

Teaching and Learning in an ODL University: Bridging the Gap between the Learning Environment, Learners and Instructors

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Abstract

Many researchers have commented that educators need to use different techniques and methodologies in an online, distance learning (ODL) environment. The constructivist perspective is said to be especially relevant to the ODL environment as it emphasizes independent learning and the active construction of knowledge, which suits ODL learners as they are usually self-motivated and more mature. However, two questions come to mind – do instructors and learners in the ODL environment really embrace constructivist principles in teaching and learning, or is there a gap between the learning environment, learners and instructors? This paper attempts to answer these questions by determining the preferred teaching and learning styles of instructors and learners in an ODL university, to gauge if they are more behaviourist or constructivist in their teaching beliefs and practices. It also attempts to identify the constructivist elements present in an ODL university and come up with conceptual framework for nurturing constructivist practices.

Introduction

Teaching and learning that take place in an online distance learning (ODL) environment differ from that occurring in traditional classrooms. This means that ODL instructors need to use different techniques and methodologies if they wish to deliver effective teaching. Many researchers believe that the ODL environment provides a unique context in which to infuse constructivist learning principles (Tam, 2000; Romiszowski and de Haas, 1989). Some of these principles – for instance, that knowledge is socially constructed (Vygotsky, 1986) and that learners learn best if they are actively engaged in authentic, real world problem solving – seem especially suited to ODL learners who are usually self-motivated and self-directed, mature, independent learners.

In the constructivist learning environment, learners acquire new knowledge by constantly assimilating and accommodating new information with existing knowledge structures (Woolfolk, 1993). Some may even perceive the external reality differently, based on their unique set of experiences and beliefs about the world (Jonassen, 1991). The role of the instructor is essentially to provide learners with a collaborative situation that supports critical reflection and allows them to draw on experiential processes and assemble prior knowledge from diverse sources (Ertmer and Newby, 1993).

The instructor is thus a guide, a facilitator and a coach instead of a transmitter of knowledge while learning is the result of the complex interplay of learners' existing knowledge, the social context and the problem to be solved (Tam, 2000). In recent years, there have been repeated calls for guidelines to be drawn to set up a supportive learning environment for distance learners based on constructive principles (Petraglia, 1998; Valasidou, 2005).

Open University Malaysia (OUM), as the first ODL university in the country, has been far-sighted in this respect. It offers more than 80,000 distance learners the opportunity to acquire new knowledge and improve the necessary skills in a wide range of courses via a blended learning model. This model sees OUM learners engaging in learning on three interfaces –self-instructional materials (80% of total learning), face to face interaction with tutors and facilitators (8%), and online discussion via its management learning system, myLMS (12%). OUM's theoretical platform is constructivist in nature as all three modes of learning aim to steer learners towards self-managed, active learning and to move

the instructor from the traditional role of “sage on the stage” to “guide by the side”, from leader to coach, from purveyor of knowledge to facilitator of personal meaning making.

Basically, OUM’s learning environment has been set up based on the fundamental principles of constructivist learning. But the question is: Are the current instructional and learning processes also adopting the same principles?

For effective learning to take place, it is insufficient to provide just a constructivist learning environment. More importantly, the teaching and learning processes that are carried out must comply with the inherent principles of such an environment.

If OUM’s learners and instructors are constructivist in their teaching beliefs and practices, then there is congruence between the learning environment, instructors and learners. But if they are not, then there is a gap which needs to be bridged. These are some of the issues that this paper attempts to address.

OUM learners and instructors – constructivists or behaviourists?

In order to determine whether OUM learners and instructors are constructivist or behaviourist, two sets of questionnaires were designed.

These questionnaires, each comprising 20 items – 10 constructivist and 10 behaviourist – are loosely derived from that developed by Tennenbaum et al. (2001), who highlighted seven key constructivist characteristics – arguments, discussions and debates; conceptual conflicts and dilemmas; sharing ideas with others; materials and measures targeted towards solutions; reflections and concept investigation; meeting student needs; and making meaning, real-life examples.

