

Integration of Instructional Models and Learning Styles for Open and Distance Learning Environment

Zuhri Arafah Zulkifli¹, Anis Afiqah Sharip¹, Siti Maisatah Md Zain¹, Nurul Najwa Abdul Rahid Abdul Rashid¹, Raihana Md Saidi¹, Nur Aimuni Md Rashid¹ & Alya Geigiana¹

¹ Faculty Computer and Mathematical Sciences, Universiti Teknologi MARA, Malaysia

Correspondence: Zuhri Arafah Zulkifli, Faculty Computer and Mathematical Sciences, Universiti Teknologi MARA, Malaysia.

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Abstract

The widespread use of technologies is increasing exponentially in various sectors including education. In relation to this, Open and Distance Learning (ODL) is one of the methods in delivering lectures through the use of internet. ODL has been proposed years back but the implementation is getting obvious lately. Due to unforeseen circumstances, ODL is the best medium to ensure the effectiveness of the deliverable. An instructional model is used as a method to guide teaching process. This method would be more useful when it can integrate with learning styles as well. This paper aims to integrate instructional models with learning styles for the ODL environment. Based on the previous research, classifying the instructional models that fit best to the learning styles would help in enhancing student performance. This integration will also give benefits towards educators significantly. To conclude, a well-designed instructional model that is align with learning styles will give a great impact on teaching and learning process.

Keywords: open distance learning, learning styles, instructional model

1. Introduction

Open and Distance Learning (ODL) is defined as the ability to get knowledge freely without any constraints of time and space (Combrinck & van Vollenhoven, 2020; Combrinck, Spamer & van Zyl, 2015). ODL is helpful and effective in which it allows interactions and collaborations among educators, learning environments and also institutions (Ngubane-Mokiwa & Letseka, 2015) without being physically at the same place. Currently, ODL has become a necessity in educational sector particularly during the Novel Coronavirus Disease 2019 (Covid-19) even though ODL has started years ago. Most learning institutions all over the world are handling classes through ODL especially high School and college students. A number of tools have been used to ensure the learning process to proceed as usual where some of these tools are guided by instructional models.

Instructional model is a guideline for an educator in order to plan for their teaching (Yaman & Ozcinar, 2020). It is crucial to find the best model for teaching to ensure that the model is fit enough to be implemented in class. In response to this, an instructional model should comply with the program course as well. There are numbers of instructional models from numerous researchers. As for the present study, KEMP, ASSURE, ARCS, KIRKPATRICK, ADDIE and Merrill's Principles of Instructions were chosen to be reviewed. These models were analysed with learning styles to integrate which models are suitable to which learning styles.

Romanelli, Bird & Rayyan (2009) in Wang, Lowe, Newton & Kocaturk (2020) defined learning styles as individual features that can regulate cognitive, and psycho-social behaviour of the learner, their insight of knowledge, collaboration and processing information in diverse learning environments. Similar to instructional models, there are numbers of learning styles models that have been created to meet learner's preferences in education. In this study, Kolb's learning styles, R2D2, VARK and Honey & Mumford learning styles were chosen to be implemented with those instructional models in the ODL environment.

Observing on the ODL environment, instructors could barely know whether this ODL suit the students' learning styles or not. Different students will need different approaches. Through ODL, integrating instructional models with learning styles seems possible because various media can be used. Unlike traditional classes where the medium of

teaching and learning is quite limited such as using white board and power point slides, there is an opportunity to integrate instructional models and learning styles to ensure the ODL is done successfully by considering students' learning styles. In addition, there are limited studies that focused on the aggregation of instructional models and learning styles for the ODL environment.

2. Instructional Models

2.1 ARCS Model

The Attention, Relevance, Confidence, and Satisfaction (ARCS) model was invented to find a greater effective method to understand the motivational impact on education (Keller, 1987). This review focuses on three aspects of ARCS model; (1) what are the components of ARCS model, (2) how the ARCS model was applied to e-learning system and (3) examples of ARCS model used in e-learning.

There are four components of ARCS model. Attention is the first component of ARCS model that grabs learners' attention with an entertaining learning environment before starting the lesson (Mohamad, Embi & Nordin, 2016). Keller (1987) highlighted the importance of gaining and monitoring the *attention* from a learner before the lesson begins. This monitoring can be done through attention strategies. The second component is *Relevance* which is also an important component to motivate learners and encourage them to develop clear goals. The goals will help learners connect particular knowledge with their curiosity and observation. The goal is gained through any deliveries medium that allow the delivery of contents. The third component of the ARCS model is known as *Confidence*. According to Keller (1987) different people have different confidence levels due to the fact that the learning process will take place differently. Keller (1987) also invented strategies to build learners' confidence that involve learning requirements, content arrangement, incentives on learner's performance and develop self-confidence. The fourth component is *satisfaction* that needs to be earned from learning environment. The satisfaction received from some factors can be obtained from questionnaires to get responses about the learning environment (Mohamad, Embi & Nordin, 2016).

