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Twisted thinking and its relationship to radical thinking among university students

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Orientation: Twisted thinking and its relationship to radical thinking among university students.

Research purpose: This study aimed to reveal the level of twisted and radical thinking, and to know the relationship between them among university students.

Motivation for the study: To know the effects of these two negative types of thinking on students. These thoughts can cause a decline in their academic achievement and affect their social relationships within the university, leading to a waste of youthful energies.

Research approach/design and method: This study used a descriptive approach on a random sample of 400 male and female students, in the second year in different specialisations, for the academic year 2023–2024.

Main findings: It was found that the problem of second-year students in the colleges of the University of Mosul is that they possess twisted and radical thinking, and there is a strong direct relationship between these two types of thinking, which may cause a decline in their academic and social abilities in the future.

Practical/managerial implications: The study highlights the impact of negative thinking patterns represented by twisted and radical thinking on students' academic and social life, and the need to develop positive thinking skills to confront these negative thinking patterns.

Contribution/value-add: This study contributes by providing data on deviant and radical thinking patterns among second-year students in the University of Mosul. Educational policy makers and curricula should include critical and positive thinking skills to ensure that these negative thinking patterns do not spread among students.

Keywords: twisted thinking; radical thinking; catastrophic thoughts; negative filtering thoughts; thoughts dismissing evidence; unreliable predictive thoughts; utopian thinking; dystopian thinking.

Introduction

The world has changed dramatically in the past two decades because of technological advancements that have turned the world into a global village. Globalisation has affected many aspects of our lives and education, in particular, changing the way humans teach and learn (Barsoum et al., 2022).

College students face important health, mental and academic challenges in their first academic year. This transition period can be stressful and challenging for students who are unable to cope with academic demands and adapt to the new educational environment, increasingly causing symptoms such as anxiety and depression, which are linked to their faulty and negative thinking styles (Davis, 2018).

Accordingly, individuals adopt irrational beliefs and ideas that affect their personal lives and create multiple problems for them. Moreover, their exposure to repeated psychological pressures from the surrounding environment directly or indirectly affects their thoughts and beliefs, making their thinking negative and rigid, and their ideas very narrow (Kadhem & Muhamad, 2021).

Submission to authority or intellectual references also (blind subservience to authority) results in the idea of cancelling the mind's ability to take off and be free, in addition to placing obstacles in the way of thinking based on argument and proof. All of this results in a lack of knowledge, corruption in the method of thinking, inability to research and negligence in dealing with the laws of the universe, its principles and its laws (Al-Zagha, 2010).

Utopian thinking allows individuals to build a mental image of ideals. Some see this as 'unrealistic' – far from their current experiences and with the current society. These ideas, especially when they are radically different from the present society, are psychologically distant. To motivate a person to work to achieve these utopian ideas, he needs to cross this long psychological distance. Thus, the focus on the role of high-level interpretation in bringing distant mental objects to mind assumes that utopian thinking, which requires a mental interpretation of images of the ideal society, reinforces an abstract mindset and formulates a high-level understanding of the future and the ideal society. This is where abstraction enters the picture as a cognitive interpretation strategy. This high-level interpretation or abstraction will, in turn, support goal-oriented behaviour that contradicts the status quo with the ideal society. Problems arise because of the lack of accepting reality, and in contrast to utopian thinking, dystopian thinking is formed. It is a pessimistic view of the bitter reality (Badaan et al., 2022).

Therefore, learning critical thinking skills is essential for every learner because it is a necessary language that everyone needs to learn and develop. An individual may face some situations that need planning or making the right decisions, which requires him to use thinking skills. For teaching these skills, the teacher needs to use diverse and unfamiliar educational situations by processing information in order to produce new outputs that are compatible with the educational situation (Al-Blushi, 2014).

