Managing the Systems Approach to Develop Efficient and Effective Virtual Learning Environments

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ABSTRACT

This research paper aims to discuss two different yet interrelated concepts: the Systems Approach (SA) and the Virtual Learning Environment (VLE). This paper reflects on the importance of managing a Virtual Learning Environment based on a new alternative modern System Approach in which technology is integrated within its components. It attempts to explain the impeded functions pertinent to managing the systematic application of the Systems Approach and Virtual Learning Environment in real-world situations that may lead to an efficient Virtual Instructional Environment (VIE). This scientific endeavor has confirmed the issues projected in the purpose of the study.

Keywords: systems approach, virtual learning environment, systems, instructional system design, management

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Introduction

An educational system involves a dynamic environment that requires a series of interactive relationships among several subsystems, such as institution, management, instruction, curriculum, and Evaluation. All of the subsystems are under one umbrella, namely the supra-system, the learning environment. The learning process assists learners in acquiring a new behavior or knowledge. It occurs when a new experience is obtained. Sometimes, learning happens when pre-knowledge is used to build up new knowledge. It even happens when information is transferred and replaced by new facts. Nowadays, there are two methods of learning: physically and virtually. Virtual learning processes, as Veronica Racheva (2017) defined, are "Distance learning conducted in a virtual learning environment with electronic study content designed for self-paced (asynchronous) or live web-conferencing (synchronous) online teaching and tutoring." Nevertheless, the physical learning process is the learning method requiring students' physical attendance. However, the main difference between the two methods is the physical contact in the learning settings and many other differences that will be mentioned later in this paper.

Whether the learning is achieved virtually or physically, the Instructional Design (ID) process consists of four main components: input, process, output, and assessment. Input is the main structure for objectives based on the content. The process is the approach used to deliver the content and describes what learners should do, why, and how. The learning process can be achieved in both the surface approach of learning, which is related to comprehending the information, and the deep approach of learning, which is related to using new information to create new knowledge. Outputs reflect the outcomes of the teaching-learning process. Assessments must be applied to ensure content is delivered based on the designed objective. Assessments also measure to what extent learners comprehend knowledge. The input, process, outputs, and assessments are four sequenced phases in the instructional design that require a clearly organized system to analyze the efficiency of the application.

Any system contains a few elements that function together. These elements are linked with each other directly and indirectly. The interrelated relationship between the elements may be affected positively or negatively by any change in the regulation of the interaction between these elements. In other words, the components of any system contribute to the overall presentation of the process that must be interrelated. However, the Systems Approach (SA) in education is an organized procedure that develops knowledge comprehension.

Purposes of the paper

This research paper highlights the significance of utilizing Systems Approach (SA) models that enhance inter-relationship regulations between subsystems to ensure an adequate and sufficient learning environment in educational organizations. The paper presents how managing Instructional Design can provide a sophisticated Virtual Learning Environment (VLE) under and within the Systems Approach framework.

Significance

The significance of this paper is embedded in projecting both know-how and know the theoretical and practical aspects of the core concept discussed in this paper.

1.0 Education Management and the Systems Approach

Salam (2015) defined the Systems Approach (SA) as "to do something systematically. In the educational industry, to teach systematically, teachers must consider input, process, and output and decide objectives, contents, methods, and assessment "(p. 1). On the other hand, Siddiqui (2013) defined the Systems Approach (SA) as "a rational, problem-solving method of analyzing the educational process and making it more effective" (p. 1). Thus, the Systems Approach (SA) is a systematic procedure to improve any working system. However, in education, it is a technique that requires managing regular interrelation among several subsystems to enhance the system's components. The improvement in the process reflects on individuals' performance. Furthermore, the

educational Systems Approach (SA) has a technical sequenced plan consisting of a few elements that work together to solve learning problems. It is systematically inspecting education-relevant policies that utilize benchmarking methodologies.

The measurement methodologies must be based on pedagogies and practices. Jacknicke and Samiroden (1991) argued that studying and practicing educational theories is the best way to gain efficient learning methodologies. Brethower (1993a, 1993b) mentioned the incompetence trap. Incompetence traps consist of three main factors. The first factor is enhancing global competition and the call for quality education for individuals. The second factor is the need for competition that requires intensive work processes and equipment. The third factor is the requirement for computer skills literacy. If educational institutions are working toward improving their learning systems, they have to organize and combine all the Instructional Design (ID) components under the Systems Approach to achieve efficient results.

