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**The Effect of Blended Learning Environment on Teachers’ Course Design
and Instructional Practices**

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In India, Technology-Enabled Learning (TEL) provides sustainable solutions to address the country’s education needs and chronic shortage of qualified teachers. Though a number of government-led digital learning initiatives are underway, TEL is still at a nascent stage in India due to the lack of: infrastructure, digital literacy, institutional readiness (policies and strategies) and technologically and pedagogically qualified teachers. To address these issues at the institutional level, Commonwealth of Learning (COL) partnered with Rajiv Gandhi University of Knowledge Technologies (RGUKT), Andhra Pradesh to strengthen RGUKT’s vision and mission and to deliver quality education through TEL.

COL’s TEL partnership helped the RGUKT in developing a TEL policy in consultation with the stakeholders; identifying and integrating appropriate open source technologies with teaching-learning; building technological and pedagogical capacity among the teachers to design, develop and deliver blended learning courses through Moodle; and measuring the impact of TEL.

The evaluative study “Impact of Technology-Enabled Learning Implementation at Rajiv Gandhi University of Knowledge Technologies” examined students’ blended learning experiences and analysed the experiences of teachers in the design, development and delivery of blended courses. The sample included the 2472 blended course students and 21 blended learning teachers. Since this paper presents the effect of Blended Learning Environment on Teachers’ Course Design and Instructional Practices, it shares the experiences and perceptions of the 21 blended learning teachers collected through interview and self-reflection journals. The 21 blended learning teachers perceived that designing and delivering the blended course helped them in: (i) planning and integrating offline and online assessments and activities, (ii) enriching students’ learning experience with multimedia resources, including open educational resources (OER); (iii) adopting flexible and innovative instructional practices; (iv) improving communication and interaction with students; (v) improving digital literacy etc.

Keywords: blended learning, course design, impact study, learning management system, Moodle, open educational resources, technology-enabled learning

Introduction

In India, Technology-Enabled Learning (TEL) provides sustainable solutions to address the country's education needs and chronic shortage of qualified teachers. Though a number of government-led digital learning initiatives are underway, TEL is still at a nascent stage in India due to the lack of: infrastructure, digital literacy, institutional readiness (policies and strategies) and technologically and pedagogically qualified teachers. To address these issues at the institutional level, Commonwealth of Learning (COL) partnered with Rajiv Gandhi University of Knowledge Technologies (RGUKT), Andhra Pradesh to strengthen RGUKT's vision and mission and to deliver quality education through TEL.

To improve access to and increase the quality of learning, thereby promoting the achievement of SDG 4,¹ the Commonwealth of Learning (COL, n.d.) focuses on the "Policy–Technology–Capacity" advocacy triangle to:

- develop ICT in education and open educational resources (OER) policies and strengthen policy implementation;
- help institutions use TEL for programme delivery;
- promote the use of open technologies and OER for skills development;
- support research on TEL for evidence-based advocacy and decision making; and
- implement tested models at scale and develop new models for learning with emerging technologies.

The Government of Andhra Pradesh established the RGUKT in 2008 for providing Engineering education opportunities for the deprived rural youths through the 6-year integrated Engineering programme – 2-Year PUC / Pre University Course and 4-Year B. Tech. / Bachelor of Technology (undergraduate). Though the university's ICT-based pedagogy provided students with access to video lectures, Open Educational Resources (OER) and other eContent through the local content servers, it collaborated with COL to design, develop and implement Technology-Enabled Learning (TEL) courses in a systematic to show the evidence of learning outcomes. The TEL partnership with COL helped RGUKT in developing a TEL policy in consultation with the stakeholders; identifying and integrating appropriate open source technologies with teaching-learning; building technological and pedagogical capacity amongst the teachers to design, develop and deliver blended learning courses through Moodle; and measuring the impact of TEL.

