



SYSTEMIC THINKING APPROACH IN OPEN SCHOOLING: AN ANALYTICAL STUDY OF THE NATIONAL INSTITUTE OF OPEN SCHOOLING

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Abstract: *The systemic approach is a way of thinking popularly called Systemic Thinking. It is an interdisciplinary way of looking at problems to solve them. The systemic thinking approach attempts to understand parts of the whole system's behaviour. Thus, looking at the problem from a holistic perspective. The specific issues are looked at in relation to the whole to resolve them. To elucidate it, this paper begins with a metaphor of the digestive system and how it works about the whole. This is followed by types and elements of a system and how the understanding of systems contributes to a systemic thinking approach. In the second part of this paper, open schooling has been dealt with from the systemic perspective. The way the organisational structures are interdependent to pursue a common purpose makes Open Schooling a System. The systemic approach defines the human role in this system. The paper concludes by discussing the challenges of open schooling from systemic perspectives.*

Keywords: *Open Schooling, Systemic Thinking, Holistic Approach, Education System, Interdependence, Integration.*

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Introduction

The second half of the 20th century witnessed a transformation from the machine age to the knowledge age. This transformation has shaped how we look at ourselves, the environment we live in and how we view the world. This worldview has many dimensions, including social, cultural, economic and scientific. These dimensions interact and mutually influence each other to create a new landscape, and that's our reality. However, when we continue to look at the world from an old view, the complexity of the problem increases. What is challenging for us is to look at the problems from a new mindset that requires new thinking. Often, researchers call this a system approach of thinking.

The industrial era mindset was rooted in classical science, often referred to as Newtonian science, that emerged three hundred years ago. Its technological bent manifested machine technology. The mindset of the post-industrial has been influenced by the cybernetics system. Its manifestation resulted in high technology that has improved our cognitive process to 'manage complexity'. The technology of the machine age was only able to manage productivity in the class system. This has a reductionist orientation that was not able to grasp parts. But today, the problems are more

complex and dynamic, characterized by interaction with changing environments. Whether it is a problem of population, climate, global warming, or nuclear power, changing educational demands require an understanding of wholeness and interaction with their environment. This calls for setting new goals, new perspectives and new functions. This calls for changing the systems.

We study education in various fragmented disciplines such as the sociology of education, psychology of the classroom, economics of education, education administration, policy and governance. Such compartmental inquiry results in incomplete and unintegrated knowledge of education as a system. Hence, the need of the hour is to have wholeness or systemic thinking to develop a system view of the world that would not only resolve the problems but dissolve them in ways that make one question whether they ever existed.

Systems Concept

To understand the concept of a system, let us consider the human body as a metaphor. What is the function of the human body? What are its different parts? What constitutes our digestive system? What happens if a component fails to function? The Human Body is a system called a biological organism. Life is the property of this organism as a whole. The whole body is divided



into different parts called organs. Other organs join together to form sub-systems, such as the digestive, circulatory, respiratory, endocrine, nervous, etc. Each of these systems contributes collectively by *interacting* with each other. For example, functions of the digestive and circulatory systems are related; the food is absorbed in the blood and transported to all body parts by the circulatory system. The circulatory system depends on the digestive system to absorb nutrients in the body. Thus, there is *interdependence* among different sub-systems. Sometimes, several organs fail to function at a time. In such a case, improving the function of one organ alone will not carry the vital function of *life*. Moreover, none of the body parts has life independently. Concludingly, the human system has the property of that of the whole, and none of the parts has life function independently. All the parts function together for a common goal, life. This is *integration* in the body system.

Some essential points of the above discussion are-

- A system is a whole
- The property of this whole is more than its parts.
- The system has sub-parts. They cannot exist independently.
- There is interaction and interdependence in and integration of subparts.

