Classroom of the Future

A Purposeful Application of Technology and Context to Personalize Adult Learning, Foster Social Attachment, and Promote Collaboration

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Abstract—**As a principal means of learning, the classroom of the future has to embody a barbell function. On one end, it has to leverage digital technology to make education more pervasive, increase quality of learning, and lower instructional costs. On the other end, it has to reduce theoretic dogma in favor of building proactive, strategic alliances with the nonacademic communities to deliver contextualized solutions addressing specific challenges facing human advancement and organizational development, while laying emphasis on the learning proclivities of adult learners. Grounded in empirical phenomenology and guided by three objectives, this paper explores the characteristics of a technology-enabled, context-rich classroom of the future. First, it investigates the specific features of the classroom supporting social collaboration, fostering communal connection, and tailoring academic experiences to learner preferences as well as real-world context. Second, it identifies extant obstacles to creation of an effectual classroom for adult learners. Third, it delineates approaches to surmount the obstacles, recognized and anticipated. A model of the classroom of the future is presented, along with framework of the components and constituents required for the realization of an innovative temple of learning that knows no boundaries. The results should prove valuable to scholars, theorists, and practitioners in the design and development of a future-oriented classroom that decisively conjoins technology and context to personalize learning, cultivate social attachment, and advance collaboration.** *(Abstract)*

Keywords-Classroom of the Future; Learning technologies; Online learning; Cohort; Adult learners; Adult learning; Social collaboration; Contextualized learning; Social attachment; Learning preferences; Academic-nonacademic alliances.

I. INTRODUCTION

Nietzsche once wrote, "The time will arrive when everyone's thoughts will turn to education" [1]. With recognition of knowledge as the unassailable source of wealth [2], education finds itself front and center on the agenda of policymakers. The dawn of technology has altered the Pythagorean notion that earth is round. Philosophically, the new world is flat in a way that not only renders opportunities equal for its dwellers, but also enables best minds to come together, without divisions or barriers, to collaborate in service of common missions [3]. With this new realization, nations are framing policies to raise educational standards, and organizations are fostering continuous education to help create competitive advantages of lasting value.

Organizational investments into the search of knowledge have turned employees into adult learners, who funnel part of their spare time into learning to boost their output and value, leveraging a pervasive accessibility of learning options in and out of their own organizations. An increase in the number of adult learners has also brought into focus the distinctions in learning proclivities. Whereas a traditional learner is used to the established pedagogical methods, the adult learner learns more effectively with andragogical approaches [4]. Based on the broader life experiences he or she brings onboard, the adult learner is capable of thinking abstractly with only some facilitation from an experienced coach or faculty, and is able to share and create knowledge more effectively in social collaboration with his or her peers.

The figurative change in the shape of the world is, however, defied by empirical reality in a telling way. The promise of a boundaryless technology-enabled learning system for knowledge-hungry businesses and adult learners has not been fully realized. An engaging technologically-enabled, context-rich classroom for adult learners is one that supports cognitive, emotional, entrepreneurial, and values-related aspects of learning. It facilitates adult learners to work collaboratively in the day to day. While even the extant patchwork of tools has been able to foster an increase in the quality of learning experiences, remove situational barriers in alignment with cross-border expansion of businesses, and make learning cost effective, a systematic enabling of spatially-, functionally-, and culturally-dispersed learners to collaborate effectively has remained a challenge. It is, therefore, important to isolate and examine the role of technologies utilized by adult learners in order to understand the features of 1) collaborative technologies that learners use well, 2) instructive technologies the learners consider valuable to an engaging learning experience, and 3) social technologies that instill a sense of community though learner interactivity, regardless of esoteric or exoteric obstructions.

A. *The Business of Knowledge*

Learning and knowledge thrive in symbiosis, for the garden of knowledge blooms from the seeds of learning. Aristotle and Ibn Sina described learning as a process of actualization of the mind's potential [5]. While the principal tenets of education have remained unchanged, instructive media and methodologies have evolved. During pre-writing period, teachers used oral, visual, and observatory means to pass along lessons to their pupils. With development of writing methods, teachers facilitated the knowledge process through an accretive loop and enabled the understanding of natural phenomena to be accretively passed on from one generation to the next in the form of values, traditions, methods, and skills. The invention of the printing press further catalyzed knowledge propagation. Electronic technology, the fabric of modern life, delivered the next quantum leap, leading up to the Internet-based learning platforms. Information systems have liberated access to arrays of learning content in the form of text, images, lectures, animation, audio, video and games, while communication systems have enabled a platform for borderless collaboration. The proliferation of laptops, smart phones, tablets, and other mobile devices underscores the emergence and promise of virtual learning.

