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**Promoting Financial Literacy through Digital Platforms: A
Systematic Review of Literature and Future Research Agenda**

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Abstract

The utilisation of technology has increased and continues to evolve for all social and economic purposes around the world. Studies suggest that technology has made teaching and learning process enjoyable and interesting for both educators and learners; and this factor has greatly aided the spread of knowledge and education using technology. Imparting financial literacy through offline mode has been studied extensively by researchers around the world. However, there is a dearth of studies concerning the role of technology in imparting financial literacy. This paper is an attempt to systematically study, review and explore the existing literature in the area of online financial literacy. It outlines the roles played and impact generated by electronic platforms in imparting financial literacy through the use of technology. A systematic review of literature was conducted on 159 documents on online financial literacy, extracted from the Scopus database, and on which, content analysis was further performed. Through this process, the researchers have been able to safely establish that using online tools to impart financial literacy, coupled with digital literacy amongst individuals has led to an increased and targeted use and subscription of financial services by consumers around the world.

Keywords: *Technology, Online financial literacy, Financial literacy, Financial education, Systematic literature review.*

INTRODUCTION

Technology is an integral part in the day to day lives of human beings. As a consumer, when it comes to availing products or services or to fulfil any basic necessities, computers and smart phones are used to complete the transaction; whether to buy a product or avail any service. Moreover, apart from the lives of the average individual consumer, advanced technologies using business intelligence are used by all major organizations in their commerce, trade, banking and finance operations, marketing and logistics activities in order to gain a competitive edge and enhance their bottom lines. Thus, any engagement between businesses and all its stakeholders including consumers take place with the help of various technologies in this digital era. However, not all consumers would be able to leverage and exploit the usefulness and features of a particular technology due to poor access to technology or low level of digital literacy. Further, there are other concerns of excessive usage of technology as compared to the brick-and-mortar system of working.

In the context of financial planning, there recently has been an increase in individual preparedness for retirement by displaying financially responsible actions and financial choices. This is due to the shift in individual choices from defined benefit plans to defined contribution plans and innovation of complex financial products at the same time (Lusardi, 2008; Geng & Yang, 2018). The ability to plan well for retirement is determined by the financial literacy levels of individuals (Lusardi, 2008, & 2011). Financial Literacy is the ability to make informed decisions about the use and management of money (Rugimbana & Oseifuah, 2010). However, previous studies reveal lower levels of financial literacy leading to poor retirement planning (Lusardi, 2008, 2009 & 2011). Contrarily, it was also observed that financial literate individuals are more likely to show retirement confidence (Lusardi and Mitchell, 2007; Lusardi, 2010; Van Rooij et.al, 2011), participate in the stock market (Yoong, 2010; Van Rooij et al., 2007), have better asset accumulation (Bottazzi, R., et al., 2011; Stango and Zinman, 2009), access online and

mobile banking for diverse purpose and also make less phone calls to customer service representative compared to those who are financially illiterate (Nejad, & Javid, 2018). This necessitates higher level of financial literacy.

Traditionally, there have been significant amount of financial literacy programs but there have been serious concerns over the effectiveness of such programs (Hoffmann, A., & Otteby, K. 2018). Also, commonly prevalent financial illiteracy will not be alleviated by single, lone, onetime individual efforts on financial education; not because the efforts are ineffective, but that the efforts end up being inadequate (Lusardi and Mitchell, 2007). Studies have also gone on to show that planned actions alone are not sufficient to evince follow-on action and it is important to give individuals sufficient tools to change their financial behaviours (Lusardi and Mitchell, 2007). Thus, there is a need for using technology enabled modern tools in order to promote financial literacy through electronic devices like computers, smartphones along with enabled systems and applications which can play a significant role here.

Ample studies and publications have highlighted the advantages, limitations, effectiveness and challenges while offering financial education through online platforms. However, as the use of information technology is an emerging field, it becomes imperative to obtain certifications or to acquire certain needed skillsets in order to have a broad overview of the developments and applications of financial literacy programs conducted online. The current study thoroughly reviews the studies on the role of technology in facilitating financial education. The study will help in providing a holistic framework that would highlight the current state of financial literacy offered through electronic platforms. The flow of the paper is as follows: Section 1 provides a brief introduction to the topic of the research paper. Section 2 discusses the objectives and research methodology employed in the study. Section 3 highlights the methodological survey of literature and Section 4 provides discussion and section 5 concludes the research study and provides direction for future research.

