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A study of the role of Saudi Higher Education institutions in promoting critical thinking among university students amidst the subtle cognitive reprogramming induced by social media

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Abstract

Cognitive online effects greatly influence critical thinking, and Saudi Higher education institutions (HEIs) have been reassessing their approach to educating students on issues of critical thinking. While teaching methods to bolster CTS have been explored at the higher education level in many western universities, in Saudi Arabia, similar research is scarce, understudied, and theretofore uncorroborated. In Saudi Arabia, efforts to foster critical thinking skills (CTS), in the effective intervention of new media and critical reading instruction, have been caught in spirited controversies. This clarification is needed but not yet definitively addressed in the literature. Therefore, the present study aims to critically evaluate the role of the Saudi higher education institutions in promoting critical thinking among university and whether the Saudi universities could manage to combat intellectually the subtle cognitive reprogramming induced by the social media. Therefore, the present study relies on reflective and critical methodology through reviewing the previous studies tackling the incorporation of the critical into the University curricula. The methodology used in the current study is highly critical and insightful as it raised questions and suggests solution through reviewing numerous studies tacking the Saudi context which pertains to the Saudi institutions of the higher education awareness of the importance of the critical thinking, its incorporation into the curricula, the threats of the social media on the minds of the university studies. The study has reached a number of high invaluable findings, among the most important of which is that method of incorporating the critical thinking into university crucial is still ineffective and many instructors are not adequately trained to deliver the critical thinking content to their students' minds.

Keywords: critical thinking, cognition, mind reprogramming, Saudi Institutions of Higher Education, social media.



Public Interest Statement

The study looks to be significant since it investigates the role that Saudi universities play in the process of turning critical thinking instruction into practical applications. Due to the fact that social media platforms use misleading and manipulative strategies in order to attract students into radicalism and undermine their stable nations, this has a huge influence on the behaviors and reactions of learners to the wealth of knowledge and data that is accessible online. To put it another way, pedagogy plays a key part in the development of persons who are capable, flexible, and forward-thinking, and who are also well-equipped to make substantial contributions on society as a whole.

Introduction

Amid the chaos of the information being widely shared on the social media, the majority the university students across the globe have become unable to distinguish valid from invalid information. They are overwhelmed by conflicting information and fake news on social media platforms. Therefore, the role of higher education institutions has become vital in fostering critical thinking into the minds of the learners. Higher education is a sector that provides specialized instruction to students in their chosen field of employment, such as engineering, accounting, science, medicine, and more. It is essential for these students to possess critical thinking abilities. Comprehensive and complete instruction in critical thinking methods, procedures, and approaches is essential for students whose future employment need the application of critical thinking skills (Amin et al., 2020). This training guarantees that individuals are adequately prepared to address intricate issues, scrutinize data, assess evidence, make well-informed choices, and devise inventive solutions that are in line with the requirements of their particular domains.. In addition, critical thinking empowers people to engage in logical reasoning, interrogate assumptions, question established conventions, and make valuable contributions to the progress and development of their chosen fields. By cultivating a culture of analytical reasoning at higher education institutions, students are enabled to cultivate a sophisticated comprehension of the complexities of their disciplines, adjust to changing trends and breakthroughs, and emerge as exceptional experts in their respective professions. Therefore, the present study aims to evaluate the role of the Saudi Higher Education Institutions in fostering critical thinking among the Saudi university students and whether the Saudi Higher education institutions could manage successfully cultivate the critical thinking into the minds of its learners and how it is reflected in their ability to deal with huge information being offered through social media channels. The current study argues the Saudi higher education institutions could manage partly in fostering the minds of the learners with principles of the critical thinking because the idea of informing critical thinking into the minds of the university students does not depend only on integrating the principles of critical thinking into the minds of the learners but also it is a rather societal and cultural issue. Therefore, the development and refinement of critical thinking skills in the context of higher education requires other integration of other important elements and components that work side by side with the institutions of higher education. An integrated approach to critical thinking can bridge the gap between theoretical teaching in universities and practical application in real-life situations. This approach enables learners to effectively utilize critical thinking skills beyond the confines of academia. Thus, the current study makes a serious effort to accomplish several objectives: first, it provides an overview of how Saudi universities could incorporate critical thinking into their pedagogies; second, it draws attention to the barriers to critical thinking applications and instruction in Saudi universities; and

third, it presents strategies used by Saudi universities to convert critical thinking pedagogy into useful behavior that enables students to use social media effectively. In order to accomplish its goals, the present research endeavors to provide explicit responses to the following inquiries: What are the obstacles that Saudi universities encounter when attempting to incorporate critical thinking into the minds of learners? What obstacles do Saudi universities face in promoting critical thinking? Have Saudi universities been successful in enabling their students to use critical thinking skills in real-world scenarios, away from campus? How can critical thinking protect Saudi students from falling victim to the manipulation of their brains via social media? Is critical thinking pedagogy adequate to produce a critical thinker students or students who are able to practice it in their real-life situations?