Theoretical background

Twisted thinking

Twisted thinking is defined as:

> Patterns of distorting reality in your perceptions of your world and the events around you; they malform the way you think about what is actually occurs without you're being aware of that, but if you think about this regard a little, you will probably see that they are doing so. These patterns contain the different ways wherein the mind distorts the information coming in. These patterns are: (catastrophic thoughts, negative selective thoughts that reject evidence, and unreliable predictive ones). (Smith, 2022)

Smith (2022) found that the way you explain or think about events specifies largely the way you feel. All humans have some notions that do not match reality, or what cognitive therapists call distorted thinking. 'Distorted' means that your thinking does not accurately reflect, predict or describe what is happening. Have you ever heard a noise in the night that woke you up and scared you? Your mind was probably filled with dreadful ideas and images of someone breaking into your home. These notions are rarely accurate. Most often, the noise is caused by wind or creaking floorboards. But when you hear a noise in the night, your fear is very real, and your ideas, though understandable, are distorted. Although there are open-ended ways in which the human brain can distort reality, the following three types of distortions are particularly common: distorting reality,

making judgements about mistakes, and attributing blame to the wrong source (Smith, 2022). Humans have developed false ideas and, moreover, they have developed false emotions and behaviours to support those false ideas (Bliss, 2014).

Reality distortion devices or patterns "as described by Smith" contain several ways wherein the mind distorts the incoming information. For example, assume a depressed man receives average medical care. He is likely to expand this event into a complete disaster by assuming, 'He is worthless as a person,' and tends to exaggerate negative information. This pattern is called 'catastrophising reality distortion.' Without reality distortion patterns, the truth is simply that the medical care was normal, even though he would have preferred better care (Smith, 2022).

Smith identified reality distortion patterns, which are tools of twisted thinking, as follows:

Catastrophic thoughts

It is the explicit and direct emphasis on the negative aspects of an event (Ouhmad et al., 2023). Your mind inflates the hypothesis of unpleasant events and reduces the value and importance of anything positive about yourself, your world or your future (Smith, 2022). The term 'catastrophising' refers to the imaginary and often involuntary creation of speculative disasters as an expression of materialistic philosophies and forms of interpretation, in addition to the response to them. The familiar meaning of the word is 'the habit of moving to the worst possible conclusion, that is, in the sense of making something out of nothing and inflating and exaggerating events and situations' (Passannante, 2019). 'Making negative predictions about the future based on little or no evidence' (Rnic et al., 2016).

Negative filtering thoughts

The term "selective thoughts" describes the capacity to encode irrelevant information. information in the presence of relevant information that is central to the topic or situation at hand (Robison et al., 2018). Your mind searches for depressing, dark or scary data while screening out more positive information. The nonadvanced outcome? The world (or yourself) seems bleaker or scarier than it is. For example, you are sent home by your boss because you were exposed to someone who tested positive for coronavirus disease 2019 (COVID-19). You assume you have probably been infected, will probably be hospitalised and will probably die. You call your brother to say goodbye, and he reminds you that you have been vaccinated, are wearing a mask, and your workplace has increased ventilation. Selective thinking leads you to the darkest conclusion rather than the most reasonable one (Smith, 2022). Where you only attend to aspects of reality that align with your negative beliefs (Thomas & Theresa, 2020). Selective thoughts call for undue attention to a single negative detail rather than seeing the full picture. For instance, 'Since I got one low rating on my review (which also had several high ratings),

it means I'm doing a bad job' (Beck, 2011). You focus almost exclusively on the negatives, but rarely notice the positives. For example, you might say to yourself, 'Look at all the people who do not like me' (Leahy, 2017). Here, you focus intensely on the negatives while ignoring the positives (Kelly, 2019a). Where your mind acts as a filter or strainer through which it excludes all your personal experiences of a positive nature from having any relevance and importance (Amilon & Stephanie, 2022). That is, you selectively attend to negative events or outcomes and ignore or miss out on other information (Nieto & Carmelo, 2022).

