

Simultaneous Training of 10,000 Teachers through Weapons of Mass Instruction

Kannan M. Moudgalya

IIT Bombay, Powai, Mumbai 400 076. email: kannan@iitb.ac.in

Abstract

Spoken Tutorial and T10KT (Train 10,000 Teachers) are two highly successful large scale educational methodologies, respectively, using asynchronous and synchronous teaching methods. These two are combined to come up with a massive blended workshop methodology. Using this method we trained a large number of learners on Koha, Moodle, Scilab and Python, training of the order of 5,000 teachers and librarians at a time. A financial model to make this approach self sustaining in the long run, without burning a hole in the pockets of the participants, has also been successfully tested. The blended method proposed here is effective, scalable and sustainable.

Keywords: Spoken Tutorial, Train 10,000 Teachers, A-VIEW, self learning, blended workshop, scalable, sustainable, Koha, Moodle, Scilab, Python, eSim, Linux

1 Introduction

Employment is a major issue in India [1]. If this issue is not addressed, what is a demographic dividend will become a demographic nightmare [2]. One of the reasons for this problem is the lack of good education [3]. Given that India has about 300 million students to be trained, it is important that we train millions of teachers. This problem is faced by other highly populous developing countries as well. Synchronous education is proposed as a solution to this problem [4, 5]. Although these methods result in lower per capita cost, they turn out to be very expensive, as they have the potential to reach out to many.

In this work, we explore whether it is possible to combine an asynchronous method of Spoken Tutorial [6, 7, 8] with the Train 10,000 Teachers (T10KT) programme [9, 5] to provide blended training to a large number of teachers, in the area of Information Technology (IT). One of the objectives is to keep the cost of training low, without sacrificing the quality. The next section summarises the Spoken Tutorial method. The T10KT method is briefly explained in Section 3. The massive blended method obtained by combining Spoken Tutorials and T10KT is explained in Section 4. The last section is devoted to conclusions.

2 Method

In this section, we explain how we have combined Spoken Tutorials and T10KT to train a large number of teachers simultaneously. We will refer to this as the *blended* approach. The workshop conducted using this blended approach will be referred to as the *blended workshop*.

A Spoken Tutorial is a 10 minute long audio-video tutorial created for IT training. All Spoken Tutorials are scripted, and not created extempore. All sentences in a script are made

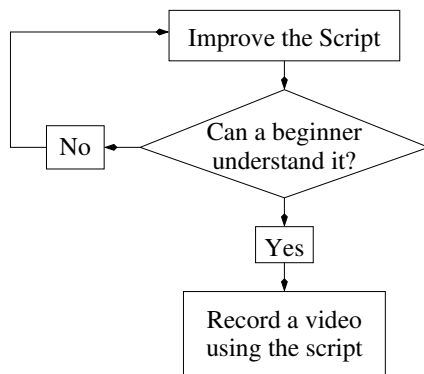


Figure 1: Novice check of scripts in creating Spoken Tutorials

short by mandating them to be less than 80 characters long, an important requirement in the learning process [10]. Novice check of the script before it is recorded makes Spoken Tutorials suitable for self learning. Fig. 1 explains the role of novice check in the creation of Spoken Tutorials. It is fair to say that the requirement that the script passes a novice check increases the work at least ten fold, as compared to the recording of extempore talks.

T10KT is possibly the worlds biggest technology based synchronous teacher training programme. It is a synchronous training programme that is offered from IIT Bombay to a large number of Remote Centres through videoconferencing. The software used for this purpose is A-VIEW [9]. Participants can go to a Remote Centre near where they live or work and listen to the lectures. As two way interaction is possible through this software, participants can ask questions in real time. Both the question and the answer provided by the instructor at IIT Bombay can be seen from all other Remote Centres, by the participants assembled therein. All Coordinators at Remote Centres get trained ahead of time.