The questionnaire designed for the learners consists of 20 items, aimed at measuring learning preferences. Ten of these items are learning preferences that are indicative of the constructivist learning style, while the other 10 items point towards the behaviourist learning style.

The questionnaire designed to measure the instructors’ teaching preferences consists of 20 items, measuring exactly the same constructs but phrased from the instructors’ perspective.

Table 1 categorises the activities indicated in the 20 items according to the behaviourist or constructivist nature.

QUESTION NOS	TYPE	QUESTIONS / ITEMS
1	B	Students learn by memorising
3	B	Rely on drills and practice
5	B	Teacher decides on the assignment
7	B	Gives clear, step by step instructions
10	B	Teach strictly according to textbook/module content
11	B	Show answer immediately when students have problem
13	B	Passive listening when teacher teaches
15	B	Teacher explains in great detail
16	B	Motivate by praising
19	B	students to copy notes prepared by teachers
2	C	Students prepare own notes
4	C	Gather information on their own
6	C	Do challenging task
8	C	Authentic real world problem solving
9	C	Manage own learning and reduce dependence on teachers

12	C	Explore alternative solutions
14	C	Ask /answer challenging questions
17	C	Open classroom discussion
18	C	Teach according to students' varying needs
20	C	Self search for answers
<p>KEY: B : Behaviourist C : Constructivist</p>		

Table 1: Questions based on behaviourist or constructivist nature

A 4-point Likert scale was used. For each item, the respondents were given four options to select their level of agreement. These options were “strongly disagree” (1), “disagree” (2), “agree” (3), and “strongly agree” (4).

The questions were piloted on a small group of OUM instructors and learners, fine-tuned and amended before being administered on learners and instructors in learning centres in the Klang Valley. Respondents were selected based on convenience sampling.

A total of 201 people responded to the survey – 148 learners and 53 instructors (tutors and facilitators). Analysis was then carried out to answer three research questions (RQ):

1. Are OUM learners constructivist or behaviourist in their learning style preferences?
2. Are OUM instructors constructivist or behaviourist in their instructional style preferences?
3. Is there a gap between what is advocated at OUM and what actually takes place?

Research findings

RQ1: Are OUM learners constructivist or behaviourist in their learning style preferences?

In order to answer the first research question, the question items were divided into two categories – constructivist and behaviourist. The scores for all the items in the respective categories were then added up to derive two scores – one for constructivism and the other for behaviourism.

However, since these scores indicate two different set of characteristics, for differentiation purposes, *negative* values were assigned to the *behaviourist* scores and *positives* values to the *constructivist* scores.

The summated score for all 20 items was then calculated. For ease of reference, this summated score will be known as the *inclination index* as it shows the respondent’s inclination, either towards behaviourism or constructivism.

Bearing in mind that the scores for behaviourist items have each been assigned a negative value, a negative inclination index would suggest that the respondent is more inclined towards the behaviourist approach in either their teaching or learning.

To illustrate this, let us look at learner 1:

Learner 1’s behaviourist score is 28.

His constructivist score is 35.

The inclination index = summated score of all items
 = +35 + (-28)
 = +7.

As +7 is a positive value, we can infer that learner 1 is more inclined towards constructivism.

The learners' mean inclination index was then calculated (summed inclination index divided by N or 148) and shown to be **0.29**. This suggests that, taken as a whole, OUM learners seem to lean just slightly towards the constructive perspective.

However, in order to understand the full significance of this inclination index (0.29) for OUM learners, we need to place it in context by looking at the full range of scores possible. After all, a numerical figure can only have meaning if its parameters are clearly set.

The possible score of each respondent lies on a continuum ranging from a minimum of -30 to a maximum of +30. The case of the -30 is obtained based on the assumption that the respondent selects option 1 (on the Likert scale) for all constructivist items and option 4 for all behaviourist items, and vice-versa for the score of +30.