The research appears noteworthy as it delves into the role Saudi universities play in translating critical thinking pedagogy into practical applications. This has a significant impact on learners' behaviors and responses to the abundance of information and data available online, as social media platforms use deceptive and manipulative tactics to draw students toward radicalism and threaten their stable countries. In other words, pedagogy plays a vital role in developing individuals who are skilled, adaptable, and forward-thinking, and who are well-equipped to make significant impacts on society as a whole.. (Reynders et al.2020) The inquiry pertains to whether students get instruction in critical thinking throughout their tenure in higher education, and if higher education institutions consider it to be of significance.(Thorndahl and Stentoft, 2020).

The problem that this current study addressing is that the contemporary Saudi students possess a high level of proficiency in technology and often use social media platforms to acquire knowledge and establish connections with their peers (Anthonysamy, 2021). In addition, according to the most recent statistics issued by Global Media Sight, the Saudi Arabia social media statistics 2024has been reflected in the following:

- In 2024, Saudi Arabia will have a total population of 37.47 million people.
- In Saudi Arabia, an estimated 35.33 million individuals have social media accounts, which accounts for 94.30% of the total population.
- In Saudi Arabia, 99% of the population, or 37.10 million individuals, have access to the internet.
- The average daily internet usage time in Saudi Arabia is 7 hours and 9 minutes.
- In Saudi Arabia, the mean daily duration of social media usage is 3 hours and 6 minutes.
- In Saudi Arabia, WhatsApp is utilized by a substantial user base of 21.46 million individuals.
- 65.30% of social media advertising consumers are male, according to audience profile data.
- 43.60% of web traffic referrals originate from social media platforms via Facebook. TikTok is the predominant social media platform, attracting users for an average of 34 hours and 48 minutes per session.

With the highly increasing rate of the Saudi social media users, it is crucial for students to cultivate fundamental digital literacy abilities in order to assess the trustworthiness and veracity of the material they come across. This entails confirming the sources, scrutinizing the accuracy of assertions, and evaluating the circumstances in which the information is delivered. Moreover, it is essential for students to develop a critical attitude in order to distinguish between factual information, personal viewpoints, and manipulative propaganda. By developing and refining these abilities, students have the ability to actively participate in the online community and make well-informed choices by relying on trustworthy information

Review of Literature

There are abundant studies addressing the contribution of the Saudi Arabia universities in incorporating the skills of the critical thinking into their curriculum (e.g. Al Zahrani & Elyas 2017; Al Ghamdi & Deraney, 2013; Alosaimi, 2013; Bahatgeg, 2019; Gulnaz, 2020; Al-Qahtani, 1995) That is to say, notable institutions of higher education in Saudi Arabia include King Saud University, King Abdulaziz University, and Princess Nora bint Abdulrahman University, Prince Sattam bin Abdulaziz University and so on provide a diverse array of programs and disciplines, including engineering, medical, business, and humanities. Students get a thorough education and training to enhance their knowledge and abilities, allowing them to effectively adjust to the quickly changing world and make valuable contributions to their country's progress. Saudi universities students have been exposed to numerous academic programs integrating the critical thinking into their curriculum ranging from scientific, engineering, medical, pharmaceutical, education, humanities to social science.