Learners' motivation is affected via e-learning system and it is important to gain learners' motivation for effective e-learning. The ARCS model is used to identify learning motivation among learners and become an important role in e-learning environment. This model emphasizes four components that allow learners to identify their learning progress and achievement (Mohamad, Embi & Nordin, 2016). The ARCS model has been used to implement e-portfolios to study learners' motivation level based on ARCS motivational design strategies. This e-portfolio is used to analyses learners' passion in learning and it has given a good impact for e-learning environments (Mohamad, Embi & Nordin, 2016). Ying & Yang (2013) also used the ARCS model to develop an e-learning system using games which allows the system to analyse learner motivation. The ARCS model is implemented in Massive Open Online Courses (MOOCs) to motivate learners in e-learning environments (Li & Moore, 2018). Based on review of ARCS model, all four components are needed to strive learner's success in an e-learning environment. Therefore, it is important to identify all factors that may affect learners based on the components of the ARCS model before starting any lesson.

2.2 ADDIE Model

The ADDIE model of instructional design is invented to deliver a systematic approach for preparing instructional materials (Shelton & Saltsman, 2006). The ADDIE model divided into five steps; Analysis, Design, Development, Implementation, and Evaluation that are used for an e-learning environment. Wiphasith, Narumol & Sumalee (2016) stated that an e-learning environment needs to comply five steps in the ADDIE model in order to deliver effective e-learning contents. Branch (2009) also stated that the learning contents are very important to create an effective learning environment. Therefore, in the present study, all five steps in ADDIE model were applied to achieve this goal.

Analyse on course and learners are carried out to identify all requirements needed for online learning such as determining learning goals, identifying targeted learners and organizing course materials (Branch, 2009). The Design and the Development of the materials or contents for an e-learning environment is very important to increase learners' interest for online learning (Shelton & Saltsman, 2006). The fourth step in the ADDIE model is Implementation that allows instructors to implement the contents of online learning for their learners followed by the *Evaluation* step to identify the outcomes of this online environment (Wiphasith, Narumol & Sumalee, 2016).

Durak & Ataizi (2016) designed Programming Languages-I online course using the ADDIE model. Following the first step in the model, all possibilities of the course in all aspects (course needs, learners, content, technical, structural, online environment) were analysed and necessary actions were taken in the designing step followed by the development and implementation steps before the evaluation of the course were made. Wiphasith, Narumol &

Sumalee (2016) also applied the ADDIE model in developing the contents of e-learning for English Language course.

Based on review of the ADDIE model, a good content is created from these five steps in the ADDIE model. The most important step for this model is evaluation, where all feedback from all aspects are needed to improve the learning environment.

2.3 ASSURE Model

The ASSURE instructional design is an abbreviation used in the learning model. Sundayana (2017) described that ASSURE consists of six steps. The first step is *analyzing*. Instructor may analyze student characteristics (learner characteristics). The second step is *formulating*. Here, the instructor formulates the standards and learning objectives to be achieved (state standards and objectives). The third step is *selecting* methods, media and teaching materials (select methods, media and materials). The fourth step is *using*. The instructor used any media and potential materials (utilize media and materials). The fifth step is involving student participation in learning (*require* learner participation). The last step is *evaluation* and revision (evaluate and revise). These components focus on encouraging student to interact with environments rather than passively receive information.

The reason for utilizing this model is according to Ibrahim (2015) and Rahman (2017) that it is a systematic process employed as the solution of problems regarding enabling the use of technology effectively to develop a lesson that will integrate the use of technology and media known as audio visual in order to improve learners' interactive and authentic learning. The ASSURE model is based on the constructivism and part of the characteristics of the student, whose identification is made in the first stage of the process (Gonzalez, 2019).