In the blended approach, which is the focus of this work, learning at Remote Centres happen through Spoken Tutorials, unlike in T10KT, in which training is provided by live lectures. The workshop begins with an explanation of how the workshop is conducted and answering the questions of participants. The Side-by-Side method of learning Spoken Tutorials [7] is explained through pre-recorded videos and live demonstration. All participants are urged to use the Timed Discussion Forum [11] as well, to learn from, to post questions and to answer. All participants get to learn from Spoken Tutorials for about four hours.

Lunch, coffee/tea and snacks are provided by the Remote Centres, using the money collected from the participants as a course fee, which is a nominal ₹500 per person. The workshop concludes at the end of the day with an hour of live interaction with the participants at Remote Centres.

About 4,000 to 5,000 teachers have been attending these blended workshops through more than 100 Remote Centres, see Table 4 and Fig. 2. We discuss the efficacy of this training here.

3 Research Question

Using the large scale IT training using the blended method described above, we would like to provide good quality training, while keeping the costs low. The experimental group is the teachers who undergo the blended training programme. The control group is somewhat difficult to identify: Choosing the conventional classes as the control group is incorrect, because these are usually small in number, unlike the proposed blended training methods that have the potential to train thousands of teachers simultaneously. It may also be incorrect to compare with T10KT,

Table 1: Comparison of the blended method with synchronous method, which seems to be more attractive than the former

	Synchronous method	Blended method
Learning	Through live lectures by experts.	Learning through Spoken Tutorials.
Answering questions	Questions are answered live.	Answered by neighbours and in the forum.
Exploring new ideas	Doubts, if any, are answered live.	Answered by neighbours and in the forum. If no help is available, reproduce only what is strictly available in the Spoken Tutorial. Whatever is shown in the tutorial will definitely work.
TA/DA	Travel and Dearness Allowances (TA/DA) are paid by the Government.	None of these allowances are paid by the Government. Participants or their institutions have to bear them.
Course fees	No course fees.	A nominal sum of ₹500 per person, which includes the cost of lunch, coffee/tea/snacks, etc.
Duration	Long duration workshops result in recognition for promotion, etc.	As it is only a one day workshop, it is of less value from the recognition point of view.

whose efficacy has been studied only for longer duration training, unlike the blended method. Nevertheless, to point out some salient features of the proposed blended method, a comparison is still made. From this comparison, it seems that the proposed blended method, although perhaps financially feasible, is not as attractive as the conventional synchronous methods. So we ask the following Research Question.

RQ : Is the proposed blended method effective? Will it be attractive to teachers?

Given that the proposed method is sustainable, and scalable, it will be extremely useful, even if we can get only partial answers to the above question.

4 Answering the Research Question

We enforce a large number of rules that make Spoken Tutorials simple, and easy to follow. No. 1.1 to 1.4 in Table 2 and No. 2.1 to 2.3 in Table 3, respectively, explain the pedagogical and the logistical benefits of this approach.

There are a few interventions that make Spoken Tutorials suitable for self learning [7]. These are (1) learning through examples, accepted as one of the methods of learning [12] (2) examples are presented first and then the theory, which is different from the conventional, instructor-led, classes in which one generally teaches theory first, and (3) at least 80% of a Spoken Tutorial is devoted to demonstrations that a learner can reproduce. This in turn results in active learning. No. 1.5 to 1.7 in Table 2 explain the pedagogical benefits of this approach.

Learning involves the reproduction of all the commands shown in a Spoken Tutorial. Rigorous novice check ensures that this is indeed possible. Learners are recommended to use a Side-by-Side method [7] in which the Spoken Tutorial is opened in one half of the screen and the software itself is opened in the other half, to reduce the important problem of cognitive overload [13, 14]. Side-by-Side learning is always possible because we use only open source software to provide IT training [15]. Any number of people can use the open source software

without worrying about the license fee, making it suitable for country-wide programmes. No. 1.8 to 1.10 in Table 2 and No. 2.13 to 2.15 in Table 3 explain the benefits of this approach.

