MANAGING TEACHING AND LEARNING IN DIGITAL CLASSROOMS: THE LEARNING FACTORY MODEL

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Abstract
Mauritius recently embarked upon a digitization of primary school curriculum programme. In the context of this initiative, the Mauritius Institute of Education was entrusted with the tasks of designing and developing digital learning resources, empowering stakeholders at various levels to work with digitized curriculum and conduct research on the topic of digitization.

Case studies are applied in social sciences to capture the essence of the complexity of a single case. The notion of case is not well defined in literature. However in the context of this paper, the subjects, headmasters, are the case. They can be described as digital migrants operating in an increasingly digitized educational set-up. Headmasters of Mauritian primary schools function in a very complex environment and have multiple tasks. To add to their workload, they presently have to monitor classrooms equipped with digitized educational resources and teachers trained to use these resources. Hence the ‘case’ of this case study operates in an evolving environment and faces the contemporary issue of dealing with technology in education.

Methodology
Case studies are applied in social sciences to capture the essence of the complexity of a single case. The notion of case is not well defined in literature. However in the context of this paper, the subjects, headmasters, are the case. They can be described as digital migrants operating in an increasingly digitized educational set-up. Headmasters of Mauritian primary schools function in a very complex environment and have multiple tasks. To add to their workload, they presently have to monitor classrooms equipped with digitized educational resources and teachers trained to use these resources. Hence the ‘case’ of this case study operates in an evolving environment and faces the contemporary issue of dealing with technology in education.

Case study as methodology has appeared in the 1900’s stemming from the field of anthropology. Accounts of expeditions, explorations and encounters with different cultures were systematically charted down. Participant observation remained the principal method of investigation. The liking for case studies decreased in the 1940’s and 1950’s due to the rise of the positivistic stance. Recently, case study has re-emerged as an important methodology in social sciences.

There are essential characteristics to a case study, the first one being triangulation. Triangulation is an essential way to ensure validity of the case study. This is done by looking at the case from multiple perspectives. Indeed empowering headmasters to effectively monitor digital classrooms is described from their own [headmasters’], the programme designers’ and the researcher’s perspectives. The programme designers’ perspective is presented in programme design notes as well as in reports they gave of workshops held with headmasters.

The headmasters’ perspectives are available in post-workshop feedback and in post-workshop field work reports. Prior to the workshop, informal conversations were also conducted with teachers and headmasters in schools.

The second aspect important to the case study methodology is the selection of the case. In the context of this paper, post-workshop feedback is available for over 200 headmasters, which makes about 66% of the sampling frame. However, only 12 schools were visited to gather post-workshop field notes. Therefore generalization of the case is problematic. However, given the qualitative nature of the research, the focus is much more on authenticity of the case rather than on generalizability.
The other type of individual is called digital immigrants or migrants. Most of the headmasters and indeed educators were not born in the digital era. They easily relate to technologies such as mobile telephony, Internet and other devices such as tablet PCs. They are indeed digital natives and immigrants process information differently. Natives are those who are born in the digital era. For them, technology is commonplace. They are indeed native speakers of the digital language. With reference to this explanation, all primary school students are digital natives. They easily relate to technologies such as mobile telephony, Internet and other devices such as tablet PCs.

Transference issues regularly arise in qualitative studies. Qualitative researchers rightly ask themselves the question whether their work can be applied to other situations. Although each case is different, the idea of transferability should not be discarded. If experts in the field think that cases investigated in the research study are similar to theirs, they might relate to their own context. Therefore, a full description of the context is needed. Dependability deals with questions of reliability. Processes of the study have been reported in detail to enable subsequent researcher to use the processes for similar research.

The type of case study in the context of this paper can be described as an illustrative case study. It is used to make the unfamiliar familiar. Given that headmasters’ empowerment in relation to digitized curriculums in school is a rarity, it was deemed appropriate to go for an illustrative case study. The case study has strived to answer three research questions. These are namely:

1. What is the headmasters’ empowerment programme to manage teaching and learning in digital classroom about?
2. How was the programme designed?
3. To what extent has the programme been successful?