Umar et al. (2017) proposed a learning model of football-based design using ASSURE to improve learning outcomes of football in students. Learning soccer using ASSURE-based design is an alternative learning model that can be done to maximize the role of students in the learning process. The model design of this learning system is developed to create learning activities that are effective and efficient, especially on learning activities that take advantage of media and technology. According to Umar et al. (2017), the model of instructional design is very simple and easily implemented by teachers or lecturers in order to ensure an instructional design that can improve learning outcomes, motivate their learning, improve memory material or the content longer (retention), and to encourage students to apply knowledge and skills learned. Rahman (2017) implemented the ASSURE model as this model is most likely suitable to any school or district lesson plan patterns. This instructional system design is using principles and approaches that should be adapted to the target of the learning. Therefore, according to Sertin (2016) the ASSURE model design shows some advantages such as: (1) recommends teachers to use authentic materials and technology other than simple learning using textbooks; (2) focuses on step by step learning instructions to see the pros and cons of the lesson; (3) provides lesson planning to promote English teachers' creativity in selecting and using authentic tasks for learners; and (4) guides learners to actively participate in using instructional media especially audio-visual materials both inside and outside of the classroom. This model of learning, however, also needs some considerations, as follows: (1) some technologies like tablets and computers may be available in limited quantities and also need a good internet network to organize the ASSURE model effectively; (2) technology may be doing the teaching instead of the teacher; and (3) evaluation is the last step in this model, although it is good to know if the strategy, materials and media worked or did not.

2.4 KEMP Model

Kemp Instructional Design Model implements a circular structure that provides a degree of flexibility. The design process of this model can be started with any of the nine components or stages, rather than in a linear fashion (Kurt, 2016). Ongoing revision based on other elements should be done continuously. Students, objectives (what to be learned), method (what procedures and resources will work best to reach desired learning levels), and evaluation (how we will know the desired learning occurs) are the four essential elements of instructional technology (Batoon et al., 2018).

The Kemp model describes nine different components of an instructional design by adopting a continuous implementation or evaluation model. The Kemp model highlights interdependencies of each step in the process, highlights the importance of the evaluation, and it recognizes more environmental factors in educational settings (resource and support, such as budget, facilities, time, equipment, personnel and materials) (Ibrahim, 2015). The elements of the model are: (1) instructional program identification, and goal specification of an instructional course, (2) examination of learners' characteristics based on the instructional decisions, (3) subject content identification with task analysis related to goals and purposes, (4) instructional objective specification, (5) instructional unit in

arranged, in logical sequential order of learning, (6) instructional strategies design to meet the mastery of lesson objectives, (7) plan and develop instruction, (8) evaluate instruments for measuring course objectives, finally (9) resource selection for instruction and learning activities (Pappas,2017; Kurt, 2016).

Kemp model adopted the circular approach guides designers to take the standpoint of the learner by looking at the learner’s overall goals, needs, priorities, and constraints when deciding on instructional solutions. The nine key components of the Kemp Instructional Design, which are intended to focus on the whole learner throughout the design process, are much more detailed and subtle different than those included in other models. However, because the stress in the Kemp model is on the interrelatedness of these nine elements, the design process itself can be a more dynamic and fluid process than other models would allow (Kurt,2016). The Kemp model is particularly useful for developing an instructional program that mixes technology, pedagogy, and content to deliver effective, reliable and efficient learning (Ibrahim, 2015). According to Ahmad (2015), the Kemp model provides four basic advantages which are; (1) all elements are interdependent and (2) can be performed simultaneously, (3) the developer can start anywhere, while (4) learning needs, goals, priorities, and constraints determine the instructional solution.

Carrie et al. (2019) proposed a development of cyber-security awareness materials in Google Classroom using the instructional technology design principles to accommodate user learning styles while increasing cyber-security expertise. This project implemented the Kemp model due to flexibility provided by this model than others because the designer can start with whatever element they want to without the completion of previous steps in the model. Meanwhile Avcu and Er (2019) developed an instructional design that focuses on programming teaching for gifted and talented students and to investigate its effects on the teaching process. During the development of the instructional design, the steps of Kemp Instructional Design Model were followed. Both of these projects used the Kemp instructional model because of its flexibility and interdependencies of each step.

2.5 KIRKPATRICK’S Model

Kirkpatrick’s model is known widely for evaluation purposes. In his model, a conceptual framework was developed to assist the collection of data. The four levels of this model are as shown in Table 1.

Table 1. The four levels of Kirkpatrick’s model

Level Reaction	1:	To what degree participants react favourably to the learning event.
Level Learning	2:	To what degree participants acquire the intended knowledge, skills, and attitudes based on their participation in the learning event.
Level Behaviour	3:	To what degree participants apply what they learned during training when they are back on the job.
Level 4: Results		To what degree targeted outcomes occur, as a result of the learning event(s) and subsequent reinforcement.

