Role of Learning Ability and Learning Agility for Corporate Success : A Textual Analysis

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Abstract

Learning agility has been considered an essential antecedent in the context of organizational performance in recent years. The present study aimed to review selected papers for the association between learning agility and learning ability at an individual and an organizational level. Textual analysis was done to extract the word count, word occurrence, similarity, and clustering from 29 research papers. An open-source predictive analytics platform software RapidMiner Studio 9.6 version was utilized. This software permitted different operators of Natural Language Programming (NLP), R, and K-means algorithms to analyze the data, and 9,034 words attributes were observed to exist in the database, and the word "Learn" occurred 3,382 times in it. Similarity analysis yielded two files to be a 100% match since both used a systems modeling framework. The thematic analysis generated 25 words through the Latent Dirichlet allocation operator. Cluster analysis highlighted five groups, out of which one of the clusters with eight papers was observed as having similar content. This meant that the authors were discussing a similar perspective in these studies. The paper is innovative in being one of the first to use RapidMiner software in the discussion regarding learning agility and learning ability. The analysis methods used in this paper provide an insight into variables required for an agile workplace. These variables may be utilized to develop a conceptual framework model for an organization's agile learning and development initiatives.

Keywords : **learning agility, learning ability, agile, training, learning style, text analysis, RapidMiner**

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In the VUCA world, organizations that use learning agility to identify agile learners and train them to gain and develop from experiences benefit immensely in dealing with uncertain and complex situations (DeRue et al., 2012a). Agility, the quality of employees to acclimatize to change, speed, and disruption, is a contemporary feature of the business world (Ulrich & Yeung, 2019) and is associated with their learning ability, their previous work experience (DeRue et al., 2012b), and organization culture (Ghosh et al., 2021) among other things. Learning ability, a personal characteristic of individual mental prowess, is dependent on the level of education, motivation, learning style, and personality (Germine et al., 2011). Therefore, both learning ability and agility seem to be the key traits organizations would value in their employees.

The focus area of the study is important in the context of the current uncertainty that surrounds the world, with

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implications for the future of work. External business environments and internal processes require agile learners to quickly learn, unlearn, and relearn from their own experiences as well as from others.

In this context, the present study is the first to use the predictive analytics platform RapidMiner to identify the factors associated with learning agility and learning ability based on textual analysis. Holistic research into the identified themes and variables may be further used to construct a generalized learning agility model.

Literature Review

The literature review was conducted on papers and reports published during the years 2009 – 2020. This section presents key definitions, associations, and relevance of the key theme of the paper.

Definitions

(1) Individual Learning Agility : The term is attributed to Lombardo and Eichinger (2000). They defined it as the willingness and ability to learn from experiences and its application to novel situations (De Meuse et al., 2010). Speed and flexibility were considered to be central to it (Vandewalle, 2012). It was believed to be a "meta-competency," consisting of specific behavioral mechanisms consisting of emotional and social dimensions (De Meuse et al., 2010). It involved learning new skills, letting go of old ones, and continuously evolving.

(2) Organizational Learning Agility : Tikkamäki and Mavengere (2013) defined organizational agility as the ability of an organization to rapidly respond to changes in demand.

The following three definitions are attributed to Li et al. (2011) (as cited in Tikkamäki and Mavengere, 2013).

- **Social Agility :** Quicker collaboration by individuals and teams to meet business goals.
- **Agile Communities :** Societies designed based on social and organizational agilities.
- **Ecosystem Agility :** Use of social technologies (e.g., Wiki and blogs) by businesses to manage relationships in the ecosystem.

(3) Agile Manufacturing Systems : A cluster of related practices (Attafar et al., 2012 as cited in Žitkienė & Deksnys, 2018).

(4) Learning Ability : Mental processes involved in learning to attain skills and knowledge (De Meuse et al., 2012).