It must be noted that case studies is a common method used in the field of ICT and education. A case study done in the context of OECD countries in ICT in innovative schools (2001) adopts a historical approach to the case. It focuses on the elements that have driven ICT and innovation in the 1980’s and 1990’s in OECD countries. In another context, a Ugandan case study presents the challenges and opportunities in ICT educational development (2007). This case study uses a different approach. It identifies the challenges posed to the development of educational programmes and describes how Uganda faced them. Yet another approach is described in an Asian case study on ICT and Education in the West Bengal state of India (2010). This study adopts a survey approach with demographic data. It also gives a thick description of the state of affairs in the education sector which is backed by the description of the policy framework regarding ICT and education. The case ends with how the policies were implemented.

Theoretical Framework

The work of Weick (1995) is central to understanding how the programme was designed. Sensemaking can be defined as the structuring of the unknown (Waterman 1990). By this he means that the necessary stimuli should be placed on a given set-up to enable us to comprehend, understand, explain, attribute, extrapolate, and predict (Starbuck & Milliken, 1988, p. 51). This approach is very useful when dealing with complex organisations or individuals who have multi-faceted functions in organisations. Indeed both are true in the case of the HM. Schools are complex organisations and headmasters do have multi-faceted functions.

Sensemaking has occurred at two levels in the context of deploying the empowerment programme for headmasters. The first level is that of the programme designers. The second level is the headmasters; indeed they had to make sense of the Managing Teaching and Learning in Digital Classroom workshop.

According to Weick, members of organisations (headmasters in schools) extract cues to action from the changing environment in which the organisation finds itself. What is seen as significant will vary, and is influenced by previous experiences and underlying values. The action that occurs as a result of these cues will in turn change the environment within the organisation and will play a part in determining which cues are taken on consideration in future (Weick, 1995). Surveys and other data gathering strategies such as informal conversations with teachers have helped in making sense of the role of the headmaster.

In relation to research, the case of General Practitioners [GPs] in Weick (1995) are more likely to notice research evidence that concentrates on technical diabetic control, and less likely to notice evidence that concentrates on psychological issues. They will alter their practice according to evidence that is congruent with their beliefs, and this will then reinforce their belief in the importance of technical control. In reality, most GPs recognise the importance of both aspects of diabetic care; however, this example illustrates how the ongoing feedback that Weick describes might work in practice. Weick states that the process of sensemaking in this context is rooted in identity construction. How a GP cares for a patient with diabetes is not only a technical question, but also one of identity, for example: 'What kind of a doctor am I?' Weick argues that sensemaking is also tied up with collective identity: 'What kind of a practice are we?' This is not necessarily a shared identity, as complete consensus is unlikely in any organisation, but it does represent an identity which members of the organisation feel they can accept.

This study examines the notion of sensemaking in general practice. It investigates the usefulness of the concept and how, if practices ‘make sense’ differently, this is manifest. This study also examines factors that inform the sensemaking process at both levels (Headmasters and programme designers).

This study also draws from two other frameworks, namely the digital native and digital migrant concepts of Prensky (2001) and distributed leadership.

Prensky’s identified two distinct individuals in the digital era: digital natives and digital immigrants. According to him, digital natives and immigrants process information differently. Natives are those who are born in the digital era. For them, technology is commonplace. They are indeed native speakers of the digital language. With reference to this explanation, all primary school students are digital natives. They easily relate to technologies such as mobile telephony, Internet and other devices such as tablet PCs. The other type of individual is called digital immigrants or migrants. Most of the headmasters and indeed educators were not born in the digital era. They have migrated into the technological age in the sense that they had to adapt to technologies. According to Prensky, they [migrants] think and pre-digital age. They are for instance more at ease with print materials than soft copies. They would rather receive information in a sequential and structured manner which is diametrically opposed to the way natives received information from concurrent sources at the same time. The issue that arises is how to we teach digital natives, who are multi-tasking individuals, who live in a world with ever-present visual stimuli and information from every direction and source possible? The introduction of interactive projectors in Mauritian primary schools is an attempt to bridge the gap between increasingly pre-digital classrooms and learners; digital natives.