The evaluative study "Impact of Technology-Enabled Learning Implementation at Rajiv Gandhi University of Knowledge Technologies" examined students' blended learning experiences and analysed the experiences of teachers in the design, development and delivery of blended courses. Since this paper presents the effect of Blended Learning Environment on Teachers' Course Design and Instructional Practices, it shares the experiences and perceptions of the 21 blended learning teachers. The blended learning teachers perceived that designing and delivering the blended course helped them in: (i) planning and integrating offline and online assessments and activities, (ii) enriching students' learning experience with multimedia resources, including open educational resources (OER); (iii) adopting flexible teaching practices; (iv) improving communication and interaction with students; (v) improving digital literacy etc.

Review of Literature

In its simplest form, Blended Learning (BL) is a combination of face-to-face (F2F) instruction and online learning. BL designs leverage the strengths of both the classroom and online modalities so as to provide students with some element of control over time, place, path, and/or pace and a personalized learning experience" (Christensen, Horn and Staker, 2013; iNACOL, 2016). Blended learning as a techno-pedagogical innovation (Chafiq N., Housni M., Moussetad M., 2019) facilitates teachers create an enabling digital learning environment and design learning experience through the organic integration of thoughtfully selected face-to-face and online approaches (Vaughan, Cleveland and Garrison, 2013).

¹ Sustainable Development Goal 4: Ensure inclusive and quality education for all and promote lifelong learning. <http://www.un.org/sustainabledevelopment/education/>.

A thoughtfully created technology-enabled blended learning environment empowers teachers to design and develop pedagogically-sound blended courses through a variety of media and diverse learning activities and assessment tasks to improve their students' learning outcomes. The choice of media, learning objectives, learning processes, learning content, greater access to knowledge, greater engagement and participation, learner interaction and connectedness, F2F support, and improved autonomy are significant factors in enhancing learner satisfaction and learning experiences (Kintu, Zhu & Kagambe, 2017; Lim & Morris, 2009; Larsen, 2012; Renner, Laumer & Weitzel, 2014).

BL is an organic integration of technology with F2F teaching–learning requires a fundamental rethinking of course design with the goal of optimising student engagement (Garrison & Vaughan, 2008). A Blended learning approach requires teachers to rethink course design to help students understand the course overview, learning objectives, assessment and measurement, instructional materials, activities, course technology, learner interactions, learner support, accessibility and usability. Institutions can address the challenges that they face in transitioning to and scaling up blended learning by training and supporting faculty to take full advantage of pedagogically-sound digital platforms and design student-centered learning by aligning assessment, activities and course content with learning outcomes (Biggs & Tang, 2007; EDUCAUSE, 2019). Teachers' attitudes and beliefs, their willingness to try new teaching methods, and their use of a balanced mixture of synchronous and asynchronous communication are all key factors in creating a successful blended learning environment (Alammary, Carbone & Sheard, 2014; Owston & York, 2018; Quality Matters, n.d.).

Blended Learning Environment

COL's "Policy–Technology–Capacity" TEL implementation model supported the RGUKT to build an enabling blended learning environment. Creating a blended learning environment necessitates providing access to technology; adequate and timely support and building technological and pedagogical capacity amongst the staff (Cook, Giardina, 2011). At RGUKT, a blended learning environment was created using Moodle² (Modular Object-Oriented Dynamic Learning Environment), an open source LMS (Learning Management System). Moodle hosted on the RGUKT local server³ facilitated the teachers to blend F2F teaching with online learning; create flexible learning environment; share and manage content in multiple media; create activities and assessments; grade students' performance and provide feedback; communicate online and offline learning events with students; and engage students in collaborative and constructive learning tasks (Indira, 2015). Twenty one Moodle-enabled blended courses were offered to the Pre-University Course (PUC) and Engineering undergraduate students during the January–April 2018 semester.