The above discussion gives a general impression of a system. The metaphor of the 'human body' is employed to understand the concept of a system. Several metaphors, machine, classroom, ecology, family etc., may be taken to capture the essence of the system. The significance of these metaphors lies in stimulating the imagination and opening new pathways to understanding complex concepts. Whereas, the power of concise and analytical definition may be confined to capturing an aspect but not the whole of it. This does not mean that analytical definitions do not function in our understanding. Instead, it is emphasised that these definitions are better explained and understood through metaphors and their imagination (Guilherme & Freitas, 2016). The real tension in the scenario is in the choice of metaphor, and no metaphor can ever wholly encapsulate the essence of the actual phenomena or experience. Therefore, metaphors help broaden the understanding but our limit of understanding may restrict the choice of metaphors. With this fundamental tension, seeking a definitive metaphor for a concept may be pointless, as the idea of using metaphor is to promote reflection and expansion of our understanding of the concept and not to fix our explanation within a particular context. Such an attempt may hide some old and new facets which might be significant for us. This argument is followed by precise system definitions extracted from the literature. The term system can be defined in several ways.

The system, from the Greek word *Systema*, refers to 'organised whole, a whole compounded of parts. Semprevivo (1982, p.1) defines a system as "a series of interrelated elements that perform some activity, function, or operation". In other words, a system is a set of elements bonded together by functional relationships. These elements, called components or subsystems, are integrated so that any change in the functioning of one may directly or indirectly affect the effectiveness of others. The defined relationships make them interrelated, interdependent, and overlapping.

Another characteristic is that a system has goals. These goals are contingent and negotiated in a dynamic environment. Humans adopt multiple ways to achieve these goals. For example, you have to travel from Delhi to Lucknow. Not every time you will take the same train. Considering the weather, traffic, road congestion, law and order, emergency, finance, need, and safety, you may choose to travel by flight, cab, or drive on your own.

There are different types of systems:

Open System: A system that continuously works with the surrounding environment. For example, a school changes its curriculum and infrastructure with changes in governmental rules, policies, students' contextual needs, and developmental goals.

Closed System: A system independent of the surrounding environment. E.g. An educational institution where the head office instructs different teachers on what to do but needs feedback about their grievances.

Subsystem: A system within a system placed in a defined relationship with another. E.g. A bus service from an airport that connects from terminal to terminal is part of a more extensive system.

Based on the above explanation a system has been represented below in Figure 1.

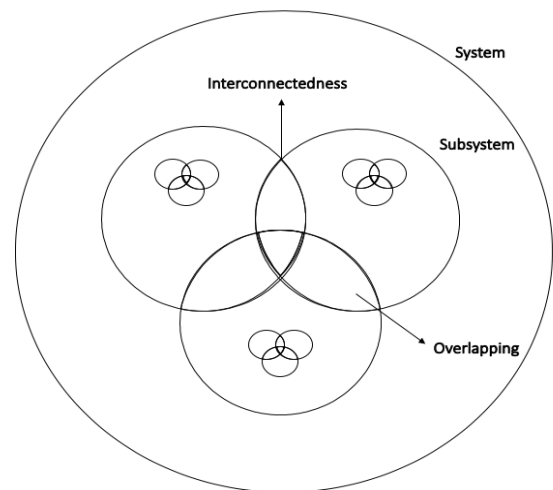


Figure 1: System and overlapping Subsystems

Elements of a System

The system concept is widely studied in management and was initially drawn from engineering (Optner,1965). Then, a very pragmatic definition of the system was given by Schoderbek, Kefalas, & Schoderbek (1975, p.30) as "a set of objects together with relationships between objects and their attributes connected or related to each other and their environment in such a way as to form an entity or a whole". Based on this definition, Figure 2 presents a diagrammatic representation of a system and its essential elements: input, processes, output, feedback and environment. Let us examine these elements one by one-

Input: Resources such as energy, human, material, information, etc., are inputs for a system.

Process: Process includes all the activities that transform inputs into desired outputs. They may be through the machine, thoughts, chemical actions, computer technology or a combination of all the above.

Outputs: Outputs are the result of processes. They may be intended outcomes (as a new invention) or unavoidable outputs (as wastages). Efficient system designers put in the best possible effort to maximise the planned output and minimise the rest.

Relationship: Relationships are the connector link among parts. They may be the patterns, behaviours, functions, coordination, or hierarchical actions. A synergistic relationship is defined as a combined effort in which subsystems, when joined together, produce a greater output than the sum of the production taken independently, i.e. $1+1>2$.

Feedback: Feedback is a form of input representing an error between the system goal and the actual output. To minimise this error, negative feedback is reintroduced, carrying a message to reverse or modify the action that caused the error. Positive feedback, on the other hand, is a reinforcer that enhances the system's activity. However, positive feedback should be given only a few times. This is because it makes one's behaviour mechanical, and the effect of reward reduces.