Source: Kirkpatrick and Kirkpatrick (2009)

An adaptation of Kirkpatrick's Model has been done to accommodate e-learning environments by Hamtini (2008). According to the study, *reaction* is defined by Kirkpatrick’s as what the participants thought of the particular program, including materials, instructors, facilities, methodology and content. Participants could share their response on the satisfaction of the tools by using surveys. Most teachers agree that initial approachability offers a good environment for learning materials in the program, but does not automatically contribute to a high level of learning. *Learning* is concerned with determining the knowledge principles, facts, techniques and skills presented in a program. Measuring the responses is more complicated in that it must be objective and quantifiable measures of how the participants interpreted and absorbed the information. They are not necessarily measuring of performance on the job. *Behaviour* is used in reference to the measurement of job performance. A positive reaction does not necessarily mean that learning is well going because sometimes greater achievement in the program does not always turned as good behaviour in working environment. There are many influences that can affect job performances other than the training program. Lastly, evaluations at the *results* level are used to relate the findings of the program to organizational improvement. A research by Quintas et al. (2017) regarding on retrieving an e-learning and b-learning model offered three environments of the research which are:

- **e-Learning and Communication** - emphasize on the flexibility of learning using Moodle as the platform for students’ and lecturers to interact;
- **Face-to-face sessions and Communication** – communication through face to face learning and teaching;
- **Learning Rhythms and Tools** – emphasize on learning rhythms and tools.

Results from the research show that there was no compromise in regards to that perceived satisfaction on b-learning

and e-learning systems. The research also concludes the following:

- Immediate interaction with lecturers and classmates makes the students prefer face to face learning;
- Communication and online interaction caused delayed by technical problem;
- E-learning is considered a valid alternative;
- Students consider that e-learning poses some advantages, that the process is well organized and that it meets their expectations.

Bates (2004) found there are three limitations of the four-level model. The limitations have implications for the ability to deliver benefits and further the interests. These include the incompleteness of the model, the assumption of causality, and the assumption of increasing importance of information as the levels of outcomes are ascended.

2.6 Merrill's Principle Model

Merrill's Principles draw from several instructional design theories and models, identifying and articulating the design principles. These principles are prescriptive (design-oriented) rather than descriptive (learning-oriented). Merrill's Principles of instruction is the most used and cited model in the literature since 2002. Merrill's five principles are:

1. Learning is promoted when learners are engaged in solving real-world problems.
2. Learning is promoted when existing knowledge is activated as a foundation for new knowledge.
3. Learning is promoted when new knowledge is demonstrated to the learner.
4. Learning is promoted when new knowledge is applied by the learner.
5. Learning is promoted when new knowledge is integrated into the learner's world.

Jghamou et al. (2018) considered the principle as 'always true under appropriate conditions regardless of program or practice'. These principles are relevant to use as criteria to evaluate the effectiveness of a training modality emphasizing work-based activities and the blend of formal and informal learning. The research stated Merrill's Principles integrate a large part of the models developed in the literature two decades before, and also the four pillars of learning advocated by psychologist Stanislas Dehaene: *attention, active engagement, feedback and consolidation*.

In adaption to blended learning, Simarmata et al. (2018) developed appropriate learning styles and preferences according to students' learning needs for blended learning courses. This is because most of the blended learning courses require a systematic approach in instructional design decisions and implementations, instructional principles to specify the elements of the course, and also to provide a solid base from which to build the technology. This paper presents blended learning design steps that include: problems, activation, demonstration, application, and integration using Merrill's Principles of Instruction in Fig. 1.

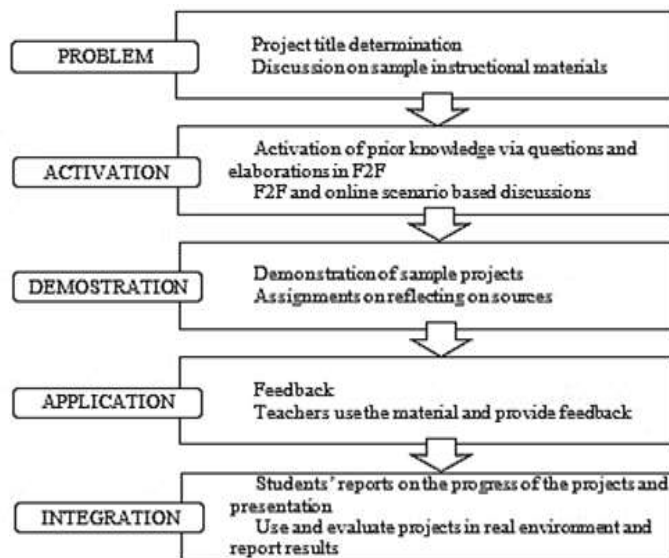


Figure 1. Blended learning design steps using the Merrill's Principles of Instruction (Simarmata et al, 2018)