A second group of studies have addressed the role of the extra-curricular activities in promoting the critical thinking inside the Saudi Universities. These activities have been prepared to motivate students to think autonomously, to question established conventions, and investigate alternate viewpoints. They target prioritizing evidence-based reasoning and logical thinking in decision-making (e.g. Alghamdi, 2016; El Haggag et.al, 2019; Yusof & Yusof, 2017; Sajid et.al, 2023; Jamal, 2012; Yousef et.al, 2023)

However, there are a few studies addressing the subtle negative effect of the social media on the Saudi University students and how the Saudi universities could manage to train their students on how to overcome the negative effect of the social media on reprogramming their minds and affect their cognitive skills, as the majority of the studies addressing the social media impact on the university students have focused on their negative impact without stressing the role of the Saudi Universities in equipping their students with necessary thinking skills that would help them overcome the negative effect of the social media (e.g. Aljehani, 2019; Alsanie, 2015; Alamri, 2019; Naguib et.al, 2018). That is to say, these studies have focused on the direct impact of the social media on the students' academic achievement (Al Shaibani et.al, 2020; Alshalawi, 2022; Nasrullah & Khan, 2019; Alamri; Mansour et.al, 2020 Halboub et.al, 2016) few studies have focused on the utilization of the social media in learning and teaching in the Saudi universities (Alyoussef, et.al, 2019; Alamri, 2019; Alsuraihi, 2016; Alabdulkareem).

Other studies have addressed the psychological and cultural impact of the social media on the university students (Naguib, et.al, 2018; Aljehani, 2019;). However, studies addressing the role of the Saudi universities in fostering critical thinking that makes students most likely invulnerable to the reprogramming cognitive effect of the social media are scarce. Indeed, there are many general studies that addressing the necessity of incorporating critical thinking into their curricular the aim of which is to train learners to deal with different issues that might encounter them in their lives. (e.g. Allmnakrah, 2020; Alwehaibi, 2012; Tiruneh, 2014).

Although there are many studies recommending that Individuals possess the capacity to engage in critical analysis of information, scrutinize its correctness, and discern possible biases, these studies are theoretical in nature and never provide practical framework through students can be informed about how to deal wisely with the social media.

These studies have not focused on how train university students to use critical thinking while using social media; however, it has been generally focused on their subject matter, improving their skill research writing , how to improve their learning of English and so on (Allamnakrah, 2013; Almalki, 2019; Dalha, 2018; Almalki & Yahya, 2019) However, this entails acquiring the skills to carry out comprehensive research, scrutinizing the underlying intentions of the material, and taking into account many viewpoints. By refining these abilities, students may cultivate a perceptive perspective to analyze

the extensive quantity of information accessible to them and produce well-informed assessments.

The studies dealing with developing and refining digital literacy in Saudi Arabia context has little to do with mentioning the negative impact of the social media on the Saudi university students and how they could overcome it (e.g. Albawardi,2018; Saad et.al, 2021; Albawardi,2017; Al-Abdullatif & Alsubaie, 2022; Alharbi,2019) According to the present study, by developing and refining their digital literacy abilities, people may effectively evaluate the trustworthiness and accuracy of the information they come across. They can also verify the sources, fact-check statements, and analyze the context in which the information is presented. This enables individuals to differentiate between objective knowledge, subjective viewpoints, and manipulative propaganda, so equipping them to make well-informed choices grounded on trustworthy data. Moreover, via the development of a perceptive mentality, people may actively participate in the online community by participating in conversations and debates that enhance their comprehension and expand their viewpoints.

2. The Impact of Social Media on Critical Thinking of the Saudi University Students

The global rise in social media use has resulted in a decline in the consumption of print media that covers intricate subjects. Due to the abundance of easily accessible information, people are increasingly becoming used to quickly and superficially consuming knowledge. (Su, 2021; Flew, T., & Iosifidis, 2020; Livingstone, & Brake, 2010; Dubose, 2011; Postill, 2018).

This phenomenon has led to a decline in the ability to think critically and a propensity to prefer quantity above quality. Moreover, the pervasive existence of social media platforms has worsened this problem. The continuous flow of concise information delivered via tweets, postings, and headlines promotes a tendency among users to neglect thorough investigation and analysis (Banerjee & Meena, 2021). The transition towards relying on internet sources of information has detrimentally impacted attention spans and general understanding. Many websites have a disorganized combination of hyperlinks, videos, and animations (Al-Zou'bi,2021)These burgeoning platforms often blend videos and articles, which may be overwhelming and perplexing for readers. Users find it challenging to simultaneously do many tasks and switch between audio, video, and text. Trying to handle all this information at once may lead to cognitive overload, when the brain becomes overwhelmed by the sheer volume of input. Simultaneously watching a video and reading text can pose challenges for viewers as they may find it difficult to reconcile the two sources of information, resulting in confusion due to redundancy or conflicting information. The transition to online information consumption has contributed to a decline in attention span and overall comprehension of written content. In essence, several websites may be described as just collections of material artifacts, mostly consisting of hyperlinks, videos, and animation. (Alamri, 2019).