Thoughts dismissing evidence

People's prior beliefs critically influence how they tackle scientific evidence. Specifically, when faced with evidence that contradicts their prior beliefs that have been formed through their life experiences, individuals tend to dismiss, reinterpret or ignore evidence rather than amend their own previous thoughts. This motivated reasoning allows individuals to keep their prior assumptions, even when scientific evidence suggests that they are questionable or wrong (Thomm et al., 2021). Your mind ignores evidence that might deny its negative ideas. For example, assume you are preparing a speech and you think that when the time comes to speak, you will be so afraid that you will not be able to speak. Your mind automatically rejects the fact that you have given many speeches before and have never been afraid that you will not be able to speak (Smith, 2022). Some people tend to look for or interpret information in a way that confirms one's preconceptions (confirmatory evidence), causing the misinterpretation of ambiguous evidence as confirming their existing hypotheses (Johnson, 2020). The weight of evidence indicates the factors (for example, the quantity or usefulness of evidence) that mitigate or amplify the effect of the strength of evidence on changing belief degrees. Griffin and Tversky describe the weight of evidence concerning predictive validity and see it as similar to the statistical concept of precision, for example, a confidence interval around an effect size (Gugerty & Drew, 2020).

Unreliable predictive thoughts

Most people overestimate the extent to which outcomes can be predicted before they occur, and they use their own information (according to their acquired beliefs about reality) when making decisions, judgements or estimating others' assessments (Dietvorst & Uri, 2018), and an unreliable prediction presupposes a negative result without any real evidence. In essence, you have an argument with your partner and you think he or she will leave you definitely. Or you avoid driving on highways because you are convinced you will have an accident (Smith, 2022).

Radical thinking

Radical thinking is defined as:

> A cognitive process that involves distorted, contradictory, and extreme (utopian-dystrophic) visions and perceptions of human nature. Utopian visions amplify the positive sides of human nature and imagine an ideal, flawless future, while dystopian visions magnify the negative sides of human nature and imagine a dystopian, insecure future. This duality of human nature makes it impossible to achieve pure (utopian-dystrophic) perceptions but rather needs a combination of the two. This duality of vision allows us to imagine the consequences of certain ideologies, policies, and societal structures. By exploring these extreme visions and scenarios, we can better understand the potential outcomes of our actions and make informed decisions about the future, critically by looking at alternative possibilities. (Gordin et al., 2010)

The term 'radical' is derived from English. The word itself is derived from Latin, meaning root, so the word 'radical' means 'rooted' or 'roots'. Therefore, philosophy is defined as radical thinking, or thinking about its roots. Towards the end of the 18th century, the term 'radical' was employed in the political world for referring to those who advocated or supported radical and comprehensive political reform in Europe. The term 'radical' will be employed in the future, not only for those who want and seek a complete and comprehensive ideal change but also for those whose efforts for change must be revolutionary and comprehensive but not superficial. Change can happen peacefully according to agreement, but it is more commonly executed through coercion, compulsion and even violence. Although radicalism has previously grown in the political world, it has recently appeared in other areas, especially the social, religious and psychological (Harahap et al., 2019).

In fact, radicalism is a cognitive state of mind that straddles the line between 'moderate radical thinking' and 'radical-utopian or dystopian thinking'. Radical thoughts can have a noticeably strong attraction to their adherents (Sukabdi, 2023). Desmond Tutu saw radicalism as not allowing different dimensions, that is, constructing one's own perspective as something very exclusive and not accepting possible differences, that is, rejecting another view. Radicalism is a mental and emotional process that can motivate individuals to pursue incompatible behaviour. Radicalism is created by a process of changing the cognitive psychological construction of persons into new identities that are part of behavioural change. As radicalism is understood as a process, it can be said that a person's radical views and attitudes always appear in the form of an intellectual ideology and the values of the belief system that he gained through the process of socialisation (Asrori et al., 2020). The faltering development process exposes young people to the harsh effects of exclusion, for example, identity formation crises among young people as well as other social crises such as poverty, unemployment, inequality, unfair treatment, oppression, among others, in addition to the process of marginalisation and exclusion from the most important fields of life. This failure leads young people in Arab countries to form exaggerated perceptions (mostly compensatory) about society and the future and provides a fertile ground for radical thinking and action among young people (Al-Badayneh et al., 2023).