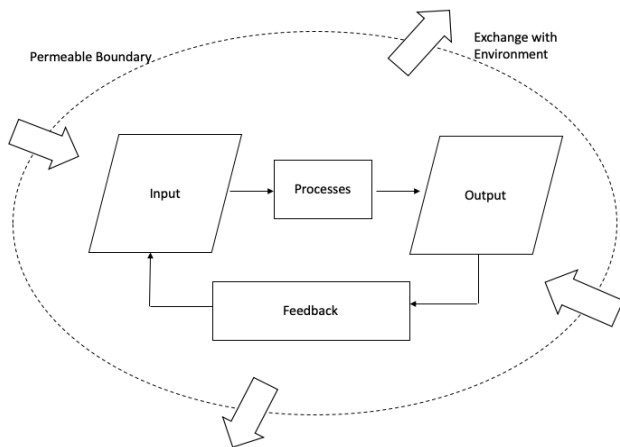


Figure 2: The System and its Elements

Note: This figure shows a system and its elements. The broken curve line demarcates the system from its environment. The line is porous to let the stuff pass through it. [Adapted From] "On System Thinking and the Systems Approach" by A. G. S. Kefalas, 2011, World Futures: The Journal of Global Education, 67(4), p.348. Copyright by Taylor & Francis Group: LLC

System Boundary: A boundary is a line of demarcation between the system and its environment. Noticeably, the nature of this boundary is arbitrary; it is determined by the observer and porous so that information may pass through it.

Environment: Figure 2 represents that a system operates within an environment. When one says environment, one forms images of birds, green trees, blue skies, houses, lakes, rivers etc. However, a system environment must be distinct from the vernacular use of these terms. The atmosphere in the system encompasses two conditions: (i) Any event or factor relevant to the system; (ii) any aspect beyond the system's control needs to be controlled for the smooth running of the system.

Entropy: The system tends to run down, deteriorate and move down towards disorganisation if left on the old system. Hence, it seeks balance. The energy and resources must keep coming to the system to help maintain its equilibrium or homeostasis. The human role becomes indispensable in preventing it from running down.

The above is a system's building block that must be clearly understood. To get accustomed to this term, consider a pizza-making firm. The inputs for such a firm are flour, vegetables, cheese, an oven, a refrigerator, sauce, and pizza boxes. The process involves preparing the dough, cutting vegetables, making sauces, microwaving, answering phones, delegating cooking tasks, accounting and getting delivery bags. The outputs are obviously in the form of prepared pizza, delivery to customers in a way that satisfies them, profits, employees, salaries etc. The company also bears the responsibility of putting the waste material in dumpsters. The company collects customer feedback about taste and quality and brings more innovation in varieties of pizza according to customer demand. Changing firm policy, prices, and ingredients according to trends is what the manager expects; it will enable the pizza firm to survive in the market for a long time.

Systemic Approach

The concept of the System gave way to the Systemic Approach; in popular parlance, systemic thinking approach was proposed by biologist Ludwig von Bertalanffy in 1968 in his book *General System Theory* (p.31).

The systemic Approach is a way of thinking that shapes one's thought process to look at a phenomenon in totality, however complex it may be, with clarity. It is a combination of analytical and synthetic thinking. There are three main characteristics of a systemic thinking approach.

(i) **Holism:** It is a gestalt approach to look at an event as a whole, with interaction among all the interrelated and interdependent parts. It must not be mistaken for fragmenting elements and studying each in isolation.

(ii) **Interdisciplinary:** It is an interdisciplinary concept that draws its viewpoint from various disciplines to depart from conventional thinking and isolation towards a more integrated view.

(iii) **Goal Seeking:** The fundamental relationship among parts or attributes of a system is in parity with some goal attainment. Therefore, there exists a purpose or goal or an equilibrium position that the whole system seeks to achieve.

Application of Systemic Thinking Approach to Open Schooling

Open schooling refers to an educational system that offers a wide range of courses, and students choose among them. The students accomplish these courses self-paced. Competencies rather than qualifications determine entry to open schooling, as the conventional education system demands. In brief, the promotion of 'freedom to learn' is the ethos of open schooling. In India, open schooling emerged from the concern of providing a minimum level of *education to all*. The importance of school instructions in improving the quality of life in terms of health practices, economic activity, and skill development is indispensable.