3. Learning Styles

3.1 R2D2

The R2D2 model recommends a variation of e-learning technologies activities for active and successful online learning that suitable for each type of learners. *Reading/Listening, Reflecting/Writing, Displaying* and *Doing* are four types of learning activities that was proposed by the R2D2 model. Bonk & Zhang (2006) have further explained on each types of the learning activities.

a) Reading/Listening

Firstly, the R2D2 model is focusing on the knowledge acquisition, where reading, listening to online lectures, and exploring resources activities are taking place. This is the most preferable type of learning for those who prefer words, spoken, or written explanations. Bonk & Zhang (2006) suggest several learning activities such as reading materials from online or offline resources, conducting synchronous online presentations, online group discussions, chatting with experts, and watching online lectures, tutorials, or webinars. Other than that, learners can have an online testing to assess their understanding of the course content. There are a variety of ways instructors can help online learners to read, listen, explore, and obtain knowledge. Learners must be guided on the usage of online tools and maintaining focus point to keep the momentum on enrolling the courses.

(b) Reflecting/Writing

Secondly, the R2D2 model is reflecting/writing. This quadrant is suitable for those who favour to reproduce and perceive, and point out their judgment from different perspectives. This learning type also emphasizes on writing activities. ODL may suggest these kinds of learners to engage online for instance, learners are provided with some articles, or videos, and then they may think thoughtfully, reflect, and post their understanding on online discussion forum. This learning type is suitable for asynchronous learning session since learners will be given more time to critically think before they respond to the topics. Reflection papers, summary writing, and collaborative group papers are others form of activities that can be perform.

(c) Displaying

Thirdly, the R2D2 drives students to signify their understanding through visual representations, overviews, or illustrations such as producing diagrams, charts, videos and mind maps. In software engineering field for instance, instructors can provide case studies and learners are instructed to produce diagrams such as using case, data flow, and class diagram. In addition, for ODL environments, instructors can use the interactive whiteboard during synchronous and asynchronous learning sessions. In the latest technology, this form of learning can be addressed through technology such as virtual reality where learners can develop virtual reality products based on their research or knowledge on that particular topic area.

(d) Doing

The last activity of the R2D2 model is to ensure the learner can apply their understanding on the real world. These types of learners need to experience, imitate, and apply concepts and knowledge to increase a better understanding. This form of learning can be addressed through simulations, role play, creative movement and dance, and hands-on projects. The aim of online learning is to ensure that the learners can engage towards the content by manipulating the contents physically and perceiving the results.

There are wide-ranging chances to engage with learners with diverse styles of learning and preferences. The R2D2 model permits the instructors to mull over learners and learning activities in each part, theoretically provides a more appealing and inspiring atmosphere for online learning. There are growing demand for online education towards the booming of tools, resources, and activities for ODL (Bonk & Zhang, 2006). Additionally, various recommendation from this model from the retrieving of content to the reflection and visualization and on the actual usage. It provides both bigger pictures as instructional model on processes that an instructor or instructional designer should ponder in designing an online class, along with a detailed idea that might work in fruitfully delivering it.

3.2 VARK

VARK learning styles are guided by the VAK model that has been proposed by Fleming in 2006. Modification are made by categorized the student learning styles into four types. These types are based on dissimilar senses, that is Visual (V), Auditory (A), Reading (R), and Kinaesthetic (K). It is necessary to differentiate students' learning styles in order to ensure the effectiveness of each lesson. Teachers should plan their ways on teaching according to the learning styles because it is proven that students' can effectively learn when they meet their suitable learning styles. Othman & Amiruddin (2010) and Hussain (2017) examined on four physiological elements of the VARK learning style.

(a) Visual

This type of student prefers to use figures, images, and models for instance flowchart and hierarchies to represent the information. They are able to observe things such as through films, demonstration, and painting in order to extract the information. Moreover, according to Drago & Wagner (2004) as cited by Othman & Amiruddin (2010), these students would be easily distracted or lose focus by movements but not noise. In order to serve the needs for visual students, instructor can use several tools and techniques such as graphical materials, colour coding, highlighters, images, maps, and diagrams. Activities such as word searching and puzzles can be effective for such learners.

(b) Auditory

Auditory students learn something and give more attention by listening. They grasp knowledge over loud reading and are able to toughen their memory by listening to recorded audio of lectures or discussion, and by discussing with teachers or their classmates. Such learners are unable to visualize reading well and may find reading as a boring activity. In order to tackle auditory learners, instructors can arrange discussion among learners, make audio streaming, conduct activities such as brainstorming and songs.