Importance

The benefits of learning agility at an individual level were observed to be addressed in recent literature. Researchers pointed out that learning agility helps in improving talent management (De Meuse et al., 2012); employee retention (Nagesh & Sherif, 2010); job engagement and productivity (Chung et al., 2014); workplace sustenance (Tikkamäki & Mavengere, 2013); inspiring and motivating others in advancing their entrepreneurial spirit (Fielitz & Hug, 2019); and delivering better in new situations (Connolly & Viswesvaran, 2002 as cited in Yadav & Dixit, 2017). It is a predictor of greater success in addressing uncertain and tumultuous situations (Dai et al., 2013).

Learning agility is deemed to be vital since it is expected to lead to organizational growth, cost reductions, improved brand image, and productivity enhancement (Gravett & Caldwell, 2016). Learning agility is observed

as mediating the relationship with disseminating a learning culture, work engagement, and employee performance (Cai et al., 2018). In some organizations where training budgets were tight, employees took the initiative to learn new skills on their own (Alavi et al., 2014). Employees prefer to develop their skills and faculties with the objective of personal and career growth (Khatri & Raina, 2017).

Associations at Individual and Organizational Levels

We did not find a comprehensive literature review study encompassing both the variables so far, which is the prime objective of the present paper. The components or elements associated with learning agility and ability are observed to be dispersed across individual studies and not available in a single study.

Though Hezlett and Kuncel (2012) associated learning ability with agility, DeRue et al. (2012b) believed that learning ability is an overarching concept comprising of learning agility and the ability to control emotions, self-awareness, and interpersonal awareness, among other aspects. Hence, from their perspective, learning agility is one of the components impacting the ability to learn.

Text Mining Techniques, Purpose, and Applications

The evolving field of text mining has been utilized as a method of analysis in various fields (Grover & Kar, 2017) due to the richness of analysis it presents to researchers (Sheth & Kellstadt, 2021). There are several techniques of text extraction and text classification, for example, topic analysis, keyword extraction, cluster analysis, and similarity analysis (Hussain et al., 2019). Usually, analysis is conducted using natural language processing, knowledge management, machine learning, information extraction, retrieval, filtering, knowledge representation and management, machine learning, data mining, web mining, and text mining (Philip, 2010). The purpose of usage spans multiple objectives: thematic analysis, model development, validation, opinion mining, causal relationships, and understanding customer sentiments. Despite its advantages, the processing of 'semantic aspects' remains an “open research problem” in-text mining (Sinoara et al., 2017), which may present both an opportunity and a limitation.

Text mining studies related to the theme of business and management are discussed briefly. The key topics identified were Twitter opinion mining regarding iPhone 6 (Anwar Hridoy et al., 2015); identification of causal relationships amongst socio-economic indicators (Hira & Deshpande, 2016); causes of occupational accidents in the steel industry (Sarkar et al., 2017); and use of BI tools for data-driven decision making (Tripathi et al., 2020). Sentiment analysis and thematic analysis were used to develop predictive models using the National Stock Exchange's opening and closing prices (Ranjan et al., 2018). Ramesh and Nalluri (2019) generated the pattern of words like being, belonging, believing, and benevolence by using data mining tools on convocation speech texts at business schools. Big data analytics were also utilized for understanding technology-driven strategies in transportation and the supply chain (Govindan et al., 2018). Wamba and Mishra (2017) used it to draw associations between business process management (BPM), business process re-engineering (BPR), and business process innovation (BPI) by reviewing secondary literature.

It is observed that text mining has not been utilized in drawing associations between learning agility and learning ability in the context of organization studies. Hence, the specific research questions that the paper intends to address is to identify:

- High-frequency words occurring in association with studies related to learning ability and learning agility.
- Extraction of research themes/topics from the existing studies.
- Identify through similarity analysis and cluster analysis, the state of current research on the focus area.

Research Methodology

For this qualitative research, text mining, which helps to identify patterns in multiple digital files containing unstructured data (Sinoara et al., 2017), is used. Published research papers were sourced from Google Scholar and journal databases, based on keywords search : 'learning,' 'training,' 'agility,' 'learning ability and styles,' and 'agility models,' and 29 papers were selected based on the relevance to the topic.

