



Indian Educational Technology under a Learning Sciences Lens

Nilanjana Saxena

Learning Design Professional, Higher Education, Singapore

nilanjanasaxena17@gmail.com

Abstract

Education delivery and design is being continuously recast by application of learning technology. Several web-based learning applications are contributing to accessibility, enabling differentiated learning needs at scale. No doubt this is an important first step towards education for all, however since learning is a complex socio-psychological experience, are current EdTech products simply replicating traditional teaching? This paper presents a Learning Science (LS) perspective on EdTech solutions emerging in India, aimed at examining their pedagogical efficacy and proposing recommendations for greater cognitive engagement. Results reveal that while teacher centred approaches are visible in the Indian EdTech products, designing products aimed at constructive and interactive learner tasks will likely pave the way for higher learning gains.

1 Background

EdTechXGlobal [1] reports marked change in the EdTech market. In 2016, the education market was seen to be over \$5 trillion, that is 8 times the size of the software market [1]. With only 2% of education digitised, there is tremendous scope for massive digitization. Technological, demographic and public policy enablers will support such digitization. Such momentum is evident in India too, based on the increasing number of deals in the mergers and acquisitions space [2]. The driving forces propelling demand for online education in India are reportedly: government's digital initiatives, increased household spending on education, realistic pricing and increased availability of quality online education [3].

While the promise of online education to provide accessibility and convenience at lower costs is being realised, are these solutions merely digitizing content using the latest technology. To what level are Indian EdTech products engaging learners cognitively or promoting constructive learning? This is discussed below when evaluating select K12 EdTech offerings in India, from a LS perspective. In 2018, when this research was undertaken, there were no comprehensive free access industry papers on the India's EdTech sector, especially from a pedagogical perspective. This paper attempts to address this gap in literature by undertaking a pedagogical evaluation of the Indian EdTech products, by first providing a market overview and subsequently analysing their pedagogical efficacy. It is hoped that the findings and analysis will benefit anyone studying the Indian EdTech sector and its product evolution.

2 Methodology

Two primary main tasks were carried out: first, publicly available Indian EdTech Industry papers, magazine/ newspaper articles and blogs from 2015-2018 were reviewed. Next, the Crunchbase (CB) [4] database was trawled for company profiles, employing search terms like ‘EdTech’, to shortlist providers on their CB rank¹, profile and ‘operational’ websites. Companies ranked greater than 110,000 (as of March 29, 2018) were excluded. The research did not cover companies/organisations catering to offline student support, online designed for EdTech intermediaries. The shortlisted companies were further investigated by trialling their products. These companies were segregated according to their product characteristics, details in section 3.

In terms of limitations paid resources were identified but only publicly available online sources were considered. The accuracy and completeness of company data is dependent on information retrieved from Tracxn [5], CB [4], company websites and blogs as at May 2018. Of the 410 seemingly relevant websites for review, a handful were selected for evaluation with the rationale of obtaining an overview of the market rather than an exhaustive picture of all players.

3 Results

The literature revealed a spectrum of integrated solutions, addressing specific aspects of the education value chain. For the purposes of this paper, categorization of companies offering more than one solution, is based on their primary product. The shortlisted companies were categorized as depicted in Table 1.

Table 1: Summary of the Indian EdTech²

Digitized Repository	Tutoring K12	Higher Education Products	Post-Secondary Test Preparation	Language & Casual
Doubtnut CB Rank: 7,770	BYJU’s CB Rank: 771	UpGrad CB Rank: 53, 730	Embibe CB Rank: 175	Unacademy CB Rank: 3858
Kopykitab.com CB Rank: 23,148	Meritnation CB Rank: 3768	Simplilearn CB Rank: 3351	NeoStencil CB Rank: 10,695	SpeakAlley










‘Digitised Repository’ includes eBooks/notes, and text in any form for perusal. ‘Tutoring K12’ comprises pre-recorded lectures and services connecting the student and teacher. Learner feedback, autonomy of choosing the content to study are features some companies allow. ‘Higher Education Products’ include Massively Open Online Courses and boot camps. ‘Post-Secondary Test Preparation’ covers university entrance examinations solutions. Products in the last category cater towards personality and skill development akin to co-curricular learning. Emerging technologies such as Augmented Reality (AR) and Virtual Reality (VR) are yet to enter mainstream education [7]. Smartivity, a Delhi based EdTech (CB Rank: 5601) offers AR books.

¹ CB rank is a dynamic ranking system set up by CB for all entities in their dataset [6].

² CB rank source: CB [4], CAA May 10, 2018. Companies without a rank were not listed in CB [4] and these names are extracted from Tracxn [5].

K12 school solutions: ‘Tutoring K12’ providers were further investigated and categorised as depicted in Table 2. A detailed version of the Table 1 and Table 2 can be provided upon request.

Table 2: ‘Tutoring K12’- A closer look

Teaching	Test Preparation	Marketplace for Teachers and
 BYJU’S CB Rank: 771	 Embibe CB Rank: 175	 GuruQ
 Meritnation CB Rank: 3768	 Toppr CB Rank: 122	 Unacademy CB Rank: 3858
 Zaya Education, Software CB Rank: 97571	 Aakash iTutor	 Vedantu CB Rank: 1110

‘Teaching’ includes supplemental educational videos/texts, worksheets, and/or practice tests while ‘Test Preparation’ included targeted practice tests and past years papers. Bite sized videos catering to specific content, automatic grading, feedback, progression tracking were notable features visible in some offerings. ‘Marketplace’ products connect teachers and students for a price, and support video calling, ‘Real time Whiteboards’. The value proposition of these solutions is value for money and online and offline accessibility.