Reference [6] promoted the ideas of knowledge creation through conversations within an open community to deepen understanding of any phenomenon of interest, attack common problems, and envision creative solutions. Referencing the Socialization-Externalization-Combination-Internalization or the SECI model, Reference [7] put forth a view that knowledge creation was a continuous, dynamic process and that the transfer of tacit and explicit forms knowledge could best be facilitated through social interplay among the participants. Reference [8] too held the view that knowledge resulted from a synthesis of minds and was an aspect of a social bustle embedded in cultural practices. The recognition of knowledge transfer as a social process augurs that the more effectively learner collaboration is supported, the more successful the learning outcomes.

B. *Learning Proclivities of Adult learners*

With talent management turning up as a vital part of the learning agenda of organizations, the role of corporate education and training has evolved in importance. Changing workplace technologies, the dramatic transition to frontierless knowledge work, and competitive world markets have heightened administrative complexities. Academia and training institutions have been building appropriate capabilities to be supportive. Universities have leveraged accessible e-learning platforms to offer convenient educational options for adult learners. One of the main obstacles to a sound educational strategy implementation has been the failure to recognize that the learning proclivities of adult learners are dissimilar. There is a temptation to ignore the peculiarities of learners, because doing so makes educational design a bit more tractable, but the result of such platonicity is creation of one-size-fits-all programs designed for en masse delivery [4]. Universalized education relies on broad strokes in favor of specific focus. To be more effectual, educational establishments would be better served by reducing theoretic dogma in favor of seeking to build alliances with nonacademic organizations to collaborate on addressing specific challenges facing human advancement and organizational development and increasing focus on the styles of adult learners.

Andragogical principles suggest four adult learner levels. Rational (Level I) learners are the kind of learners motivated by bounties, such as grades, diplomas, output, and career growth. These learners are interested first and foremost in acquiring knowledge that can immediately be applied to create measured outcomes. They are motivated by solving problems and finding innovative solutions that can get them acknowledged. Rational learners' motivation to learn can be escalated by a context-content application approach, where these learners are exposed to the big picture of the subject matter before the small picture is shared. For example, a course in strategy may be prefaced by a presentation of an organizational leader on how the lessons may relate to the company or functional approach. The big picture sets up a context for the nuts-and-bolts of subject matter. Before the course is wrapped up, concepts are tied back to applications, particularly as they relate to learners in their given roles. The context-content application approach stimulates rational learners by framing sturdy linkages across theory, practice, and application.

Emotional (Level II) learners have the same basic needs as rational learners, but their genuine motivators are relationships. These learners cherish personal interfaces. They are motivated to build enduring bonds that they believe will drive collective success. Emotional learners can be motivated by community-based learning systems (social networking, gaming, blogs, etc.) that encourage teamwork and collaboration, allowing them to tap into the group's explicit and tacit knowledge. The motivation of these learners can be boosted by assembling them into learning teams where they feel empowered to create their own goals in association with peers. An intimate atmosphere inspires emotional learners to open their minds to new perspectives and assume responsibility, resulting in a sustained cycle of positive changes and development over time.

Entrepreneurial (Level III) learners bear the seeds of rational and emotional learners, but it is action and risk play that truly motivates them. Every chance they get, these learners like use hands-on activities to acquire knowledge and build their confidence. They are motivated by nonacademic learning environments that allow them to express themselves physically and mentally. Simulations, role plays, game boards, and discussions are ideal tools to heighten the learning motivation of the entrepreneurial learners. The trick to engaging these learners is to foster a culture of sharing, sparring, and validation of ideas in a safe environment. Creative design of nonacademic learning approaches helps by instilling a sense of confidence that the

entrepreneurial learners eventually need to apply capital and assume informed risks in the real world.

