Chapter 9
AI-Enabled Smart Learning

9.1 What Is Smart Education?

Smart education is "a form of learning tailored to new generations of digital natives" (morningfuture.com 2018). In contrast to conventional classroom teaching methods, smart education is an interactive, collaborative, and visual paradigm that enables teachers to adjust to their student's talents, interests, and learning preferences while increasing student engagement (Glasco 2019).

Professor Byeong Guk Ku, a teacher in South Korea and pioneer of smart education, says that in the past, "what students could see, hear and feel was bounded by the walls of the classroom." According to Professor Ku, one of the most significant benefits of innovation in education is that new technology allows students to relate to the outside world. Professor Byeong Guk Ku created an interactive learning model with social networking and cloud-based capabilities (Glasco 2019).

Unfortunately, the uptake and efficacy of educational technology (Deloitte 2016) trailed behind other societal changes, such as consumers' quick uptake of digital products and services. The learning method is expanding due to students', instructors', and parents' "increasingly digital and tech-centric behaviors."

As one might anticipate, younger teachers, especially "digital natives," strongly believe in the educational benefits of using technology in the classroom. More than 80% of educators with 10 or fewer years of experience "think educational technology at school makes a 'huge' or 'very substantial positive influence' on students' learning," according to a Deloitte survey on digital education (Glasco 2019).

Many children need to relate to knowledge differently for it to be meaningful, according to Sean Arnold, a special educator, STEM coach, and teacher in New York City's District 75 special needs program (Arnold 2018). Arnold adds that teachers must use innovative presentation strategies "to engage students who learn best visually, aurally, kinesthetically, and tactilely."

M. Kurni et al., *A Beginner's Guide to Introduce Artificial Intelligence in Teaching and Learning*, https://doi.org/10.1007/978-3-031-32653-0_9

9.2 Smart Education vs. Traditional

Let us evaluate the two educational systems and decide which is best for you (MyEdu 2021).

- *Communication:* Other forms of effective communication cannot replace in-person interaction. However, utilizing technology can improve communication significantly. Thanks to the smart school administration system, it is simpler to update parents with important school news, such as PTM. The student, instructors, and parents were previously manually alerted of the school's modification.
- *Administrative Task:* Keeping records was a major hassle in the traditional educational system. It takes a lot of time and effort to manually handle the record, as requested by the employees. Such labor significantly decreased output. On the other hand, the school management system has completely replaced all manual record-keeping by automating processes. The administrative staff is relieved of the burden of monitoring numerous records and devoting additional time to record verification.
- *Affordability:* Because human record-keeping and data entry require much time and are more prone to error, they are more expensive. Instead, the automated software makes it easier to manage data quickly and accurately, which saves time and money.
- *Flexibility:* In a traditional educational system, students are under constant pressure to perform at a speed they might not feel comfortable with to stay up with other students. On the other hand, a smart educational system is characterized by the flexibility that allows students to learn at their rate and dispels teachers' concerns.
- *Learning Material:* The only way to learn the subjects in a traditional classroom is through books and printed materials. Students can explore learning resources in various forms in the modern educational system, including e-books, PDF papers, audio/video lectures, and many more.

The traditional education system provides a better social learning environment than the smart education system. Skills like leadership and teamwork can be successfully exhibited in the conventional classroom setting. Additionally, various extracurricular activities are available for students to engage in.

A smart education system, however, provides more benefits than a conventional one. Through the automated system, it offers streamlined operations with swift school management.

9.3 Why Should You Choose a Smart Education System?

Depending on the criteria employed, you can choose between a traditional education system and one that uses technology. Both educational institutions undoubtedly have benefits and drawbacks. However, given the numerous ways technology has

advanced, parents and students are prepared for digitalization in educational institutions.

A smart educational system increases operational effectiveness while allocating more time to high-quality education. The school management software includes valuable features, including updating exam results, managing schedules, and tracking attendance.

This functionality allows administrative staff and teachers to increase productivity and focus on their primary duties. For instance, when you allow your teachers to attend management automatically, you may spend more time providing the students with high-quality instruction.

Check out the main advantages (see Fig. 9.1) of the smart education system as well (MyEdu 2021):

- Effective communication between parents, instructors, students, and the administration of the school
- Enhancing interactions between students and teachers
- Enhances operational effectiveness
- Send updates, alerts, and notifications immediately
- Online fee administration (secured and safe)

A smart education system must be chosen because the next generation needs creative learning methods. The contemporary educational approach not only makes teaching a pleasurable experience but also encourages higher production.