OBJECTIVES AND METHODOLOGY

The purpose of this study is to systematically study, explore and organise the existing body of research literature that either qualitatively or quantitatively explored the role of technology in promoting financial literacy. We have highlighted the application of technology along with the benefits and challenges faced in facilitating teaching and learning financial literacy with the help of a comprehensive review of the literature. Some of the steps covered for conducting a systematic literature review by previous studies have been followed (Okoli & Schabram, 2010; Parris & Peachey, 2013).

The following research questions guided this study:

- (a) What were the objectives of promoting financial literacy through technology?
- (b) What was the methodology followed?
- (c) What were the results of using these technologies?

2.1 Database search:

To address the research questions, document search related to Online financial literacy was made through Scopus database available with the authors' university library system. Scopus being the largest database and is multi-disciplinary in nature has been selected to extract the documents. All results were limited to research papers in English only.

2.2 Inclusion and Exclusion Criteria:

The initial search was made using the keyword "Online financial literacy" without any restriction on a year of publication. The number of articles containing the mentioned keywords was recorded. Next, we identified the related and unrelated articles on the topic. The inclusion criteria for the articles were as follows.

- (a) it should be a part of peer review articles, the article in press and review paper (under source and document type)
- (b) Not be covered under conference paper, conference review, book, book chapter and editorial
- (c) The article describes the online financial literacy as the main theme and
- (d) examines the application of digital platforms or online platforms for imparting financial literacy.

Articles were excluded if any of the above points was not addressed in the abstract of the paper, including objectives, methodology, results and discussion sections. In all, a total of 159 documents were retrieved. All articles were carefully screened based on the above-stipulated inclusion criteria. Finally, after meeting the inclusion and exclusion finally 120 articles from a variety of peer-reviewed journals were selected for the study. Under the section literature review, Table 3 presents the list of those journals.

REVIEW OF LITERATURE

Previous studies highlighted that using digital platforms to promote financial literacy has impacted learning outcomes positively for the learners (Rondillas & Buan, 2019; Kuntze et al., 2019; Shefrin & Nicols, 2014). However, some argue that financial literacy is based on prior knowledge and internet does not help the learners (Fürstenau, & Hommel, 2019). In order to understand the existing scenario, we now present the extensive review of the major studies highlighting the benefits and challenges of using online information to increase the financial literacy level.

Table 1 A Detailed Survey of Literature

Source	Purpose	Methodology	Findings
Li, J., Wu, Y., & Xiao, J. J. (2020)	To study the impact of digital inclusive finance on household consumption	Panel data from Household Finance Survey along with digital inclusive finance index	Digital inclusive finance promotes household consumption
Fürstenau, B., & Hommel, M. (2019).	The paper examined whether people develop financial competence by	Random sampling and study on experimental or control group	The study found that Informal learning using the Internet is not effective if people did not have

Source	Purpose	Methodology	Findings
	using information available on internet on their own informally		sufficient prior knowledge. Thus, prior knowledge gained through self is important.
Rondillas, F. I., & Buan, A. T. (2019).	The study was conducted to introduce financial literacy module in grade 7 mathematics	Quantitative and qualitative study; Interactive learning modules were developed with the help of interactive websites, financial literacy videos and online assessments	There was a significant improvement in student's performance after incorporating interactive financial literacy modules. The study recommends the use of interactive modules to facilitate learning process in teaching fractions and decimals in secondary maths classes.
Bavafa, H., Liu, J., & Mukherjee, A. (2019).	The paper outlines the effect of online search activities on the financial literacy levels of older population	Data obtained from Health and Retirement Study survey. Further, analysis using Ordinary Least Square (OLS) and bias-corrected instrumental variable analysis was conducted	The study found that use of internet for finance and health related information significantly affects the literacy levels among older age population.
Nadolny, L., Nation, J., & Fox, J. (2019)	The objective of this paper was to measure motivation in an online course designed with and without Game Based Learning	Instructional Materials Motivational Surveys (IMMS) was used as an instrument in the study	Students with game based learning had significantly higher number of interactions with contents as compared to traditional courses.
Kuntze, et al. (2019)	To develop and test through experiment, an innovative teaching module that will improve the level of financial literacy among business students	Online video lectures and financial literacy tests	Introducing innovative ways of teaching financial literacy like online videos significantly improves the financial literacy levels among young adults.
Rodrigues, et al. (2019).	The paper measures the financial education and awareness levels of individuals about complex financial products through online quizzes offered through a bank website	Survey and online quiz games for bank clients	Through the survey it was found that basic financial knowledge levels are higher however advanced skill levels are poor among individuals.
Han, L., Xiao, J. J., & Su, Z. (2019).	The paper studies the factors affecting consumer behaviour in adopting online person to person borrowing	National Representative Survey, Empirical analysis using instrument variable	Financial knowledge and risk attitude are two factors associated with person to person lending. Enhancing financial literacy education can enhance the consumer internet borrowing market.
Lee, H. W. (2019)	The paper outlines the role of online technology in promoting financial literacy. It also explores the perceptions of financial institution's leaders.	Qualitative study; quality inquiry through telephonic interviews from bank and credit unions	The study found that tools like online financial calculators, website information posting, social media communication can be used to impart financial literacy education online. Partnership among government, financial

