

Personalised and Adaptive Learning: Emerging Learning Platforms in the Era of Digital and Smart Learning



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ABSTRACT: The learning process is never-ending. It is a continuous process through every phase and stage of human life. Man always seeks new lessons and ideas and adapt to new surroundings and changes. In this process, several platforms and tools make the learning effective. These tools also provide proper translation services from the official language into any other language, enabling a learning experience for every learner individually stipulating unique paths for learning, including teaching the previous experience, skills, and knowledge. Numerous adaptive tools assist learners in experiencing the learning process with interest, like the presentation of the required material, which helps them grasp the subject quickly. This review paper discusses personalised and adaptive learning platforms, approaches, and solutions implemented in the prevailing eLearning systems. It discusses personalisation with basic concepts, describing competency-based learning, customised web service solutions, and presentation approaches. A design and development method of adaptive learning is presented with personalised access provision learning various objects provided with models and stored for every learner for repeated learning. LMS- learning management system model is also discussed tailored to the individual needs and in response to search queries. Personalised learning is submitted for assessment where applications implement the personalisation systems.

KEYWORDS: Online learning, Digital learning, Smart learning, Personalized Learning, Customized learning, Adaptive Learning, Learning Grid, Web Services.

INTRODUCTION

A personalised and adaptive learning environment is not clearly explained so far. It is not elaborately defined either, though it is touted as the up-and-coming and gifted emerging platform and tool to increase student success in learning. At the prevailing stage, the term Personalized and adaptive learning makes it complicated for higher learning and education institutions to implement technology as a new approach towards learning which currently is in its infancy and is yet to be entirely comprehended by those who will be utilising them; the teachers and the students. This learning goal is presumed to evolve student learning to fruition in the prevailing circumstances. Adaptive and Personalized learning constantly evaluates every learner's real-time performance, generating an ever-improving individualised learning path intended by machine learning. Artificial intelligence, therefore growing student satisfaction of knowledge, is vital and the primary purpose. To sum up, the study explains the potential personalised learning obstacles and practical answers to these issues. Various components are utilised to describe the personalised learning model and how it evolved as technology developed, and we create a better understanding and interaction of human machines (Andreas Kaplan, 2021).

This learning system provides learner's with personalised support with navigation, presentation, and content, in the prevailing learning environment (Park & Lee 2003). These systems are considered relevant enough to assess the characteristics of students' (Park & Lee 2003). This appropriate model is developed on the personalisation basis of adaptive learning system (Chrysafiadi & Virvou 2012) and is accountable to store the characteristics of students like prior knowledge, making decisions, learning styles, self-efficacy, cognitive abilities, intellectual ability, abilities to solve problems, and achievement motivation (Park & Lee 2003; Chrysafiadi & Virvou 2012). The student's characteristics in adaptive systems can provide a personalised learning window, like adaptive materials and courses, along with support like adaptive navigation and annotations, with recommendations.

The personalised and adaptive learning process is presently adopted and implemented in several ways in the classrooms using technology to provide benefits and opportunities that shape the career of a learner in line with futuristic research ingenuity, highlighting possible future options useful for the faculty, institution, and particularly the learner. This is because personalised instructional approaches and learning are customised and designed to meet the individual learner needs (Nisar Ahmad, 2021). The students can save their time adapting to specific courses using online tools and platforms. The system provides an absolved understanding, while the course training increases the learning by formatting online courses, practical classes.

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Adaptive learning is adaptive teaching, the overall educational system using computer algorithms and artificial intelligence to interact and communicate with the learners to design and deliver customised learning activities as well as resources to focus on learner's unique needs, professional learning context, where individuals to ensure they engage with special instructions. It involves AI, psychology, brain science, psychometrics, education, and computer science (Speech Buddies, 2021).

Educators use the intensity of adaptive learning technology to create an engaging learning environment where every student feels as if it is personalised to them (Nisar Ahmad, 2021). Adaptive learning technology, in a nutshell, empowers teachers' creativity and ability to custom learning experiences for every student, anywhere, anytime. It becomes very challenging to provide a good learning experience to meet the unique needs of every student. The Adaptivity factor is used to establish a learning program that meets every student's individual needs. The collected data is segmented to follow the Adaptivity factors, like Knowledge, Performance, Demographics, Misconceptions (EdTech Impact, 2021).