The process of text mining generally involves gathering data, converting it into readable files, breaking sentences into small words, removing common stop words, and using filters to transform data sources into readable Excel CSV files (Chakraborty et al., 2013). The files were pre-processed in the following manner in Rapid Miner 9.6 version. First, the PDF files available on Google Scholar were downloaded on a local machine. Next, each digital paper was converted into a .txt file. One by one, all papers were uploaded into a 'read doc' operator. To keep track of data, one paper was uploaded per 'read doc' operator. Next, the operator 'process document' was hooked to the entire read documents operator. These operators used further sub-operators like tokenizing, transform cases, filter, stem, remove stop words, etc., for text parsing. This operator helped in preparing the base data for applying other modeling operators. A .csv file was saved on a local machine, and its path was mapped to the next operator called 'write .csv.' This operator was hooked to 'process document.' Text classification operator, 'data to word list,' was also hooked to the process document operator. The final step was to join 'write .csv' and 'data to wordlist' operators to result and execute to pre-process the data. This resulted in a .csv file containing data of all the papers in a common file for further analysis. After pre-processing, different tools in the form of text analysis, topic extraction, data to similarity, and clustering of data were applied. Table 1 presents the list of research papers that have been used for analysis.

Table 1. ***List of Papers for Applying Text Analysis***

S. No.	Author (Year)	Publisher/Journal
1	Doyle (1967)	*Management of Personnel Quarterly*
2	Cronbach & Snow (1969)	Bureau of Elementary and Secondary Education, Washington, DC.
3	Ehrman & Oxford (1990)	*The Modern Language Journal*
4	Bostrom et al. (1990)	*MIS Quarterly*
5	Sadler-Smith (1996)	*Journal of European Industrial Training*
6	Lupton et al. (1999)	*Industrial Marketing Management*
7	Matthews (1999)	*The Learning Organization*
8	Shatté et al. (2000)	*The Psychologist-Manager Journal*
9	Buch & Bartley (2002)	*Journal of Workplace Learning*
10	Elloumi (2004)	*Theory and Practice of Online Learning*
11	Baldwin-Evans (2004)	*Industrial and Commercial Training*
12	Barmeyer (2004)	*International Journal of Intercultural Relations*
13	Kontoghiorghes (2004)	*International Journal of Training and Development*
14	Layng (2007)	*Performance Improvement*
15	Germine et al. (2011)	*Cognition*
16	DeRue et al. (2012a.)	*Industrial and Organizational Psychology*
17	DeRue et al. (2012b.)	*Industrial and Organizational Psychology*
18	Dries et al. (2012)	*Personnel Review*
19	Sarabdeen (2013)	*IBIMA Communications*

20	Martin et al. (2014)	*Human Resource Development Review*
21	Urick (2017)	*International Journal of Training and Development*
22	Daltrozzo et al. (2017)	*Brain and Language*
23	Žitkienė & Deksnys (2018)	*Montenegrin Journal of Economics*
24	Fielitz & Hug (2019)	*International Journal of Advanced Corporate Learning*
25	Ulrich & Yeung (2019)	*Strategic HR Review*
26	Troussas et al. (2020)	*Entropy*
27	Rigby et al. (2016)	*Harvard Business Review*
28	Payaprom & Payaprom (2020)	*Journal of Language and Linguistic Studies*
29	Mitchinson & Morris (2012)	Center for Creative Leadership White Paper

Note. Please refer to the *References* for the titles of the manuscripts.

Analysis and Results

In this study, text mining, topic extraction, similarity, and clustering visualization have been presented.

Text Mining to Identify High-Frequency Words

Text mining yielded the statistics of 9,034 words occurrence. The top five words to occur in the literature were "learn," "train," "agile," "style," and "manag." "Develop," "effect," "changes," "base," and "work" were found in all 29 documents. Words like "process," "performance," and "behavior" were observed to prevail in at least 86% of the documents. Table 2 displays word occurrences for the top 30 words. These words were stemmed; hence, in a few cases, the spelling might seem incomplete. The software did not permit us to go back and investigate the full word used.