(c) Reading

This conventional learner is able to read and write well and more prone to accept and retain information by repetition of written words. They perform well in quiet environment and like to learn from lecture notes and re-write lecture notes into sketch forms. To tackle these learners, instructors can use PowerPoint presentations, textbooks and notes, and incorporate activities such as reading, displaying, and reflecting.

(d) Kinesthetic

The kinesthetic students prefer to learn by experience and practice. According to Drago & Wagner (2004) as cited by Hussain (2017), kinesthetic learners are a bit passive in class because they prefer to have a physical movement and cannot sit idle for a long period of time. These learners have several traits such as they will quickly hand up to answer questions though they are uncertain about the answer. They will demonstrate gestures while talking and pointing techniques while reading. Instructors can be better in tackling these learners by arranging activities that involve body movements such as dancing, drawing, acting, and field trips.

3.3 KOLB'S

One of the popular learning styles was founded by David Kolb in 1984. Knowledge is created through a change in experiences of learning process (Kolb & Kolb, n.d.). There are four basic learning styles that have been discussed by Kolb. *Accommodative*, *assimilative*, *divergent*, and *convergent* are four types of learning styles that were proposed by Kolb.

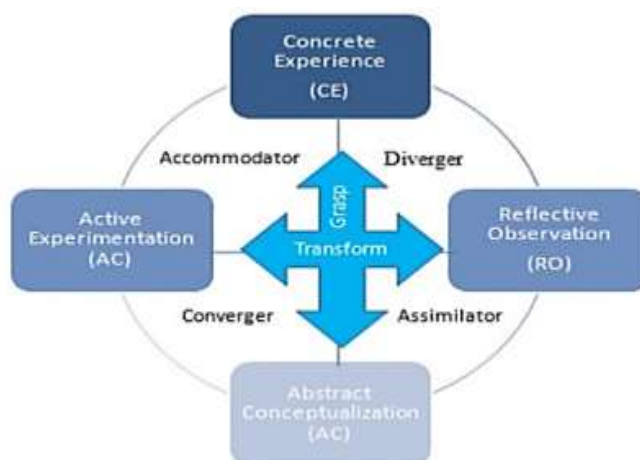


Figure 2. The Experiential Learning Cycle and Basic Learning Styles (Kolb, 1984)

Assimilative Style. The assimilative learning style is characterized by the ability to reason inductively. Knowledge is approached through abstract conceptualization and to conduct it through reflective observations. One of the assimilator's utmost capabilities is to "create theoretical models in assimilating disparate observations into an

integrated explanation” (Kolb, 1984). Based on what has been suggested by Kolb, the Assimilators apprehension themselves with thoughts and abstract concepts rather than with people and social interactions (Mccarthy, 2016; Richmond & Cummings, 2016). People who prefer the assimilative style incorporate the learning modes of reflective observations and abstract conceptualization (Richmond & Cummings, 2016).

Accommodative Style. The accommodative learners outrival at completing tasks by following directions, precisely planning, and eventually looking for new experiences (Kolb, 2013). They learn from hands-on experience and they can be categorized as opportunistic, action driven, and risk takers (Mccarthy, 2016; Richmond & Cummings, 2016). The ability to adapt to changing conditions provides accommodative label. Unlike an assimilative learner, someone who solves problems through intuitive trial and error rather than examining the facts carefully and relies too much on information for others rather than analytical ability. Learning methods involving wise learners include solid experience and active experimentation.

Convergent Style. Kolb advocates that this style of learner have greatest ability on problem solving. This type of learner is a problem solver and loves to make a decision and uses practical ways to overcome a problem (Mccarthy, 2016; Richmond & Cummings, 2016; Kolb, 1984). Usually, these people can organize knowledge by hypothetical deductive reasoning and able to converge to one given answer hence they do well on standard conventional intelligent tests. Individuals with convergent learning style prefer to deal with practicality and difficulties compared to the issues that are related to social interactions and involve interpersonal. Convergent learners draw from the learning modes of abstract conceptualization and active experimentation (Mccarthy, 2016; Richmond & Cummings, 2016).

Divergent Style. These types of learners focus more on imagination and consciousness of meaning and value (Kolb, 1984). Having the ability to determine solid examples of a concept and producing diverse qualities of that particular concept is the characteristics of divergent learner (Richmond & Cummings, 2016). They are then able to organize these qualities by how each quality interrelates to one another, which then provides a meaningful “gestalt” whole of the concept. They are considered “brain- stormers”, creative, good observers and emotional oriented. Divergent learners prefer experience and observation as their learning mode (Mccarthy, 2016; Richmond & Cummings, 2016).