4 Discussions of findings and Recommendations

Applying LS research, this section analyses K12 Indian EdTech using ICAP [8], effective tutoring [9] and assessments [10]. The ICAP framework categorises learning tasks in terms of activities learners engage in when performing the task. This framework has outlined four levels of activity, ranging from most engaged to least engaged: Interactive, Constructive, Active and Passive learning. Interactive is the highest level of cognitive engagement, followed by Constructive, Active and the least Passive. Applying ICAP to the above-mentioned EdTech products helps assess the activities’ cognitive engagement, depicted in Table 3.

Table 3: Application of ICAP to features of products offered by EdTech players in India

	Interactive	Constructive	Active	Passive
EdTech product features	Human Tutoring, Chat service, Doubt clearing discussion	Question and Answers in between videos or practice	Physical video manipulations, self-paced.	Video lecture, animation, eBook/ notes.

Looking at table 3, it may seem there are interactive and constructive tasks embedded in the EdTech solutions, however, these were limited to instructor led student query interactions. Here, learners received and shared answers from other sources. Discussion and collaboration, as defined in ICAP [8], was not visible. Second, it seems that the design of EdTech products leaves scant room for learner construction of knowledge, since learners were engaged purely in recalling information while

answering objective questions. Lastly, most products offered video lectures/ repositories invoking receptive behaviour with some ‘clicking’ activity. These videos had high pedagogical structure, with Direct Instruction. While well-assembled and sequenced, such teaching delivery is limited to answering exam questions, not triggering the learner to assimilate, and contextualise knowledge in differing contexts, especially ill-structured real-world situations [9,10,12].

Overall, the level of cognitive engagement in EdTech tools discussed is low, leaving considerable scope to enhance them towards greater cognitive engagement by purposefully shifting emphasis from teacher to learner centredness. ‘Tutoring K12’ EdTech products can foster greater cognitive engagement when informed by theoretical constructs pertaining tutoring and assessment. The key takeaway for tutors and instructional designers is to ‘teach less and elicit more’ [9]. Effective teaching resists the temptation to prompt frequently, making room for far transfer of knowledge and deeper learning. In view of this, tutoring apps should provide space and motivation for exploration. On assessing learning, EdTech creators should reconsider the goal of assessment keeping ‘far transfer of learning’ [10] in mind. Authentic questions allowing for open-ended constructed responses [11,12,13], as opposed to declarative objective questions allows for greater cognitive engagement. EdTech creators ought to be mindful that learners should be treated not as passive consumers but rather as active co-creators, see the *Pallas* [13] product.

References

- [1] MarketWatch. (2016). Global Paper Predicts EdTech Spend to Reach \$252bn by 2020 [Press release]. Retrieved from <https://www.marketwatch.com/story/global-paper-predicts-edtech-spend-to-reach-252bn-by-2020-2016-05-25-4203228>
- [2] CBInsights. (2016, April). Ed Tech Goes Global: India Sees Deals Explode While China Takes One-Fifth Of Funding. Retrieved from <https://www.cbinsights.com/research/edtech-deals-geographic-trends-2016/>
- [3] KPMG. (2017). *Online Education in India: 2021; A study by KPMG in India and Google*.
- [4] Crunchbase. (2018). Crunchbase: Organizations. Retrieved 1 June 2018 <https://www.crunchbase.com/search/organizations/field/organizations/categories/edtech>
- [5] Tracxn. (2017). *EDTECH-INDIA*. Retrieved from https://blog.tracxn.com/edtech-india-paper-download/?utm_source=blog&utm_medium=blog&utm_campaign=edtech-paper
- [6] Stephan, D. (n.d.). What is Crunchbase Rank and Trend Score? Retrieved from <https://about.crunchbase.com/blog/crunchbase-rank-trend-score/>
- [7] KPMG. (2017). *Online gaming in India: Reaching a new pinnacle; A study by KPMG in India and Google*.
- [8] Chi, M. T., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, 49(4), 219-243.
- [9] VanLehn, K., Siler, S., Murray, C., Yamauchi, T., & Baggett, W. B. (2003). Why do only some events cause learning during human tutoring? *Cognition and Instruction*, 21(3), 209-249.
- [10] Bransford, J. D., & Schwartz, D. L. (1999). Rethinking Transfer: A Simple Proposal with Multiple Implications. *Review of Research in Education*, 24, 61-100. doi:10.2307/1167267
- [11] Kapur, M. (2012). Productive failure in learning the concept of variance. *Instructional Science*, 40(4), 651-672.
- [12] Jacobson, M. J., Markauskaite, L., Portolese, A., Kapur, M., Lai, P. K., & Roberts, G. (2017). Designs for learning about climate change as a complex system. *Learning and instruction*, 52, 1-14.
- [13] Pallas. (n.d.). Pallas Advanced Learning Systems. Retrieved from <https://pallasals.com/> on 1 June, 2018.