Source	Purpose	Methodology	Findings
			regulators and educators is necessary here.
Filipek, K., Cwynar, A., & Cwynar, W. (2019)	The paper evaluates the debt literacy levels of users of Social Networking Sites like Facebook	Quantitative instruments, Resource generator tool was built and used in the online questions of Facebook users in Poland	It was found that those with more social capital and better access to resources possess high level of debt literacy and vice versa.
Hidayat, N. S. N. (2019)	The paper outlines the role of research based learning and virtual trading laboratories in improving financial literacy	Survey based, Behavioural approach with the use of Technology Acceptance Model (TAM)	It was found that using online trading laboratories and research based learning enhances students' learning and makes concepts more easy and interesting for them
Carlin, et al. (2018).	The paper studies the effect of using online education and related video content on the personal finance decision making ability of individuals	Online video delivery, Assessment through participant's survey. Further, regression analysis was used to analyse the survey results	Proper instructions in the online content improves the search quality and financial decision making provided the particular online content should give perceived usefulness to the user
Hoffmann, A., & Otteby, K. (2018)	The paper explores that consumer intentions to use personal finance blogs as an alternative to acquire financial knowledge	Online Survey based data, Conceptual model was analysed using Structural Equation Modelling	The study finds that the personal financial blog as an online resource can provide just-in time financial education to consumers around the globe.
Blonski P., & Blonski (2016)	The paper outlines the role of online math training in improving trading experience.	Quantitative and Verbal reasoning tools	It was found that investors using online math training had a greater demand of mathematical reasoning ability.
Shefrin H. & Nicols C.M. (2014)	The paper studies credit usage to know about spending and borrowing behaviour.	Survey based, economics literature tool for measuring financial literacy.	The study found better budgeting decisions while using credit cards and also introduced a new set of online financial tools about spending & borrowing for making decisions.
Widyastuti U., & Suhud U. (2017)	The paper explores impact of financial literacy and intention to play financial literacy digital game.	Online Survey, Data analysed using Exploratory factor analysis, SEM used for testing the hypothesis.	It was found that financial literacy led to perceived ease of play and learning opportunity.
Shelly Horwitz & Katharine Briar Lawson (2016)	The paper studies about collective effort of developing, using and evaluating online financial education tools in schools	Data collection and surveys following training activities	Through the survey it was found that there is a need to integrate financial knowledge, skills and competencies in schools
Guria L.S., Patankar R., Tyagi D. (2017)	The paper studies how financial literacy helps in improving finances and thereby standard of living	Information Communication Technology application and tools	The study found that modern technology can immensely help in creating financial literacy and investor awareness programmes.
Heyman S. (2015)	The paper explores online advisors and the recommender system in	Semi Structure Interview (Open ended research questions)	The study found that novice users who were pointed out by online investment systems would also

Source	Purpose	Methodology	Findings
	financial knowledge base which is becoming more well-known at a low cost than human advisors.		have to include educational sections that address the common misconceptions such as investing in stocks is like gambling.
Servon L.J., Kaestner R (2008)	The paper outline about financial literacy training and of using internet for lower income people	Survey based, Interviews, regression analysis was used to analyse the survey results.	The study found that financial literacy along with technological literacy is needed to exit from poverty for low income groups. Using information technology can provide wide access to financial information
Volpe et al. (2002)	The paper evaluates the investment literacy on online investors & relationship between literacy and online investors.	Online Survey based data	The study found that online activities improves financial literacy and thereby trading knowledge