Radicalism is an attitude or thinking that contains four main characteristics: (1) intolerance and lack of appreciation for the opinions of others; (2) a fanatical attitude that justifies itself by blaming others; (3) a closed-minded attitude and efforts to appear different and (4) a revolutionary attitude that tends to exaggerate, whether positively or negatively (Mujani et al., 2020).

It should be mentioned that the term 'radical' does not have a meaning in itself because the content of radical thought depends on the context. What is called radicalism depends on what is considered prevalent in a given society (someone may be regarded as a radical extremist in one society, but not in another). The social and political system plays a role in this context. In nondemocratic societies, people who strive for freedom of expression and other democratic rights are labelled as extremists, while in democratic societies, the opposite is true (De Meere & Lisa, 2015). Contemporary educational policies and debates focus on how to link the fields of radical (utopian and dystopian) and moderate ideas (Ruggiero, 2014). Educational programs must be in hand and adaptable, requiring teachers to treat their curricula as design problems to be solved with creative, critical, and moderately radical thinking (Kelly, 2019b). The future vision of radical thinking includes an invitation, often addressed to the younger generation of critical thinkers, to initiate a dialogue with theories of change that have been developed within programme plans in various disciplines (Monticelli, 2018).

Radical thinking is composed of utopian and dystopian thinking. Utopian thinking relies on the ways of explaining the present with an eye to the imaginary but positive future. Dystopian thinking depends on explaining the present with an eye to the imaginary but negative future (Gill, 2017).

Utopian thinking

Humans can genuinely change people's lives and refocus their thoughts, especially their beliefs, feelings, and actions. The ideal outcome of such a powerful utopian vision that shapes life is a response that says, in effect, 'I believe that a new ideal world could be like this!' A 'categorical normative prediction' that turns into inspiration and commitment, based on which utopian thinking is formed (Hanna & Otto, 2022).

In psychology, utopia is regarded as 'a symbolic representation of an ideal human world' (Logan et al., 2020). Utopia has been conceptualised as a general utopian thinking, which refers to people's tendency to imagine an ideal society and what it might look like. By measuring general utopian thinking, it has been found to be associated with the activation of three utopian functions: compensation, critique and change. Furthermore, engaging in this thinking has been shown to promote intentions to critique and change society (Basso & Dario, 2022).

The utopia functions are numerous and involve compensation in the form of daydreams and fantasies, criticisms of existing conditions and the ability to arouse the desire to transform into a better way of life. For Levitas, the essential utopian aspect is the space to think and feel outside the established normative and conceptual frameworks, or to desire differently (Johnson, 2006).

The scholar Bloch described utopian thoughts as 'daydreams' that evoke what has been repressed in reality, and paint a hopeful picture of an ideal world that has not yet been (in the future) (Cruz, 2022), and this is one of the absolute interpretations of utopia; as an image opposite to the present, it expresses wanting ideas towards impossible perfection and that this running after perfection will inevitably cause violence and repression in the real empirical world towards the future (Lakkala, 2020). This aspiration for the future is part of a utopian strategy, in which 'ideas' are represented in opposition to and negation of the present. However, the past is also a negation of the present and can therefore be connected to the desired (ideal) future (Wagners, 2020).

Utopian ideas serve as a means of securing psychological calm and as a mechanism for compelling ones who are radically divided by their pleasures in the search for an imaginary moral ideal philosophy (Rieley, 2020). Thus, utopia is an internal, contradictory intellectual construct that has no rational foundations (Płachciak et al., 2015). These utopian ideas seem desirable but unattainable (Bal & Andy, 2022).