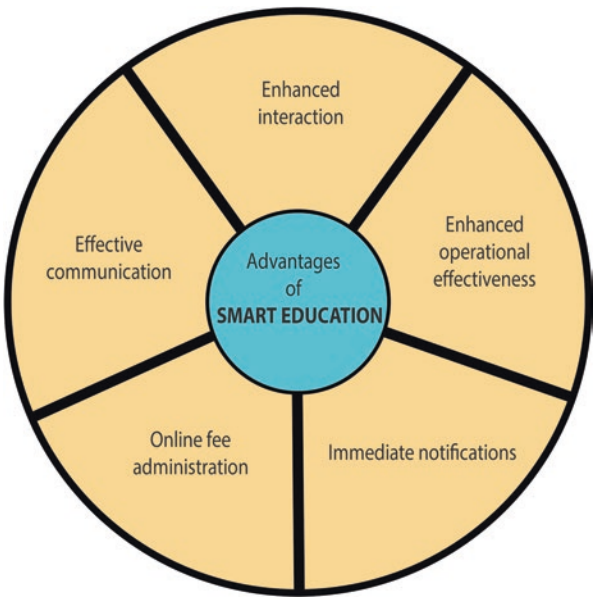

Fig. 9.1 Advantages of smart education

9.4 What Is Smart Learning?

The term "smart learning" refers to any method of education that improves upon traditional methods. This education helps students quickly and conveniently consume knowledge and information. Imagine spending hours on challenging, in-depth research only to comprehend one straightforward idea. Imagine, however, that you could understand the same notion with a brief video clip or a well-written essay; this would save you time and make it simpler for learners to understand the concept. Smart learning makes accessing online content easier and enhances the learning process. Learning can benefit significantly from technology tools. Teachers can transform lengthy paragraphs or words into images, graphs, flowcharts, and animated films to help students understand a concept better. Images, rather than words, have been shown to aid information retention. Children benefit from its help in long-term memory retention.

The following (see Fig. 9.2) are some advantages of smart learning (teachmint@wp 2021):

- This method of instruction is smart and efficient.
- These lessons guarantee that the students will remain motivated.
- For the students, it makes the teaching and learning process simpler.
- It is a cost-effective method of learning.
- Because so much paper is saved, it benefits the environment.

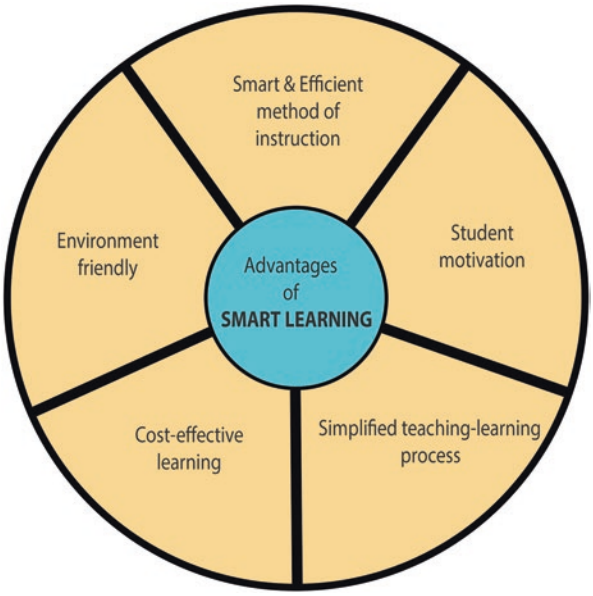

Fig. 9.2 Advantages of smart learning

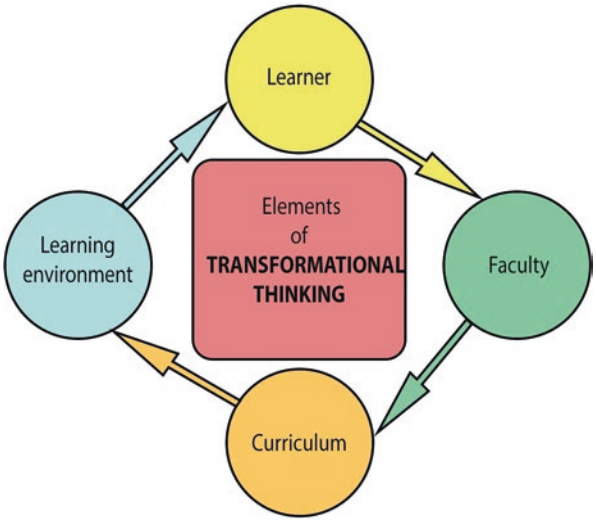

Fig. 9.3 Elements of transformational thinking

Many individuals still have trouble understanding the concept of smart learning, even though it represents a significant paradigm shift in contemporary education. It is best understood from the Three T's, or Total Transformational Thinking, point of view.