All required files for every Spoken Tutorial, such as data files, and code files, are provided. This helps the learner create an identical environment to what is used in the Spoken Tutorial. While some learning systems *force* a learner to study in a particular sequence, our method allows them to choose any order of their liking [6]. No. 1.11 and 1.12 in Table 2 explain the pedagogical benefits of this approach.

Spoken Tutorial based training uses a timed discussion forum [16], which allows learners to ask questions pinpointing exactly the time when the difficulty arises [11]. A testimonial on the Spoken Tutorial based method in general, and the use of the forum as an intervention, is provided by a librarian:

I have been using Koha for four years. I learnt Koha through manuals. When I compare that learning with this learning, it is amazing. It took a long time for me to learn through manuals. The Spoken Tutorial method is saving a lot of time and is also helping me understand easily. Forum is a great thing. The moment I have a question, help is readily available.

This is explained in No. 1.13-1.14 in Table 2. It is through the timed discussion forum we are able to answer the questions of learners in different remote centres.

The audio of Spoken Tutorials is dubbed into all 22 official languages of India, with the video always in English. This makes our content easy to access to those who are not fluent in English, while retaining their employment potential. As the translation and dubbing technology is not completely developed for Indian languages, manual dubbing process is used. Enforcing the original English script to be simple, easy to understand, and to have short sentences, allows us to use the same video for all language audio dubbing. Dubbing only the audio makes the dubbing process inexpensive. It also ensures that the same high quality video is available in all language dubbing. Finally the timed discussion forum is common for all languages. Language dubbing will be especially useful when the school teachers trained through this method want to use the same approach to teach their students. No. 1.15 to 1.21 in Table 2 and No. 2.4 to 2.10 in Table 3 explain the benefits of this approach.

Use of Spoken Tutorials involve asynchronous learning, allowing learners to use at their own convenient speed, using a language dubbing of their choice. This results in as many video streams as there are learners. The required bandwidth for this purpose far exceeds what is available in most educational institutions in India and in other developing countries. This problem has to be addressed if the technology based education has to be effective [17]. To overcome this difficulty, we made it possible to use Spoken Tutorials in an offline mode. The offline version increased the use of Spoken Tutorials a hundred fold. Any organiser can download required Spoken Tutorials and copy them on to every one of their computers for offline use. As a matter of fact, we could conduct effective workshops in 2015 using the Spoken Tutorial approach in Myanmar, without a reliable power supply and no Internet bandwidth. These benefits are listed as No. 1.22 in Table 2 and No. 2.11 and 2.12 in Table 3. Use of offline versions of Spoken Tutorials is fundamental to the success of the blended method, focus of the current work.

Using Spoken Tutorials, more than 5 million students have been trained over a period of about five years in about 5,000 colleges. A large number of testimonials have also been received from them. We received the following feedback from the Head of an MCA department, who confirms that the SELF workshops can be organised without an expert.

Recently, I came across one company which wanted students with sound knowledge in PHP MySQL. As our MCA syllabus does not cover PHP MySQL, I decided to

train my students using Spoken tutorial. More than 30 students took up the course, and in a very short time, I could train my students. This helped place six students, by training them to meet the company requirement, without incurring any cost. The Spoken Tutorial courses are effectively designed to train a novice user, without the support of a physical teacher, and have taken care of all possible questions that may arise during a course.

A B.Sc graduate who got employed as a Linux Developer in Tata Consultancy Services, the leading IT company in India, has the following to say:

I am very glad to inform you that I got an opportunity to speak about my experience with IIT Bombay for working on a project (Spoken Tutorials). This exposure seemed to be one of the reason for getting selected in TCS, which various engineers and other graduates would love to. The amazing certificates and having leadership qualities for organizing several workshops during my college days brought in me the confidence to undertake any task. I have got into TCS as a Linux developer. The first time I learned about Linux is when I conducted as well as undertook a test on Linux which was organized by IIT Bombay.

