This is a powerful tool for organizing coursework, fostering collaboration, and streamlining communication.

Figure 2.27: Google Class Room App Icon

b. Google Knowledge Graph: This tool provides live online tutorials, lesson plans, interactive class materials and many resources for educators.

Figure 2.28: Google Knowledge Graph App Icon

c. Google Maps: Kids can learn to find the distance between two places and look at 360-degree images of places. This can help your students become familiar with multiple locations across the world.

Figure 2.29: Google Maps App Icon

d. Google Earth: This tool shows the entire earth with every location and supports an amazing zoom feature. Kids can learn about different regions, landmasses, and water bodies in a fun way.

Figure 2.30: Google Earth App Icon

e. Google Forms: This is a cloud-based system. **Google Forms** is a fantastic tool for teachers to enhance the way class works. Teachers can be used Google forms by **Quizzes and Assessments, Surveys and Feedback, Homework Submissions, Attendance Tracking, Parent Communication, Peer Evaluation, Field Trip Permissions.**

It making easy to distribute anything you create by sharing a link. You can collaborate with other teachers and customize quizzes to suit different subjects.

Figure 2.31: Google Forms App Icon

v. Web 3.0 Era Tools for Teachers:

a. FigJam: It has an infinite canvas. This tool allows you to embed, resize, and play videos. You can also encourage interaction with stamps and comments and use the built-in timer to stay on track and lock elements when you want to preserve the layout (Harries, 2023).

Figure 2.32: Figjam App Icon

b. Text Blaze: This is the ultimate time-saver for teachers. This Chrome extension acts like a digital assistant, with custom shortcuts, snippets, and templates for frequently used phrases. Just add the extension to your Chrome browser, set up shortcuts for repeated typing and then use them anywhere on the web (Harries, 2023).

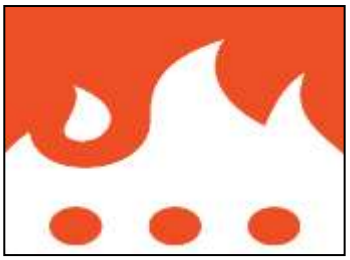

Figure 2.33: Text Blaze App Icon

c. Diffit: It is a game-changing AI tool that can be used to create leveled resources for any lesson. Just insert an excerpt, paste a URL, or upload a document, and Diffit will modify the text to the grade level or language of your choosing. Also, you'll get a summary, key vocabulary, and lists of questions, including multiple choice, short answer, and open ended (Harries, 2023).

Figure 2.34: Diffit for Teacher's App Icon

d. MagicSchool.ai: Teachers are talking about MagicSchool.ai. In just one platform, you can do everything from composing emails, generating rubrics, producing multiple explanations for complex concepts, creating learning activities, writing jokes, and more (Harries, 2023).

Figure 2.35: Magic School App Icon

e. ChatPDF: ChatPDF is a fast and easy way to "chat" with any PDF. This new platform allows teachers and students to upload ebooks, research papers, articles, essays, or any text-based PDF. Once you drop in the PDF, you can begin a chat with the document, just like ChatGPT. You can ask for a summary, generate questions based on the PDF, locate information, or get creative and change the format of the text (Harries, 2023).

Figure 2.36: ChatPDF app icon

f. Text FX: This AI tool is one of the most innovative. Designed by Google AI developers in collaboration with hip hop artist Lupe Fiasco, this tool helps users play with language and inspire their thinking. The Text FX word database offers 9 different tools, including Simile, Explode, Unexpected, Chain, POV, Alliteration, Acronym, Fuse, Scene, and Unfold. Perfect for writers, wordsmiths, rappers, and poets, each tool takes your input and provides enhanced lyrical and linguistic techniques that can be applied to projects. Teachers can use Text FX with students to develop language skills, generate creative writing prompts, and more (Harries, 2023).

Figure 2.37: Text FX app icon

Text FX app icon - Search Images (bing.com)

g. Khanmigo: It acts both as a tutor and a guide to help students learn, rather than spitting out answers like ChatGPT.

It works by asking the student how they arrived at a solution and pointing out how they might have gone off track. Teachers can toggle to the teacher platform to get help with lesson creation, question generation, and even summarize students' chat history (Harries, 2023).