In other words:

$$\begin{aligned} \text{Maximum possible score} &= 10 \text{ (constructivist items)} \times 4 - 10 \text{ (behaviourist items)} \times 1 \\ &= 40 - 10 \\ &= 30 \end{aligned}$$

$$\begin{aligned} \text{Minimum possible score} &= 10 \text{ (constructivist items)} \times 1 - 10 \text{ (behaviourist items)} \times 4 \\ &= 10 - 40 \\ &= -30 \end{aligned}$$

All this can be represented diagrammatically as in Figure 1 below:

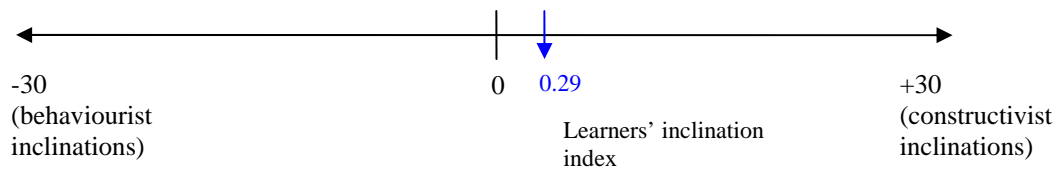


Figure 1 : Continuum of teaching and learning style preferences

If we now place the inclination index of 0.29 on the continuum (as in Figure 1 above), we can infer that OUM learners are just slightly inclined towards the **constructivist** perspective in their learning style preference.

It needs, however, to be noted that the value of 0.29 on a continuum with a scale ranging from -30 to +30 is actually **TOO SMALL** to be considered significant.

RQ2: Are OUM instructors constructivist or behaviourist in their instructional style preferences?

To answer this research question, the data analysis process was repeated, that is, the summated score for behaviourism and constructivism was derived for OUM instructors to get their inclination index.

The mean inclination index (summed inclination index divided by N or 53) was then calculated and found to be **-1.30**.

The negative value of the index suggests that OUM instructors seem to be more inclined towards *behaviourist principles* in their instructional style preferences.

Once again, however, if we place this value of -1.30 on the same continuum, with its scale ranging from -30 to +30 (Figure 2), the inclination of OUM instructors towards the behaviourist style seems truly negligible.

RQ3: Is there a gap between the system, learners and instructors?

Preliminary research findings suggest the following scenario:

- the OUM environment is constructivist.
- OUM learners seem more inclined towards the constructivist perspective, but
- OUM instructors seem to be veering slightly towards behaviourism.

However, the small inclination index for instructors (-1.30) and for learners (0.29) makes it difficult to say conclusively that one is constructivist and the other behaviourist.

This point is most clearly illustrated when both inclination indices are placed on the continuum, as in Figure 2 below:

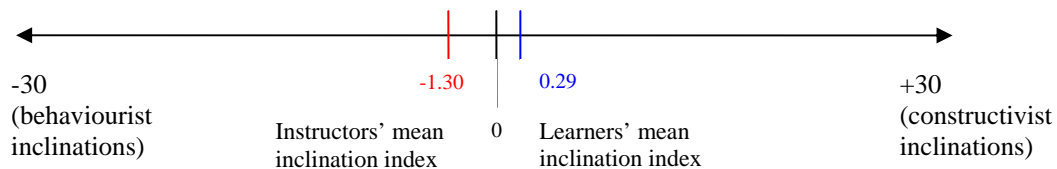


Figure 2: Lecturers’ and learners’ inclination indices on the continuum of teaching and learning preferences

The two values are so small that they can hardly be considered significant. In other words, research findings indicate that both the instructors and the learners of OUM are NEITHER strongly inclined towards the behaviourist NOR the constructivist style.

However, OUM’s learning environment is set up to promote a constructivist teaching and learning environment, both for the instructors as well as for learners. This indicates the existence of a gap that needs to be bridged.

The next section of the paper will discuss some measures that can be taken to close this gap, focusing on three interfaces of learning present in the OUM learning environment.

Closing the gap

As mentioned earlier, OUM learners and instructors interact in three interfaces – self-managed instructional materials, face to face, and online via myLMS. The underlying philosophy of the teaching and learning paradigm at OUM is constructivist in nature as it emphasizes constructivist values such as active engagement, reflectivity, personal autonomy, personal relevance, collaboration, generativity and pluralism.