The impetus to open schools has four distinct features in our country:

- Providing education to the disadvantaged population in locations where conventional education is not being facilitated;
- Providing students freedom of choice;
- Continuing education for drop-outs so they do not end in illiteracy and

- Educating students who work for social and economic reasons, are over-age, and need more opportunities to attend conventional schools.

These objectives focus on marginalised people and complement education in developing countries like India, where school opportunities are fewer. Open schools have a significant role to play in education for all. It has operated in India through the National Institute of Open Schooling (NIOS) since its inception in 1989. The Open Schooling is recognized as complementary to the education system. This entails available schooling as a part of a more extensive system. It implies that the system is a *relative* concept.

Open schooling as a system has subsystems; they interact with each other. Any changes in one will bring changes in the other. System approach to this system means a holistic perspective of defining the function of schooling, analysing the functioning of subsystems, and responding to and receiving expectancies from the environment.

As a system, the National Open School has evolved over some time. Its inception occurred in 1979; the institution operated as an ‘open school’ under the Central Board of Secondary Education. The courses as Bridge, Secondary, and Senior Secondary were offered. The remarkable feature was time

flexibility. Self-instruction materials were designed, developed and refined. The goal was to reach the students where conventional schools were unreachable. Soon, the evolving system felt the need to carry on its administration. Its functions were redefined in 1992 when the organisation was established as an autonomous body by the government of India. It developed its mechanism for examination and the Board of Examination. In 1993, NOS became a national institution named as National Institution of Open Learning. The NIOS envisioned its goal as *education for all* through open learning. The key idea in this description is that the organisation as a system evolves, defining and redefining its purpose by being sensitive to environmental needs. The systemic thinking approach is about identifying the human role in the functioning of a system. The sensitivity to ecological demands, thereby bringing equilibrium to any system, is a crucial role of humans in the existence of a system.

Figure 3 presents the organisational structure of NIOS. The chart portrays system, and subsystem relationships and defines authority, design, and proper flow of communication. The structure comprises the higher authority as the General Body. The finance committee and Academic Council are part of the Executive Board. The chairman coordinates the functions of various departments such as academics, vocational education, administration, student service and computer unit.

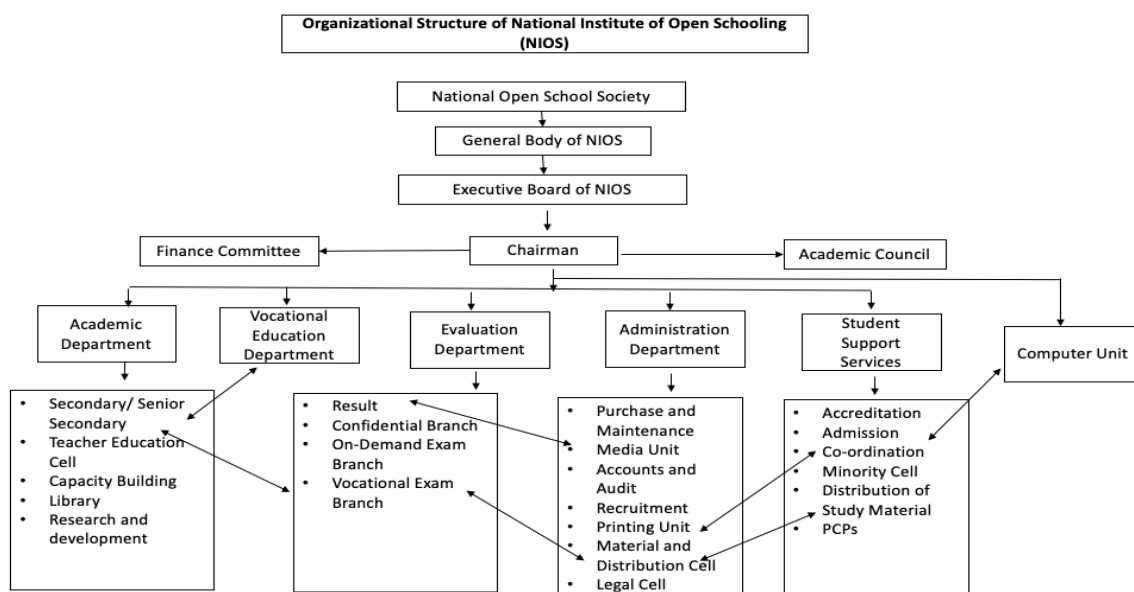


Figure 3: Organizational Structure of NIOS

Adapted from: <https://www.nios.ac.in/departmentsunits/administration/organisational-setup-of-nios.aspx>