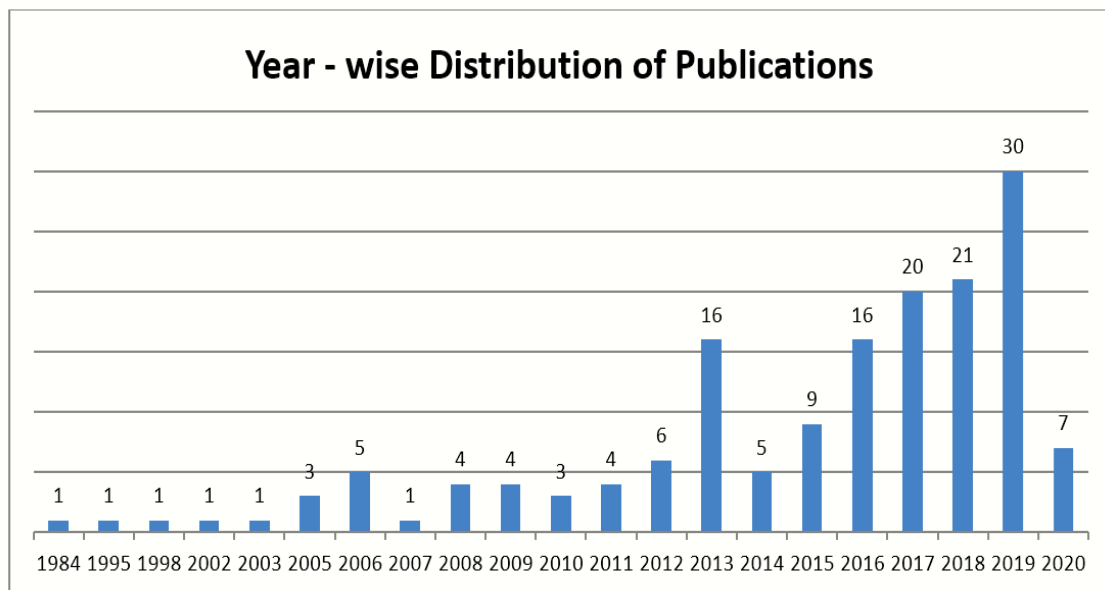


Fig. 1: Year wise Distribution of Publications (Period 1984 - 2020)

To clearly highlight the studies, we present the year wise distributions of publications, source type and year wise citations on the existing topic of our research. From Fig.1 it can be observed that there has been a significant increase in the publications starting post 2000. In the recent years, the topic of online financial literacy has been significantly published upon. There were 30 publications in 2019 which was the highest among all the preceding

years followed by 21 in the year 2018 and 20 in the year 2017. This depicts that online technology for financial education has and will be commonly used by the people and will be studied by the researchers of research of the publications during the period 1984-2020.

Table 2 State of Research

Document Type	Number
Article	109
Book	2
Book Chapter	6
Conference Paper	22
Conference Review	8
Editorial	1
Review	11
Grand Total	159

From the above table, we can see that the maximum research publications in the area of online financial literacy are in the form of journal articles (109) followed by conference papers (22) and review paper (11). It can thus be seen that the topic of online financial literacy is gaining prominence as an attractive area of study among researchers around the world.