Numerous widely-used websites now use video snippets as a means of conveying information. Although this may be advantageous for those who learn best via visual means, it also has its drawbacks. Integrating videos with an article might potentially prolong the time required to convey a message and has the capacity to perplex the reader. The source of this misunderstanding stems from the difficulty that many internet users have while attempting to multitask, particularly when switching between audio, video, and text media. Simultaneously engaging with the material and video may lead some to feel overwhelmed by the topic and suffer from cognitive overload (Alabdulkareem,2015). Cognitive overload arises when the quantity of information to be processed exceeds the capacity of mental effort. When attempting to simultaneously watch a video and read text, the viewer may attempt to establish a connection between the two distinct sources of information. This may lead to confusion when there is either repetition or compatibility between the two sources (Alasmari, 2020; Alkhalwaldeh, & Khasawneh,

2023.

The influence of social media on the way Saudi University Students consume information. Based on this prominent research, a significant proportion of the material shared on social media sites is not only misrepresented but also of very poor quality. Surprisingly, students unintentionally assimilate and retain this incorrect information in their long-term memory, accidentally substituting their previously solid knowledge with worse data (Eid, & Al-Jabril, 2016)

As a result, this well-supported occurrence obstructs the development of critical thinking abilities, thereby compromising the whole educational experience of university students. Talaue et.al.(2018) argued that in this unpleasant situation, students often encounter a troubling dilemma where they tend to forget the genuine and trustworthy knowledge they previously learned, effortlessly replacing it with fresh but false material, which they mistakenly consider to be equally valid.

Talaue, G. M., AlSaad, A., AlRushaidan, N., AlHugail, A., & AlFahhad, S. (2018). The impact of social media on academic performance of selected college students. *International Journal of Advanced Information Technology*, 8(4/5), 27-35.

This situation presents significant difficulties for both students and instructors, particularly in intellectual exchanges when the exposure of discrepancies between the aforementioned contemporary information and previously acquired knowledge takes place. Despite students' awareness of these contradictory bits of information, they face the formidable challenge of determining the correctness and truthfulness of each, sometimes resulting in their making misguided decisions as they mistakenly rely on low-quality information (Ghareeb, 2000)

Bradshaw & Howard (2018) argued that this dilemma emphasizes the severe repercussions of the increasing amount of low-quality information, as it spreads throughout and alters students' memory, eventually hindering their ability to think critically and limiting their capacity to make well-informed decisions. It is imperative for schools, parents, and society in general to acknowledge and reduce this urgent problem, cultivating a generation of perceptive people who can traverse the intricate web of information with unshakable sharpness and intellectual ability.

While having an extensive array of high-quality material is advantageous for learning, it may also pose a challenge for university students. When students search for information, they may come across substantial quantities of material that differ in terms of quality. In the absence of adequate supervision, they can have challenges in distinguishing between high-quality information and low-quality information.

Social media is a potent instrument that grants university students easy access to a wide range of knowledge and information. Facebook, Twitter, blogs, and wikis are among the several social media platforms often used by students. By combining all of them, the potential quantity of information that may be acquired is almost boundless. Frequently, students claim to have acquired knowledge for an assignment from a website they discovered via a social networking platform.

The impact of social media on cognitive processes.

Petty, et.al (1986) argued that the elaboration likelihood model of persuasion posits that attitude changes and persuasion can happen through two routes: the central route and the peripheral route. In the central route, individuals engage in extensive cognitive effort, leading to thorough comprehension of arguments and analysis of information, which in turn informs their decision-making process. On the other hand, the peripheral route relies on superficial decision-making, often based on heuristics, which is less likely to result in attitude changes due to a reduced need for critical thinking and analysis.

Social media may influence cognitive processes by using heuristics. A study conducted on a

sample of Chinese university students revealed that utilizing social media to disseminate news and narratives regarding political and economic instability resulted in heightened discussions. However, it also led to a rise in the adoption of shallow decision-making processes, primarily driven by emotions and a lack of cognitive effort to fully comprehend intricate information. This may have detrimental effects on critical thinking in terms of the quality of information and the level of cognitive processing.