Spiritual (Level IV) learners are macrocosmic learners in that they encompass and embody the qualities of all other levels of learning. They are motivated by the aspiration to understand nature. These learners carry a profound yearning to reach beyond humdrum and mundane in search of self-realization. Spiritual learners can be motivated through facilitation focusing on the illumination of their personal values and engagement into learning with authenticity and congruency. Through the discovery of biases and mental paradigms, these learners can be assembled in trusting social interactions on a journey to discovery, transformation, and philanthropic contribution.

An employee-competency survey at certain large multinational companies found that key higher order skills, such as thinking strategically, managing change and conflict, communicating and collaborating across cultures, mentoring and leading, and innovating thinking have not kept pace with needs of business and pointed to a labor-to-talent gap. These institutions could benefit from adopting a barbell approach by keeping the goals, motivations, and proclivities of learners in mind and embracing alliances with business to develop and deliver effective learning content. By doing so, institutions could engage learners, open their minds to prepare to apply themselves in the real world, and bring increased meaning and performance to their alliance partners.

C. Problem Statement

Companies are investing heavily in the learning needs of their workforce in the face of changing organizational technologies, labor market shifts, and growing regulatory pressures. Talent development has been driving budget in excess of $2 trillion on training and education programs worldwide [9]. While success in this market requires catering to the needs of adult learners, comprehending industry- and company-specific workforce challenges and ever-evolving needs, and designing a classroom that enables spatially-, functionally-, and spatially-dispersed learners to come together in social collaboration, the response from educational institutions has been lagging [10]. The mitigation of this challenge requires a clear-cut understanding of how technology and context could be purposefully combined to result in personalized adult learning, greater social attachment, and increased borderless collaboration.

D. Purpose Statement

The purpose of this study was to explore the features of the technology-enabled, context-rich classroom for adult learners. Three objectives guided this research. The first objective was to investigate the specific features of the classroom supporting social collaboration, fostering communal connection, and tailoring academic experiences to learner preferences as well as real-world context. The second objective was to identify extant obstacles to creation of an effectual classroom for adult learners. The third objective was to delineate approaches to surmount the obstacles, recognized and anticipated. The findings of this research, grounded in empirical phenomenology, were based on the lived experiences of seven adult learners engaged in a cohort-based, online degree program.

E. Research Questions

This study posited that a classroom of the future that is capable of personalizing adult learning, fostering social attaching, and promoting seamless collaboration would consist of six key subsystems encompassing reading, collaboration, assessment, assimilation, application, and relationship building. The following six questions, as presented to participants, guided this study:

1. How effective did you find the "reading" tools in your learning process? For example, physical textbooks, web-based documents, PDF files, e-readers, etc.

2. How effective was the asynchronous classroom in fostering your interactions with other learners and with your faculty member?

3. What role did assessment/testing play in reinforcing and validating your learning in the classroom? Assessments may have included writing assignments, projects, multiple-choice tests, etc.

4. Did you use any formal/informal project management tools to manage collaborative/team-based projects? What was your overall experience?

5. Did your experience and learning in the classroom help you be more productive in your work? How? Has your experience helped you think or do things differently?

6. Did your interaction and collaboration in the classroom help you develop relationships with other employees across functions and sites? Have these relationships been useful in your day-to-day work life? If so, how?

F. Data Collection and Management

As part of an academic alliance between Cisco Systems, Inc. and University of Phoenix, a cohort-based Master of Business Administration degree program was chartered. This initiative was part of a broader portfolio of learning and development solutions offered to employees. The cohort program was contextualized for the company through collaborative content development and delivery. This cohort program was offered on an online learning system

proprietary to the University and offered participation from employees worldwide.

The target population for this study was knowledge workers, defined as skilled, qualified, and experienced employees responsible for creating, modifying, and orchestrating knowledge. Ten cohort participants were identified for data collection and seven agreed to participate. These participants represented five functional business domains, namely Sales, Finance, Engineering, Services, and Supply Chain Operations. Based in the United States, these participants were geographically-dispersed with four coming from California and one each from Illinois, Georgia, and Missouri.