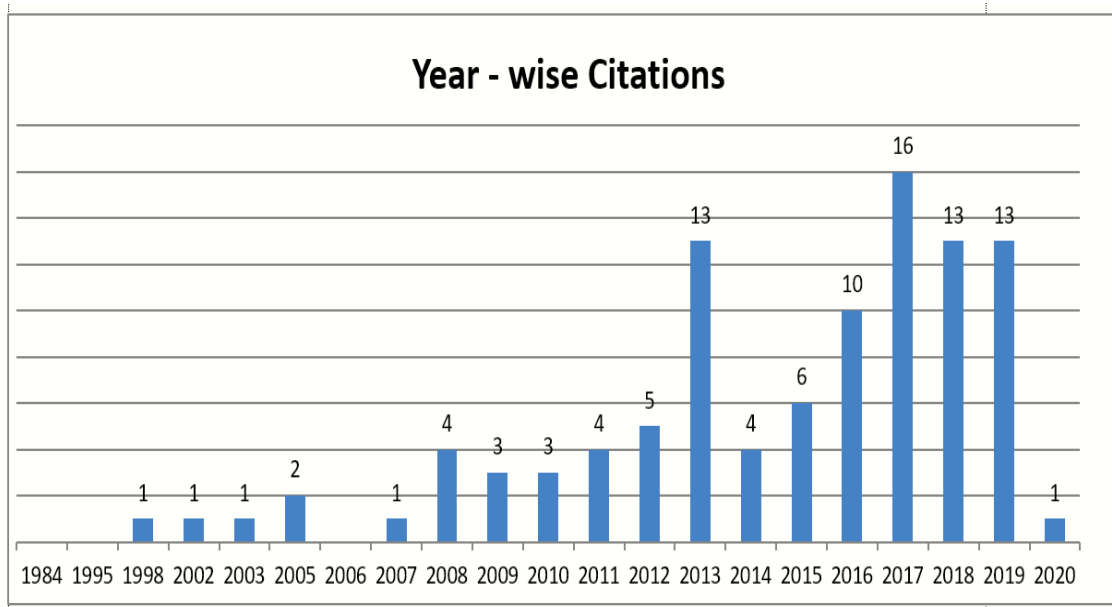


Fig. 2: Year Wise Citations of Publications

The above graph highlights that there has been an increase in the citations related to the publications in the areas of online financial literacy. This is a result of the increasing number of publications which is covered in an earlier part of our study. However, what is interesting to note with the increase in citations is that the selected studies that are a part of this research work has been found relevant and important by having contributed to other research studies too. The list of source title indicating count of the article published and review paper published is listed below in the form of a table. This suggests that online financial literacy and its application is a multidisciplinary area of research.

Table 3 List of Journals

Journal	Count of Source Title
Academy of Strategic Management Journal	1
Addictive Behaviors Reports	1
Advances in Mental Health	1
American Journal of Public Health	1
Biodiversity and Conservation	1
BJU International	1
BMC Geriatrics	1
BMC Health Services Research	1
BMC Medical Informatics and Decision Making	1
BMJ Open	1

Journal	Count of Source Title
CALICO Journal	1
Canadian Journal of Gastroenterology and Hepatology	1
Citizenship, Social and Economics Education	1
Computers in Human Behavior	1
Computers in the Schools	1
Current Opinion in Supportive and Palliative Care	1
Economia Politica	1
Economic Modelling	1
Electronic Journal of e-Learning	1
Electronic Library	1
Emerging Themes in Epidemiology	1
Empirical Research in Vocational Education and Training	1
Epidemiology and Psychiatric Sciences	1
European Journal of Psychological Assessment	1
Evidence Based Library and Information Practice	3
Finance Research Letters	1
Global Health Action	1
Health Informatics Journal	1
Health Marketing Quarterly	1
Information	1
Interdisciplinary Journal of Information, Knowledge, and Management	1
International Journal for Technology in Mathematics Education	1
International Journal of Advanced Science and Technology	1
International Journal of Applied Business and Economic Research	1
International Journal of Applied Engineering Research	1
International Journal of Bank Marketing	3
International Journal of Communication and Linguistic Studies	1
International Journal of Consumer Studies	6
International Journal of Economic Research	1
International Journal of Game-Based Learning	1
International Journal of Information and Communication Technology Education	1
International Journal of Innovative Technology and Exploring Engineering	1
International Journal of Pharmaceutical and Healthcare Marketing	2
International Journal of Scientific and Technology Research	2
International Journal of Social Economics	1

Journal	Count of Source Title
International Journal of Technology and Design Education	1
International Review of Economics Education	1
Internet Reference Services Quarterly	1
Journal of Adolescent Health	1
Journal of Affective Disorders	1
Journal of Alternative and Complementary Medicine	1
Journal of Behavioral and Experimental Finance	2
Journal of Business and Finance Librarianship	1
Journal of Business Research	1
Journal of Cardiovascular Nursing	1
Journal of Child and Family Studies	1
Journal of Consumer Affairs	3
Journal of Consumer Health on the Internet	1
Journal of dental education	1
Journal of Economic Education	1
Journal of Extension	1
Journal of Family Psychotherapy	1
Journal of Financial Counseling and Planning	3
Journal of Further and Higher Education	1
Journal of Health Care Finance	1
Journal of Health Communication	1
Journal of Library and Information Services in Distance Learning	1
Journal of Medical Internet Research	3
Journal of Pension Economics and Finance	1
Journal of Property Investment and Finance	1
Journal of Social Science Education	2
Journal of Social Work Education	1
Journal of the European Economic Association	1
Journalism Practice	1
Journalism Studies	1
Knowledge Management and E-Learning	1
Kuram ve Uygulamada Egitim Bilimleri	1
Library Trends	1
Management Science	1
Management Science Letters	1
Medinfo. MEDINFO	1
Nutrients	1
Online Journal of Health and Allied Sciences	1
Ontario Health Technology Assessment Series	1
Open Learning	1
Polish Sociological Review	1
Prague Economic Papers	1

