World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:14, No:3, 2020

Building a Transformative Continuing Professional Development Experience for Educators through a Principle-Based, Technological-Driven Knowledge Building Approach: A Case Study of a Professional Learning Team in Secondary Education

Melvin Chan, Chew Lee Teo

***Abstract*—**There has been a growing emphasis in elevating the teachers' proficiency and competencies through continuing professional development (CPD) opportunities. In this era of a Volatile, Uncertain, Complex, Ambiguous (VUCA) world, teachers are expected to be collaborative designers, critical thinkers and creative builders. However, many of the CPD structures are still revolving in the model of transmission, which stands in contradiction to the cultivation of future-ready teachers for the innovative world of emerging technologies. This article puts forward the framing of CPD through a Principle-Based, Technological-Driven Knowledge Building Approach grounded in the essence of andragogy and progressive learning theories where growth is best exemplified through an authentic immersion in a social/community experience-based setting. Putting this Knowledge Building Professional Development Model (KBPDM) in operation via a Professional Learning Team (PLT) situated in a Secondary School in Singapore, research findings reveal that the intervention has led to a fundamental change in the learning paradigm of the teachers, henceforth equipping and empowering them successfully in their pedagogical design and practices for a 21st century classroom experience. This article concludes with the possibility in leveraging the Learning Analytics to deepen the CPD experiences for educators

***Keywords*—**Continual professional development, knowledge building, learning paradigm, andragogy.

I. Introduction

IN a society that is constantly seeking ways to design and enculturate youths into active learning and collaborative inquiry, then shift towards the new norm of active and collaborative inquiry is still in its early stage (model of transmission/conventional learning is generally more favoured) for many of the CPD programs for educators around the world [1]. Without personal experiences and engagement in working and learning within a collaborative and technological culture, it would be relatively challenging for educators to successfully propel, promote and pursue such learning environment and processes in the classroom context [2]. This will in turn severely compromise the students' readiness and preparedness for their future in a VUCA world. It is with this urgency that the need for a transformative and future-ready CPD is critically required.

Knowledge Building (KB) approach emphasizes that knowledge is best constructed socially and authentically within a technological setting where learners co-own the problems, processes and practices [3]. This absolutely aligns with the heartbeat of a 21st century CPD where the focus is on nurturing, equipping and building teachers' learners with collaborative, critical, creative and technological competencies so as to better inculcate these dispositions to the youths of tomorrow. Together with the successful integration of the basic principles of effective andragogy [4] and the philosophical social essence of the progressive learning theories [5], the KBPDM (refer to Fig. 1) acts as a key enabler in providing a meaningful, productive and constructive 21st century professional learning environment where the capacity for professional autonomy and collaboration is highly valued and represented.

II. Background and Methodology

A. Participants and Context

Participants of this study are members of a school-based PLT that consists of teachers with varying teaching subjects and years of teaching experience. ¾ of the participants are familiar with the use of Knowledge Forum (KF), the technological tool of the KB approach. For the past 2 years, this PLT team has been following a structure with a stronger focus on transmitting strategies and skills and not so much on designing curriculum and practice. For example, there was the adoption of the cascade model, a model mainly used train specific practice in standardized school-wide implementation; a second example is the use of the traditional coaching model where a novice teacher will be provided with instructional support and technological guidance from a more experienced teacher. The various initiatives serve to elevate the teachers' proficiencies concerning their subject mastery and pedagogical content knowledge. However, through classroom observations and students' survey, there exists an uneven practice of collaborative, critical and creative components in classroom practice. In addition, the school has also seen positive correlations between teachers' ownership in PLT to that of a collaborative and creative classroom. The extent in

Joo Seng Melvin Chan is with the MOE, Teck Whye Secondary School, Singapore, Singapore (e-mail: chan_joo_seng_melvin@moe.edu.sg).

which teachers are allowed to creatively examine an issue is reflected in the way they work with their class. These indicators point to a necessity to overhaul and re-structure the entire CPD experiences and way of doing. It is in this context that the KBPDM prototype is being created for use in this PLT for 2019.