The learner, faculty, curriculum, and learning environment are the four components (see Fig. 9.3) that make up total transformational thinking (Awar 2022).

- *Learner:* The student transforms from a passive follower of the educational process to a proactive leader.
- *Faculty:* Instead of only teaching, faculty members increasingly emphasize mentoring and coaching, which calls for effective training to transfer information within a learner-centric framework.
- *Curriculum:* The curriculum has been updated to reflect how knowledge is delivered and presented.
- *Learning environment:* Finally, the learning environment is broadened to consider contemporary realities, such as the prevalence of mobility, which has created many chances for mobile learning.

9.5 Smart Learning: The Wave of Higher Education in the Future

The future of higher education can be secured most effectively through smart learning (Awar 2022). In the coming years, colleges and universities will keep using more nontraditional ways to bring in new students.

Exciting new technologies blur the lines between the physical, the digital, and the biological. For the education community worldwide, this new era is giving us the tools, techniques, and beginnings of an infrastructure we need to reach our ultimate goal of educating everyone. The dream goes beyond the typical classroom because it reaches out to people who want to learn but cannot because of their situation.

The mind is like a parachutist; it will not work without opening it. All of us who have the will and resources to help students successfully navigate the smart new world must collaborate to realize the full promise of smart learning.

The educational community, like the Wright brothers, who dared to take flight and transform the world, should extend its wings boldly and strategically to bring about a brighter future for all people.

9.6 Pillars of Smart Learning

Accessibility, flexibility, and affordability are the three pillars (see Fig. 9.4) on which a smart learning service or provider is built (Awar 2022).

1. *Accessibility:* Awar (2022) proposed the adoption of a lifelong learning model (4 C's Model) to classify learners as Casual, Committed, Concentrated, and Continuing Learning and to use context-specific learning strategies accordingly.
2. *Flexibility:* Regardless of gender, physical limitations, age, religion, or other categories, smart learning should be adaptable for everyone.
3. *Affordability:* In traditional education, affordability is a recurring problem because of institutions' ongoing struggles with space constraints, high tuition costs, and other factors. While many people lament the cost of education, the

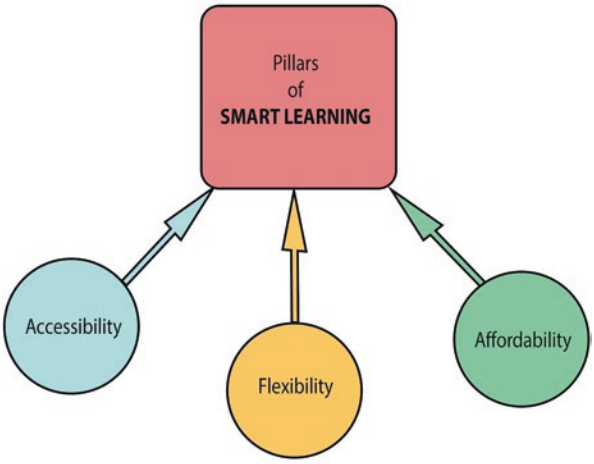

Fig. 9.4 Pillars of smart learning

truth is that ignorance is more expensive. Smart learning lowers transportation costs and classroom requirements, giving students the more financial freedom to complete their education and positively contribute to society.

9.7 The Challenges and Barriers to Smart Learning

Typically, society is reluctant to change. The scientific community, for instance, mocked the Wright Brothers for thinking that human-crewed air flight would revolutionize transportation. Today, it is impossible to envision a world without airplanes.

Smart learning encounters several obstacles because it is still in its early phases. The fundamental difficulty is that smart learning goes against traditional education's rigid structure. Instead of concentrating on managing to learn, institutions nowadays are more concerned with managing employees, buildings, and finances (Awar 2022).

Smart learning solves many issues that the public and the academic community should accept (Awar 2022). For this approach to work, we must adopt a new educational perspective and acknowledge that traditional schooling cannot keep up with the changing world. To make higher education more useful for today's learners, we must overhaul the entire system's operations.