Journal	Count of Source Title
Prävention und Gesundheitsförderung	1
Proceedings of the ACM on Human-Computer Interaction	1
Psychology and Marketing	1
Qualitative Report	1
Qualitative Research in Financial Markets	1
Rational Pharmacotherapy in Cardiology	1
Review of Behavioral Finance	1
Review of Financial Studies	1
Social Psychiatry and Psychiatric Epidemiology	1
Telecommunications Policy	1
Turkish Online Journal of Educational Technology	2
Zeitschrift für Orthopädie und Unfallchirurgie	1
Zeitschrift für Psychosomatische Medizin und Psychotherapie	1
Grand Total	120

DISCUSSION

Financial planning is important element for individuals these days. Apart for successful retirement it is also important for wealth creation. This necessitates saving and investing early. Previous studies outlined that investment decisions of individuals are significantly affected by the financial literacy levels apart from certain demographic and behavioral traits of individuals (Sahi, 2013; Agarwal, et al., 2015). The studies on financial literacy consider financial knowledge, financial attitude and behaviour as its three major dimensions (Atkinson and Messy, 2013; Santoso et al. 2016). Financial literacy levels are also dependent on education received in schools. Education at school is an important determinant in shaping positive financial behaviours among youths later on in life (Butters et al., 2012; Opletalová, A. 2015). Teachers and peers at school and parents at home can play a significant role in inculcating literacy towards money related matters among youths (Lusardi, 2010; Van Campenhout, 2015).

In the recent times, technology adoption has become a global phenomenon and widely studied by researchers across the globe (Buchanan, 2013; Nejad, & Javid, 2018). Traditionally, programs on financial literacy has been conducted at schools, college and business organizations by financial regulatory bodies. However, due to extensive use of

information technology, applications and systems, and e-commerce; the way of delivering financial literacy education has changed immensely, where, all information regarding finances and investments are available on a single click. Digital platforms like social networking sites are also used to promote financial education in some countries. Financial literacy coupled with digital literacy facilitates technology adoption which leads to accurate and higher availing of financial services including those such as banking and insurance (Karlan et al., 2016). People with higher financial literacy are more likely to participate in electronic banking, mobile banking and trading (Servon, & Kaestner R. 2008, Hidayat, 2019). They are also less likely to make phone calls to customer support and more likely to give feedback and suggestions using online platforms (Nejad, & Javid, 2018; Nedungadi et. al., 2018).

PRACTICAL IMPLICATIONS

This paper contributes to the existing literature by identifying the major studies and their role played in the area of usage of online or information technology in imparting financial literacy. Out of 120 articles there have been around 88 studies which were quantitative and another 32 were qualitative covering the role of digital technology in imparting financial literacy. The topic has been covered worldwide and is multi-disciplinary in nature. Through our study, it has been observed there has been continuous increase in research in the area of online financial literacy and this seems to increase on year on year basis due to increasing use of smart phones, e-commerce and growing usage of electronic media. The insights from this research can be useful for various policy making bodies and government agencies in designing financial literacy programs for various sections of the society.

CONCLUSION AND FUTURE RESEARCH DIRECTIONS

Achieving financial literacy through online mode is dependent on the digital literacy of the individual along with prior knowledge and experience of the subject. It has been observed that available digital platforms or systems accessible through electronic devices such as computer, desktop, laptop,

smartphones etc. has significantly improved the financial learning experience of the users. Furthermore, it has made the task of learning easy and enjoyable for both educators and learners around the globe.

Due to tremendous use of technology, corporations, financial institutions, regulatory bodies are increasing using various digital platforms to enhance financial literacy and engage customers through customised financial products offerings. Financial awareness has been continuously promoted through E-content including financial news, blogs, podcast and advertisement on social media platforms about investors literacy has made the subject more interesting and further to explore. Majorly studies on financial literacy are from developed economies and with the rapid increase in electronic gadgets including smartphones people in emerging economies have started to excessively leverage technology for all piece of information. Furthermore, there are other emerging technologies based on web 4.0 which can enhance financial literacy. For instance, the role of A.I tools including chatbots, gamification and fintech in enhancing financial literacy can be considered. It would be exciting to explore the role of such technologies in promoting financial literacy and thereby boosting the growth in financial services industry.

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