However, while the learning environment and system at OUM seems to be inclined towards the constructivist perspective, research findings suggest that its instructors and learners may not really, or fully, share the same inclination.

There thus seems to be a gap between the OUM learning environment, its instructors and its learners.

To close this gap, the learning environment or system at OUM needs to have the functionalities to guide learners and instructors in their instructional and learning activities so that the learning process becomes more constructivist in nature. In other words, learners need to be moved towards independent learning whilst instructors need to be guided towards effectively performing facilitating tasks in the appropriate manner. Such a system needs to promote *guided exploratory learning*, rather than free exploratory learning.

To sum up, there needs to be concerted efforts to promote constructivist-based instructional and learning practices – a kind of *stewardship* (Lebow, 1993), so to speak – so that learners and instructors at OUM can be gently guided towards the constructivist perspective.

Towards this end, the authors have come up with a proposed conceptual framework (Figure 3) that may help OUM learners and instructors achieve this end.

A proposed conceptual model

The proposed conceptual framework (Figure 3) sees instructors and learners interacting with the OUM learning environment in the three interfaces described earlier – self-managed instructional materials, face-to-face sessions, and online participation via myMS.

All these three interfaces rest on a *constructivist platform* which actively nurtures and promotes the core constructivist values of *active engagement, reflectivity, collaboration, generativity, personal relevance, personal autonomy* and *pluralism*.

To encourage OUM learners and instructors to move towards the constructivist perspective, a *multi-directional attack* (Goodyear and Hativa, 2002) is advocated to ensure that all the learning tools and objects currently in the learning system – printed modules, multimedia learning objects, CDs, online forum, I-Radio, digital library, digital notes – are created and used with constructivist principles in mind.

As shown in the conceptual framework (Figure 3), learners and instructors interact with each other as well as with the learning system. The interaction of learners and instructors with the learning system is two-way, meaning that learners and instructors not only get input from the system but also impact upon it.

A good place to start inculcating constructivist elements, therefore, would be at the first interface of the learning system – self-managed instructional materials and course design.

This means that all courses offered by OUM should be designed with *constructivist pedagogy* as its backbone and framework, and that all self-managed instructional materials, be they be they printed modules, CDs or textbooks, should reflect this.

Irrespective of whether it is module writing (for new courses) or module enhancement (for old programmes), concerted efforts to interweave constructivist thinking into teaching and learning need to be implemented at this stage.

Activities and tasks in the modules should impart content via *authentic, real world problem solving* and *situated cognition* (Brown, Collins & Duguid, 1989; Jonassen, 1991) as well as focus on engaging learners in *relevant and meaningful* learning (Lebow, 1993).

Techniques such as *anchored instruction*, which involves the embedding of skills and knowledge in holistic and realistic contexts, can be used to help move OUM learners and instructors towards the constructivist perspective (Cognition and Technology Group at Vanderbilt, 1992).