This feedback was given by a library sciences student on the efficacy of Spoken Tutorials in imparting Koha training.

My bachelors degree was in development communications. Being from social sciences background, learning a software in two to three hours feels really great, that I could actually create my own library... We always heard the term learning by doing - it actually stands true for this programme, because we are learning and side by side doing. We are actually saving a lot of time and we get results on screen, which is really helpful. I have heard about the term digital divide. I think that sessions like this will eradicate it very soon, because even a nontechnical person like me is able to catch it so soon.

T10KT could train large numbers because, many learners could find a convenient Centre close to their home, as opposed to travelling across the country to IIT Bombay or IIT Kharagpur. This especially helped women teachers who could go back home at the end of the day. As a matter of fact, the enrollment of women in IT and electronics courses were more than 40%, which is a very large number [18]. T10KT also helped young faculty members who would have waited many years to get their turn to attend traditional courses with small enrollment. More than 70% of the learners were at the lecturer or Assistant Professor level, with bachelor's or master's degrees, for example. Because of the Internet technology, learners in every Centre received the same high quality training, whether they were in a small town or in a remote place, shrinking distances in some sense. These benefits are summarised in No. 2.17 to 2.20 in Table 3.

A summary of blended workshops conducted and number of teachers trained is given in Table 4. In [19], a brief summary of the massive blended workshop on Python is provided. Videos of interactions with course participants, linked from this article, demonstrate the success of this approach. A large number of discussions take place through the timed discussion forum [16]. Locations of Remote Centres that took part in eSim and Linux workshops are shown in Fig. 2.

The testimonials received from the users, the benefits of the underlying methodologies of Spoken Tutorials and T10KT listed in Tables 2 and 3, and the large numbers of teachers who attend the blended mode workshops despite its shortcomings listed in Table 1 help us answer the Research Question in an affirmative way: it is possible to provide a reasonably effective training through blended method described in this work.

Table 2: Pedagogical benefits of the proposed method

No.	Activity	Benefit from pedagogy point of view
1.1	Short sentences used in the script of Spoken Tutorials	Simple language constructs are enforced
1.2	Simple language in the script	Easy to understand for target audience
1.3	Novice check of the script	Suitable for self learning
1.4	Short Spoken Tutorials	Addresses the short attention span requirement
1.5	Learning through examples in Spoken Tutorials	Suitable for beginners
1.6	Examples first and then theory	Suitable for self learning
1.7	80% example, 20% theory	Suitable for active learning
1.8	Reproduction of every command in the video as the learning process of Spoken Tutorials	Makes the learning process very easy to follow
1.9		Standardises learning process across all topics, very useful for self learning
1.10	Side-by-side learning using Spoken Tutorials	Reduces the cognitive overload
1.11	Providing complete code along with Spoken Tutorials	Identical environment as in the video is provided, important for beginners
1.12		Allows learners to start from any tutorial of their choice, without insisting on a particular route. Useful to learners who already know some aspects of a topic, and hence are interested only in select tutorials of a series.
1.13	Timed discussion forum that goes with Spoken Tutorials	Allows beginners to easily locate previous Questions and Answers, and to ask new questions, if required.
1.14		Any learner who knows the solution can also answer. Experts get recognised in this manner. It also reduces the time required to answer a question.
1.15	Dubbing of Spoken Tutorials into all 22 languages of India	Empowers students, including linguistic minorities, not fluent in English
1.16	Manual dubbing	Can be approximated, if required, to fit into the available time, for example
1.17		Idioms of target languages can be used, if required
1.18	Approximate while dubbing for clarity	Easy to understand for the target audience
1.19	Enforcing identical English video in all languages	Enforces identical quality for language learners
1.20		Confidence that they will retain employment potential encourages students to learn from Spoken Tutorials
1.21		Same timed discussion forum is useful to all language learners. Answers given to one will be suitable for learners of other languages too.
1.22	Offline use of Spoken Tutorials	Meets the small response time requirement for effective learning
1.23	Learning from videos only (and no live lectures)	Quality degradation possible in the traditional train the trainer programme is absent
1.24		Timed discussion forum is possible
1.25	Workshop through Remote Centres	Creates in different parts of the country a conducive environment for learning