Topic Extraction from Data (LDA)

This section focuses on the topics which were grouped based on ideas or subject matter. LDA is a feature of natural language processing that allows finding some parts of similarities in unstructured data. Latent Dirichlet Allocation, in short LDA, is a probabilistic modeling approach developed by Prof. David M. Blei in 2003. The word 'Latent' refers to themes or topics that are present in the data set. Dirichlet is the distribution of such themes or topics. Lastly, allocation means to allocate the distribution of topics. RapidMiner uses an extension operator tool for topic extraction like the thematic analysis in other software. Table 3 highlights five groups of broad topics which emerged from the analysis.

It is observed that in Topic_0, 'Learn' is associated with language, generation, and state. It may be inferred that teaching, as well as training methodology, is associated with the language used. Usage of examples may also aid both learning agility and ability. In Topic_1, 'learn' is associated with the value and cost of learning and its management. Another word, 'active,' is also associated with this theme. Topic_2 seems to be associated with making learning student-centric to affect learning agility and ability. Topic_3 highlights training methods and content development in learning which may impact its acceptance and adoption. In Topic_4, 'learn' is associated with agile training for corporates at the macro level.

Topic extraction highlights the current dominant themes through which these areas are being studied. The importance of language, examples as ways of learning for students, customization of learning, and the

Table 2. ***Word and Document Occurrences***

S. No.	Word	Total Occurrences	Document Occurrences
1	learn	3,382	28
2	train	1,372	26
3	agil	1,081	8
4	style	878	14
5	manag	782	28
6	develop	740	29
7	process	603	28
8	research	601	28
9	valu	581	28
10	studi	551	27
11	organ	520	27
12	student	510	18
13	model	491	26
14	experi	458	27
15	perform	453	28
16	effect	446	29
17	activ	416	25
18	method	408	25
19	organiz	396	19
20	individu	395	28
21	chang	387	29
22	learner	385	21
23	prefer	385	15
24	base	383	29
25	system	376	24
26	gener	375	28
27	educ	373	22
28	measur	363	23
29	abil	362	26
30	exampl	362	27

Table 3. ***Topic Extraction from Data***

	(Common Themes Associated with Topics)				
Topic 0	learn (389)	language (216)	example (196)	state (174)	gener (173)
Topic 1	value (523)	learn (373)	manage (354)	cost (301)	active (301)
Topic 2	learn (1312)	style (878)	student (398)	prefer (377)	learner (247)
Topic 3	train (1331)	learn (468)	method (357)	develop (304)	sale (276)
Topic 4	agile (1081)	learn (840)	organize (295)	organization (295)	

Note. Figures in parentheses indicate the frequency of word occurrence.

management aspects of learning and training have been highlighted as directions of research indicated in the papers analyzed.

Data to Similarity Analysis

The data to similarity operator calculates the similarity among the documents. Comparisons are repeated here with others if found to be similar to one of the documents. Table 4 provides insights into papers with at least a 50% similarity index.

Table 4. ***Data to Similarity Analysis***

First Doc	Matched Second Doc	Similarity Percentage
26	28	1
16	17	0.7
16	22	0.7
3	22	0.7
3	16	0.7
17	22	0.6
3	17	0.6
11	19	0.6
16	20	0.5
1	16	0.5
20	22	0.5
9	22	0.5
3	9	0.5
7	11	0.5
1	22	0.5
17	20	0.5

It may be observed from Table 4 that there is a 100% match between documents 26 and 28 based upon the method used in the papers "Corporate Training Media: The Development and Use of an Assessment Model" by Jacqueline M. Layng and "Workplace Learning : Developing a Holistic Model" by Pamela Matthews. Although the paper sections were different, they utilized a systems approach for model building, leading the software to read them as a complete match. This analysis is beneficial for researchers in providing a bird's eye view of the interconnection of research work with the selected data set.

Cluster Analysis

In cluster analysis, groups are formed based on the similar content of the data sets. This can help group similar content in a cluster, with each cluster being different from another (Mothukuri & Bob, 2018). Cluster 3 has the highest number of files (8 out of 29 files). This indicates that maximum similar content is in this group. The significance of this analysis points out the similarities in the topic of research and supporting literature of grouping nature.