The COL's two capacity building workshops on Moodle functionality, blended course design, open educational resources (OER), blended course development etc. enabled the RGUKT teachers to:

- redesign their courses using the backward design / Understanding by Design (UbD) (Wiggins & McTighe, 2002) and/or constructive alignment (Biggs, 2003) approach
- structure the online course week-wise or unit-wise
- write course and unit learning outcomes
- self-record the course introductory video and Face/Flip (Ruffini, n.d.) videos using Screencast-O-Matic⁴; publish on YouTube; and embed in the Moodle course in order to orient students towards the blended environment, provide online learning support and have pedagogical effectiveness on learning (Garner, 2008; Pang, 2009)
- create assessments, such as file submission and video-based assignments, such as ANSYS/Autodesk Inventor, professional software-based assignments and self-assessment quizzes for creating a test series environment
- engage students in interaction through activities, such as forums and chat
- promote learner-content interaction by creating interactive videos using the H5P plugin⁵ to increase learner engagement and enhance learner control over the content and process (Zhang, 2005)

² Moodle. Moodle. <https://moodle.org/>

³ The RGUKT LMS login page is at <https://lms.rguktn.ac.in>.

⁴ Screencast-O-Matic is a free screen recording too. <https://screencast-o-matic.com>

⁵ H5P plugin allows Moodle users create interactive content. https://moodle.org/plugins/mod_hvp

- share and/or create learning resources in a variety of media, including Khan Academy videos, animated videos, video tutorials (on ANSYS 2D Modelling, ANSYS 3D Modelling, ANSYS Meshing) and open educational resources (OER), such as NPTEL⁶
- track students' learning progress and course participation
- grade students' performance and provide feedback
- communicate with and send bulk and individual messages and alerts to students through Moodle course and Moodle mobile app and
- take maximum advantage of the benefits of digital delivery (Bailey, 2018)

Blended Course Design

A blended learning environment necessitates teachers to assume the role of an instructional and/or learning designer. Instructors transitioning courses to a blended modality must do much of the design work up front in order to: (i) find the right blend of online and face-to-face instruction; (ii) ensure that the f-2-f and online activities are mutually supporting one another; (iii) make informed techno-pedagogical decisions in redesigning their blended course (Christensen, 2003; Linder, 2017; Buus and Georgsen, 2018).

Blended course design centered upon the good teaching and learning principles and deeper approaches leads to enhanced learning experiences and transformative teaching practices (Hannon and Macken, 2014; Powell, Rabbitt and Kennedy, n.d.). The COL Facilitator created the Blended Learning Course Design Template (*see* Annex-1) based on the “backward design” (Wiggins & McTighe, 2002) approach, as it focuses on intended outcomes rather than content. Utilizing a blended course design impacts teaching-learning in different ways, including (i) shifting from enabling through transforming blends and (ii) paying additional attention to alignment in the design stage to ensure that the face-to-face and online activities are mutually supporting one another (McGee and Reis, 2012; Linder, 2017).

“Supporting faculty to design learning experiences that take full advantage of digital platforms and to expand their pedagogical repertoire to include collaboration and student-centered learning design will support the growth of blended learning” (Educause, 2019). During the first capacity-building workshop held in June 2017, the RGUKT faculty members gained an understanding of the technological and pedagogical dimensions of blended course design by exploring and experiencing various Moodle modules and functionality and understanding the backward design components. The RGUKT faculty redesigned their courses using the Blended Learning Course Design Template provided, which enabled them to define course objectives and unit learning outcomes; constructively align assessments (either Moodle-enabled or offline), activities and resources with the outcomes; shift focus from content towards assessment; incorporate flexibility, and facilitate interaction (Wiggins & McTighe, 2002; Biggs, 2003; Boelens, R., De Wever, B., & Voet, M., 2017). The faculty submitted their course design and had it reviewed by the COL Facilitator for feedback, which helped them in improving the quality of their online course.