Alnunu, & Abu-Rayya (2021) argued that there is much evidence indicating that social media platforms such as Facebook, Twitter, and others that facilitate various types of social interaction and media communication might influence how people make informed decisions.

Although there is a notable absence of cross-sectional research examining the impact of social media on cognitive processes, there is some evidence suggesting that the changes and impacts it brings may range from moderately significant to very powerful (Cooley & Parks-Yancy, 2019; Mergel, 2017). Applying cognitive processing to critical thinking, under appropriate conditions, may lead to more well-informed judgment. However, social media has the potential to impede this process in several ways (Alloway & Alloway, 2012; Stecula, Pickup, 2021; Bouko, 2021).

Using Critical Saudi Higher Education Institutions to Foster Critical Thinking

The concept of critical thinking is highly valued in education, but, there is a lack of consensus over its precise definition and the most effective methods for fostering its development. Critical thinking is often acknowledged as deliberate, self-regulatory judgment that leads to correct conclusions and carefully considers all available options. (Lai,2011; Ennis, 1993; Halonen,1995; Riddell, 2007). Additionally, it emphasizes the use of logic and empirical support to settle conflicts, along with Richard Paul's methodology. Developing critical thinking skills is a crucial objective of higher education. The significance of this ability lies in its high level of generalizability, allowing it to be employed across many contexts and topic domains. Developing logical thinking skills is crucial for students, as it equips them with the ability to successfully analyze and solve issues. Recognizing the significance of critical thinking, educators and politicians have been diligently striving to enhance students' capacity for critical thinking. Indeed, this is true in the Kingdom of Saudi Arabia (KSA). Interviews conducted with many university staff members have shown a prominent desire to enhance the critical thinking skills of university students. This is not just driven by internal motivation, but is partly attributed to the detrimental impact of social media on the young population of Saudi Arabia. Many educators and parents are concerned about the unrestricted and unregulated content on platforms like YouTube and Facebook, which they believe have brought detrimental effects from the Western world. Despite the strong Islamic principles in Saudi Arabia (KSA), social media nevertheless has a significant impact on today's young generation. An instance of this occurred when a parent expressed worry that their kid was browsing websites related to girls' volleyball, and these young individuals were recognized for their perplexity on the attitudes associated with such conduct in contrast to their own society.

Incorporation of Critical Thinking into the Curriculum

To evaluate the incorporation of critical thinking into the curriculum, we conducted an exploratory case study. Given the scarcity of resources, the study was restricted to a just 3 courses: a business course, an Islamic studies course, and a health course. The decision was made to allocate the resources of the health course to a different course that focused on changing the rhetoric around the amount of critical thinking being taught. However, there was limited evidence of the actual implementation of these strategies to promote critical thinking.

Integrating critical thinking skills into university courses is the main approach to promote their

development. Scholarly literature emphasizes the significance of instructing students in the art of critical thinking and the practical implementation of critical thinking abilities across all academic disciplines. An argument has been put up advocating against the teaching of topics as isolated pieces of knowledge that are only remembered. Instead, it is said that by connecting disciplines and instructing students on basic principles of evidence and argumentation, they would be motivated to engage in critical thinking. Adopting this teaching method should enhance students' ability to see the significance of critical thinking in relation to their studies and facilitate their use of these abilities. A research done at colleges in the United States discovered that students who got intensive education in critical thinking shown the most significant improvements in this capacity. The study also stated that the most successful method of teaching critical thinking is to explicitly emphasize it.

Faculty Development Programs to Improve Critical Thinking Instruction

Saudi higher education institutions (HEIs) have begun to acknowledge that in order to foster critical thinking among students, faculty members must acquire the necessary skills (Albalawi,2007; Alghamdi,2018; Syahrin & Alzaanin, 2024). A recent study has shown a lack in the existing efforts to improve critical thinking skills among college professors.(Eissa, 2020)