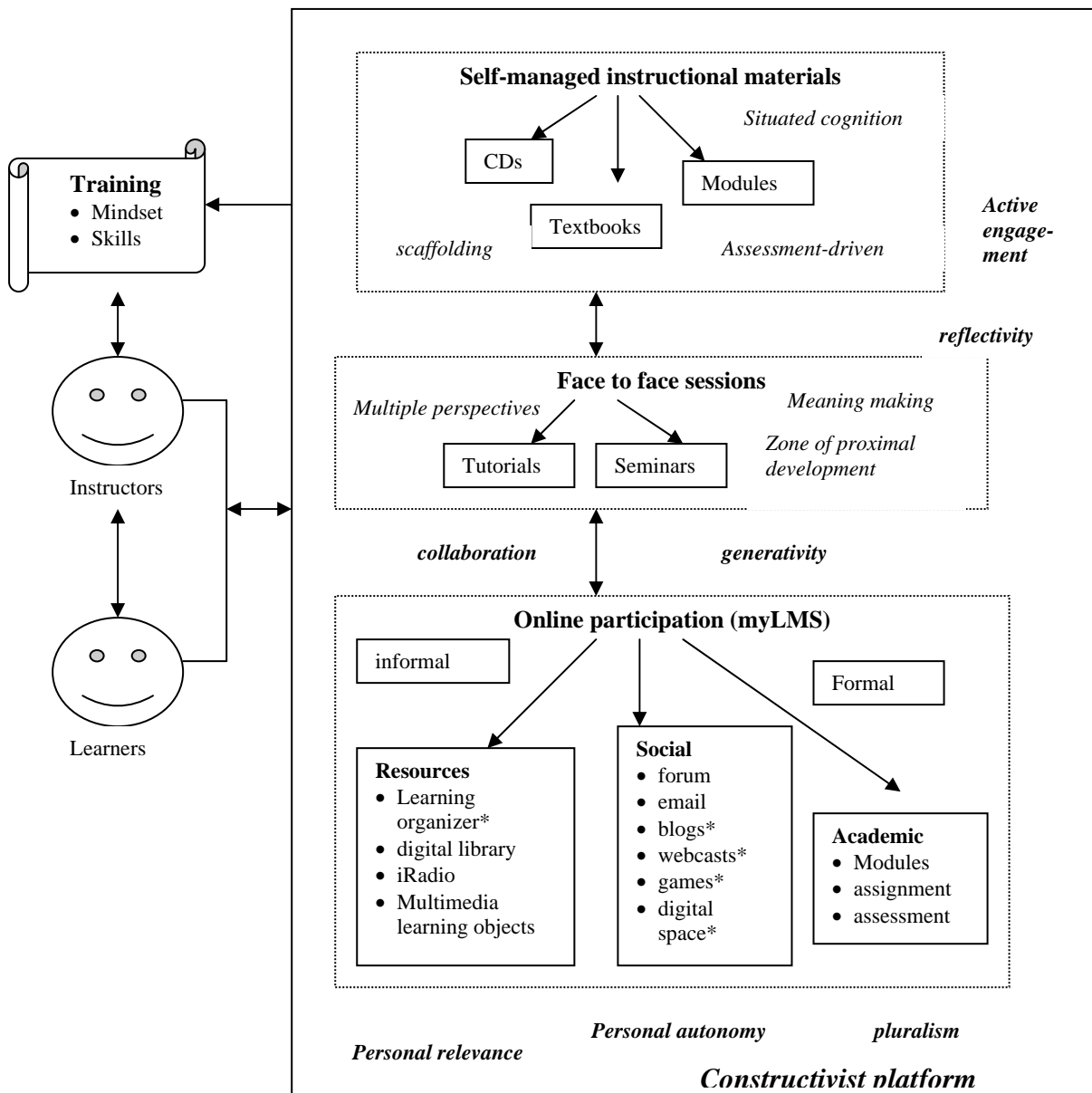


Figure 3: A proposed conceptual model for nurturing constructivist learning at OUM

Instructional materials need to provide a context for learning that supports both *autonomy* and *relatedness* so that learners can take control of their learning while sharing and building upon past experiences. An important element that must be present in modules and pedagogy is *scaffolding*, which can extend the potential development of learners within their zones of proximal development (Vygotsky, 1986). With proper scaffolding, learners can be challenged to move more smoothly from what is “known” to what is “to be known” and to perform tasks slightly beyond their ability to do so without assistance.

Constructivists recognize that *autonomy* exists on two levels in the constructivist learning environment – in the freedom of learners to choose learning resources as well as in their freedom to exercise and express critical thought. The tasks set for learners need to encourage them to engage in frank discussions so that they may share views and voice opinions openly.

Modules should also contain appropriate assessment to allow learners to move through the learning process at their own pace, in their own space and on their own time. This not only reinforces content knowledge but also serves as a form of monitoring and self-regulation. Modules, thus, need to be *assessment-driven*, with learners assessed in meaningful ways, preferably through authentic tasks based on *real world problems*.