Research Design

The study adopted qualitative approaches to collect data through semi-structured personal interview and from their self-reflection journals. Since the scope of this paper is limited to analysing the blended teachers' experiences with course design, development and delivery, it shares the experiences and perceptions of the 21 blended learning teachers. Faculty interviews were scheduled using the Moodle Scheduler plugin's⁷ group scheduling feature, which allowed the researcher to add appointment slots. To book a slot, uploading the self-reflection journal was mandatory for the faculty by enabling the “File upload required” feature of the Scheduler plugin. Faculty booked their preferred time slot for sharing their blended teaching experience. As per the preferred dates and time slots, the RGUKT Nuzvid faculty interviews were conducted face-to-face, whereas the RGUKT RK Valley interviews were conducted through the Zoom⁸ video conference application.

⁶ National Programme on Technology Enhanced Learning, a project funded by the Ministry of HRD offers multimedia-based material and courses for basic undergraduate Science and Engineering courses. <https://nptel.ac.in/>

⁷ Moodle Scheduler plugin: https://moodle.org/plugins/mod_scheduler

⁸ Zoom: <https://zoom.us/>

Respondents' Profile

Among the 21 blended learning teachers, 15 (71%) were from RGUKT Nuzvid, while 6 (29%) were from RK Valley campus, which included 11 (52%) male and 10 (48%) female.

Data Analysis and Findings

With the prior permission from the teachers, the interviews were audio and video recorded and transcribed. Recurrent phrases in the transcriptions and self-reflection journals were classified into themes and sub-themes according to their similarity, then grouped into codes. Coding was done on Dedoose⁹ (Version 8.0.42), a cross-platform CAQDAS (Computer Aided Qualitative Data Analysis Software). Dedoose workspaces allowed: uploading interview transcripts and self-reflection journals; uploading of descriptor field definitions and data; creation of a code tree structure with weighted parent and child codes; linking of uploaded files to the descriptors (faculty); creation of excerpts and application of codes; data analysis; and export of analysed data and transcript excerpts. During the interviews, faculty shared their perceptions and experiences on: the benefits of BL; the advantages of planning, designing and peer-reviewing blended courses; their open educational practices (OEP); blended teaching experience and future TEL plans etc.

Blended Course Design

The majority of the faculty perceived that training on the “backward design” (Wiggins & McTighe, 2002) approach enabled them to (i) identify desired results by defining course goals and unit-wise/week-wise learning outcomes; (ii) determine acceptable evidence by designing assessments and the ways to conduct assessments — either Moodle-enabled or offline; and (iii) plan learning experiences and instruction by designing learning activities and sharing and sequencing learning resources that equip students with the required knowledge and skills to improve their performance and achieve desired results. They also maintained that designing their blended courses helped them with: online course development and integrating assessments, activities and resources as planned. The following illustrative quotations extracted from the interview transcripts support the study findings.

“Even though it took quite a lot of time to prepare the Blended Course Design, it paved a path to me as a facilitator to ensure that the course has met all its necessary elements of concepts including recent advancements.”

“Helped in planning entire course, topic-wise with resources and activities — assignments, forums, quizzes.”

“Helpful for prior planning... Inevitable to thoughtfully integrate offline and online activities.”

“It is easier to develop the course page with blended course design document, as the design document contains all the OER links and learning objectives etc.”

Blended Course Peer Review

Guidelines and standards for the evaluation of online and blended courses help alert instructors to critical factors to consider when designing the online portion of blended courses (Owston & York, 2018). During the Workshop on Technology-Enabled Learning Implementation Review held in March 2018, faculty were asked to use the COL's Blended Course Learnability Evaluation Checklist¹⁰ for peer reviewing and self-reviewing the quality of their blended online courses.

The majority of the BL teachers realised that peer reviewing of blended course designs helped them to improve the quality of their online courses. They perceived that the peer-review activity was useful not only to identify the strengths and gaps in their own courses but also to identify and adopt their peers' innovative online teaching practices, such as audio-based resources, video-based assignments, interacting with students through Moodle's chat module, etc. The illustrative quotations given below support the key findings.