There is a conceptual relevance between the Systems Approach (SA) and education management. (2017) wrote an article about management and Systems Approaches. He stated that - Ludwig Von Bertalanf, Lawrence J. Henderson, W.G. Scott, Daniel Katz, Robert L. Kahn, W. Buckley, and J.D. Thompson- were the main contributors to the new school, namely "The Systems Approach" in management. They think that any system encloses several elements that interact and are interdependent in subsystems: input, process, output, and feedback. Every subsystem consists of several components. Each subsystem is a system in its structure. However, it cannot function independently, meaning it must be integrated into other subsystems to form the overall system.

On the other hand, Treseder (2017) mentioned in his article that Horace Mann, the creator of the modern public education system in the USA, pointed out that the economic system needs skillful, educated people. Horace Mann explained how a well-managed educational system may have changed the economy in the US in the 19th century. The systems approach and education management are related because both need organized procedures to create skillful individuals. These educated individuals should contribute to enhancing societies financially and socially. The organized

procedures are designed via planning professional instructional design systems. Therefore, to professionally manage a practical educational system, an approach should illustrate learning processes and procedures.

Since the Systems Approach needs a managerial process, it needs a few organized, straightforward steps. The first step, Systems Analysis, is to analyze each element in the system, namely, input, process, output, and environment. The second step, Systems Design, explains the objectives, methods, and the learning environment. The third step, Systems Operation, and Evaluation, evaluates designed objectives and makes adjustment decisions. This step will rectify weaknesses to ensure the objectives are accomplished. The fourth step, Systems monitoring, is the last, and through it, implementation occurs. Garvin (1998) argued that higher educational institutions are undertaking the essential reconstruction of their educational systems by using quality management measurements to improve the effectiveness of these systems.

In response to this need, various Systems Approaches are applied. The first one is the Rummler and Brache Model (1990), which consists of three performance levels: organizational, process, and individual. The three levels reflect the quality of systems performance regarding system development, production, and delivery. The second model is ASPIRE model (1991), which focuses on curriculum development in higher education. This model consists of 6 stages: Appraisal, Specification, Planning, Implementation, and Review Evaluation. Stoner (1996) cited from (SCCC, 1991 p23) (*Scottish Consultative Council on the Curriculum*) that this model "represents a dynamic process of developing an appropriate curriculum. This process results in a progression of stages designed to ensure the systematic response to perceived needs."

In addition to that, one article (2023) claimed that (Deming, 1986) mentioned Total Quality Management (TQM) that can measure the quality of systems performance. System performance measures the effects of instructional design on learners' performance. Higher education institutes can utilize (TQM) to evaluate their educational systems. So that learners' performance that is described and explained in the instructional design plan can be measured too. Measurement results indicate to

what extent the system must be adjusted and changed. Thus, the vital educational and managerial aspects must be centered around picturing the whole image of the system by verifying the system's goals and describing the components that carry out the procedures to obtain these goals. It is essential to manage educational systems through employing a systems approach.

2.0 Models of Instructional System Design

The Systems Approach recognizes instruction as an operation containing a few elements connected. It provides the Instructional Designers with the framework of the educational process. Moving from a Systems approach to Instructional System Design (ISD) means changing from analysis generalization to specific examination. Instruction system design uses learning theories to guarantee high-quality instruction. Besides, it is a practical tool to evaluate organizations' achievement of standards. Instruction System Design is an analysis process measuring learning content, context, and efficiency of the learning process. (ISD) Instructional System Design constructs materials, tools, and environments to acquire and transform information into practical knowledge. The *University of San Diego* published an article under the title (*What is Instructional Design? [5 Examples + Overview]*), in (2022) and defined ISD as "The systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation."

Therefore, an Instructional Designer delivers learning experiences based on a few elements. Instructional designers consider the materials, tools, theories, learners, standards, learning environment, and many other components. He or she utilizes a systematic methodology to develop content, create learning experiences, construct information, and design assessments based on learners' learning backgrounds. Identifying learners' backgrounds must be done through various educational assessments to pinpoint learners' strengths and weaknesses.

Therefore, Kemp, Dick and Carey, Keller's ARCS, and many others are models of Instructional System Design ISD that were designed to guarantee the quality of the delivered learning process.