9.8 AI Is the Next Step of Smart Learning

While there may be disagreements over AI and its relationship to smart learning, one thing is for sure: AI can improve it (Smyth 2019).

It Keeps Getting Better Let us start with machine learning, which is where it all began. As the name suggests, machine learning is how electronically programmed devices and software adapt their operations to each input.

Let us look at it this way. Three subjects (X, Y, and Z, specifically) are tested as part of an eLearning course (http://firstclasseducation.org/online-courses/a--definitive-guide.php), and two students participate in the first round of testing. One of the students excels in subjects X and Y while struggling in Z. The other one succeeds in tests Y and Z but fails exam X. Results are revealed.

As a result, the first student must pay closer attention to topic Z, and the second must put much effort into subject X. An eLearning course using AI can provide tailored advice, recommendations, or course assistance according to the subject(s) in which each student is poor. Moreover, that is not all, either. A smart learning course can meet several other needs with AI integration (Smyth 2019).

It Can Find Areas Where the Course Needs to Improve The ability of machine learning and AI to assist teachers in raising the caliber of a particular course is another fantastic benefit for the education sector (Smyth 2019).

How? Have you read about its capacity to use students' test results to provide them with more appropriate advice and suggestions? The findings advise professors to improve course quality or remind students of a missed topic.

For instance, if many students respond incorrectly to questions about a specific topic, the topic may be unclear. Alternatively, it might have even gone unnoticed. AI can be employed to alert instructors and course designers to the same.

It Can Provide Students and Educators with Helpful Feedback Feedback is crucial to every instructional program (Smyth 2019). If your teachers cease pointing out your weaknesses, you might never achieve success.

AI can ensure that this does not occur. A smart learning platform or AI-powered course would offer professors and students pertinent, helpful feedback on each student's performance. Teachers and students can use this feedback to improve their weak areas.

It Might Change the Experience of Online Education. Entirely! ELearning is already changing how education is delivered (Smyth 2019). The addition of AI to smart learning will therefore cause several new modifications in the educational system. AI is constantly growing and learning. As a result, employing an AI-driven learning platform will make it extremely intelligent, enabling it to improve its reactions to every user action.

An AI system can become skilled at serving that specific audience in this way (students and teachers for a particular course or subject here). Additionally, it may compile comparable information from each and every other user. This would undoubtedly improve the educational experience for both students and teachers and make it simpler for them.

AI Can Make Trial-and-Error Learning More Comfortable Anyone who attended a traditional school will be familiar with the humiliation of failing and feeling disrespected in front of peers or teachers. eLearning eliminates this suffering. Furthermore, it improves significantly when combined with AI.

Not getting it? Keep following along. Even while trial-and-error learning is beneficial, school students are typically reluctant to make errors that could be seen as embarrassing. Students will find it less intimidating with an online course.

After that, AI will continue to use inputs to improve its recommendations to students about their trials and how they should construct them. The idea is to allow children to attempt new things without worrying about failure or criticism.

Reason? An AI environment is ideal for learning through trial and error. AI itself learns through successes and failures.

It Can Help Ease the Transition Between High School and College Transition is one of the main issues that several students occasionally encounter (Smyth 2019).

You learn in a grade and discover that everything is pretty simple there. The next one after that draws you into a headache.

Many of us have, at some point, encountered this particular issue. This can be prevented by taking a decent AI-driven smart learning course. The AI system can let students know what subjects will be covered in the following grade, easing the transition. They will be better briefed, as a result, making it simpler to advance to the subsequent learning stage.

AI Can Help Create Smart Learning Content After discussing how AI and machine learning works together, it is clear that everything is data-driven—data provided by users (in this case, students).

In addition to providing feedback and a variety of other services, this data is used by AI-driven educational platforms to assist in producing content that will pique students' interests and meet their educational goals.

All of this is also simple to complete. All you have to do is prepare your eLearning course and inform an LMS consultancy of your requirements. Once they have provided you with an LMS quote, you can finalize the sale if satisfied.

Your eLearning course will be simple to prepare with its assistance. You can integrate AI with the aid of proper consulting.