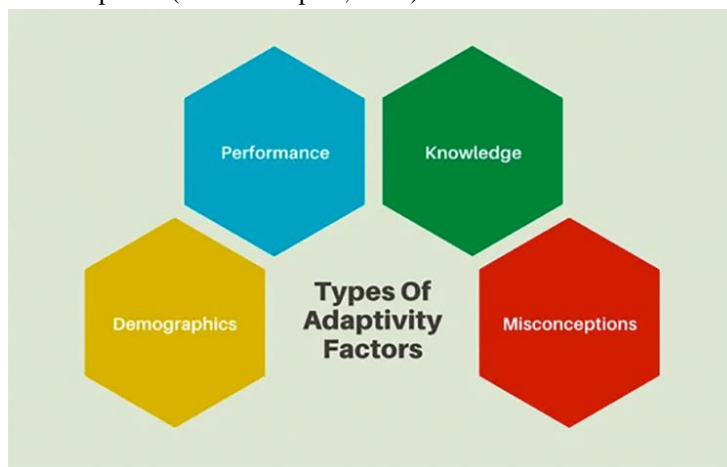


Figure: Various Types of Adaptive Learning (EdTech Impact, 2021).

Individualised instruction terms are mainly applied to explain individuals' specific goals and needs during instruction. The U.S. Education Department (2010) explained personalised and adaptive learning that involves individual learners customising the learning program with a particular pace (individualisation), tailor-made instructional method (differentiation), and contents for personalised learning. This kind of notion commenced with the one-on-one tutoring method. However, whether individualisation is a personalised learning component or some other term applied instead of customised learning is not yet understood. This review paper tries to explain whether it is individualised instruction or a part used as a replacement to define personalised learning and some specific personalised learning product. Chou, Lai, Chao, Lan & Chen (2015) made use of these "terms" without making an effort to explain their relationship with each other. Bahçeci & Gürol (2016) developed a portal to present the contents of individualised learning modelled on a single learner's cognitive knowledge level. Bahçeci & Gürol (2016) opined that their education system should be implemented by comprehending the differences of individual students like their learning characteristics and styles (Çakıroğlu, 2014). These researchers noticed that Bahçeci & Gürol (2016) applied personalised learning and individualised learning interchangeably without actually justifying the need to do so.

Further, they used the finding of studies based on individualised learning to create individualised instruction known as an IEP (individualised education plan) for specific students having disabilities to meet their personal goals and needs. They provided individualised instructions and a distinct approach to improving their learning experience to help all learners (Barrio et al., 2017). The personalised learning system involves students' needs, motivation, readiness, and interests to evolve by placing the needs of the learner at the core of the learning procedure. Individualised learning meets all unique needs of the learners' (Cavanagh, 2014). Whereas a paradigm of learner-centred education has generated enough impact on acquiring personalised knowledge, the present teacher-student ratios in the school education system appear to meet the obstacles to deriving learning experiences to be personalised for every student without using the new technology (Lee et al., 2018), with the needs for IEP remain as an exception in several school districts. Therefore, they follow the U.S. Education Department definition of the school system of individualised learning that needs considerable technology support, like learning analytics and big data.

HISTORY AND LIMITATIONS

Personalised learning has been an area of research for a long time. It was only in 2008, personalised learning became more prominent and transformed its meaning (see figure). The mentoring and apprenticeship educational system and technology started to mature in the 20th century, and personalised learning transformed into an intelligent tutoring system. There has been a persistent change, bringing learning analytics and big data to convert personalised learning formats (Spector, 2015). Customised learning is a complicated approach that needs self-organisation (Chatti, 2010) improved methods of customised instruction and learning as per individual goals and needs. The improved system can enhance understanding, engagement, and motivation

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(Pontual Falcão et al., 2018), maximum learning efficiency, learner satisfaction, and learning (Gómez et al., 2014). However, though personalised learning is possible, it becomes a big challenge in the existing educational system. This review paper explains the growth of personalised learning with a well-developed concept in the prevailing technology.



Figure: Personalized learning systematic chart and literature review (Taylor, Yeung & Basset, 2021).

For any student to take advantage of the techniques used in adaptive learning, he must commence and start interacting with the system, try to improve and progress, successfully finish the assigned activities and sustain engagement. A learner working in such a space has to encounter behavioural features that affect his interaction with the academic contents and requirements. The internal factors associated with the learners, also impact learner behaviour in an adaptive learning process, which has been scrutinised by the motivational theory perspectives. The main features of engagement are self-regulation, motivation, self-determination, autonomy, and the overall positivity connected with his learning. The initiating engagement actions are driven by emotional factors (Taylor, Yeung & Basset, 2021). Self-determination is a unique theory that emphasises the instructional work to vitalise inner motivational resources for the student is a crucial stage to facilitate superior-quality engagement.

