Chapter 6 Conclusion

Chapter Outline:

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Digital learning technologies provide learners to grasp concepts very easily and completely. It also connects theory as well as technical concepts more adeptly, and keeps engage and connects learner to improve the collaborative learning amongst each learners. It proposes better ways and creates new opportunities beyond the limits of imagination. With its richer resources, collaborative approach, digital archives, global sharing and many more features make learning more interesting and effective. This chapter discusses contribution drawn from the research, benefits and application outcomes. This is followed by a brief outline of some possibilities for future research and finally dissemination of this research is listed.

6.1 Contributions drawn from the research:

The basic objective set was to propose the framework and to develop a prototype for VCLE in an education habitat. The following summarizes the contribution from this research and the objectives met:

- Identification of the readiness of the student as a learner in the virtual collaborative learning environment.

After analysing the scope of the personalized collaborative learning environment, the readiness towards the approach was validated. To check the operational feasibility i.e. readiness of the learner, a survey was conducted for the students studying in undergraduate as well as post graduate classes undergoing the classroom teaching and somewhat acquainted with digital learning.

The primary intention was to check the readiness of the students for the collaborative learning and then the digital i.e. virtual collaborative learning environment. Purposive sampling scheme
was adopted with criteria like student uses electronic gadget, Internet connection and the age group. The primary data collected from the students with close ended questionnaire.

In the survey, the tool used to capture the responses from the student uses the Knowledge Acquisition (KA) with the customized fuzzy likert scale.

The fuzzy scales taken are from not-agree at all to agree strongly, lowest to highest, never share to share very often, entirely to not at all.

Alongside the readiness towards the collaborative learning, the psychometric scales were also measured that focuses upon the relevance of basic qualification and readiness, basic qualification and the kind of course or subject referred on-line. 106 student respondents were selected out of which 58 post graduate and 48 undergraduate. On the collected responses the statistical tools like chi square test, percentage analysis, and descriptive statistics were used to analyse the data. For the calculation, chi square test is used to test non-parametric test and as such no rigid assumptions are necessary in respect of the type of assumption. We used this chi square as a test of goodness of fit. As s test of goodness of fit, this test enabled us to see the how well does the assumed theoretical distribution fit to the observed data.

Positive outcomes were received showing that there is no relationship between age and readiness towards the collaborative learning, also there is no relationship found between the age and readiness towards the type of course and subject to be studied.
online. 80% of the respondents were strongly agreed and tend to agree to accept the virtual collaborative learning environment to improve knowledge sharing through digital environment [32].

- Identification of initial significant learner parameters for an effective interface and to study the impact of technological revolution in collaborative learning environment.

The core of the research problem was to offer personalized content to the learner in the environment. To offer this, agent must have the clear interest, learning efficiency, learning pedagogy of the learner in the environment. And to produce the personalized content right from the beginning, it was important to identify the initial learning scale and the same to be calibrated during the course of actions. The algorithmic approach used with multiple criteria decision making theory that helped in identifying the preliminary learning capability using the decision table using various registration parameters as an input. The outcome of the algorithm then being measured in the list of conditions and accordingly conclusions are drawn using a decision table.

- Continuous study of significance of leaner in the collaborative learning environment.

Once the parameters are identified; they are continuously evaluated to have more accurate and up-to-date learning scale of the learner. To do so, the activities performed in the system are tracked. These behavioural activities are mapped with the continuous evaluation which monitors the learner behaviour. These parameters are calibrated with the present skill and on that the effective measure for the learner are being monitored
and used to have more personal attention and content through the system agent.

To strengthen the continuous effect measure of the learner in the environment; the tests are also configured which are multiple choice in nature with various heuristics applied on the same. These tests are configured in such a way that, it measures the effectiveness by calibrating the type and level of the question with the effectiveness scale and time to answer the question.

- Identification of the aggregate comprehensive measure showing the group effectiveness for the paper generation using the system.

To identify group effect measure; multi-objective situation decision comprehensive matrix is used with the decision table mapped. This decision table gives clear list of conditions with its concluding parameters for evaluating the learner by taking into consideration the overall effective scale of the cluster. To have more accurate conclusion in the decision table to fetch the type of questions and level of questions from the question pool, many experts being contacted as well as used our own experience in the field of education.

- A generic architecture of VCLE is designed which is a domain independent.

The architecture also can be easily configured to impart training to the employee with their effective evaluation mechanism.

6.2 Outcomes and advantages:

The research work signifies an effective user interface to enhance the teaching-learning pedagogy. To solve this problem, the
perception identification is done with several heuristics applied to the algorithm to have an edge over traditional teaching-learning paradigm. The simulating environment offers more knowledge sharing, learner centric methodology, social interaction skill, critical thinking, and flexibility to the learner as well as the tutor in the environment. More personalized content motivates the learner to operate the system and flexibility, and aggregate comprehensive measure encourages the tutor to effectively use the environment.

6.3 Future scope:

Although the study has reached the objectives that have been outlined, some of the future scopes have been found that make possible the potential avenues for further research. These are outlined below:

- As the content increases in the pool, it may attract big data analytics on the content being either available in the pool as well as on the external resource pool used.

- As number of answers increases in the forum, more data mining techniques can also be applied to rank the answers and showing the answers as per their rank. That also can be taken as one more parameter to evaluate the effectiveness of the learner in the system.

- Researcher also can pick the blog of the learners and can apply text analytics to have more abstract representation of the implicit knowledge. This further can also be ranked as well as can be arranged. This further can be taken as a parameter to measure effectiveness of the learner in the system.

- Result of the learner also can be uploaded into the system in detail that also give an opportunity to the system to analyze the analytical skill, understanding skill as well as the writing skill of the learner.
This also allows system to calibrate the learner’s learning capabilities.

6.4 Dissemination:

The research described in this thesis has been used in the various conferences and journal papers. The following is the list of publications and presentations derived from the above mentioned work.

6.4.1 International Journal Papers


(3) Vaidya, N.M.; Sajja P.S.“Learner Ontological Model for Intelligent Virtual Collaborative Learning Environment”, International Journal of Computational Engineering Research, ISSN: 2250-3005, URL:

### 6.4.2 National Journal Papers


(2) Vaidya N.M.; Sajja P.S "Agent based system for collaborative learning environment in an educational habitat," 2016 International Conference on ICT in Business Industry & Government (ICTBIG), Indore, India, 2016, pp. 1-5. doi: 10.1109/ICTBIG.2016.7892644 (Published in IEEEexplore in April 2017)

### 6.4.3 National/International Conferences


**Secured first rank in research level category**