B. KBPDM

Bringing in the principles of effective andragogy, KBPDM (Fig 1) localizes it for easier understanding and implementation through the 4Ps: Recognizing that Personal Experiences matters, adult learners want to solve Problems with Practical Learning and working adults learn best when they own the Process. Synthesizing it together with the KB principles [6] and TWSS KB Pedagogical Framework, KBPDM formulates and devises the ABC approach that comes in handy in facilitating the CPD paradigm shift towards an active and collaborative form of future-ready professional learning. The ABC approach can be easily summed up as follows: Acknowledge Experiences, Build Competencies and Champion Improvable Culture (refer to Fig. 2 for its alignment and Fig. 3 for the detailed description of the various components).

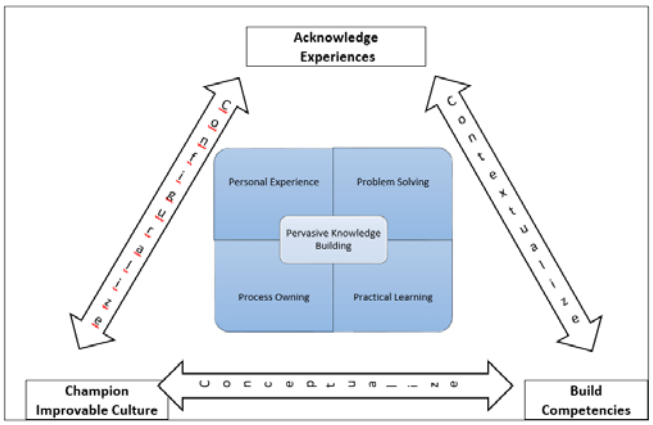

Fig. 1 TWSS KBPDM

Components of KBPDM	Principles of Andragogy	TWSS KB Pedagogical Framework	KB Principles
Acknowledge Experiences	Personal Experience Problem Solving	Centrality of Learners' Voices: Idea Generation	Democratizing Knowledge Real Ideas, Authentic Problems
Build Competencies	Problem Solving Practical Learning Process Owning	Culture of Build-On: Idea Development	Constructive use of Authoritative Sources Community Knowledge, Collective Responsibility Epistemic Agency
Champion Improvable Culture	Practical Learning Process Owning	Course of Rising Above: Idea Reflection	Improvable Ideas Real Ideas, Authentic Problems

Fig. 2 Alignment of the KBPDM to the Principles of Andragogy, School's KB Pedagogical Framework and KB Principles

Components of KBPDM	Description	Sentence starter (scaffold) in online discussion forum (KF)
Acknowledge Experiences	*Stage of Contextualization* Using the evidence-based approach (offline and online artefacts in KF), members of the PLT team share their individual success stories and the areas of concerns/ challenges/ contemplation concerning their pedagogical practices and designs. With these contextual considerations, the team proceeds to the identification of 1-2 areas for collaborative inquiry. The remaining areas of concerns are uploaded onto another KF view for personalized/ small-group inquiry.	My Theory
Build Competencies	*Stage of Conceptualization* Upon the confirmation and ownership of the collaborative inquiry issue, the PLT team enters into a communal phase of professional learning and growing. The following are the 2 broad aspects of their involvement: (i) Knowledge Competencies: Identification and discussion on the associated and extended KB Principles, Rigorous dialogic academic conversation on (Inter) Disciplinarity Content Knowledge and (ii) Technological Competencies: Recognizing the technological development, evolution and expansion of the KF Affordances. For each of the aspects, they are required to carry out literature review, research on latest progress and reflect on possible pedagogical and/or technological intervention strategies and design tools arising from it.	This Theory does not explain I need to understand Putting our Knowledge Together New Information
Champion Improvable Culture	*Stage of Configuration* Members of the PLT team are then invited to carry out peers' classroom observations (in actual classroom or via video recording) and focus-group discussions with the respective students. Broadly speaking, they will identify and create responses to the following 2 statements: What's Work? What's Next? As a team, they will then consolidate and synthesize the comments and learning experiences to strengthen and enhance on the pedagogical and technological design and practices for future uses.	New Information A Better Theory