2.1 Kemp Design Model

Kemp's design model is a non-linear structure of the instruction design (ID) model. The structure of the model is flexible due to its circular construction. Its instructional planning is based on learners, objectives, methods, and Evaluation. This model consists of nine core elements that support learners' goals, needs, priorities, and constraints. The first phase is Instructional Problems, which are related to designing specific goals and determining learning skills. The second phase is learners' Characteristics, which requires identifying the needed learning styles for topics and tasks adapted to learners' characteristics. The third phase is Task Analysis, which requires explaining course content concerning the mandatory tasks' components. These components must be combined with learners' learning styles.

The fourth phase is Instruction Objectives, in which learning objectives and outcomes that learners must acquire should be outlined. The fifth phase is Content Sequencing, which involves determining and confirming a sequenced structure for each instructional unit based on course objectives. The sixth phase is Instructional Strategies, which explains specific learning strategies that facilitate content learning through constructing various activities. The seventh phase, Designing the Message, involves organizing delivery mode resources to allow instructors to deliver effective teaching and learning methods. The eighth phase is Instructional Delivery. In this stage, evaluation instruments must be designed to measure learners' performance progress. The ninth phase is the Evaluation Instrument, which involves designing summative and formative evaluation methods.

Figure 1

Kemp Design Model

Figure 1. Kemp Design Model

It is instructional planning based on learners, objectives, methods, and Evaluation. The figure is copied from https://educationaltechnology.net/kemp-design-model/ 2.2 Keller's ARCS

2.2 Keller's ARCS model

Keller's ARCS model stands for Attention, Relevance, Confidence, and Satisfaction. This model is a problem-solving approach that concerns learners' acceptance of the idea of receiving knowledge through attracting their Attention. The first element is Attention**,** which involves learners as active participants in the learning process. The second is relevance**,** which is related to connecting learners' pre-knowledge and new knowledge to achieve a general understanding from the learners' side of the need for learning. The third one is confidence, which is about encouraging learners to be proud of their success in their childhood and motivating them to go on to succeed in the future. The fourth is satisfaction**,** which is about designing a reward system to enhance learners' learning desires.

Figure 2

Keller's ARCS model

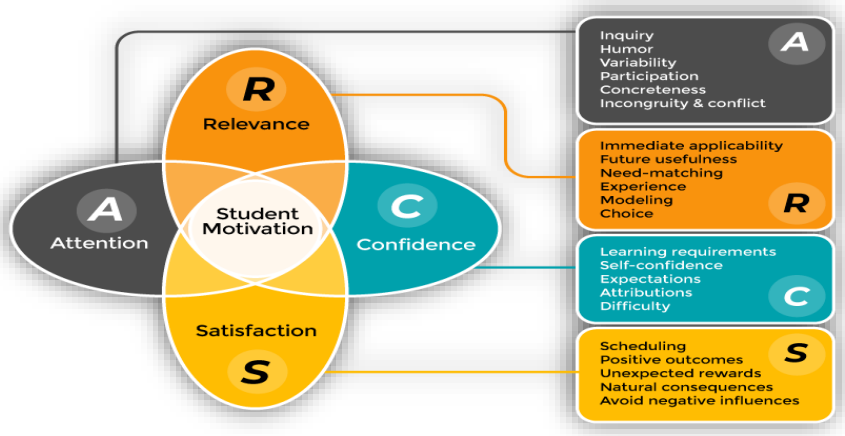

Figure 2. Keller's ARCS model

Leveraging Learning Theories in eLearning. This model is a problem-solving approach. The figure is copied from https://www.flarelearning.com/post/22-leveraging-learning-theories-in-elearning

2.3 Dick and Carey model

Dick and Carey's model emphasizes the importance of relating content, instruction, context, and learning to each other. This model consists of nine stages: Instructional Goals, Instructional Analysis, Entry Behaviors and Learner Characteristics, Performance Objectives, Criterion-Referenced Test Items, Instructional Strategy, Instructional Materials, Formative Evaluation, and Summative Evaluation.