⁹ Dedoose: <http://www.dedoose.com>

¹⁰ Blended Course Learnability Evaluation Checklist. <http://oasis.col.org/handle/11599/2941>

“Knowing others’ course development using different Moodle modules and features helped in self-reviewing course development.”

“Peer review helps in 1. self-analysis, 2. sharing knowledge and innovative practices, 3. inculcate innovate thoughts of peers (e.g., video-based assignment, Telugu faculty using chat).”

OER Adoption

COL has been promoting OER adoption and adaptation to improve access to quality learning resources. During the capacity-building and course-development workshops, the COL Facilitator trained the RGUKT TEL faculty on: understanding OER and Creative Commons Licences; searching and identifying OER unit-wise/week-wise; reusing OER with proper attribution in the TASL¹¹ format; and integrating OER in their course design and online courses.

The majority of the BL Teachers acknowledged that engaging in identifying course-relevant OER and adopting OER through a systematic course re-design process widened their domain and interdisciplinary knowledge, enabled them to provide multimedia learning experiences for students and engage students’ in searching for course-relevant and interdisciplinary OER. The following illustrative quotations extracted from the interview transcripts support the findings.

“OER enabled us to expand the scope, we’re always restricted by the syllabus. With OER students can improve their knowledge.”

“Gained additional knowledge from the OER.”

“OER improved domain knowledge.”

“Students showed interest in exploring course-relevant OERs and in other subjects (ISRO rocket science).”

“The concept of open education has enabled me to reach out the students with difficulty in understanding the concepts and make them to explore the recent advancements in their interested area.”

“I collected resources for all the topics from open sources like NPTEL courses.”

Though faculty realised the potential of OER, 30–40% stated that they could not find course-relevant OER in their native language, local context and standard and therefore adopted OER to a lesser degree and expressed interest in releasing their own content as OER.

Blended Instructional Practices

Switching from traditional approach of teaching to blended approach enabled the RGUKT faculty adopt innovative teaching practices to improve teaching efficacy and realize a variety of benefits, including (illustrative quotations listed under blended instructional practices support the study findings):

- flexible teaching
 - “Moodle enabled me to even make my time to focus on my career advancement like doing my Ph.D.”
 - “This semester I attended two conferences. At that time, I gave online assignment to our students.”
 - “Met with an accident and couldn’t open mouth, then felt the need of some online platform and tools to share teaching-learning content.”
 - “Moodle-enabled blended learning enabled me to assign activities and assignments to students when I was on sick leave.”

¹¹ TASL:

https://wiki.creativecommons.org/wiki/Best_practices_for_attribution#Title.2C_Author.2C_Source.2C_License