Each of these departments has well-defined functions, summarised in lower cells. All these departments are subsystems of higher systems, NIOS. Each of these sub-systems is a system in itself. They all have sub-goals, coordinated for bigger goals of ‘education for all’. None of these subsystems can function in

isolation. The pattern of interaction among them defines the relationship. This can be well explained through an example. The design and development of programmes for open schools is a significant task. Figure 4 shows the arduous process of designing and developing a programme of self-study material for learners.

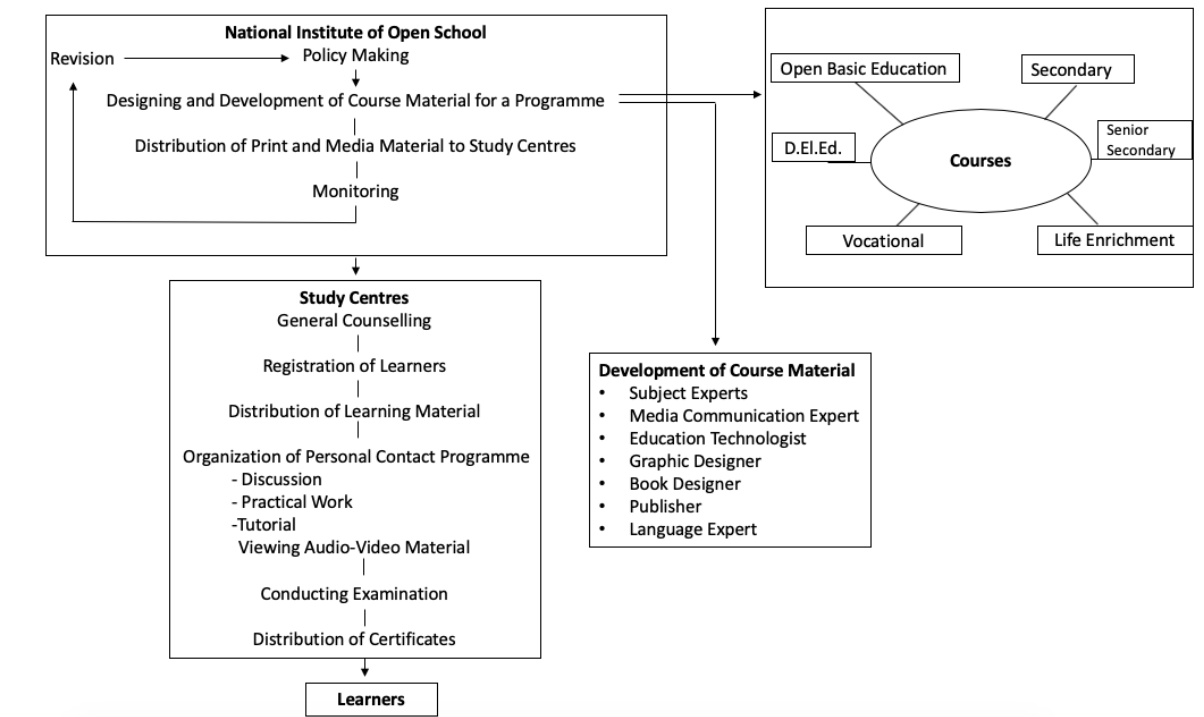


Figure 4: Functional System at NIOS

The NIOS uses a team approach to develop programmes. An expert group, in the beginning, prepares policy direction. Then, the subject experts are chosen to write the curriculum material. These experts are drawn from national and regional institutions: NCERT, Teacher Education Institutions, universities, and conventional schools. This team is supported by professionals from different sub-departments of NIOS, including Education Technology Experts, Graphic Designers, Book Designers, publishers, and language experts. The key features of these materials are the content present in small sections followed by in-text questions for self-check and terminal exercises. The course materials are in modules; each module is reviewed by the chair team and revised over the years for improvement. Electronic media and audio-video tapes are also used, though marginally. The study-centres of NIOS play a significant role in distributing material, enrolment of students, interacting with students through the Personal Contact Programme (PCP), holding examinations, and distributing certificates. These functions feature the interdependence of subsystems. The arrows in Figure 4 show the pattern of relationships among departments. The General Body of the NIOS system keeps itself open for feedback to continuously improve the organisation's functioning. Response to feedback is crucial for homeostasis in the organisation.