9.9 Applying Artificial Intelligence to Smart Learning

Responding to each learner's particular needs and learning path was, until recently, a nearly impossible task (Hopp 2018). Technology based on artificial intelligence (AI) has altered that. Artificial intelligence software and smart learning systems are used to predict what would pique each person's attention and keep them engaged. Intelligent software examines how people respond to learning, how quickly they pick things up, and how well they assimilate new ideas. Based on that analysis, algorithms will adjust learning delivery to each person's preferences, substituting engaging active learning experiences for passively consuming learning modules.

This strategy frequently referred to as "the user-centric approach," is especially effective for teaching foreign languages (Hopp 2018). Based on their mother tongue and prior language acquisition experiences, people acquire languages in diverse ways and at varying rates for hearing, reading, speaking, and writing. Language acquisition requirements usually supplement a learner's basic skill sets. A learner may need to scrounge up much extra time and drive to study a language in addition to regular work.

To address this, intelligent learning technologies use AI-driven algorithms to match each learner with the most fascinating and pertinent information, such as industry-specific knowledge, enabling them to use newly acquired language skills on the job right away (Hopp 2018). As a result, productivity and learner happiness should all see measurable benefits. If not, learning experts can use analytics to track

how the learner interacts with the system to create future programs that are more successful.

Design thinking principles considerably maximize cloud-based learning delivery for skill development (Hopp 2018). Individual learning experiences that accomplish the intended results and fulfill academic goals will be driven by the user-centric design thinking approach, which starts with profound empathy with each learner, their requirements, and their pain spots.

9.10 AI-Enabled Smart Learning Examples

Artificial intelligence (AI), the theory and practice of creating computer systems that can carry out tasks that traditionally require human intelligence, is relevant in this situation; for example, see the list below (Bose and Khan 2020):

- *Classcraft:* Classcraft, a teacher-friendly gamification tool introduced in 2015, is currently being utilized in over 50,000 classrooms across 75 countries and 11 languages. The Quebec- and New York City-based education technology startup addresses student motivation using gaming ideas. It uses gaming principles to promote social-emotional growth and individualized learning, allowing teachers to modify curricula and teaching methods to suit the needs of individual students. This ground-breaking teaching strategy is adaptable, can be applied to any subject, and has been highly effective at raising student motivation, raising engagement, and fostering secure team building to create a positive classroom community.
- *Alta:* Knewton, an adaptive learning firm headquartered in New York, created Alta, a software application based on a personalized learning engine for students pursuing higher education. Knewton released Alta in January 2018 following 10 years of working with publishers. It is supported with high-quality internal content that industry veterans have carefully selected. Universities and institutes can use the software as a comprehensive tool for all of their students, and students can access it as a standalone package. The product includes lessons in statistics, economics, chemistry, and math. Textual, graphical, and visual information are all included in courses. Students can purchase the software in a standalone edition. Every student can now use the mobile software of Alta. The most remarkable aspect of Alta is that students are not only left to fend for themselves with the program; there is 24-h online chat help for student questions.
- *Squirrel AI Learning:* After Derek Li Haoyang left his position as CEO of his previous education company, which had an IPO, he created Squirrel AI in 2014. With approximately 2000 classrooms around China, Squirrel AI is a Shanghai-based after-school tutoring company. Students study their lessons in a classroom under the guidance of a subject-area teacher while using a laptop computer with the company's software installed.

- The primary goals of Squirrel AI were to address the issues with the educational system, including the lack of individualized attention in classrooms and the unfair distribution of educational possibilities. The inflexible, ineffective educational system has reduced students' interest in studying, which inspired Derek Li to create China's most comprehensive AI-powered education product. The extent and reach of Squirrel AI are excellent. However, the idea behind systems like Squirrel AI and others that support adaptive learning will not soon render teachers redundant. Instead of teaching the "nuts and bolts" of each subject, Squirrel AI is intended to support and supplement teachers' work (Building Personalized Education With AI Adaptive Learning—AI Business, 2019).

9.11 Conclusion

Implementing AI in education places a premium on improving upon established instructional approaches and creatively using readily available digital tools for education. AI-enabled smart learning is the next natural phase in integrating technology into classrooms and educational establishments.

However, it is not as simple as picking out a piece of equipment; technology is (whether we like it or not) an integral element of any sector, and children would be well to start learning about it as early as possible due to the rapid pace at which it evolves. Even more importantly, a tried-and-true strategy must be implemented to help students grow and improve their abilities gradually, naturally, and efficiently. Therefore, we keep in mind that the purpose of technological and pedagogical advancements is not to replace the established methods of learning and education but rather to offer a comprehensive spectrum of additional tools to help smart learning and education realize its full potential.

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