This has prompted the researcher to establish a preparatory program for teaching staff at King Saud University. A total of sixty-four faculty members from the College of Education took part in the program, and the findings demonstrated a noteworthy influence on the experimental group. The ANCOVA test demonstrated a statistically significant difference between the two groups. The experimental group, consisting of individuals who participated in the preparatory program, achieved a mean score of 80.46 on the logical thinking exam. In contrast, the control group, which did not engage in the program, had a mean score of 51.57. Al Malki determined that his program was effective. The control group agreed that depending just on intuition is insufficient. The United States is where they received their education, which equipped them with problem-solving and decision-making skills. They also agreed that acquiring the abilities is not arduous; the challenge is in using them in daily life. This is in opposition to the conventional beliefs that critical thinking abilities are inherent and challenging to impart. The program prompted faculty members to engage in critical reflection on their teaching beliefs, the efficacy of fostering students' thinking and problem-solving abilities, and the need to enhance their own talents. This finally resulted in the determination that the program was advantageous not only for the development of the essential skill set to support students' learning, but also prompted teachers to challenge the established procedures they had previously unquestioningly accepted. This reinforced the idea that providing faculty with the required abilities is insufficient; they must also have the will to use them. Al Muhasen says that this shift in the faculty's mindset has a profound impact on pupils.

Extracurricular Activities and Initiatives Promoting the Development of Critical Thinking Skills

Within a less formal setting, extracurricular activities provide a valuable chance to foster critical thinking and participate in experiences that broaden students' intellectual perspectives (Yuliana & Eliasa, 2023). Regrettably, a significant number of students see extracurricular activities as supplementary components to their academic lives (Morris et al. 2022). Proposed the implementation of activities that were integrated into the academic curriculum and directly related to the subject matter being taught in class (Hanafiah et al., 2022). An instance of academic embeddedness may be seen in the form of debate clubs that are associated with certain court members, facilitating cooperation and the exchange of comments. These activities served as a platform to highlight the academic accomplishments of students and also promoted a feeling of solidarity among the academic institution. Moreover, the presence of academic

embeddedness may be identified via interdisciplinary initiatives, in which students from many fields collaborate to address practical challenges. These projects provided students with the opportunity to use their knowledge and skills in a purposeful manner, fostering the development of critical thinking and problem-solving capabilities. In addition, industry leaders provided guest lectures and workshops, providing real-world views to enhance students' comprehension of the subject matter and its practical implications. In general, academic embeddedness refers to a variety of activities and projects that seek to connect academic learning with real-world experiences. These efforts attempt to provide students with the required skills and information to succeed in their future pursuits. Thank you. Another method to promote critical thinking and maintain a direct connection to academic work is by designing a research-based assignment that aligns with certain courses and is integrated into a research day. Faculty engagement and supervision were necessary for all of these activities, and according to many key informants, obtaining buy-in from faculty was crucial for establishing a culture of critical thinking at the university level.

Strategies for Saudi Higher Education Institutions to Combat Cognitive Reprogramming

Saudi higher education institutions have a crucial role in properly addressing and fighting the subtle cognitive reprogramming that might occur among the varied university student population. (Adams, et.al, 2011; Daoudi,2018).

By acknowledging and addressing this phenomenon, these respected institutions can develop specific strategies and initiatives to protect the mental well-being and intellectual independence of their students (Daoudi,2018). This will enable students to effectively navigate difficult situations and develop strong critical thinking skills.(Stanger, 2017)

Aifan (2015) argued that the dedication of Saudi higher education institutions to promoting critical thinking and protecting against cognitive manipulation is essential in cultivating an enlightened society that values diverse perspectives, defends intellectual liberty, and ultimately advances the progress and growth of the nation. The Saudi Ministry of Higher Education should formulate regulations and guidelines to facilitate the students in cultivating resilience against the adverse impact of social media. Chugh, & Ruhi (2018) explained that the college students often encounter a wide range of digital tools and technology as part of their academic experience. Nevertheless, many teachers are inexperienced with the methods of applying these tools, despite their popularity among pupils. Thorisdottir et.al (2019) stated that it is crucial that both the students and instructors be critically aware of how these tools are being utilized, the effects on learning and reconsidering what tools are best employed in teaching and learning to support effectively adopting 21st century abilities. Only when both students and instructors are aware and skilled in utilizing these resources to foster 21st century abilities, can effective reprogramming be managed.

The availability and accessibility of digital tools utilized by university students differ across persons and circumstances. Features of technologies which students use to compile and convey their ideas such as online blogs, podcasting or concept mapping software, may mainly go unnoticed by instructors who are inexperienced with such tools and never utilized them to study or teach. Curricula are often developed without particular reference to technology, tools and/or software individual students utilize in or outside the university learning setting. Our knowledge of the study suggests that assessing the scope and efficacy of these tools and practices to measure whether it produces the needed 21st century abilities is of limited value and/or resources have not been allocated to do such assessment. It is vital that we understand how different tools and technologies are utilized within diverse settings and analyze the level of the tools' usefulness to enhance 21st century skills for different persons. This will aid in detecting

where reprogramming has happened and how to properly reverse it.