Efforts to nurture constructivist thinking and beliefs can also be made at the second interface of learning at OUM – face-to-face sessions between instructors and learners (please refer to Figure 3). These face-to-face sessions are held at least three to five times a semester, in the form of tutorials (for undergraduates) and seminars (postgraduates).

If we wish to close the gap between the learning environment at OUM, its learners and instructors, care must be taken to ensure that these face-to-face sessions do not end up offering the same normative, linear teaching experience that is so predominant in traditional lectures.

Since the constructivist perspective emphasizes the affective domain in learning (Lebow, 1993) as well as the social construction of knowledge (Vygotsky, 1978), instructors need to ensure that face-to-face sessions are not confined to just academic sharing but should also nurture *caring, camaraderie* and *esprit de corps* (Eshet et al, 2002). This means instructors need to actively work at creating a *collaborative learning environment* which will allow learners to interact meaningfully, work together on tasks, bounce ideas off each other and draw on each other’s diverse life experiences.

Kelly (1970) described the constructivist’s view of the world as never constant – it is always changing because human beings are always construing and learning, and never inert. In line with this perspective, learners therefore need to be exposed to *multiple perspectives* during face-to-face sessions, so that they may look at issues from different vantage points (Bednar et al., 1992). Instructors should be trained to implement strategies which present multi-faceted content such as problem solving based on *case studies* (Valasidou, 2005) as these can motivate learners to reflect on, and to evaluate, different perspectives and ideas.

To nurture and to promote constructivist thinking during face-to-face interactions, instructors can model *problem-solving processes* and coach learners on self questioning, reflection and other metacognitive skills.

At this juncture, it may be pertinent to mention that there may be a need to provide some form of *training* or *refresher courses* for OUM instructors to ensure they are well-versed in techniques that integrate constructivist principles in teaching and learning, for instance, setting *authentic tasks* (Collins, Brown and Newman, 1989) and *problem-based learning* (Barrows, 1985). Although most OUM instructors are academics with many years of experience, there may be some who are not familiar with constructivist perspectives and strategies of instruction.

This training, which can be provided either on a regular or needs-based basis, should focus on changing instructors' mindset (to make them more receptive of constructivist practices) as well as honing skills to help them implement constructivist teaching.

The proposed conceptual framework also illustrates clearly the elements that can help to nurture constructivist beliefs and practices in OUM's third interface of learning, that is, myLMS.

Measures to interject constructivist elements in this interface are two-fold.

The first involves tapping into existing elements. As can be seen in Figure 3, there are already many learning objects and technological tools in myLMS that lend themselves to constructivist principles of learning, for instance, online forum and discussion groups which foster *personal meaning-making* (Jonassen et al., 1995), digital notes, I-Radio, email etc.

Online forums and discussion groups can encourage the social construction of knowledge but instructors may need more training before they can effectively engage in this process. A cursory check of comments posted in several forums suggested that most postings by learners tend to focus on assignments – usually in the form of comments, laments and questions - resulting in learners “playing the game” of assessment (Oliver and Shaw, 2003). However, with the right training and proper guidance, learners and instructors can be steered towards a higher level of discourse in the forum rather than just engage in surface learning.

The second measure involves introducing new elements which may pave the way for nurturing constructivist beliefs and practices. Suggestions include setting up avenues for learners who, for various reasons, are not comfortable about participating online but prefer watching and learning on the side – “lurkers” (Beaudoin, 2002) who are not free riding in the ODL environment but for whom active online participation is difficult or unwanted.

Ghulati (2004) also highlighted this need to provide some kind of acknowledgement for individuals who prefer to learn *informally* and *silently* when they are online by suggesting that informal learning spaces be set up so that learners feel confident and supported when working on their own and with each other.

Since the constructivist perspective recognizes and accepts diversity in education, this measure seems in line with attempts to nurture and to promote constructivism. A *shared digital space* in myLMS where learners can interact informally – pool resources, collect thoughts and reflections about their work and thinking, write collaboratively and critique each other's contributions – seems worthy of consideration.

New technological tools such as *blogs*, *webcasts*, *e-portfolios* and even interactive *educational games* can also be set up to make myLMS a more engaging interface for learners to “hang out”.