II.   FINDINGS AND CONCLUSIONS

Learning and education are both interrelated sociological change processes. While the former is a process for preparing individuals to think differently, the latter is one for changing behaviors. As technology becomes increasingly pervasive and learning turns into a lifelong process, the paradigm of adult education must evolve. The future framework of the classroom of the future encompassing six dimensions, whose importance is underscored by the impact on knowledge building, business value creation, and social attachment formation. These dimensions are reading and intelligent search, collaboration, assessment, assimilation, application, and relationality.

The function of the reading and intelligent search dimension is to scan the environment for sources of learning. It is estimated that 2.5 quintillion bytes of digital data is being generated each day [11]. One key responsibility of this subsystem of the classroom is to not only make information available conveniently and comprehensively, but also act as a filter to noise in the environment. The collaboration subsystem is responsible for engaging diverse learners into social interplay, playing a critical role in knowledge sharing and transfer. Learner collaboration ensures that diversified learning of the cohort is more than the sum of each learner's learning. The assessment subsystem lends a safe environment in which learners could test ideas and validate knowledge. The assimilation subsystem enables learners to combine and synthesize the ideas shared in the classroom into internal knowledge through reflection process. The application subsystem is designed to ensure that the theory-to-practice gap is minimized. The context-rich, fit-to-purpose body of knowledge developed in collaboration between educators and practitioners helps shorten the link between learning and application. An engagement of diverse learners in the technology-enabled classroom provides a rich learning experience that strengthens social bonds. A culture of respect, trust, friendship, and cohesion in learning teams ensures long-term advantages for the learners as well as for their workplace sponsors.

A.   *Effectiveness of the extant online classroom features*

Reading and intelligent search. The reading and intelligent search function is designed to facilitate a scanning of the environment—internal and external--for learning sources [12]. With an exponential growth in the volume of unstructured data in shape of images, videos, tweets, posts, and emails, this function is required to make information easily and expansively available and sift through the clatter associated with and around the sources.

The classroom deployed the portable document format (PDF) for text books. The PDF format is independent of application software, hardware, and operating systems. Journal articles, recorded video streams, and internet-based content was furnished via web pages. Both formats are designed provide accessibility across a range of devices from laptops to phones and tablets. In addition to the reading material in electronic format, learners could purchase physical text books to gain a traditional immersive reading experience. Emails and chat facilities in the classroom were used for exchange of content, such as faculty feedback and learner-to-learner communications. Learners received certain text-based instructional lectures or recorded audio and/or video content delivered on CD-ROMs or DVDs.

The participants primarily used laptops and tablets in their work and personal environment. Based on their existing device usage model, a majority of the participants felt satisfied with the accessibility of reading formats provided for by the current classroom. Access to online library was highly appreciated. A participant noted the University's e-library had the potential to be "one of the best resources in the world." Participants felt that online reading worked out just as well for them as physical books. A great benefit of the electronic format is that learners could purchase only the chapters they found useful.

Collaboration. The collaboration function is designed in recognition of the social nature of learning. Effective collaboration requires emphasis on the learners' ability to share, analyze, create, and assimilate knowledge. It reflects a desire to address the andragogical needs to encourage the interplay of tacit and explicit knowledge in the classroom [7].

The classroom was designed as a flexible e-learning platform with capabilities for course management. It enabled information sharing among a network of learners through location- and time-independent asynchronous interactions. The collaboration tools embedded into the platform included threaded discussions, chat rooms, learning team rooms, private rooms, email, and mailing lists. The classroom afforded learners the freedom to supplement capabilities of videoconferencing and telephone conversations to further coordinate learning activities.

Participants found the asynchronous classroom to work effectively in fostering more meaningful interactions among the learners themselves as well as between them and the faculty. Participants noted that their asynchronous interactions were much more involved than those in a traditional, synchronous environment. Given the temporal flexibility, participants were prone to carefully and deeply researching their answers to discussion questions before posting them to the classroom. As learning tends to arise in the context of relationship with others, the result of individual thoughtfulness was an enriched interaction with other participants. The time to research answers also helped participants exercise greater discipline with such things as recording references and citations, helping enhance the overall quality of the learning experience.

Assessment. Assessments are essential to making sure that learning has taken place as intended. It is a process of comparing actual results against expected results and ascertaining differences. In a traditional classroom, the visual and verbal feedback is readily available from learners, but in an online classroom, physical cues are unavailable. Therefore, implementing special assessment mechanisms becomes essential in an online classroom. For this study, participants were asked about assessment in a broad context of interaction in the classroom, writing assignments, and formal and informal tests.