Table 3: Benefits of the proposed method from logistical point of view

No.	Activity	Benefit from the logistics point of view
2.1	Spoken Tutorials are based on scripts	Helps do a novice check before recording. Useful for dubbing, search, etc.
2.2	Simple language and short sentences	Possible to translate within available time into other languages
2.3	Making Spoken Tutorials 10 times better than an average video	Number of people watching it increases 1,000 times
2.4	English video	Normal computers, normal keyboard, normal software can be used by all
2.5		Retains employment potential
2.6		Helps improve their English skills eventually, and thereby integrate the learners into the main stream
2.7	Dubbing into 22 languages	Cheapest way to make the content available to the public - dubbing cost is only 5% of the original tutorial creation cost.
2.8		Easy to dub into any of the world languages
2.9	Manual translation and dubbing	The fact that this technology has not matured for Indian languages does not matter
2.10		Language is a sensitive matter in India. Helps ensure that wrong approximations are not used
2.11	Use of offline version	Increased the utilisation of Spoken Tutorials a hundred fold
2.12		Allows workshops to take place with laptops even during power outages, if the laptops are already charged
2.13	Open source software	Side-by-side learning is possible
2.14		Country wide training is possible
2.15	Releasing the video as open source	Country wide training is possible
2.16	No registration and login are required	A large percent of people leave a portal when registration and login are mandated. This problem is solved here.
2.17	T10KT	Less travel time, reduces the requirement of long distance travel, overnight stay, etc., thereby reducing the cost and effort
2.18		Empowers women
2.19		Allows young faculty members to join such a programme
2.20	Engineering colleges as Remote Centres	Can handle well the technology required in live transmission and interaction

The method adopted in the blended method may actually be better than the conventional train the trainer kind of workshop, wherein there is a loss of information and degradation in the quality. In the blended method proposed here, learning happens only through Spoken Tutorials, and hence the information content is identical to everyone, at all levels. Another way to say the same thing is that any teacher who learns through our blended method can themselves conduct an equally effective training to their colleagues and students. These benefits are listed as No. 1.23-1.24 in Table 2.

5 Conclusion

Spoken Tutorial and T10KT are two highly successful educational programmes that have demonstrated their efficacy by training a large number of students and teachers, respectively. By

Table 4: Statistics of training imparted through massive blended workshops

Date	Topic	No. of Centres	No. of teachers trained
8-10-2018	Koha	104	2,500
9-3-2019	Koha	79	1,040
15-3-2019	Moodle	104	4,359
4-5-2019	Scilab	164+, including a few from Afghanistan	4,387
22-6-2019	Python	187, including a few from Afghanistan and Bangladesh	5,264, which includes 1,100 high school teachers
27-7-2019	eSim	130, including one Centre from Myanmar	Coordinators' training
3-8-2019	Linux	120, including one Centre from Myanmar	Coordinators' training
23-8-2019	Linux	120	3,000+ expected
21-9-2019	eSim	130	2,000+ expected

combining these two, we have arrived at a massive blended workshop method to train a large number of faculty members and high school teachers. Using this method, we have provided training on Koha, Moodle, Scilab, and Python. The most recent workshop on Python had more than 5,000 faculty members and high school teachers participating in it. If each teacher can influence 100 students, this method has a potential to indirectly reach out to 500,000 students after every workshop.

Participants of these workshops pay a part of the expenses needed to support these programmes, thereby making them sustainable. This also demonstrates the acceptability of the adopted method by the learners.