4.1 Implementing Media Literacy Programs

At the same time, it should be explored if workers of media should also engage in such courses as a method of learning how media may impact the university's students as well as themselves. This might be connected with specialized professional development programs sponsored by the institution. As for selecting when such courses should be taken, it is feasible that adding media studies into freshman year programs might work as a preventative phase by providing students with the skills required to decipher/understand the media they are exposed to. (Albaqami, 2019; Al Danani, et.al., 2023). Al-Madani (2019) argued that giving such courses as an intervention after identification of students displaying evidence of cognitive reprogramming would be an effective approach of countering the reprogramming process. In the latter situation, it is vital that persons identified as being afflicted finish the media studies course during the same academic year that their symptoms were recognized, so as to reduce the probability of future advancement of those symptoms.

Unlike the public education system, higher education institutions in Saudi have the liberty and freedom to construct programs that are more sensitive to the impacts of media on its students. With a specific focus on Saudi universities, one effective means of enhancing media literacy skills is via the integration of courses related to media studies and critical analysis. Most importantly, these courses should be made compulsory for all students, irrespective of their disciplinary specialization. If the aim is to combat the effects of media on cognitive restructuring, then it seems only logical that students should be equipped with the skills to understand the media and how it affects them.

4.2 Enhancing Digital Literacy Skills

This section is inspired by the discussions and interviews with educators; by youth seeking to consciously comprehend the impact of the internet on their lives; and by others who expressed the pain and confusion of being unable to reconcile their experiences in the traditional world with an online 'reality'. The phrase 'digital literacy' briefly surfaced in some of the interviews, though almost everyone sought to understand this concept. It is widely recognized that in order to understand and teach a particular skill, it is necessary to identify the principal components of that skill. This can be regarded as a directory for consumers, educators, and researchers interested in acquiring a deeper understanding of digital literacy and its development. Al Khateeb (2017) argues that digital literacy and citizenship skills are abstractions of the general concept of literacy and are regarded as having the ability to understand and utilize diverse types of information.

This information can either be understood as knowledge or representational of the world in digital form. Therefore, literacy can be to glean information or use it to accomplish other tasks. Literacy is also generally considered as an ability to employ reading skills to learn and to have command of writing to effectively communicate and do things with words. (AlQaidoom & Shah, 2020).

This broad definition of literacy is then transposed in the digital world. Knowledge is constructed and information is gathered from the internet through reading, and writing/non-written work is posted and shared in a multitude of digital formats. These components are variably abstracted to formulate complex digital literacy skills, suggesting a wide range of abilities of variable depth, from basic to advanced. Given that literacy and its uses span such an extensive spectrum of abilities, it is desirable to encapsulate and measure these skills. For this purpose, a 'online assessment knowledge and skills inventory' has been developed for Ontario students, as a component of the web-based literacy assessment tool. The aim was to determine students' ability to extract and construct knowledge from the internet

and to evaluate their 'overall literacy' using a digitized medium. The results of this research suggested that a wide range of digital literacy abilities existed, and that they indicated a significant component of the overall literacy. A similar theme occurred during interviews with educators. An assumption was often made that our digital-savvy youth have digital literacy skills; however, the ability to understand and navigate the online world, and the ability to effectively utilize diverse digital information, are not skills naturally attained from general internet use. It is also indicated that the repercussions of not having or understanding these skills are quite detrimental. This can be related back to the subject of cognitive reprogramming, where the mismatches between the apprentice's prior ways of understanding and the online experience can cause a disruptive and deconstructive mediating process. In extreme cases, mismatches and the inability to find desired information may cause abandonment of the task and a state of learned helplessness.

Encouraging Critical Analysis and Evaluation of Online Content

Students would greatly benefit from these programs as a study was able to show a positive correlation between individuals who receive higher education and having the ability to differentiate between credible and non-credible sources. The more educated individuals also had a better way of formulating questions to look for specific information and better research skills to find the information they need. This is important as society is bombarded with information of all types and students need to have these skills if they are to be well-informed decision makers.