The classroom was designed to help the learners demonstrate personal accountability and the ability to work independently as well as in learning teams. When learners failed to make a certain number of postings within a specified time, the built-in checks in the platform helped keep track and the learners risked being dropped. Learners were required to submit substantive answers to a set of discussion questions and encouraged to interact in meaningful ways under the watchful eyes of the faculty member. The course grade took into account the participation level and quality of individual contributions as well as learning team work. In some courses, the classroom included Assessment and Learning in Knowledge Spaces (ALEKS), a Web-based, artificially intelligent assessment and learning system to assess the knowledge of the learner.

Participants found individual and team essay papers to be beneficial when they were relevant and had some applicability to their day-to-day business. Although participants found writing papers—particularly, in APA format--a bit challenging, they saw it as a necessary evil to get and demonstrate a comprehensive view of the learning material. Some participants also found the tests administered in class to be beneficial in validation of acquired knowledge.

Assimilation. Assimilation of knowledge takes place through the process of learning-by-doing [13]. In a classroom, assimilation is accomplished by bringing learners cooperatively and competitively to work on projects that not

only encompass required lessons, but also appeal to learner interests. Projects are a connection between planning and doing, and working on them affords learners the opportunities for both personal and professional growth by boosting their participation, exposing any defensiveness, encouraging constructive action, and motivation to reduce theory-to-practice gap.

The classroom was designed to encourage learners to assimilate knowledge through projects. A certain percentage of the course grade was earned by learners by completing projects with other members of their learning team. The classroom also gave the the learners the ability to leverage the differences among themselves to optimize the collective learning experience.

Participants consistently pointed out the organizing structures they put into place to work effectively on team-based projects. Some used Microsoft Excel to break down the execution of course assignments and document the delegation of tasks, while others used Evernote as a tool for capturing notes to assist with work assignments. Notes were taken during team meetings and published for easy access via email. While the projects in the classroom were not complex enough to warrant the use of formal project management tools, it appeared that learners were able to improvise with existing tools to get their project work done. Participants remarked having regularly scheduled meetings, use of agenda in team meetings, and publication of minutes that also included the division of responsibilities among team members. Project work helped the learners exercise and demonstrate trust and accountability.

Application. For the knowledge of the learners to be relevant, it can and must be applied. The concepts learned over the study period should, in some positive way, inform the learners' work in the day-to-day. Eventually, it is application of the methods to the design and operation of management systems and business processes that enables the learners to deliver the greatest value to stakeholders.

The classroom took a strategic, holistic, and tailored approach to learning. Based on an appraisal of the talent needs, the program curriculum was appropriately contextualized. Some of the courses in the program were fit to purpose and the accredited body of knowledge was covered along with an integration of industry- or company-related readings, simulations, and projects. The central objective of the cohort program was make courseware aligned to learners' careers and business, so as to enhance work-related skills, career progression, and impact on personal and professional growth.

Participants shared examples of knowledge gained in the utilization of productivity tools, such as WebEx Social. Some participants expressed how their participation had given them a different and broader perspective on business not only through knowledge gained in the coursework, but also through the social interaction with other learners in the

project work, where everyone's knowledge was socialized to accomplish course assignments. Participants particularly valued the cross-disciplinary and cross-cultural social interactions, as part of their learning experience. A participant noted, "I am more productive in using my time and focusing my energy in important tasks. I also think more critically." Multiple participants noted not only thinking more critically about business and managerial related issues, but also their tendency for a more thoughtful and reflective approach in their interactions with other employees. A participant conveyed, "I am thinking much 'deeper' and more thoughtfully on just about every topic…I am absolutely more measured in my responses, do more research on things I am working on, and believe the quality of my work has improved because of this Cohort." Another idea expressed by several participants was about the time it took them to their acquired knowledge. Using the Human Resource Management (HRM) course as an example, one participant said, "I have used the content from HRM most significantly. The overall recruiting, selection, and celebration of diversity I used [immediately]… as I have been adding headcount."