Fig. 3 Description of the different components of KBPDM with its accompanying sentence starter to support face to face discussion and to develop reflective and progressive mindset

III. Analysis

Throughout the prototyping iteration, the PLT team collected a variety of essential data, ranging from quantitative (KF Learning Analytics, Survey Results) to qualitative (learning artefacts, reflection, classroom observations, Focus Group discussion and teachers' design documents). These data trace and study on the teachers' learning experiences in the PLT and its implications on the teachers' enactment and influences in the classroom setting. It focuses on the 4 key aspects and criteria of a transformative CPD: Collaborative, Creative, Critical and Technological. Collectively, it has been observed that having a principle-based and technological-driven KB CPD via the KBPDM correlates to a major affirmative shift in the learning and teaching paradigm of the

educators. This meant an increasingly tilt towards the pervasive culture of community-orientated, technological-enabled, and idea-improvement mode of 21st century professional discourse.

A. Key Findings on the Teachers' Learning Experience in KBPDM PLT

Culture of Idea-Improvement: Critical Thinkers and Creative Builders: The intentional use of KF scaffolds and KB Principles for all the PLT sessions contributes to the diversity of ideas and continuous conceptual synthesis of varying viewpoints and ideas (higher-order thinking/meta-cognitive) by the team. For example, through the KF scaffold on <Putting Our Knowledge Together>, it gets the team to consolidate, synthesize and rise above the initial diverse ideas of epistemic agency, socialisation and crossover learning to the bigger conceptual idea of experience-based learning. In a similar vein, the use of another scaffold <New Information> adds on a new innovative layer to the PLT discussion on consciousness with the ideas of tangible and intangible cultural practices in a classroom context. Such robust, rich and rigorous symmetric advancement was largely absent during the pre-KBPDM intervention where most of the views and ideas were predominately from the most experienced teacher(s) due to the lack of meta-cognitive structures and frames of thinking being introduced for the less experienced educators as part of the professional discourse.

Culture of Technological-Enabled: Technological Enablers. Integrating the use of Learning Analytics as part of the CPD culture in professional conversation and discussion (approximately 50% of the 2019 PLT sessions) enables the team to become more familiarized and accustomed with its functions and potentials. It has been observed that through this process, the team members are getting increasingly comfortable and at ease in the integrative use of Learning Analytics for CPD as interventional and pedagogical tools for educational measurements and classroom design. During a Focus Group Discussion, a member highlights how her initial anxieties and apprehensions on the incorporation of Learning Analytics for CPD and classroom practices had been alleviated and she is looking forward to bring this technological-facilitated and enabled practice to another PLT group that she is currently participating.

Culture of Community-Orientated: Collaborative Designers: Beyond working together in addressing the collaborative inquiry issue as seen above, the KBPDM model purposefully provides an opportunity where the pervasive KB principle is being put into action where it allows the utmost acclimatization of the PLT members to gain greater internalization, deepening and appreciation of the KBPDM when they sought to overcome the issue of personalized/small-group inquiry. Currently, a sub-group of this PLT undergoes the curatorship experience of creating a school-based KB Newsletter for the KB Singapore community. Through this double experiences, just like what a member had echoed in his reflection that he is now ready for a more flexible and dynamic community of practice form of professional development program.

In summary, the principle-based and technological-driven learning experiences in the KBPDM PLT helps to develop and cultivate within the teachers' dispositions, competencies and readiness of a 21st century professionals who are ready to engage in a community-orientated, technological-enabled, and idea-improvement mode of 21st century professional discourse, and certainly the creation of a future-ready classroom experiences for their students.