Because utopian ideas define the upper limits of the possible worlds that people imagine, they can serve as standards against which current reality is evaluated and criticised. In this state, the greater the discrepancy between the utopian vision and the current reality, the darker and more negative one's assessment of the current reality becomes, gradually turning into pessimistic thoughts, known as dystopian thinking (Fernando et al., 2018).

Dystopian thinking

The term 'dystopia' is derived from the Greek word 'dys-' that means 'bad'. Dystopian ideas usually draw the worst social conditions filled with poverty, misery, suffering, death and disease, which is undesirable for any human being (Nazemian, 2019).

Dystopian notions indicate the darkest representation of an existing or potential future society, where most of the desirable qualities of life are not found. Dystopian thoughts exist as a consequence of social, climatic, financial and political events; they depict major crises that haunt the contemporary world according to bleak scenarios. These ideas strive to warn or present a pessimistic dystopian view of the dogmatic positions that lie at the heart of utopian notions (Poorghorban & Bakhtiar, 2023).

The political, social and economic crises that the world is going through have made the type of dystopian ideas particularly popular, and in addition to reflecting societal

concerns, they (dystopian ideas) allow for testing some common utopian concepts in an imaginary environment (Leine, 2023). The dystopian vision is presented in many different forms and types and conveys many ideas about human degeneration, loneliness, and loss of meaning and values, but there is frequently a common, loneliness and degradation, but there is often a common feeling that human despair is caused by an external event such as a disaster, pollution, war or miserable social, economic and political conditions (Rio, 2022).

Dystopian ideas have some specific characteristics, including a negative, pessimistic, and hopeless view of miserable societies, real or imaginary and unrealistic situations, and imaginary radical systems that are culturally, religiously, economically, socially and politically extreme (Atasoy, 2019).

It is worth noting that both utopian thinking and dystopian thinking share the same imaginative function for both types of thinking: the former presents ideal imaginary ideas, and the latter involves dystopian imaginary ones (Farca, 2017). There is a link between both 'dystopian thinking' and 'utopian thinking', so it is important to understand both words in the same order. Dystopian thoughts arise when an individual feels deficient and helpless and tries to compensate for that by reaching for idealism and perfection in personal, social, political and economic aspects, but fails to do so. Thus, dystopian ideas emerge in the dark mirror of utopia, which is the antithesis of utopian thinking. Dystopian notions are, therefore, the product of failed social experiments, oppressive political systems and arrogant economic systems that start with utopian dreams that are put into practice (Gupta, 2021).

In the academic field of education in futures, there has been relation that negative and pessimistic future scenarios in students can be harmful to their minds and thoughts. Eckersley argued that negative and pessimistic thoughts among young people can result in cynicism about the status quo, distrust, anger, apathy and an approach to life according to instant gratification (Nordensvard, 2014).

Research design

Research participants and procedure

The method followed in this study is the descriptive research method. The study population consisted of second-year university students (400 in number) selected by stratified random sampling from various humanities and science majors at the University of Mosul. There are 13 scientific colleges and 11 humanities colleges. After obtaining official permission from the university, data were collected.

Two tests were used: firstly, to measure twisted thinking and secondly, to measure radical thinking. The purpose and objectives of the study were explained to the participants on both tests, and informed consent was obtained from them. Participation in the test was voluntary, and confidentiality and anonymity were guaranteed throughout the study. The test was estimated to take 15–20 min to complete. The research sample consisted of 400 participants, of whom 200 (50%) were males and 200 (50%) were females.