Alsaleh (2017) argued that it was found that elementary and secondary schools in Saudi Arabia put either no or little emphasis on the teaching of analysis and critical reflection of information. As a result, coming into the university system, these students are ill-equipped with these skills and are bombarded with media from all sources including TV, radio, print but most significantly the internet, and lack the ability to discern between credible and non-credible sources. This is not only limited to Saudi students, but also to the influx of international students into Saudi universities, many of whom have already begun to learn these skills in their own countries, but are now challenged by information that conflicts with what they have learned. Without these skills, they are more susceptible to believing in manipulated information and are likely to be swayed into a biased view of Saudi culture and society. This can ultimately lead to undermining the national identity of Saudi society.

Students at Saudi universities desperately need to have critical thinking skills as a result of the limited access to public or controversial information versus the manipulated or biased type which is abundant. This has led them not to question or reflect on the information available and accept it as true at face value. It is the aim of the study to suggest the implementation of media and critical literacy into the main curriculum of universities and further research on this topic into the effectiveness and differences of students who encounter this problematic information early and late in their education.

4.4 Promoting Open Dialogue and Debates on Social Media

One downside, which is the specific focus of this paper, is the effects of social media on cognitive development. The immediacy, breadth, and reach of social media make it an ideal tool for debate and discussion. However, with no checks on the quality and accuracy of information it provides, combined with a lack of incentive for users to evaluate and critically appraise the veracity of what they see and read, social media can perpetuate the spread of misinformation and faulty assumptions. This can be dangerous for students. If they are exposed to bad information on an issue related to their studies, it can be difficult for them to realize it is incorrect. And once learned, incorrect information is notoriously hard to displace. Thus, it is clear that steps should be taken to cultivate an environment in social media that

encourages critical thinking and reasoned debate; one in which it is safe to assume that the practice of these skills will lead to learning and personal development.

The internet was once envisioned as a place where discussion and communication would be of such high quality that it would be a driving force propelling society to new levels of achievement. However, this vision has not yet materialized, and debate about the net's influence on society and individual cognitive development is still increasingly vital and relevant. Education, in particular, is one area where the internet has had a major effect, now with the development of e-learning and the continuing growth of online resources. For students, the internet is inevitably becoming an integral part of their education. This has many and varied effects on learning, which can be extremely beneficial, but there are also clear downsides to consider.

Conclusion

Saudi universities actively encourage research and academic inquiry, recognizing their crucial role in fostering critical thinking. It offers students the chance to participate in research endeavors, cooperate with faculty members, and contribute to the generation of knowledge in many fields of study. The Saudi Higher Education organization fosters students' critical thinking skills, ability to form informed opinions, and contribution to the progress of their fields through active involvement in research. Additionally, the organization acknowledges the significance of promoting information literacy among students. It provides individuals with the essential abilities to efficiently find, assess, and use knowledge. Saudi Higher Education provides students with specific courses and seminars to develop their ability to identify reputable sources, critically assess material for bias or contradictions, and make well-informed judgments based on solid facts. The Saudi Higher Education institution plays a crucial role in fostering critical thinking skills among students. The organization teaches students to become competent people capable of managing the complexity of the contemporary world by providing a complete curriculum, promoting intellectual freedom, supporting research efforts, and highlighting the importance of information literacy. The primary aim of higher education is to provide students immersive learning experiences that result in the acquisition of information, the development of skills, and the improvement of cognitive abilities. Critical analysis helps people challenge information, recognize biases, and make well-informed judgments based on research. This helps people rapidly navigate huge information and make smart conclusions. Students should also learn to communicate well to participate in online arguments. Learning to disagree gently, evaluate different ideas, and argue with facts is needed. Online debates and discussions can help kids grasp diverse ideas and develop empathy and receptivity. Parents and teachers must promote digital literacy. They must educate critical thinking, internet etiquette, and digital skills. Collaboration equips students to critically assess material, participate in online networks, and navigate the digital environment with confidence and resilience. Students need digital literacy in today's information-centric world. Students may serve society by identifying bogus news, analyzing data, and using the internet. It helps youngsters learn, make informed decisions, protect themselves online, and actively shape the digital environment.

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The First author contributed to collecting, and analyzing data pertaining to the research. He also wrote important sections like introduction, review of literature and the theoretical framework of the study. He contributed to writing the remaining sections of the paper with the second author

The second author also contributed to collecting and analyzing data. He also wrote the discussion, analysis and the results of the study.

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