Relationality. If business is a function of interconnectivity and interdependence, the seeds of borderless collaboration must be sown continuously [14]. Since learning is social, classrooms are the best venue for formation of solid and lasting relationships. The spread of globalism will continue to require business to break down silos and necessitate employees to form global alliances to be able to deliver to growing expectations of investors and customers [15].

Using online modality, the extant classroom provided a capability to assemble spatially-, functionally-, and culturally-diverse learners. The social nature of the platform along with the interactive structure of the course enabled employees to share, debate, and synthesize diverse ideas. The focus on team projects was directed to encouraging learners to engage in collaboration.

Participants discussed how personal and professional bonds being formed among the learners during the program. More importantly, the participants felt that their relationships extended beyond the program. Participants specifically noted how they expected their relationships to continue to grow on the strength of mutual trust. One of the participants said, "The relationships are very close and our level of trust is very high." Participants shared job openings with one another across business functions. Such sharing could serve the company in growing general management capability by developing cross-disciplinary leaders. In addition to socialization within the work-team construct—in service of project-based deliverables—the participants also reached out to one another to leverage the domain expertise of other team members. Technology is inclusive of personalities. Whether one is an extrovert or an introvert, there is a way to engage in conversation. Age barrier, which could be an issue when

individuals work in person, is blurred in the online environment.

B. Obstacles presented by extant classroom features

Reading and intelligent search. Participants noted that while the access to reading content was satisfactory on their laptops, they faced significant difficulties accessing the files on mobile devices, such as phones and tablets. A participant noted a paradox that a great feature of online classroom is its accessibility over spare time; however, when reading material requires a laptop to access, it defeats the purpose of using spare time, when a laptop is not normally unavailable. The richness of the online library was noted, but issues with organization of data and search capability were flagged. Without proper organization of data and absent an effective user interface, access to library was noted to be difficulty and time consuming. The PDF-based text books were password protected for copyright reasons. Participants found password authentication to be a major hurdle as they tried to access reading material across different devices. Specifically, a tablet version of PDF reader did not even permit the authentication mechanism, which ended up becoming a source of frustration for learners. Further, neither the PDF-based text books nor the web pages allowed learners to take notes in the margin and highlight reference content.

Collaboration. Participants had to resort to external applications, tools, content, and services, such as WebEx, Skype, FlashMeeting, Telepresence, and/or email to coordinate certain learning activities. Missing in the current platform, these tools helped built camaraderie, foster deeper understanding, and promote teamwork. Participants missed live lectures in the asynchronous classroom, and, with it, the benefit of learning from a trustworthy source, asking questions, and receiving real-time responses. Participants noted missing a sense of urgency in the asynchronous classroom. For instance, responses from faculty member to urgent questions were delayed. The assignments were found to be vaguely written, and participants found it difficult to align their expectations with the faculty over online conversations. A part of the difficulty was attributed to the short duration of the course and timing of interactions that do not always keep pace with the assignment timelines.

Assessment. Participants found open-book, multiple-choice tests to be of little value, as these types of tests became an exercise in finding the right answers rather than learning the material. To that end, one participant summarized group sentiment saying, "Quite honestly, the final exam/assessment provided little to no value…it bec[ame] a 'check box' and simply finding the answers in the text is just time consuming rather than learning." While some participants found essays to be helpful in reinforcing learning, others did not find much value in them. Effort needs to be made to require only as many essays from learners as productive to learning, otherwise they can be perceived as forced chores rather than a valuable exploration of the subject matter content. The assessment of essays is a

subjective exercise, so, based on the faculty load, there could be a large degree of bias in feedback.

Assimilation. Participants expressed dissatisfaction with the project-related tools available in the classroom. As a result, participants resorted to external applications, tools, content, and services, such as WebEx, Skype, FlashMeeting, Telepresence, and/or email to coordinate project efforts. These tools were deemed essential for successful project collaboration and, hence, for knowledge assimilation. Ill-conceived project assignments not relevant to interests of the participants were judged wasteful.

Application. Participants noted that time constraints imposed by course load prevented them from more systematically applying their knowledge. While the contextualization of program proved to have the capacity to enrich learners' understanding, critical thinking, and productivity impact, the benefit was limited by each course being contextualized on its own. Instead, if each learner came into the program with one significant problem to solve in his or her organization or business unit, and then was allowed to figure out solutions progressively through each course in the program in collaboration with other learners and the practitioner faculty, the learner's benefit could be more significant and holistic.