Measures

To operationalise the latent variables in the search, we used the following instruments:

The twisted thinking test

The test consists of four patterns: catastrophic thoughts, negative filtering thoughts, thoughts dismissing evidence, and unreliable predictive thoughts. Each pattern has 10 situations, thus a total of 40 situations. The highest score for the test is 80, and the lowest score is 40, with a hypothetical average of 60. Below each situation, there are two options to choose, and two points were given to option A, which includes twisted thinking, while option B was given one point because it represents nontwisted (critical) thinking. For example, one of the test situations of the first type is catastrophic thoughts. You get a poor grade (low average) in English from your teacher. There are two options: Option A: You feel very disappointed, which affects your academic performance, and you expect that you will not succeed in this subject. Option B: You evaluate your abilities and the nature of the subject to improve your studies and efforts (your grade point average) in the future. To verify the face validity of the twisted thinking test, it was presented to a group of experts and specialists in education and psychology, and the approval rate reached 96%. The test stability was also extracted using the application and reapplication method. The researchers selected a random sample of 100 male and female students outside the research sample. The test was applied and reapplied to the same sample with a time interval of 15 days. Using the Pearson correlation coefficient to find the correlation between the scores of the two applications, the correlation coefficient between the two applications reached 0.84.

Radical thinking test

The test consists of two dimensions: utopian and dystopian thinking. Each dimension has 20 situations, for a total of 40 situations, and the highest score for the test was 120 and the lowest score was 40, with a hypothetical average of 80, and a range that included moderate radical (critical) thinking, the value of which was 60–100, so, the minimum cutpoint between radical (dystopian) thinking and moderate radical (critical) thinking is 60, and the maximum cutpoint between radical-utopian thinking and moderate radical (critical) thinking is 100. Under each situation there are three options to choose. One point was given to choice A, which includes dystopian radical thinking, and choice B was given two points because it represents moderate radical (critical) thinking, while choice C was given three points because it represents radical-utopian thinking. For example, one of the questions in the test asks the following: What do you think of the state's investment in nuclear energy in various service sectors? The choices are as follows: option A: Do not support its use because it is extremely dangerous, especially

if it leaks or falls into the hands of extremist groups; option B: considers all possible outcomes and evaluates its effectiveness and the extent of its benefit; option C: believes that nuclear energy will radically solve the country's energy needs and preserve the environment without taking into account its danger. To verify the face validity of the radical thinking test, it was presented to a group of experts and specialists in education and psychology, and the approval rate reached 94%. The test stability was also extracted using the application and reapplication method. The researchers selected a random sample of 100 male and female students outside the research sample. The test was applied and reapplied to the same sample with a time interval of 15 days. Using the Pearson correlation coefficient to find the correlation between the scores of the two applications, it was found that the coefficient reached 0.86.

Statistical analysis

To calculate the difficulty and ease coefficients and the degree of discriminatory power of the twisted thinking and radical thinking tests, the following procedures were used in the Statistical Package for the Social Sciences (SPSS) programme:

- The twisted thinking and radical thinking tests were applied to a random stratified sample of 400 male and female students, which is an appropriate sample, that is, 10 observations for each situation, which totalls 40 situations. To lessen the impact of chance, Nannally (1978) suggested that the sample size for differentiating paragraphs should be between five and ten observations (individuals) for each paragraph of the scale or test.
- The students' responses to the test were corrected, then the data were entered, the total scores were calculated, and then they were arranged in descending order, after which a percentage of 27% of the highest scores, which amounted to 108 forms, was determined, and a percentage of 27% of the lowest scores, which amounted to 108 forms (scales), was determined. This percentage was adopted because it provides the best distinction between the two extreme groups (the highest and the lowest). According to Dancey and Reidy (2011), the number of forms that were subjected to statistical analysis was 216.
- After identifying the upper and lower groups (Which represents 27% of the highest and lowest grades), the difficulty, ease and discriminating power coefficients were calculated for each situation in the twisted thinking and radical thinking tests, using the t-test for two independent samples using the SPSS programme to compare the average scores of the upper group with the average scores of the lower group for each situation in the test, which numbered 40 situations. The situations that obtained a calculated (t) value equal to or greater than the tabular value of 1.96 were considered distinctive because they were statistically significant at the 0.05 level with 214 degrees of freedom (Table 1).