A drawback of T10KT when implemented alone is that all expenses of teachers, their travel, board, lodging, etc., are paid by the Government. Although the cost per person is much lower than the conventional approaches, the total project outlay was prohibitively high, because of the capability of the method to accommodate large numbers of learners. Because of this apparent high cost, the T10KT project is no longer supported by the government. In the blended method, however, we have used the Remote Centres of T10KT and the Spoken Tutorial together to provide massive workshops in a financially sustainable way.

A drawback of the Spoken Tutorial method is that it has been validated only for the *skills* type of training, and not in areas that are theoretical in nature. In view of this, the blended workshop method explained in this report is also restricted to skills training only. Although the method has a narrow focus, it is still useful for many other fields that require skills training. For example, we have been conducting workshops on breastfeeding to health workers and lactating mothers using Spoken Tutorials [21].

Spoken Tutorials and T10KT can be considered as Weapons of Mass Instruction as they can destroy the disease called ignorance, in a large number of people, in one go. These two together give rise to the focus of this work, namely the blended method, which has been found to be effective, while being scalable and sustainable.

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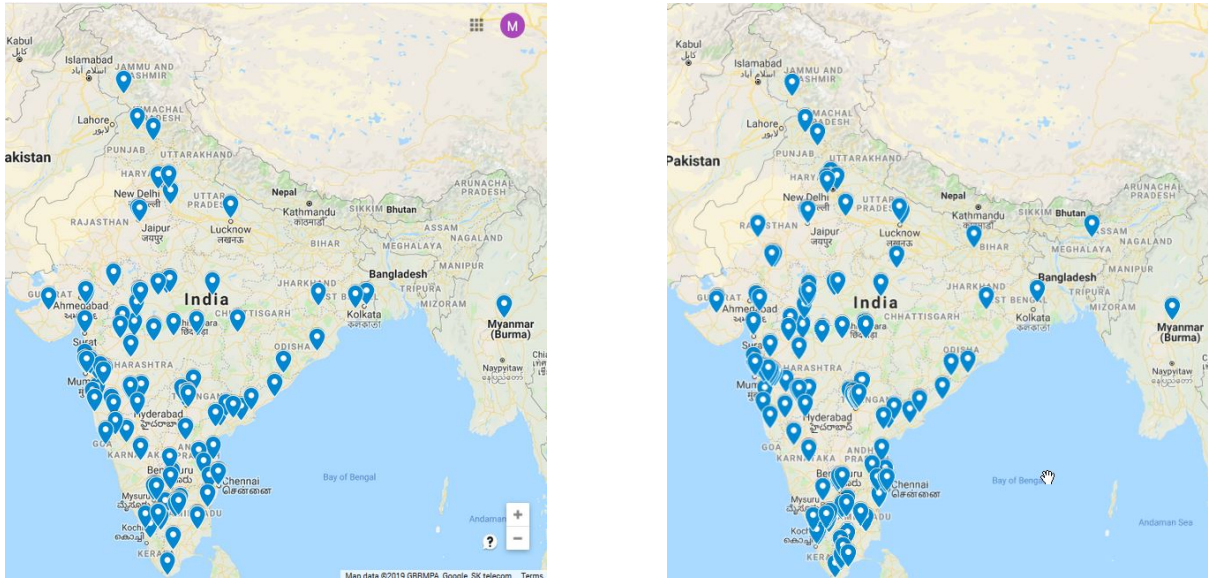


Figure 2: Remote Centres that participated in the massive blended workshop on eSim and Linux, respectively