Challenges to Open Schooling: A Systemic Perspective

The open schooling system is part of a more extensive education system. Therefore, its goal must contribute to the purposes of the more extensive system. In other words, the subsystem within the more extensive system must work for the common goal of quality education.

From a systemic thinking approach to open schooling, a few questions can be thought of:

- What do we want our students to learn?
- How can instructional processes be effective?

- What is the purpose of the examination?
- What is the role of educational institutions?

The success of our students in life and jobs will depend on their *ability to learn*. The institutional purpose of higher learning is to enable students to learn, *how to understand* and *motivate* them to do so. Therefore, open schooling requires careful shaping—the methodologies of instructions to include situational learning, experiential learning and problem-based approaches. Teaching is a marvellous way of self-learning (Acoff, 2015). Every student must teach. Hence, peer tutoring must be encouraged in our open schooling so students can learn effectively.

Today's advanced economy is in dire need of people who can build their capacity to learn continuously. This ability to learn will assist individuals in surviving the competition. However, the curriculum offered in our education system is based on a standard design model. The one-size-fits-all academics ignore entirely the fundamental need of learners to learn independently. For example, the use of the Internet in education has been limited to the delivery of courses. Its ability to adapt to the needs of a learner, unique to them, has yet to be addressed.

Moreover, the internet was introduced in distance/open schooling with the idea that instructors are not required; learners can learn by interacting with learning material. Although essential in certain instances, this form of learning loses its value in a complete educational experience. We are ignoring the potential of open schooling to allow students to learn together anywhere at any time. The need for independence of each learner requires a modification in designing courses. Observance of this gap creates a need to introduce an open education system, a design that responds to each learner's need. The emergence of new technologies offers software that uses artificial intelligence that can adapt itself to the learner's needs.

In response to the third question, the purpose of the examination is assumed to certify an individual's knowledge, skill and understanding. The post-industrial economy rewards those who can think independently more than those who conform to the predetermined industrial mould (Farhad, 2012). Still, universities ask for preparing model answers for assessing students. This way, we kill their 'ability to think'. If examination exists, then it should be for "unexpected answers." Creativity is about surprise, deviations from expectancies.'

The answer to the fourth question is rooted in a surprising assumption of the people; the world has organised the way the university is. The nature of worldly problems is physical, chemical, economic, sociological, religious and so on. So, the universities in the past were organised around these problems. In this way, these disciplines represent reality. Thereby, separate departments were created for these disciplines. Teachers, educators, and researchers from these departments hardly meet each other. Research is carried out in isolation. Contrary, adequate research is not disciplinary, interdisciplinary or multidisciplinary, but it is transdisciplinary. This holistic view attempts to erase the disciplinary boundaries, the boundary between science and humanities. Suppose science is seen as searching for similarities among things that are different, and humanities as searching for differences among things that look similar. In that case, science and humanities are just the head and the tail of reality - they are inseparable. Hence, they can be studied integrally under the system *Scianities* (Acoff, 2018). Worldly problems can not only be solved but can be dissolved if we bring change in our way of carrying academic and research work, in educational institutions, from fragmentation towards integration.

Conclusion

The present paper has been written to clarify the idea of a systemic approach to Open Schools and how they contribute to the aims of education. In a nutshell, the systemic approach is about viewing a system as a whole instead of limiting oneself to its parts. To elaborate, today, people emphasise becoming specialists. 'Knowing more and more about a small thing' is expected from a specialist. This is correct while performing tasks like cardiac surgery or flying a plane. However, 'knowing little about many

things' is powerful, too, as it helps to see connections among many things. Systemic thinking is finding these connections, interactions, patterns, and relations. It involves analysis but does not end at it. Synthesis becomes essential. This integration approach is paramount to understanding that the future of Open schooling will be brighter for those who can understand these interrelated functions thereby, integrating the resources available to achieve the aim of quality education.

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