On the other hand, the utterly inclusive software of adaptive systems does not include interactions between students nor student-to-any-instructor interaction, where a student may feel isolated in the absence of compensating adjustments (Thomas et al., 2018). To start with, one must look at the unique requirement of every student along with their likings and interests. The system must create the adaptive model for custom learning programs, a personalised learning tool and a path for every student. Students get highly engaged when they practice regularly. The adaptive learning model should provide immediate and proper feedback and discard meaningless and complicated work for the students and instructors (Nisar Ahmad, 2021).

LEARNING PLATFORMS AND TOOLS

While all learners benefit from the personalised and adaptive learning model, underachievers have gained the most out of the supportive nature of the model and succeeded in education to meet their goals. This is possible due to the personalised learning plan offered by these programs. Learners realise having more control over their learning and authority over the tasks. This lead to confidence and less dishonesty in their learning process. The learners save time adapting to standard courses using online tools and platforms. The course provides an absolved understanding, while the course training increases the learning by formatting online courses, practical classes. New and exciting channels devised for learning provide and train to infuse marketable skills. Some effective online learning platforms may be identified as:

Udemy is a depository platform that provides more than 100,00 courses to study, teaching numerous skills that include subjects like Business; Arts; Fitness; Music; Life skills, IT, and so on.

SkillShare provides creative skills using various fields and provides business training by experts covering all the different creative areas like Films; Animation; Photography; Writing skills; Interior designs, and so on (Nisar Ahmad, 2021).

Master Class provides a personalised platform for learning, offering many creative skill courses. Students acquire better skills and a bright future as musicians, artists, teachers, writers, etc. The model contains twenty lessons for deep study and is provided with video lectures followed by discussions to help learn.

Coursera is a distinct online platform that provides various teaching degrees using real professors, like academic courses. Systematic registration method affiliated with top universities teaches courses of high demand, supplied with certificates. The multimedia classes are taught with video lectures and quizzes (Gebhardt, 2018).

Edx is a professional website that offers certificates after education, after providing lectures on different topics like arts, humanities, languages, etc. They take affiliation of famous universities and institutes to bring experienced tutors to offer professional development services.

Personalised Learning EdTechise digital content tools using personal devices to offer video experiments, lectures, and digital textbooks. Multiple instruments effectively provide all the required contents, like Moodle; learning; Haiku; Microsoft teams; Canvas; Microsoft, 365; Buzz; New Classrooms (Feldstein & Hill, 2016). The management system of learning incorporates

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several features of adaptive learning such as providing software (applications) for administering, documenting, tracking, reporting, documentation, delivering various training programs, academic courses, as well as Learning and Development modules. The system of Adaptive learning was applied previously to help students widen their argumentative procedure of writing performance (Andreas Kaplan, 2021).

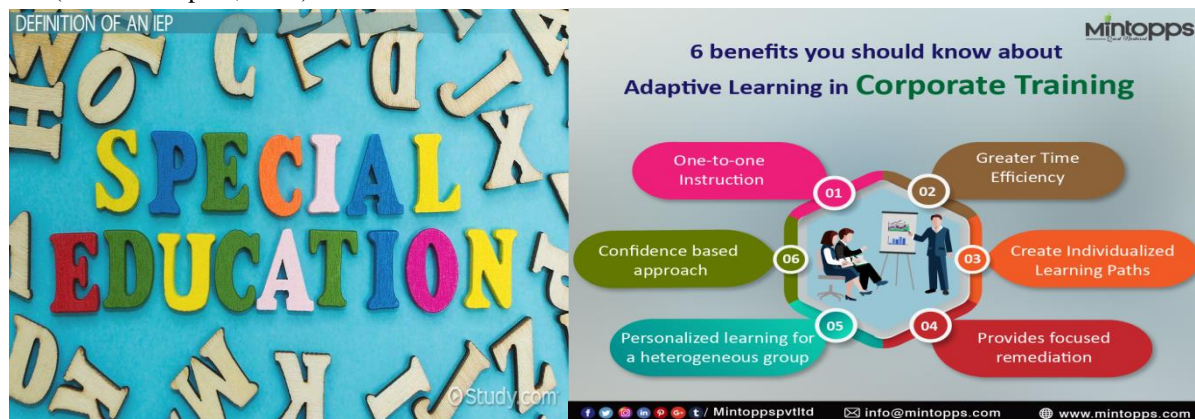


Figure: IEP is a special education plan (Feldstein & Hill, 2016).