References

- [1] D. Farrell, N. Kaka, and S. Sturze. Ensuring india’s offshoring future. *The McKinsey Quarterly 2005 special edition: Fulfilling India’s promise*, pages 75–83, September 2005.
- [2] Jadhav, N. Demographic dividend vs Demographic nightmare. 8th Chandrasekhar Memorial Lecture, IIPS, see <http://iipsindia.org/pdf/dr.narendrac.chandra-uploading.pdf>, 2010. Last seen on 7 Dec. 2016.
- [3] Vasudha Venugopal. Engineering students fail in maths, computing. *The Hindu*, <http://www.thehindu.com/features/education/issues/engineering-students-fail-in-maths-computing/article2985482.ece>, 12 March 2012, updated on 8 July 2016. Last seen on 27 November 2018.
- [4] K. M. Moudgalya, R. Deshmukh, and A.Patil. Synchronous distance education at IIT Bombay. In *Proceedings of International Workshop on Technology for Education (T4E)*, pages 54–61. IEEE, 2009.
- [5] Kalpana Kannan and K. Narayanan. A structural equation modelling approach for massive blended synchronous teacher training. *J. Educational Technology & Society*, 18(3):1, 2015.
- [6] K. M. Moudgalya. IT Skills Training through Spoken Tutorials for Education and Employment: Reaching the Unreached. *CEC Journal of Digital Education*, 1(1):19–62, 2017. <http://spoken-tutorial.org/media/CEC.pdf>.
- [7] K. M. Moudgalya. Pedagogical and Organisational Issues in the Campaign for IT Literacy Through Spoken Tutorials. In R. Huang, Kinshuk, and N.-S. Chen, editors, *The new development of technology enhanced learning*, chapter 13, pages 223–244. Springer-Verlag, Berlin Heidelberg, 2014.

- [8] K. L. N. Eranki and K. M. Moudgalya. Comparing the Effectiveness of Self-Learning Java Workshops with Traditional Classrooms. *Educational Technology & Society*, 19(4):310–331, 2016.
- [9] Kalpana Kannan. *Synchronous Teacher Training through Distance Mode: A Study of IIT Bombay Initiatives*. PhD thesis, IIT Bombay, 2015.
- [10] R. E. Mayer and R. Moreno. Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, 38(1):43–52, 2003.
- [11] S. Ganguly, K. L. N. Eranki, and K. M. Moudgalya. Assessing the efficacy of a large, self-learning, silent, L^AT_EX workshop. In *Technology for Education (T4E), IEEE International Conference on*, IIT Bombay, December 2016. IEEE.
- [12] A. L. Brown and M. J. Kane. Preschool children can learn to transfer: Learning to learn and learning from example. *Cognitive Psychology*, 20(4):493–523, 1988.
- [13] M. Hegarty and M. A. Just. Understanding machines from text and diagrams. In H. Mandl and J. R. Levin, editors, *Knowledge Acquisition From Text and Pictures*, volume 58 of *Advances in Psychology*, pages 171 – 194. North-Holland, 1989.
- [14] P. Chandler and J. Sweller. Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8(4):293–332, 1991.
- [15] Govt. of India. Policy on adoption of open source software for govt. of india. Gazette Notification, <https://www.indianemployees.com/uploads/documents/052015/1431861152-2-79.pdf>, 2015. English notification is given after that in Hindi. Last seen on 27 November 2018.
- [16] Spoken Tutorial Team. Spoken tutorial forum. <http://forums.spoken-tutorial.org/>. Last seen on 30 June 2019.
- [17] P-C. Sun, G. Finger, Y-Y. Chen, and D. Yeh. What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, 50(1183-1202), 2008.
- [18] Kalpana Kannan and K. Narayanan. Synchronous teacher training in india: A study of perceptions and satisfaction of the participants. *International Journal of Information and Education Technology*, 5(3):200, 2015.
- [19] K. M. Moudgalya. Python training for 5,264 in one go. <https://www.linkedin.com/pulse/python-training-5264-one-go-kannan-moudgalya/>, last seen on 30 June 2019.
- [20] K. M. Moudgalya. Massive Workshop: Circuit Simulation. <https://www.linkedin.com/pulse/massive-workshop-circuit-simulation-kannan-moudgalya/>, last seen on 30 June 2019.
- [21] Spoken Tutorial Team. Health and Nutrition Series. https://spoken-tutorial.org/series_tutorial-search/?search_otherfoss=Health+and+Nutrition, last seen on 30 June 2019.