Figure 3

Dick & Carey Model

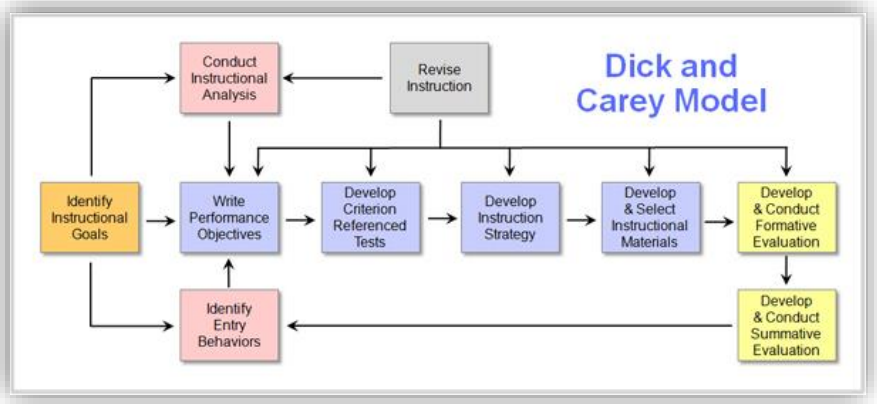

Figure 3. Dick & Carey Model

It emphasizes the importance of relating content, instruction, context, and learning to each other. The figure is copied from https://educationaltechnology.net/dick-and-carey-instructional-model/

3.0 Instructional Design and Virtual Learning Environment Literacy

The main core of any Systems Approach (SA) is an abomination of inputs, processes, and outputs. On the other hand, Instructional System Design (ISD) requires materials, tools, and environment work under one measurable procedure to ensure content, context, and learning process efficiency. Whether the learning process practicing occurs virtually or physically, it needs the same Systems Approach philosophy. Nevertheless, it will require alternative learning strategies to be inserted into the Virtual Instructional System Design (VISD).

Therefore, Virtual Instructional System Design (VISD) differs from Traditional Instructional System Design (TISD). That is because, first**,** distance learning does not require a restricted teaching time scandal since teaching materials are always available. In addition, distance learning does not require face-to-face interaction between learners and instructors that can be synchronized through virtual classrooms such as *ZOOM* and *Google Classroom* or asynchronized through *emails* and *Cloud Drives*. Furthermore, the discussion between learners and instructors mostly occurs one-on-one so that learners can learn at their own pace and study longer. Besides, distance learning procedures take place in physical and virtual settings, such as blended learning and hybrid learning strategies. Also, the online facility increases the number of participants in learning situations, whether learners, instructors, or visitors. The instructor can allow anyone to join the teaching session and contribute virtually. Daniel (2006), in her research (*Application of a Systems Approach to Distance Education*) quoted from Moore & Kearsley (2005, p. 2) a description of the virtual learning situation as "the planned learning that normally occurs in a different place from teaching, requires special course design and instructional techniques, communication through various technologies, and special organizational and administrative arrangements" (p. 2).

Remote learning calls for replicating Instructional System Design (ISD) in different physical spaces, various online strategies, and Edu-tech tools. Higher educational institutes tend to promote

educational technology usage in general. This propensity is due to the worldwide internet usage in learners' daily lives. Learners are keen on learning by using their tablets, laptops, or even smartphones because of their convenience for daily activities. Evseeva and Solozhenko (2015) mentioned in their study that using technology in the learning environment motivates learners' interaction and enhances their learning performance. Learners are able, through technology, to synthesize their learning skills and regulate their learning abilities according to their desires. Therefore, there must be an alteration in the system of education. The question here is, what are the main requirements in Virtual Instructional System Design (VISD)?

The first change in Instructional System Design (ISD) is in the learning environment, which means instead of physically utilizing the classroom space, the virtual platform can be added to employ virtual teaching. In this case, higher educational institutes must harness the learning environment and make it available anytime, anywhere. Consequently, the second change is utilizing the virtual platform and online tools and materials. Therefore, content must be digitized, and online libraries and lab simulations will replace books, papers, and real-life situations.

The third change is in the instructors' roles: monitoring and instructing more than teaching and controlling. Net-school Support is an easy software that allows instructors to control learners' learning progress by watching and monitoring their computers and tablet screens. The fourth change is in the learners' methods of participation. (*Microsoft Teams*), the virtual classroom allows learners to contribute to the learning process individually and in groups. Also, (*canva.com*) is an online presentation platform that lets learners share designing subjects virtually in groups. The fifth change is applying new entertaining online tools to increase learners' engagement. *Flippity.net* is one of the most attractive online tools that force learners to engage positively. It consists of several entertaining and educational activities.

To summarize, there must be a significant change in the components of the virtual instructional system design (VISD) compared to the traditional instructional system (TISD). These modifications must arise in Content Management, Learner engagement tools, Administration ICT

proficiency background, Online Communication Tools, Virtual Collaboration Tools, and Real-time teaching elements.