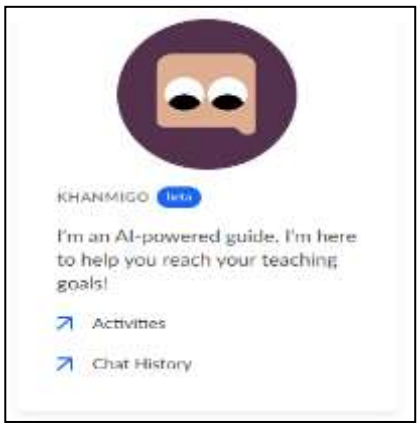

Figure 2.38: Khanmigo app icon

h. Canva AI: A teacher favorite now includes additional features that lean on AI to enhance graphic designs. Magic Eraser allows users to remove unwanted objects from photos, such as people, backgrounds, or objects. Magic Edit can swap objects, change colors, and add effects to your images.

Use the Text-to-Image feature to generate images from text descriptions. And similar to ChatGPT, Magic Write provides written content from text prompts. All of these features (and more) are part of Canva's Magic Studio and are available with a Pro account, which is free for teachers (Harries, 2023).

Figure 2.39: Canva App Icon

i. Audio Pen: Audio Pen is an AI-powered web app that transcribes, cleans up and enhances audio notes. Accessible from your computer or on the go from your phone, Audio Pen takes spoken words and converts them to text. Once text has been generated, you can review, edit, copy and paste, or share with others. This amazing AI tool is a great way to efficiently craft emails, newsletters, social media post ideas, lesson plans, and so much more.

Visit AudioPen.ai to get started (Harries, 2023).

Figure 2.40: Audio Pen App Icon

2.5 ICT Initiatives in Teacher Development as Per NEP 2020:

The **National Education Policy (NEP) 2020** recognizes the pivotal role of technology in education and emphasizes its integration to enhance teaching and learning. The **National Education Policy (NEP) 2020** in India emphasizes the integration of **Information and Communication Technology (ICT)** to enhance teacher development and improve the overall quality of education. Here are some key ICT-based initiatives outlined in the NEP 2020:

A. DIKSHA Platform for Teacher Professional Development:

- **DIKSHA** is an online platform that provides teachers with access to high-quality teaching and learning resources.
- It offers a rich variety of educational software in major Indian languages, making it accessible to all, including **Divyang** (differently abled) students.
- The platform aims to enhance teachers' skills, promote effective pedagogical practices, and foster continuous professional development.

B. SWAYAM:

- **SWAYAM** (Study Webs of Active Learning for Young Aspiring Minds) is an online learning platform that offers free courses from school to higher education levels.
- It provides opportunities for teachers to up skill, learn new teaching methodologies, and stay updated with the latest educational trends.

C. Integration of Technology into Curriculum:

- NEP 2020 emphasizes the appropriate integration of technology at all levels of education.
- This includes using technology to bridge language barriers, increase access for differently abled students, and enhance educational planning and management.

D. National Educational Technology Forum (NETF):

- The creation of **NETF** as an autonomous body facilitates the exchange of ideas on technology's use to enhance learning, assessment, planning, and administration.
- NETF aims to optimize and expand existing digital platforms and ICT-based educational initiatives.

E. Awareness on Disruptive Technologies:

- Schools and continuing education programs will raise awareness about disruptive technologies.
- Discussions on ethical issues related to technologies like Artificial Intelligence (AI) will be included in the curriculum.

F. Investing in Digital Infrastructure:

- The policy encourages investment in robust digital infrastructure, including high-speed internet connectivity, computers, and other necessary hardware.
- Schools and educational institutions are encouraged to create a conducive environment for digital learning.

G. Developing Online Teaching Platforms and Tools:

- The NEP 2020 emphasizes the need to develop user-friendly online teaching platforms and tools.
- These platforms can facilitate effective content delivery, interactive sessions, and assessments.

H. Creating Virtual Labs and Digital Repositories:

- Virtual labs provide a simulated environment for conducting experiments and practical learning.

- Digital repositories store educational resources, including textbooks, videos, and interactive content.

I. Training Teachers as Quality Online Content Creators:

- Teachers are encouraged to become proficient in creating high-quality online educational content.
- Training programs focus on effective content creation, pedagogy, and technology integration.

J. Designing and Implementing Online Assessments:

- The NEP 2020 promotes the use of online assessments to evaluate student learning.
- These assessments can be adaptive, formative, and provide timely feedback.

Overall, the NEP 2020 recognizes the transformative potential of ICT in education and aims to equip teachers with the necessary skills to leverage technology effectively in their teaching practices.