It is not really easy to design an online learning, however the Kolbs’s learning style can be the basis for online courses (Richmond & Cummings, 2016).

Environment	Activities	Content Delivery	Evaluation	Instructor Style
<i>Affective</i>	Interactive Tutorials that Require Autonomy	Synchronous Chat Discussions with Both Peer & Instructor Involvement	Peer & Instructor Feedback which is Personalized	Coach or Helper
<i>Symbolic</i>	Multiple-Choice Quizzes & Tests, Case Study Analysis	Lectures that Focus on Theories or Broad Concepts	Instructor Derived Based on Objective Criteria	Top-Down, Didactic, Guide, & Task Master
<i>Perceptual</i>	Online Reading Journal & Lecture Summaries	Lectures that Focus on Interpretation & Asynchronous Chat Discussions	Instructor Evaluates Work Compared to others in the field	Expert Opinion & Deemphasizes Critical Evaluation
<i>Behavioral</i>	Structured Group Projects & Homework that Applies to Theories	Peer Asynchronous Chat Discussions & Lectures are not Helpful	Peer Feedback Ownership & Justification of Grading Policies	Role Model and Exemplar of the Class Content

Note. Information in this table was adapted from Kolb (1984).

Figure 3. Learning Environments and Applications for Online Courses (Richmond & Cummings, 2016)

Based on Fig 3, learning environment can be categorized as Affective, Symbolic, Perceptual and Behavioural. Certain activities are suitable for certain learning environment and different instructor style should be applied for different learning environment.

In order to identify the right activities for online learning environments, we need to identify the principal learning styles of our students. As mentioned by previous study that diversity in learning styles can be attributed to variances in fields of study or type of courses (Vizeshfar & Torabizadeh, 2018), students' predilections and their personal characteristics are varied.

3.4 Honey & Mumford

Honey & Mumford Learning Style were adopted and developed based upon the work of Kolb. It is an alternative of the Kolb Learning Style (Duff & Duffy, 2002). Peter Honey and Alan Mumford are the one who developed Honey & Mumford learning styles. They identified four characteristics or preferences in learning styles which are: *Activist*, *Theorist*, *Pragmatist* and *Reflector*.

Activists is referred to a learner who involves in new experiences. They enjoy the here and now, and are happy to be dominated by immediate experiences. They will try to do anything and consider the consequences afterwards (Pratchett et al., 2018). This type of learners loves the challenges and like to be the centre of attraction.

Theorists familiarize and assimilate observations into complex but logically thorough theories. They think problems in step-by-step logical way and like the concepts and models. They tend to be perfectionists and like to analyse and synthesize. They always try to relate the fact and the situation. Their approach to problems is consistently logical. This type of learner is very structured and like to have a clear objective (Fleming et al., 2011; Honey, 2017).

Pragmatists are keen on trying out ideas, theories and techniques to see if they work in practice. This type of learner who love to do a practical task. They take the opportunity to discover new ideas and experiment with the app. They like to move things forward and act quickly and confidently on engaging ideas. They tend to be wiped out by rumors and open debates. They are basically people who are practical and want to make realistic decisions and solve problems (Honey, 2017; Pratchett et al., 2018).

Reflectors like to think in details before they take any action on certain things. They love to do observation, gather data and prefer to think about it carefully before coming to an assumption (Pratchett et al., 2018). Starting with discussion and consider all possible aspects and consequences before making any decision is the value that reflectors have. They are a good listener and prefer to adopt a low profile (Honey, 2017).

Before applying any learning style towards the students, the Kolb's Learning Style Inventory (LSI) and Honey & Mumford Learning Style Questionnaire (LSQ) can be with used to help us to identify the strength of the students (Bontchev & Georgieva, 2018; Fleming et al., 2011; Logan & Thomas, 2002).

4. Methodology

Considering the fact that this study focused on the ODL models, the researchers adopted the systematic literature review approach. According to Torraco (2005), the systematic literature review approach research is appropriate to explore the diversity and helps researchers to thoroughly investigate the existing knowledge on a special topic of study. Therefore, the review process consists of four stages, briefly described as followings:

Stage 1: Selection of journals and databases

Several journals explicitly related to education and technology were searched in this study included but not limited to: *International Journal of Educational Technology in Higher Education*, *Educational Technology Journals*, *Education and Information Technologies*, *Journal of Educational Technology Systems*, *Educational Technology & Society*, *British Journal of Educational Technology*, *Research in Learning Technology*, *IEEE Transactions on Learning Technologies*, *The Journal of Learning Sciences*, *American Journal of Distance Education*, *Higher Education*, *International Journal of Mobile and Blended Learning*, *IEEE Transactions on Education*, *Journal of Interactive learning Research and Bulletin of Science, Technology & Society*. In addition, *Google Scholar*, *SCOPUS* and *Web of Science* were searched.