OUM has also recently come up with alternative modes of assessment via *MCQ* questions. These questions can serve as excellent “bridges to learning” if provided with *strong linkages* to the outside world as well as references to supplementary, related learning material.

Recent research with a mobile learning project shows that some OUM learners do not know what to do with certain technological tools. To assist less technologically-savvy learners, a *learning organizer* that integrates all learning objects and provides a “where-to” and “how-to” guide for learners may also make myLMS a more “user-friendly” place. This can comprise features such as a *guided, virtual tour* of resources available to OUM learners and how to use these resources at different stages of learning, a list of *FAQs* for self-managed trouble-shooting, a *timeline* to inform students of what they need to do at different stages of their learning, with links to sources of help or reference, etc.

Just as the Internet can be a digital forest, so too can myLMS be a digital fortress in which less IT-savvy learners wander, lost and directionless.

To sum up, various measures can be taken to strengthen the foundation for constructivist learning in the ODL environment. These measures – directed at the three interfaces of learning at OUM – have been summarized and presented in the form of a conceptual framework as shown in Figure 3.

The idea is not so much to make a drastic change to the learning environment at OUM as it already contains all the elements necessary for effective constructive learning, but to CONSCIOUSLY steer learners and instructors towards the constructivist perspective. Most of the elements of constructivism are already present in all three interfaces – what remains to be done is purposefully direct learners' and instructors' attention to these elements, and to complement these efforts with some form of training in instructional strategies based on constructivist principles.

Summary

To summarise, this paper looked at the instructional and learning styles preferred by OUM instructors and learners to try and determine if they are more inclined towards the constructivist or behaviourist perspective. Research findings suggest that OUM instructors and learners show NO significant inclination either way.

This finding has two implications:

- Firstly, that OUM learners and instructors are still open to nurturance and guidance and can be moulded either way.
- Secondly, since they can be moulded to become EITHER behaviourist OR constructivist, some sort of plan, blueprint or framework needs to be drawn up to consciously and actively steer them towards the constructivist perspective, if that is what the institution wants. In this way, the gap between learners, instructors and the learning environment at OUM can be bridged.

A number of measures were proposed, including making concerted efforts to enhance the functionality of existing constructivist elements, giving voice to the informal in the ODL environment, and providing some form of training to instructors to change their mindsets and give them the skills to promote and to engage in active learning in a constructivist environment.

These measures were then presented as a conceptual framework as shown in Figure 3.

Conclusion

While this paper examined the adoption of the constructivist perspective in an ODL environment, it does not, in any way, prescribe this as the best philosophy to guide teaching and learning processes in such an environment.

It is true that constructivist principles and beliefs have emerged as one of the greatest influences on the practice of education in the last 25 years and is now enthusiastically embraced in many ODL settings. However, this philosophy is not without its limitations and cannot be considered as the panacea for all instructional problems. What constructivism does offer is, an alternative view of learning and a set of design principles and strategies to create learning environments where learners can negotiate meaning and construct reality.

It is up to the respective institutions to evaluate different educational perspectives and models, and to identify one most suited to their needs.

If, after examining the pros and cons, the institution believes that the constructivist perspective is of best-fit, then it may be timely to identify elements of constructivism already present in the environment, and strategise on ways to actively enhance these elements while looking for new elements which can be introduced.