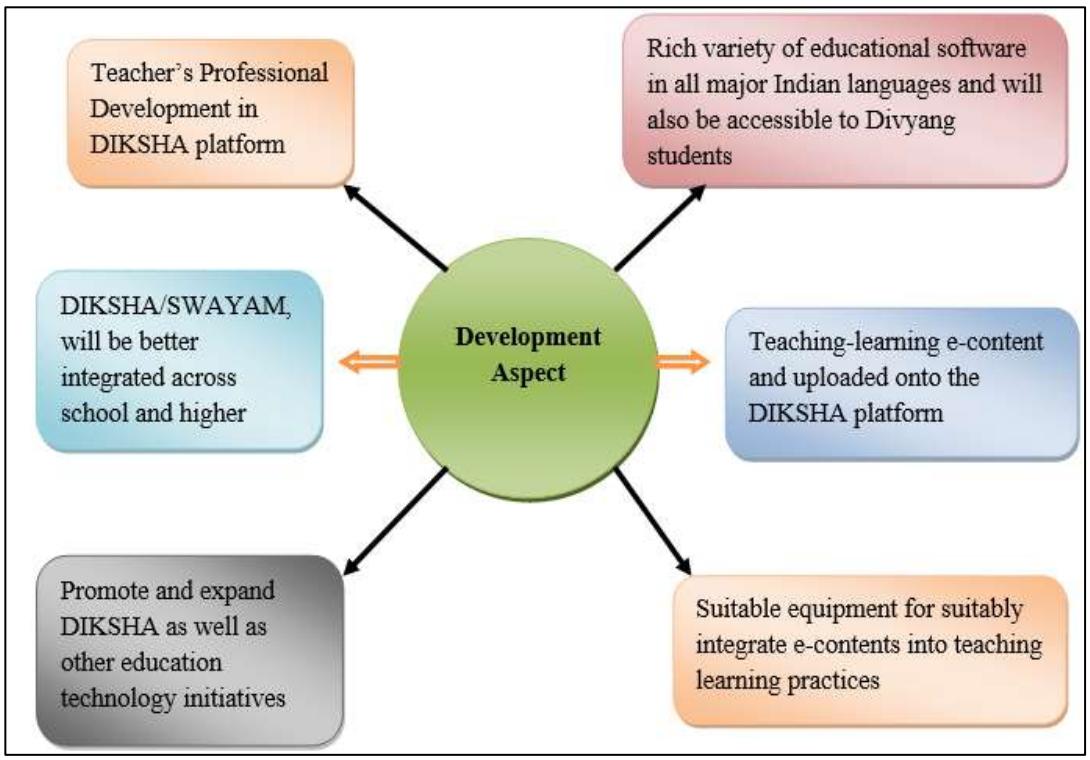

Figure 2.41: Designing and Implementing Online Assessments

Source: NEP_2020_CIET_Behera.pdf

2.6 Summary and Conclusion:

The Main Findings of This Research Are Summarized Below:

- The objective of the study was to explain the use of various ICT tools in the modern web 2.0 and web 3.0 eras for teacher development.
- How the various initiatives adopted by the Government for teacher development and various initiatives related to ICT in NEP 2020 will help teacher development.
- This study noted that DIKSHA and SWYAM portal helps in the development of both teachers and students.
- This study discussed the need for Extensive research into new technologies (involving artificial intelligence, machine learning, block chains, smart boards, handheld computing devices, adaptive computer testing and other forms of educational software and hardware), Disruptive technology, Artificial Intelligence (AI) 3D/7D, Virtual Reality, the use and integration of technology to improve multiple aspects of education before scaling up interventions to contextually, rigorously and transparently evaluate.

Multifarious literature reviews, NCFTE, National Mission on Education through Information and Communication Technology (NMEICT), NETE, NEP 2020 have talked about the use of ICT in teacher education, school education, higher education and research. In the modern digital era, NEP 2020 has talked about the development if teachers and students through ICT. Teachers will be helpful in providing digital education in the future only if they are taught in advance how to use ICT tools in education.

Schools, higher education institutes and different organizations can organize various workshops and seminars to teach them how to use modern AI-related tools that will help future teachers to flow at speed of digital. But these ICT tools will never replace a teacher but only a medium of education. Gaining better digital knowledge can easily facilitate students in their studies. Even though international countries are far ahead in the use of ICT, in our country we have realized its importance since the outbreak of Covid -19. ICT has its advantages as well as its drawbacks. In the words of various researchers, the role of ICT in the development of teachers is immense and its role in school education, higher education and research is wide. If the initiatives undertaken by the Government of India regarding ICT are properly implemented, it will be possible to accelerate the development of various fields of education. In that case, the development of teachers will also be named in the digital universe.

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