Stage 2: Keyword search

To locate scholarly articles related to ODL models for higher education institutions that consider and suit both instructors and learners, keywords used for searching in the identified databases and journals in Stage 1 included but not limited to: *e-learning model*, *instructional model*, *learning style*, *open learning*, *distance learning*, *online learning*, *mobile learning*, *blended learning and educational and technology*.

Stage 3: Article filtration, selection and categorization

Only articles that focused on learning models for both instructors and learners in ODL environments were studied. Later, each article abstract was then reviewed and arbitrated for its theoretical robustness and contribution to the

current discussion. Finally, based on the category of users namely instructors and learners, only articles related to six (6) models for instructors and four (4) models for learners have been further reviewed. The six models that have been reviewed for instructors were the Kemp model, ASSURE model, ARCS model, Kirkpatrick model, ADDIE model and Merrill’s Principles of Instruction. Meanwhile, four models for learners were Kolb’s learning style, R2D2 model, VARK model and Honey & Mumford learning style.

Stage 4: Analysis

Analysis of the current review was guided by the research objective. The research objective is to review on which instructional models that best suit learning styles. Articles from each category were then further analysed based on common characteristics that influence one or more instructional and learning dimensions in ODL environment.

5. Analysis

Integrating instructional models and learning styles could be done successfully because of the ability to choose the right model to cater for a particular student’s learning styles. According to previous models that has been reviewed in the previous section, instructional models have been categorized based on their components, learning characteristics and learning styles as shown in Table 2.

There are three instructional models that can be grouped together to adapt with two learning styles which are ADDIE, ASSURE and KEMP as they have similar components which are *Analysis, Design, Development, Implementation* and *Evaluation*. Among activities that can be done are reading or listening, writing, displaying and doing. Learning styles that meet these criteria are the R2D2 and VARK. Activities that will definitely involve students with this type of learning styles are synchronous online presentation, reading material online or offline, online discussions, video sharing, webinars, online tutorials, listening or watching lectures posted on Web, listening to experts, online demonstration, case study and exploration. These learning styles cover all sights of a human being from watching, listening and doing.

Meanwhile for ARCS, Kirkpatrick and Merrill’s principle, the learning styles that match these instructional models are Kolb and Honey & Mumford. It is because both have the similar activities which are *accommodative, assimilative, divergent* and *convergent*. This structure of learning styles focuses on the behavioral act of the learners. Examples of activities that meet this type of learning styles are games, dialogues, role plays, feeling and people-related activities, projects and activities that encourage creativity.

Table 2. Integrating Instructional Models with Learning Styles

Instructional Design	Components	Characteristics	Learning Styles
ADDIE	Analyse, Design, Development, Implementation, Evaluation	Reading/Listening Reflective Writing Displays Doing	R2D2 & VARK
ASSURE	Analyse, Set Objective, Strategy, Use of technology, Response and Evaluation		
KEMP	Instructional Problems, Learner Characteristics, Task Analysis, Instructional Objectives, Content, Strategies, Designing Message, Development of Instruction and Evaluation		
ARCS	Attention, Relevance, Confidence, Satisfaction	Accommodative Assimilative	Kolb, Honey & Mumford
KIRKPATRICK	Reaction, Learning, Behaviour, Results	Divergent Convergent	
MERRIL’S PRINCIPLES	Problem-Centred, Activation, Demonstration, Application and Integration	Activist Theorist Pragmatist Reflector	

As for this paper, ASSURE model is the best model to integrate with learning styles for distance learning because it has the ability of using proper technology to enhance learning processes. In addition, analyzing learner’s learning styles based on their academic interest, abilities and also demographic characteristics will help on the learning as well. During ODL, the comprehensive strategy to be taken out is by having a student-centered which instructor act as a facilitator to facilitate discussion and learning. Lastly, ASSURE model provide component that will ensure the

ODL is effective by having an evaluation at the end of each learning process. Feedback from students is crucial to ensure that the ODL works from both side which is the instructor and students. The integration of instructional model and learning styles would provide a better place in the ODL environment. Through the list of activities provided, instructors can use online learning tools that are available on the internet. In the future, the researchers will be focusing more on the tools that are associated with instructional model and learning styles and also some of the learning theories that can be associated. One of the major advantages of integrating instructional models with learning styles is instructors can diversify their methods of teaching and could cater their students' preferences learning simultaneously which will increase the performance level of the students significantly.

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