- sharing resources in multimedia to enable students understand the concepts effectively
 - “Enriched students learning with multimedia content.”
 - “The animation videos can be shared and this enables students to understand concepts beyond the conventional teaching classes”
 - “It was very easy for me to give them tutorials about the software tool, such as “ANSYS 2D Modeling tutorial, ANSYS 3D Modeling tutorial, ANSYS Meshing tutorial”
 - “Helped in sharing videos on complex molecule structures”
 - “I even provided Audio of the Poem, so that my students will get the correct pronunciation, accent and intonation while reading the poem”
 - “Created videos on Star Poems”
 - “Shared web resources, provide link to external game-based activity”
 - “Embedding Videos on Blended- learning course page made easy to the students to understand the concepts effectively”
- adopting innovative assessment strategies, such as video-based / software tutorial-based assignments enhanced students’ learning experience
 - “Hands-on video-based / software tutorial-based assignments enhanced students’ learning experience”
 - “Used quizzes for self –assessment”
 - “Quizzes were replacement to earlier weekly test”
 - “By giving quizzes, I could create competitive exams environment and spirit in them since now a days most of the competitive exams are online based”
 - “I provided solutions for quiz questions, once they finish the test they can cross check their results through not only with answer but also with explanation, more or less I created a test series environment”
- improved communication students
 - “The process of blended learning has taught me the effective ways of communicating with students through Moodle platform and its features.”
 - “In order to give any information, though there is no classroom teaching Announcements forum helped me a lot.”
 - “Used Moodle messaging functionality for sending alerts.”
 - “Helped in overcoming conventional teaching challenges – engaging students in discussions, receiving through e-mails.”
- improved interaction with students
 - “Activities are the new things that happened in this course. These allow more effective interactions between the students and teacher.”
 - “These technology-supported teaching techniques render better interaction with student.”
 - “Pre-readings improve interaction and discussion in the class.”
 - “From the learner point of view, with the online preparatory readings, the classroom interaction with the facilitator and peers improves, which eventually leads to the improving of the test scores.”
- improved domain knowledge
 - “While searching for relevant open educational resources, I as a teacher could improve my knowledge which was advantageous while I am delivering the content to my students.”
- saving time
 - “Handing large size classrooms have been made easy, lot of the time have been saved on developing more standard and more durable teaching materials with the help of already existing OER.”
 - “It helped me in providing the required content to my students whenever I want without running after the IT staff. Now, I can straightaway provide the link, which is saving my time.”
 - “During evaluation I used the dialogue box where I can give comments and grades by rectifying their wrong ones in the uploaded PDF document. It made the students to know their results within a few days which help me to save my time in evaluation process.”
- improved digital literacy
 - “Initially, faced challenges in understanding technology and Moodle-enabled teaching. Peers’ support helped in improving my digital literacy.”

Faculty were satisfied with their blended teaching practices and expressed the need to optimally explore Moodle functionality so as to focus on quality interactions and student engagement and improve their teaching effectiveness.

The majority opined that participating in the TEL project was a professional development opportunity that needs to be extended to the entire teaching community.

Conclusion and Recommendations

From the findings, it is evident that RGUKT's BL environment provided the teachers with a flexible teaching environment and enabled them to enrich students' learning experience with a mix of instructor-led teaching and technology-enabled learning as well as traditional and interactive multimedia. The study concluded that RGUKT's BL environment was effective in providing multiple options for instruction and improving teachers' pedagogical practices.

However, to streamline and scale up the BL initiative, RGUKT needs to address the challenges reported by the teachers, such as workload and time constraints, and the lack of: (i) periodic review, monitoring and evaluation of TEL progress; (ii) a curriculum-integrated approach, (iii) evaluation weightage for online assessments — assignment and quizzes, (iv) quick and responsive technical support, (v) software and tools for recording lectures and (vi) digital literacy among students. Institutional support is necessary to recognise the increased workload and time commitment required, and to address the challenges that faculty face in redesigning courses, handling communications, developing partnerships, managing time, dealing with technology, applying pedagogies that support a variety of technologies and receiving peer support and mentoring (Baran & Correia, 2014; Gurley, 2018; Lane, 2013).

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Annex 1: Blended Course Design Template

Course Title:

Programme:

Institution/Campus:

Course Facilitator:

Course Description:

Learning Objectives:

Course Structure Module-wise / Week-wise	Learning Outcomes	Assessments – F2F / Moodle- enabled	Learning Activities – F2F / Moodle- enabled	Learning Content – F2F / Moodle-enabled		Facilitating Online
				Self-created / Web resources	Supportive OER with TASL Attribution	
Module 1 / Week 1 / Unit 1	LO 1 LO 2 LO 3 LO 4	FA 1 (LO 1) FA 2 (LO 2 & 3) FA3 (LO 4)				
Module 2 / Week 2 / Unit 2						
Module 3 / Week 3 / Unit 3						
Module 4 / Week 4 / Unit 4						
Module 5 / Week 5 / Unit 5						