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Mosul Ministry of Higher Education and Scientific Research College of Education for Human Sciences, according to the Mission Facilitation Book No. 3/7/11436 dated 30 October 2023.

Results

The primary objective of this study was to reveal the level of twisted thinking among university students. This was achieved by applying the twisted thinking test to the research sample members. The results showed (after statistical processing using the t-test for a single sample) that the arithmetic mean of the sample members is 64.45 degrees, with a standard deviation of 3.45. When compared to the hypothetical mean of the test, which was 60, it became clear that the arithmetic mean was higher than the hypothetical mean of the twisted thinking test. The calculated t-value reached 9.54, which is higher than the tabular t-value of 1.96, at 5% significance level, with 399 degrees of freedom (Table 2 and Figure 1).

The secondary objective of this study was to reveal the level of radical thinking among university students. This objective was achieved by applying the radical thinking test to the research sample members. The results showed (after statistical processing using the single-sample t-test) that the arithmetic mean of the sample members reached 103 degrees, with a standard deviation of 3.17. When compared to the hypothetical mean of the test, which was 80, it was clear that the arithmetic mean was higher than the hypothetical means of radical thinking test, as t-value reached 11.79, which is higher than the tabular t-value of 1.96, at 5% significance level, with 399 degrees of freedom (Table 3 and Figure 2).

Another aim of the study was to identify the relationship between the level of twisted thinking and the level of radical thinking among college students. For achieving this aim, the simple correlation coefficient (Pearson) was calculated between twisted thinking and radical thinking for all the research sample. The correlation coefficient value reached 0.78 and a strong direct relationship appeared between them. To show the link between twisted thinking and radical thinking, a t-test for the correlation coefficient was utilised, as the calculated t-test value reached 14.82, which is higher than the tabular t-test value of 1.96 at the 5% significance level (Table 4).

Discussion

This study aimed to reveal the level of twisted and radical thinking and to determine how they are related. The study was conducted on a sample of second-year students in all colleges of the University of Mosul. The study revealed, through the sample's answers to the two tests, that second-year students possess twisted thinking as well as radical thinking. The study also revealed that there is a direct relationship between twisted thinking and radical thinking, meaning that twisted ideas will lead to radical ideas in the future if measures are not taken to change or modify those ideas.

TABLE 1: Difficulty and ease coefficients and discriminatory power of the twisted thinking and radical thinking test situations.