Various Edu-tech tools allow instructional designers to harness technological tools and create a digitized context that can be adjusted and changed based on learners' needs, cultural background, pre-knowledge, and future work requirements. One example of these Virtual Systematic Platforms is, (*Viewsonic.com*). (*Viewsonic.com*) is an example of an interactive web-based tool. It is designed to fulfill instructors' and learners' learning goals. It applies hybrid learning strategies to engage learners virtually and physically. It is a modern, inclusive learning tool that encourages classroom interaction through group collaboration. It is also a tool that can be synchronized to any other online tools to facilitate the learning process. To utilize the (*viewsonic.com*) platform, instructional designers must plan Virtual Instructional Design (VISD), prepare online instructional materials, and design constructed lesson planning. To implement the (*Viewsonic.com*) platform, the instructional designers must be dynamic while delivering lesson plans. They must design sequenced quizzes after each phase to measure learners' performance improvement. This pre-preparation assists instructional designers in making modifications to any learning process phases. However, it is hard for instructional designers to manage a Virtual Instructional Design model because it is time and effort-consuming. However, the second lesson plan preparation will be easier and faster due to the availability of the required materials and the ease of accessibility of the tools in the (*Viewsonic.com*) platform.

Conclusion

To sum up, constituting the new Educational System Approach is crucial. Since the learning process is changeable in its structure and components, the Educational Systems approach must be reformed to ensure the accreditation of the achievement of the educational outcomes. The Traditional Instructional Design must be transformed as well. In the past, the learning process used to occur among learners and teachers. The materials used were mostly books, papers, and pens. Learning usually occurs in the classroom, where learners follow teachers' instructions. Nowadays, learners learn from internet websites, educational tools, and instructors. Google and Microsoft World's tools, for

example, assist learners in terms of searching for any piece of information instantly. Besides, learners can construct the knowledge they desire using educational programs such as (MOOCs) Massive Open Online Content and (VEC) Virtual Educational Communities. That is why instructors today play the role of mentors and guidance via reconstructing learners' pre-knowledge with the newly received knowledge in the classrooms or remotely. It seems from the massive shift in educational technology tools that the learning process will be conducted directly by technological tools to learners via AI technology.

The designed educational systems may replace the instructors themselves. Nowadays, learning machines are designed to guide learners and direct the learning process instead of the instructors. Implementing Virtual Systematic Procedures and Artificial Intelligence (AI) tools in virtual educational platforms forced instructional designers to utilize various simple interface accessibility, management functions in knowledge practicing, and flexible content conceptualization.

Creating an effective Virtual Learning Environment (VLE) based on a new modern Systems Approach (SA) involves technology integration that would affect educational institutions' teaching and learning management process, curriculum designing, and evaluation scheming. Systems Approaches are the tools to continually operate and interact with the main components of educational systems: Input, Process, Output, and Environment. Therefore, modernizing the instructional design via integrating technological tools is essential to ensure that instructors, students, administrators, and government supervisors provide high-quality performance and supervision. Bhaskar (2019) stated that education always uses the latest ideology and technology, which helps enhance the quality of education. The systems approach is a technology which contributes in discovering most effective, cost-efficient and intelligent methods" (p. 107)

The systems approach clarifies the need for comprehending the conceptuality and functionality of educational technology embedded in the educational process, which requires, in the first place, spreading the culture of technology utilization theoretically and practically. Then, since educational systems' components are interrelated, there must be flexible regulations to determine to

what extent technology may affect learning process functionality and measure to what extent learners' learning performance can be enhanced. This is why Siddiqui defined the Systems Approach (SA) as "a rational, problem-solving method of analyzing the educational process and making it more effective" (p. 1)

The implementation of quality management measurements as a Systems Approach (SA), Such as the Rummler and Brache Model (1990), The SCCC (1991), and the Total Quality Management answers the previously mentioned questions: to what extent technology may affect learning process functionality and to what extend learners' learning performance can be enhanced?. Therefore, the new Systems Approach that requires embedding technology would determine the needed dynamic functions in education to develop the educational system as a whole.

After analyzing and regulating the educational process that requires utilizing technology, there is a need to adjust and modify Instructional System Design (ISD), which includes materials, tools, and environment. In addition, applying alternatives to traditional learning and assessment strategies to meet the implementation of virtual platforms and digitized learning materials. Finally, there must be an excellent consideration for designing new management approaches that influence management decisions in the education industry.