It has been suggested by Prensky that educators should try to learn the language of digital natives so as to better teach them. What about headmasters then who find themselves a generation or so older that the educators? The paper tries to answer the question as to how the older generations make the leap or whether they are capable to make the leap into the digital age.

The next conceptual framework is distributed leadership. In a sense, it already provides an answer to the questions raised above. The flavor of distributed leadership relevant to this paper follows the African notion of Ubuntu (Grant, 2008). Ubuntu can be defined as I am what I am because of who we all are. Ubuntu is about caring and recognizing everyone’s merit within a given set-up. That set-up can be a school. Distributed leadership built on Ubuntu means that the contribution of every member of a given community is recognized. Not only...
The reasons behind monitoring the teaching and learning process in a digital classroom were clearly explained to the headmasters. They were also cited. Furthermore, assessment was also presented as a learning event in the sense that vicarious learning can occur when pupils observe their peers interacting with the classroom interface. Measuring pupils' attainment was put high on the list. Feedback for improvement, and giving learners control over their own learning was also discussed. There may or may not have been other members in the audience. Some forms of interactivity are drag and drop and mouse click. Learner interaction with the resource is important. The Mauritian school context is nuanced however, as we will discuss in the sections to follow.

In this section, we discuss the programme in relation to the theoretical framework outlined above. The programme was structured in a way that it presented the foundations of the Sankoré, namely the context of the project and its aims. It was also sequentially organized so that it gave headmasters an insight into their roles in the implementation of the digitized curriculum.

The workshop programme covered the following aspects:

- Context
- Distributed Leadership
- Implementing digital curriculum
- Monitoring teaching and learning in the digital classroom
- Tools and templates
- Hands on

Setting up the context was always necessary to understand the advent of digitized curriculum and classrooms. One headmaster indicated in post-workshop feedback that he had no idea of what Sankoré was about. There may or may not have been other members in the audience with similar profiles. The context dealt with the Franco-British initiative that led to its inception. More importantly, the context of digital natives was highlighted. Indeed, headmasters reported that pupils will benefit a lot if a proper monitoring could be done at school level. A quotation from Dewey appropriately highlighted the context: If We Teach Today as We Taught Yesterday, We Rob Our Children of Tomorrow. This section briefly exposed the pedagogical leaders to the teaching and learning process in a digital classroom and to an overview of empowerment activities with educators so far. They were also apprised of the array of digitized educational resources available to them. Then the workshop stepped into the concept of distributed leadership which the leaders can adopt to monitor educators in the digital classrooms. The concept was itself introduced. The audience was no stranger to leadership concepts as all headmasters have to go through a Diploma in Educational Management at the Mauritius Institute of Education to be promoted to the grade of headmaster. However, the notion of distributed leadership in the context of this programme was presented as the setting up of a dialogue among the different members of the school community. For example, the importance of headmaster-teacher, headmaster-ICT support officer, teacher-teacher interactions were highlighted. These interactions are necessary for the proper pedagogical use of the digital classroom as well as for its maintenance. Emphasis was laid on team work at school level. The responses of the workshop participants went in the right direction as far as the organizing team was concerned. Headmasters felt that they had an appropriate tool to monitor classrooms. They also laid emphasis on the role of the ICT support officer for keeping digital classrooms up and running. On the downside, post-workshop observations at school level showed that only 2 schools out of 12 had effectively implemented distributed leadership.

Since the digital resources designed are based on the National Curriculum Framework, the headmasters were presented with the different concepts of curriculum development involved in a digital classroom. The lesson planning with the integration of digital tools were presented to the Headmasters as they will have the task of monitoring and evaluating the educators’ lessons. Moreover, they were introduced to the techno-pedagogical model shown below. They were made aware of the different elements of the model namely the learner, the teacher and the digitized resources. The relationships among these elements were also discussed with them. For instance the teacher-resource relationship is enlivened with proper planning. Here, much emphasis was laid on lesson planning with the purpose to integrate technology in the classroom practice. Headmasters were also encouraged to guide and monitor teachers with regards to knowledge of content, knowledge of technology, knowledge of curriculum and effective use of resource. Support to the headmasters in these areas is provided by the Learning Factory.