Relationality. Certain esoteric courses like human knowledge and philosophy are more difficult to integrate in the online modality. Because the online classroom relies on the intrinsic motivation of learners, there is a risk that learners needing a more personal interface could fall through the cracks. Further, online classroom has not evolved enough to accommodate the needs of learners with certain disabilities.

C. Strategies for the improvement of classroom

Reading and intelligent search. Participant feedback suggested that the reading and intelligent search feature could be improved by: 1) providing generous technical support for learners using reading tools to ensure effective usage across the gamut of prevailing devices, 2) creating a copyright mechanism for electronic content to work uniformly and efficiently across devices, 3) developing device-independent and portable reading formats that enable learners to highlight reference points and make notes in the margin with the ability for the learners to port the notes across their devices, 4) deploying cloud to store reading files, so that learners working on devices without local storage (for example, phones) could access files, 5) integrating immersive reading with features, such as explanatory videos and audios clips and maps into the reading files to enrich the learner experience, 6) inserting text-reader programs and word-prediction software to empower learners with learning disabilities, 7) integrating intelligent search to enable filtering through noise on the Web and large databases and provide access to assistance, communities, and expertise.

Collaboration. Participant feedback suggested that the collaboration feature could be improved by: 1) incorporating on-demand collaboration, online meeting, web conferencing, and video conferencing capabilities, such as WebEx, Skype, FlashMeeting, and Telepresence into the learning platform, 2) integrating the ability for learners to start their own blogs in their areas of interest and engage other learners to build social knowledge networks through collaborative tagging and folksonomies, 3) providing generous technical support and training for learners and faculty using the platform across a gamut of prevailing devices, 4) combining some face-to-face (blended) classroom time with the asynchronous activities to balance out the learning process for both learners and faculty, 5) addressing learning preferences of all age groups, namely Boomers, Gen X, Gen Y, etc. via collaborative approaches and social networks.

Assessment. Participant feedback suggested that the assessment feature could be improved by: 1) increasing deployment of artificially intelligent assessment and learning tools across courses to assess the learners' before-and-after knowledge of subject matter, 2) taking advantage of technologies (for example, podcasts, wikis, blogs) to help learners demonstrate their acquired knowledge, 3) instituting writing labs and plagiarism checkers to facilitate writing skills and ensure academic honesty, 4) requiring projects, simulations, and essays that are contextualized in workplace skills, 5) engaging with business to ensure that work-related skills are enhanced to achieve specific objectives and 6) eliminate assessments that are perfunctory in the learning process, adding little value beyond preserving institutional dogma.

Assimilation. Participant feedback suggested that the assimilation feature could be improved by: 1) promoting functional, spatial, and cultural diversity within learning teams to optimize interplay and assimilation of knowledge, 2) incorporating on-demand collaboration, web conferencing, and video conferencing capabilities into the learning platform, 3) designing multiplayer simulations and games to engage members of the team in a safe, social experience, 4) creating fit-to-purpose projects that learners could work with through their entire course of study instead of having a set of dissimilar, per-course projects, 5) encouraging the use of blogs, wikis, and rich site summaries (RSS) to fast and wide sharing of information not only across the learning teams, but also across the learners' organizations, 6) providing generous training to learners on pod/vodcasting to share audio and video recordings with others.

Application. Participant feedback suggested that the application feature could be improved by: 1) including program-level customizations, where possible, and where those are not possible, tailored individual courses to shorten the link between knowledge and application, 2) working out licensing deals to open access to multimedia content from the massively open online course (MOOC) sources, such as Coursera, Udacity, MIT, Stanford, and Yale, as applicable

[16], 3) deploying new adaptive learning technologies to lower costs and improve learning outcomes by more effectively linking knowledge to application.

Relationality. Participant feedback suggested that the relationality feature could be improved by: 1) integrating blended programs, where technology-mediated activities are complemented with face to face methods, 2) addressing learning preferences via collaborative approaches and social networks, so that learners can succeed, regardless of demographic factors or level of proficiency with technology, 3) including features and accommodations to support the needs of those with learning disabilities.