TECHNOLOGY PLATFORM

Adaptive or Personalized learning method drives to bring changes in the education system processed by the instructor- focussed pedagogies to help and educate student-focussed pedagogies, called learner-focussed pedagogy, a learning theory to support learning methods of students, allowing them to make proper learning decisions (Miller & Geraci, 2016). Mavroudi, Giannakos & Krogstie, (2018) reviewed the structure of personalised learning to inform that students can learn more efficiently when individualised instructions are given, while a personalised new pedagogy recognises every student correctly. This brings pedagogy to scale, further requiring technological intervention. It identifies the needs of every student to provide a scaffolding process for learning within the adaptive learning platform. Scaffolding supports and guides learners until they accomplish the task to demonstrate competency and independence (Groff, 2017). Content chunking is a pedagogical procedure done online and it is supported by research in Cognitive information processing (CIP) stating to curtail cognitive load, improve the learning process by reducing information into manageable “chunks” (Cavanagh et al., 2020). Adaptive learning content is an online pedagogical method, where the student learns improves and they are encouraged metacognition to evaluate their learning method. Further, the adaptive system employs proper tools to permit students to scrutinise their progress regularly, directed by the metacognitive understanding as they work out the lessons. Adaptive learning technology supports learning by using the retrieval learning method, called the “testing method to learn” (Dziuban et al., 2018).

The assessment process directs the content delivery and the scaffolding to address the learner’s requirements followed by frequent real-time assessments to update and learn the data regularly, permitting constantly allowing individualised learning development path. Metacognition and retrieval learning are cognitive learning component theories. It is an online-based learning design that plays a pivotal role in developing PAL. Bae, Therriault & Redifer (2019) developed a design framework with a pedagogical method for adaptive learning as a platform to serve as an initial stage for institutions to adopt technology leading to PAL for the study of course delivery (Deborah et al., 2021).

CONCLUSION

It has been observed that there had been no unified understanding of the system components to be used in designing and planning personalised and adaptive learning settings. There is a need for further research to develop a suitable strategy and approach focusing solely on the various personalised adaptive learning system components while explaining the defined terms. At the same time, other studies should simultaneously focus on several different components for every personalised learning method. We need to respond to their words to evolve as we study human psychology and attempt to develop more innovative tools of technology. Chatti et al. (2010) and Peng et al. (2019) explained them all, together, while Peng et al. (2019) considered them as a personalised adaptive method of learning. Further academic pursuits can be developed to create a general and better framework using an identical approach.

Additionally, an in-depth study is needed to review existing systems of personalised adaptive learning platforms to understand if unique designs can function better for various needs and goals. It appears that the personalised models of learning can gain additional attention from policymakers and governments apart from researchers and educators for bettering online and digital education. Also, there is a need to focus on various obstacles discouraging the educators and identify factors that motivate the researchers and the experts in the field. This will inform us and voice apprehension and identify solutions to bring in a personalised robust learning model that satisfies and strengthens the instructors and learners’ expectations. Personalised learning does not provide a complete solution to the learning system until it is explained and appropriately nurtured, and developed more

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intensely and thoroughly. Otherwise, Personalized learning appears to be different for everyone and developed as per the goals and needs of every individual. Ennouamani, Mahani and Akharraz (2020) explained that other learners have additional knowledge, culture, conditions, learning styles, behaviour, personality (Pliakos et al., 2019) preferences, and the mobile device parameters that they use. Moreover, the mounting researchers' involvement and educators' interest in proposing a personalised learning approach can create better trust in various personalised learning models.

The need to approach personalised learning centres are based on four major concepts, Decision Making regarding Data-information, Integrated Digital data and Content, Student Reflection with Ownership, and Targeted Instructions (Implementing guide, 2017). After all, the purpose is to create compelling eLearning content with user-friendly, systematic and straightforward authoring tools. This helps uncover the learning object characteristics and how they are applied in an eLearning platform. Further, it helps to identify how the learners consume new content inside and outside of work and improve engagement. Here long term and constant usage will also allow us to identify how the adaptive learning platform and tools benefit the student's best learning in the workplace.

Adaptive and personalised learning provides an appropriate opportunity to encourage and support students' learning methods, especially online or digital education. Still, it presents numerous challenges that institutions and instructors must address to implement adaptive learning successfully. The primary stage identifies problems while implementing, what is the "right approach" of adaptive learning system needs to determine. Any add-on required tool with an existing course, in several management systems learning to solve the problems and drive to move to accept adaptive learning, or to select the completely independent adaptive learning platform? There is a compatibility question in the prevailing learning management system that must be answered to choose the correct method.

Moreover, the institution's administrators decide to implement the correct adaptive learning approach, where a successful outcome may not occur. Early engaging the faculty is recommended for an institution-wide engagement process can increase the possibility of a better successful work (Implementing Guide 2017). IR- Institutional repositories are customarily utilised to manage educational material and digital research collections. The LMS is used in blended as well e-learning. IR and the LMS should integrate to support and access disabled and dyslexic students, those having learning difficulties, for higher education. Tailor-made studies of disabled students can also help ease the process of listing, indexing and accessing items in the repository (Skourlas et al., 2016).

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