The foundation of the teacher-learner relationship is communication. By communication it is meant that teachers must engage learners to talk around a resource that is displayed on the interactive interface. Conversations should be productive and generate new constructions of knowledge. Communications also mean giving opportunities for feedback and reflection to learners. Communicating also ensures that teachers verify whether or not they have attained the learning objectives they had set for the lesson. The learner-resource relationship is enacted by interaction. The interactivities present in the digitized resources were introduced to the audience. Some forms of interactivity are drag and drop and mouse click. Learner interaction with the resource is important. Resources can be used to stimulate the attention of learners. It can also be used to elicit prior knowledge and to make them interact with various screen elements.

All these gave the headmasters a better indication of the digital classroom teaching and learning processes. In the same breath, the reasons behind monitoring the teaching and learning process in a digital classroom were clearly explained to the headmasters. Measuring pupils’ attainment was put high on the list. Feedback for improvement, and giving learners control over their own learning was also cited. Furthermore, assessment was also presented as a learning event in the sense that vicarious learning can occur when pupils observe their peers interacting with the classroom interface.
The last part of the workshop was focused on hands-on activities. The headmasters were able to manipulate the tools on the interactive whiteboard. They were given the opportunity to explore the different features of the board as well as using the different tools to perform certain tasks such as importing a digital asset to the software library. After using the tools, the leaders were be in a better position to understand the teaching and learning process in the classrooms and also evaluate and monitor the educators during their classes. This was confirmed by some post-workshop feedback received.

**How was the programme designed?**

Oojorah (2011) identified headmasters as a key stakeholder of the digitization of curriculum project. They had to be empowered as they hold crucial functions at school as pedagogical leaders. Given the initial assessment made on their capabilities [as digital immigrants], they were running the risk of being completely overrun by the introduction of digital classrooms and digital curriculum.

A needs analysis was conducted to identify the specific needs of the audience in order to be able to address them properly in the workshop programme. A small survey was conducted on a sample of 20 headmasters from the 200. All of them replied that the use of Sankoré tools is unknown to them and that they would highly be interested and motivated to know more about the Sankoré project and its implementation in the classroom. They put forward that it is a must for them to get acquainted with the different tools and skills needed to use the interactive board in order to be able to monitor educators in a digital classroom. However, during an induction to the project, it was observed that headmasters were reluctant to participate in hands on activities with the interactive interface.

Questions were being asked by the project team as to whether it was necessary and possible to make headmasters competent users of technology. Or was it better to make them understand teaching and learning process in a digital classroom? They were definitely not equipped with the necessary skills and knowledge to manage the teaching and learning process in a digital classroom. To address this issue, the teaching and learning practices in the digital classroom were theorized into the Learning Factory techno-pedagogical model.

For example, it was debated among project staffs that some headmasters in practice make sense of their role as being predominantly concerned with the performance of the educators, then their roles in their practice will focus on physical parameters, such as the digitized resources used, the performance of the learners and the planning of the teachers with regard to the digital resources which is clearly illustrated in the techno-pedagogical model used as a basis for the HM training workshop. However focusing on these aspects does not provide a full picture of all the interactions in the digital classroom.

Some headmasters, it was argued, are less likely to pay attention to the communication of the teachers with the learners and interaction of the teachers and learners with the resources. In observing the teachers in their classes using the digitized curriculum, they will collect data which inform them how they are performing in terms of the physical parameters. They are likely to concentrate on changing methods or developing better pedagogical templates rather than organizing. Thus, the fundamental beliefs that the group of educators hold about the nature of their role will influence how they deliver their lessons, how they communicate with the learners, and how they plan their lessons with regard to the digitized resources. Because they are not looking for psychological issues, they are less likely to notice if they are failing to deliver high quality psychological support. This process is circular (Weick calls it ‘on-going’). In other words, the beliefs that people hold about what their role is, will determine which cues they notice in the world around them; this in turn will determine how they behave. How they behave will change the environment in which they are working, and will affect which cues they notice in the future as well as their beliefs about their role.