B. Key Findings on Its Constructive Implications on Teachers' Enactment and Influences in Classroom Teaching

Classroom that promotes a culture of Idea-Improvement: The students' survey (579 in total) reveals that there is an exponential growth in the use of KF scaffolds across the classes (~30% in pre-KBPDM to ~65% in post-KBPDM) and that students' ideas are being valued for class inquiry (~15% in pre-KBPDM to ~85% in post-KBPDM). Additionally, an analysis of the Secondary 1 artefacts reveals that close to 70% (a sharp increase from previous year) uses creative concepts to trace the history of Singapore. For example, a group is seen to use the fusion of food as a means to illustrate the evolution in the changing demographics and technological advancement in British Singapore. Together with the data from FGD and students' survey, it is evident that the contributing factors attributing to this shift revolves around the idea of teachers giving students the full autonomy of decision-making process (Centrality of Students' Voices) and the use of KF scaffolds that spurs deeper thinking and exchange of creative ideas (Culture of Build-On and Course of Rising Above).

Classroom that promotes a culture of Technological-Enabled practices: Through the data obtained from the classroom observations and teachers' design documents, all the teachers in this PLT group are observed to have been using a suite of the different KF analytical tools (beyond just Word Cloud) as an integral part of their pedagogical design, interventions and meditations to advance their students' learning. This trend corresponds to the students' survey data that show an increase in the average numerical rating scale from 1.25 (pre-KBPDM intervention) to 3.25 (post-KBPDM intervention), with a range between 2.5 to 4.0 (post-KBPDM intervention) across the different PLT members classes-- with regards to their teachers' use of KF Learning Analytics as part of their classroom delivery for at least once per week. With this context in mind, it is not surprising to see students from 2 of the classes beginning to use the data from KF Learning Analytics on their own in deciding their next move for their own content progression since their teachers have been actively using such approach in their classroom designs.

Classroom that promotes a culture of Community-Orientated: Similar to the above, with a higher social network density figures and increasing number of build-on entries as reflected in the Ideas Building network pattern (an average surge of about 3-4.5 entries per individual) across all classes in the post-KBPDM analysis, this certainly indicates a growing confidence, readiness and proficiency of the educators in carrying out a more collaborative classroom practices.

In summary, the research findings reaffirm and reinforce the idea that having a 21st century CPD experience for educators will bring forth and translate to the creation of future-ready students with future-ready classroom experiences.

IV. Conclusion

If you want to go far, do it together ~ African Proverb. Indeed, this quote sums up a key essence on the heart of a 21st Century CPD having a community-orientated approach to facilitate deeper learning, enduring knowledge and transformative growth for educators and the educational landscape at large. KBPDM, with its integrative synthesis of andragogy, technology and theories of learning sciences, has been proven successful in further equipping and empowering the educators with the remaining future-ready core competencies and dispositions within a collective setting. Having personally experiencing this forward-looking CPD learning, this article has shown how this eventually becomes a key enabler in building and constructing a future-ready classroom practices, giving rise to an entire generation of future-ready student learners to thrive in this VUCA world. With the increasing educational research inclination towards a brain-based learning and multi-modal sensory experience, this article foresees the emerging need to raise these competencies for the entire teaching fraternity. As such, it proposes the possibility in leveraging the use of Multimodal Learning Analytics to deepen the CPD experiences for educators.

References

[1] Aileen K. (2005). Model of Continuing Professional Development: A Framework for analysis. *Journal of In-service Education*, 31 (2), 235-250

[2] Fullan, Michael. Quinn, Joanne., McEachen, Joanne., *Deep Learning: Engage the World Change the World*. Corwin, 2018.

[3] Chen, B., & Hong, H.-Y. (2016). Schools as knowledge-building organizations: Thirty years of design research. *Educational Psychologist*, 51(2), 266–288

[4] Kapur, Shikha. (2015). Andragogy: The Adult Learning Theory. *Indian Journal of Adult Education*, 76 (2), 50-60

[5] Morgan K. Williams. (2017). John Dewey in the 21st Century. *Journal of Inquiry & Action in Education*, 9(1), 91-102.

[6] Scardamalia, M., & Bereiter, C. (2006). Knowledge Building: Theory, pedagogy, and technology. In K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp.97-118). New York: Cambridge University Press.