III. CLASSROOM OF THE FUTURE

"The future ain't what it used to be," Yogi Berra said [17]. The increasing complexity of the world may limit our ability to model and predict [17], but the only way to be prepared for the future is through investments in constant learning. Interdependence and interconnectivity define the future of business and society. Investments in learning are necessary, and involvement of community is essential. Based on strategies gleaned from participants in this study, Figure 1 illustrates the model of the classroom of the future encompassing the recommended features for reading and intelligent search, collaboration, assessment, assimilation, application, and relationality.

Figure 1. The classroom of the future

The realization of the classroom without boundaries will necessitate deployment of advanced social and collaborative technologies, active participation of business in learning, a constructive remodeling of academia for the future, and shared responsibilities on part of the content provider community. Reference [19] argues that traditional classrooms are a fragile system. Only if they are imbued with a real-life essence do they stand a chance to evolve into antifragile bodies that can withstand changes and emerge

stronger. Figure 2 binds these players/forces into a common platform.

Three types of institutions will cover all of higher education in the future: traditional schools (public and private universities), nontraditional schools (private for-profit and not-for-profit universities), and free MOOCs (Udacity, Coursera, edX, etc.). The degree to which these institutions succeed will depend on the extent to which they are willing, able, and ready to create academic alliances to meet the needs of learners and ensure that the challenges facing businesses are addressed through relevant, context-rich learning solutions.
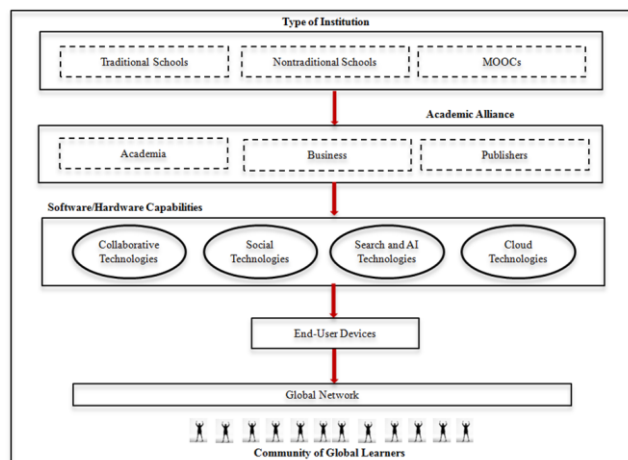

Figure 2. Components for realization of classroom without boundaries

Further, alliances among the institutions of higher learning and publishers and copyright holders will be essential to ensure that content could be readily and instantly made available to learners across the gamut of end-user devices (phones, tablets, laptops, and hybrids). Content publishers would have to evolve open yet profitable business models that enable integration of as much rich, multimedia content into the classroom as possible [18]. The role of hardware and software technologists will be to ensure that educational devices are not only affordable, but also support the needs of dispersed learners. Only through a purposeful deployment of collaborative, social, intelligent search, artificial intelligence (AI) software/applications, and cloud technologies can a personalization of adult learning, promotion of social attachment among learners, and enabling of borderless collaboration be enabled. Finally, it will be up to learners and professors to help the evolution of the technology-enabled, context-rich classroom by constantly lending their voice.

The great mystic Jalaluddin Rumi described learning attainment through a sublime parable. A grocer has an abundant supply of sugar in his store, but the amount that can be doled out depends on the capacity of the shopper's bag. Sugar is the metaphor for learning, and the bag is the metaphor for degree of learning. There are vast sources of learning available to hungry learners, but the amount that can

be delivered to them depends on the capacity and effectiveness of our classrooms.

SUMMARY

The purpose of this study was to explore the features of the technology-enabled, context-rich classroom for adult learners. Three objectives were accomplished with this study. The first objective was to investigate the specific features of the classroom supporting social collaboration, fostering communal connection, and tailoring academic experiences to learner preferences as well as real-world context. The second objective was to identify extant obstacles to creation of an effectual classroom for adult learners. The third objective was to delineate approaches to surmount the obstacles, recognized and anticipated. The findings of this research were based on the lived experiences of seven adult learners engaged in a cohort-based, online degree program. The model of the classroom of the future was proposed. The results should prove valuable to scholars and practitioners in developing an effective classroom of the future that purposefully applies technology and context to personalize adult learning, fosters social attachment, and promotes collaboration.

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