From data gathered from survey, informal conversation with teachers during school visits and the in-house discussions, it was concluded that a workshop programme is needed to equip the headmasters with the different skills and knowledge about this new form of pedagogy in our primary schools. In a sense, it echoed the in-house conclusions reached by the project team.

The programme was mainly designed based on the competencies of different members of the project team. The Sankoré team consisted of designers of the digital resources who were previously primary school teachers. These persons are equipped with a rare blend of technological and pedagogical know-how. This dual competency of the designers led to a workshop programme based on the technological aspects of the digital classroom as well as the pedagogy behind it. Besides, an academic from the field of curriculum studies and evaluation also contributed to the programme by integrating her knowledge of curriculum in a digital classroom into the project. All the above contributors discussed about the components of the programme through brainstorming sessions. This session was very fruitful as lots of ideas helped the team to have a clearer view of the aim and objectives of the workshop. It helped in making sense of the role of the headmasters in the context of digital classrooms and digitized curriculum.

Hence, the sessions helped in deriving the aim and objectives of the workshop. The aim was to empower pedagogical leaders to manage teaching and learning in digital classroom. The objectives were multifarious. They were to empower the headmasters to:

- Understand the context
- Share leadership to sustain the project
- Implement teaching with technology
- Monitor the digital classroom using the DCM model
- Assess Digital classroom using proposed checklist
- Apply techno-pedagogical skills to monitor the digital classroom

Once the aim and objectives were well established, several meetings were held whereby the different components of the workshop were discussed. From this discussion the team coined a new model for the digital classroom: the Learning Factory techno-pedagogical model.
In this model, the learner is put at the apex as he/she is the central to the class. The digital classroom is a learner-centred curriculum. The model clearly illustrates the different elements that are important for the headmasters to pay attention to during the monitoring process. It gives a clear picture of the different processes in a digital classroom.

The techno-pedagogical model was used as a base for the whole workshop programme. The different components of the workshop were all related to the model.

The next step was to separate the tasks according to the different competencies of each member of the team and each one contributed in order to have a very sequential and organized workshop programme. It was collectively decided that the theories behind each component must first be made known to the leaders in order for them to understand clearly the rationale behind the workshop. Besides, it was also concluded that the best way for the headmasters to learn about the different skills that the educators should have in a digital classroom was learn by doing. In that respect, more than half of the one-day workshop was focused on the hands-on session. This session allowed the leaders to use the different tools of the interactive whiteboard and get acquainted to the different skills needed. From the post-evaluation, it was noticed that 90% of the participants asked for more training sessions for actually using the digital classroom hardware and software, which proved that the training session was very helpful to the headmasters in understanding the use of the interactive digital interface better.

To what extent has the programme been successful?

The workshop provided headmasters with the opportunity to manipulate the tools used in the digital classrooms. All participants concluded that the sessions were very interesting and enriching. They also pointed out that the training were very clear and they could get a clear picture of the teaching and learning process in a digital classroom and they roles to monitor the process.

This response relates to the concept of tactical authenticity as the Headmasters perspectives derived from a practical session called the “Hands-on”. They could use the tools before coming to a conclusion. The positive responses of the headmasters correlate with the designers’ perspectives of empowering pedagogical leaders. Furthermore, all processes have been fully detailed during the workshop preparation. This can ensure transferability or even re-versioning of the same workshop concept.

In addition, their requests for more sessions further confirm the success of the workshop in terms of the leaders’ appreciation. However, success of this empowerment initiative can only be fully measured by field observations of headmasters at work.

Observations in 12 schools have been carried out 2 months after the workshop. It has been noted with much concern that headmasters were not implementing the distributed leadership framework. Nor were they using the techno-pedagogical model as a framework for monitoring classrooms. Only 2 schools out of 12 were doing so. The reasons cited for not doing so were firstly because of hectic schedules and impossible workloads for headmasters.
What could be crucial is that the educational authorities, namely the Ministry and the inspectorate have not yet endorsed the
techno-pedagogical model, which is a relatively new concept in the educational landscape in Mauritius. It is interesting how the model can
be used teaching, learning and evaluation of teaching and learning. However, given its novelty, the model must make its way, get
appropriated by stakeholders such as teachers and headmasters.

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