Conclusion

This paper has conducted a textual analysis of 29 research papers related to learning ability and agility. The most commonly occurring words are identified as well, as five topical themes which occurred are categorized. Similarity analysis of documents was also conducted. From the perspective of value chain analysis, the study points to the following factors of importance in the studied research :

- Internal Factors (Learner Perspective): Language, examples, value, and learning style.
- External Factors (Organizational Perspective): Cost, management, training method, content development, and organizational agility.

The paper is innovative in identifying the critical aspects of learning agility relevant from the organizational and learner perspectives. Added to the work of other researchers on themes of learning platforms (Anupama & Bansal, 2012), e-learning methods (Dash & Chakraborty, 2021), and workforce learning perspective (Chakraborty et al., 2019), it is hoped that the present paper will initiate future studies in this domain.

Implications

The managerial implications of this study lie in assessing the importance of individual abilities for agile transformation and following up with non-agile learners to improve their learning capabilities. Along with that, any learning challenges must be addressed, and solutions must be provided to alleviate employees' mental and psychological stress through feedback and follow-up (De Meuse et al., 2012). With Industry 4.0 and the proliferation of the ed-tech sector, collaborative platforms are being offered that HR and training need to evaluate for relevance.

Industry training leaders and academic researchers need to join hands to empirically examine the factors that impact learning agility for a diverse set of groups contributing to economic growth. This will help create a framework that links abilities, agility, and organization goals. It will be interesting to identify which factor has the strongest association with work performance and to target that factor with different training methodologies. On the other hand, self-development is the key to attaining benchmark performances. Further studies, similar to the one conducted by Verma and Singh (2020) in this area, hold immense potential in igniting the lamp of learning amongst our workforce. We hope this study is one step in the right direction to draw meaningful insights in the area of organizational studies.

Limitations of the Study and Scope for Future Research

In the future, the problem of stunted words in RapidMiner needs to be addressed, which lends subjectivity to the analysis. Secondly, in LDA, the topics predictions were unable to trace which theme was suggested by which author due to the unstructured nature of data. Lastly, the study was conducted on small data of 29 papers. To broaden the use of this methodology, a larger sample size spanning a longer period of review is suggested.

It is proposed that the concept of learning agility may assume greater importance in the future. It would be interesting to understand the behaviors associated with different levels of learning agility. This may have applications not only in the field of management, where its role in leadership development may be studied, but also its relevance in finding sustainable solutions to the climate crises may be considered. Specifically, it may be attractive to study whether more agile business leaders can disseminate the sustainability vision in all spheres of business functioning, including influencing demonstrable research and development agenda to provide more environmentally friendly offerings for the consumers.

The factors identified may be utilized for developing a training model for an agile learning organization in both the services and manufacturing sectors. Future research may investigate the impact of online learning in comparison to instructor-led learning. Aspects like feedback loop into training, training effectiveness, trainer effectiveness, and controls on performance did not occur among the most frequently occurring topics in the literature reviewed. Other areas which have not been investigated in the studies reviewed are learner motivation; the differences in learning organizations based on the age of the learner; learning agility of employees who are joining work after sabbaticals; relevance of learning agility; and abilities in startups versus more mature organizations; government versus private sector, etc.

The concept has relevance from the perspective of the workforce, which is neglected in most economies. The role of learning agility among the disabled in being able to perform one's work needs to be studied. Similarly, in developing economies with a large percentage of unschooled and/or unskilled workers, the concept of learning agility needs to be studied to understand how it can be used as a lever in enabling such disadvantaged sections of the society to attain life satisfaction and live a life of dignity.

Authors' Contribution

Ruchika Vatsa conceived the idea and developed a qualitative design to undertake the textual analysis. Further, she extracted relevant research papers, filtered these based on keywords, and generated processes in RapidMiner. Dr. Purnima Bhatnagar verified the analytical methods and aided in the literature review, interpretation of results, writing, and refining of the paper. The authors are considering extending this research as per the gaps identified.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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