References

1. Barrows, H. S. (1985). *How to design a problem based curriculum for the preclinical years*, New York: Springer Publishing Co.
2. Beaudoin M (2002), Learning or Lurking? Tracking the "invisible" online student, *The Internet and Higher Education*, 5, pp147-155.
3. Bednar, A. K., Cunningham, D., Duffy, T. M. & Perry, J. D. (1992). Theory into practice: How do we link? In T. M. Duffy and D. H. Jonassen (Eds.) *Constructivism and the technology of instruction: a conversation*, Hillsdale, NJ: Lawrence Erlbaum Associates, 17-35.
4. Brown, J. S., Collins, A. and Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18 (1), 32-41.
5. Cognition and Technology Group at Vanderbilt (1992). Emerging technologies, ISD, and learning environments: critical perspectives. *Educational Technology Research and Development*, 40 (1), 65-80.
6. Collins, A., Brown, J. S, and Newman, S. (1989). Cognitive apprenticeship: teaching the crafts of reading, writing, and mathematics. In L. Resnick (Ed.) *Knowledge, learning, and instruction*, Englewood Cliffs, NJ: Erlbaum, 453-494.
7. Ertmer, P.A. & Newby, T. (1993) Behaviourism, cognitivism, constructivism: Comparing critical features from an instructional design perspective, *Performance Improvement Quarterly*, 6(4), 50-72
8. Eshet, Y. (2002). Digital literacy: a new terminology framework and its application to the design of meaningful technology-based learning environments. In Barker, P and Rebelsky, S (eds), *Educational Multimedia and Hypermedia*, 2002, pp 493-498.
9. Goodyear, P. and Hativa, N. (2002). Introduction: Research on teacher thinking, beliefs and knowledge in higher education. In N. Hativa and P. Goodyear (Eds), *Teacher thinking, beliefs and knowledge in higher education*, pp 1-13, Dordrecht: Kluwer academic publishers.
10. Gulati, S (2004). Constructivism and emerging online learning pedagogy: a discussion for formal to acknowledge and promote the informal. Paper presented at the Annual conference of the *Universities Association for Continuing Education – Regional futures: Formal and Informal Learning Perspectives*, Centre for lifelong learning, University of Glamorgan.
11. Jonassen, D. H. (1991). Objectivism versus constructivism: do we need a new philosophical paradigm? *Journal of Educational Research*, 39 (3), 5-14.
12. Jonassen, D., Davidson, M., Collins, M., Campbell, J. and Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education*, 9 (2), 17-25.
13. Kelly, G. (1970). A brief introduction to personal construct theory. Chapt 1, pp 1-29. In Bannister, D (1970) (Ed). *Perspectives in personal construct theory*. London. Academic Press.
14. Lebow, D. (1993). Constructivist values for systems design: five principles toward a new mindset. *Educational Technology Research and Development*, 41, 4-16.
15. Oliver, M., and Shaw. (2003). Asynchronous discussion in support of medical education. Vol. 7 No. 1. February pp 56-67. Available online: http://www.aln.org/publications/jaln/v7n1/pdf/v7n1_oliver.pdf Accessed on: 15 May 2009.
16. Petraglia, J. (1998) The real world in a short lease: The (mis)application of constructivism to the design of educational technology, *Educational Technology Research and Development*, 46(3), 53-65
17. Romiszowski, A. and J. de Haas. (1989). Computer-mediated communication for instruction: using e-mail as a seminar. *Educational Technology*, 29 (10), 7-14.
18. Tam, M. (2000). Constructivism, Instructional Design, and Technology: Implications for Transforming Distance Learning. In *Educational Technology & Society*, 3(2). Available: http://www.ifets.info/journals/3_2/tam.html. (2009, May 15).
19. Tenenbaum, G., Naidu, S., and Austin, J. (2001). Constructivist pedagogy in conventional on-campus and distance learning practice: An exploratory investigation. *Learning and Instruction* 11:87-111.
20. Valasidou, A., Sidiropoulos, D. & Makridou-Bousiou, D. (2005). The Constructivist Perspective in Distance Learning Environments. In P. Kommers & G. Richards (Eds.), *Proceedings of World*

Conference on Educational Multimedia, Hypermedia and Telecommunications 2005 (pp. 1932-1935).
Chesapeake.

21. Vygotsky, L. S. (1978). Tool and symbol in child development. In M. cole, V. John-Steiner, S. Scribner, and E. Souberman (Eds). *Mind in society: The development of higher psychological processes.*, Cambridge, Mass.: Harvard University Press.
22. Vygotsky, L. S. (1986). *Language and thought*, Cambridge, Mass.: MIT Press.
23. Woolfolk, A. E. (1993). *Educational psychology*, Bosten: Allyn and Bacon.