To conclude, Khanna et al. (1998) elaborated that in the systems approach, education is a logical problem-solving approach named by a method for getting methodical knowledge about the teaching-learning process. To expand the issue, one may further discuss the abovementioned notions, including that the Systems Approach is an organized tool that inspects requirements, problems, or weaknesses in the educational process. It provides an analytical technique that clarifies development methods when applying an efficient and effective Virtual Learning Environment (VLE).

Reference

Bhaskar, V. L, (2019). Role of systems approach in education. Education and Practice, *10*(23), 107. https://DOI: 10.7176/JEP

Brethower, D. L. (1993a). Strategic improvements of workplace competencies I: Breaking out of the incompetence trap. WILEY Online Library, *6*(2), 17-28. https://doi.org/10.1111/j.1937-8327.1993.tb00582.x

Brethower, D. L. (1993b). Strategic improvements of workplace competencies II: The economics of competence. Performance Improvement Quarterly. *5*(2), 29-42. https://doi.org/10.1111/j.1937-8327.1993.tb00582.x

Canva. Collaborate and create amazing graphic design for free. https://www.canva.com/

Chand, S. (2017). System approach to management: Definition, features, and Evaluation. *Your Article Library*.https://www.yourarticlelibrary.com/management/system-approach-to-management-definition-features-and-evaluation/27897

Daniel, T. (2006). Application of a systems approach to distance education. ISSS, *2*. https://journals.isss.org/index.php/proceedings50th/article/view/274/64

Deming, W. E. (1986). Out of the crisis. Cambridge, MA: Massachusetts institute of technology center for the advancement of engineering study. ASQ, https://asq.org/quality-resources/total-quality-management/deming-points

Evseeva, A, & Solozhenko, A. (2015). Use of flipped classroom technology in language learning. ScienceDirect, https://www.sciencedirect.com/science/article/pii/S1877042815051393

Flashcards and other resources for educators and learners. Flippity.net: Flashcards and Other Resources for Educators and Learners

Garvin, D. A. (1998). The processes of organization and management. *MIT Sloan Management Review*, https://sloanreview.mit.edu/article/the-processes-of-organization-and-management/

Jacknicke, K. G., & Samiroden, W. E. (1991). Some perceptions of an internship program. Alberta Journal of Educational Research, *37*(2), 99-118. ERIC - EJ430398 - Some Perceptions of an Internship Program., Alberta Journal of Educational Research, 1991

Khanna, et al. (1998). Education in the emerging Indian society (made easy). Exotic India, https://www.exoticindiaart.com/book/details/education-in-emerging-indian-society-nat432/

Moore, M.G., & Kearsley, G. (1996/2005). Distance education: A systems view. Belmont, CA: Thomson/Wadsworth. *2*.

Racheva, V. (2017). What Is Virtual Learning?. VEDAMO. https://www.vedamo.com/knowledge/what-is-virtual-learning/

Rummler, G. A. & Brache, A. P. (1990). Improving performance: How to manage the white space on the organizational chart. *Perlego*, https://www.perlego.com/book/1012351/improving-performance-how-to-manage-the-white-space-on-the-organization-chart-pdf

Siddiqui, M. H. (2013). System approach in teaching. Indian Journal Of Applied Research, *3*(2), 1. https://Doi,1063106

Salam, A. (2015). Input, process and output: system approach in education to assure the quality and excellence in performance. ResearchGate, *14*(1), 1. https:// DOI:10.3329/bjms.v14i1.21553

SCCC, (1991) Facing the challenge: A discussion paper Committee on special educational needs, Scottish Consultative Council on the Curriculum (SCCC). Dundee. *23*. ResearchGate

Stoner, G. (1996). Integrating learning technology. ResearchGate, 23. (PDF) Integrating learning technology, presented at ALT-C 96, The annual conference of the Association of Learning Technology (researchgate.net)

Treseder, W. (2017). One man created the education system holding you back. Mission.org.https://medium.com/the-mission/one-man-created-the-education-system-holding-you-back-c50c39496023

University of San Diego (2022). What is instructional design? [5 Examples + Overview]. *Learning Design and Technology*. https://onlinedegrees.sandiego.edu/what-is-instructional-design-examples/

Video Conferencing, Meetings. (n.d). Retrieved 2023, from https://www.microsoft.com/en-us/microsoft-teams/log-in

ViewSonic the Education Expert provides new tools to facilitate learning. (n.d). Retrieved 2023, https://www.edarabia.com/viewsonic-education-expert-provides-new-tools-facilitate-learning/

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