No.	Twisted thinking				Radical thinking			
	Difficulty coefficient	Ease coefficient	Discriminatory power	Calculated *t*-test value	Difficulty coefficient	Ease coefficient	Discriminatory power	Calculated *t*-test value
1	0.51	0.49	0.43	3.69	0.44	0.56	0.52	6.92
2	0.52	0.48	0.39	7.24	0.45	0.55	0.43	5.32
3	0.55	0.45	0.38	6.89	0.47	0.53	0.46	11.57
4	0.61	0.39	0.41	7.21	0.53	0.47	0.50	4.26
5	0.60	0.40	0.38	6.65	0.54	0.46	0.37	7.88
6	0.59	0.41	0.46	8.60	0.46	0.54	0.48	9.57
7	0.53	0.47	0.40	7.41	0.52	0.48	0.63	10.69
8	0.64	0.36	0.42	7.31	0.53	0.47	0.69	4.78
9	0.55	0.45	0.40	7.30	0.51	0.49	0.50	8.65
10	0.59	0.41	0.37	6.49	0.49	0.51	0.50	4.85
11	0.54	0.46	0.37	6.73	0.40	0.60	0.39	8.42
12	0.54	0.46	0.43	8.02	0.54	0.46	0.44	9.95
13	0.63	0.37	0.41	7.14	0.40	0.60	0.46	4.41
14	0.55	0.45	0.38	6.89	0.60	0.40	0.65	3.63
15	0.59	0.41	0.41	7.29	0.46	0.54	0.37	8.15
16	0.56	0.44	0.44	8.08	0.50	0.50	0.74	6.30
17	0.50	0.50	0.41	7.80	0.55	0.45	0.54	4.67
18	0.64	0.36	0.42	7.31	0.49	0.51	0.39	7.59
19	0.66	0.34	0.38	6.46	0.53	0.47	0.69	9.56
20	0.62	0.38	0.38	6.58	0.44	0.56	0.44	6.10
21	0.63	0.37	0.43	7.55	0.43	0.57	0.48	4.89
22	0.60	0.40	0.38	6.65	0.63	0.37	0.56	8.39
23	0.56	0.44	0.43	7.91	0.48	0.52	0.44	9.96
24	0.57	0.43	0.41	7.38	0.46	0.54	0.48	5.83
25	0.57	0.43	0.50	9.70	0.51	0.49	0.61	6.98
26	0.47	0.53	0.38	7.31	0.41	0.59	0.52	9.46
27	0.61	0.39	0.50	9.45	0.42	0.58	0.65	5.43
28	0.60	0.40	0.34	5.89	0.59	0.41	0.70	4.70
29	0.60	0.40	0.38	6.65	0.48	0.52	0.48	7.04
30	0.57	0.43	0.41	7.38	0.53	0.47	0.69	6.93
31	0.50	0.50	0.37	6.92	0.52	0.48	0.63	9.40
32	0.52	0.48	0.43	8.13	0.49	0.51	0.54	9.25
33	0.56	0.44	0.41	7.47	0.55	0.45	0.39	8.41
34	0.49	0.51	0.42	8.09	0.46	0.54	0.52	10.09
35	0.51	0.49	0.38	7.08	0.45	0.55	0.54	5.96
36	0.55	0.45	0.38	6.89	0.58	0.42	0.72	4.89
37	0.60	0.40	0.36	6.26	0.53	0.47	0.61	7.18
38	0.61	0.39	0.44	8.06	0.56	0.44	0.43	9.73
39	0.52	0.48	0.43	8.13	0.51	0.49	0.54	6.80
40	0.51	0.49	0.36	6.66	0.45	0.55	0.43	7.72

TABLE 2: The arithmetic and hypothetical means, standard deviation, calculated and tabulated *t*-value for the research sample (twisted thinking).

No. of sample members	Arithmetic mean	Standard deviation	Hypothetical medium	*T*-value		Significance level
				The tabulated one	The calculated one	
400	64.45	3.45	60	1.96	9.54	Function

Regarding the twisted thinking, the results showed that the arithmetic mean of the sample individuals reached 64.45 degrees, with a standard deviation of 3.45. When compared to the hypothetical mean of the test, which reached 60, it became clear that the arithmetic mean was higher than the hypothetical mean of the twisted thinking test, as the calculated *t*-value reached 9.54, that is, higher than the tabular *t*-value 1.96, at a significance level of 5%, with a degree of freedom of 399.

This result shows that the sample individuals have twisted thinking, as types of incorrect information (which are not based on a scientific basis) manipulate the individual's opinion (Biddlestone et al., 2022). Sometimes our thinking can be distorted or skewed. In other words, we all tend to think in ways that can be unhelpful or unhealthy, which can lead to emotional distress. When we learn to notice these thinking patterns, we can work to modify them (Ballard, 2020). Sometimes feelings of hopelessness come when we cannot see things clearly, and our outlook on life becomes temporarily skewed. This distorted thinking happens when disappointing and unexpected things happen, such as rejection, betrayal, trauma or loss, and we cannot make sense of those events (Widdison, 2018).

As uncertainty is inherent in science (because science is inherently uncertain), students are constantly confronted

with logical fallacies when discussing, thinking and dealing with their demands in daily life. Failure to recognise these fallacies will lead to misguided decision-making and a waste of human resources. It is important to educate students on how to deal with logical fallacies encountered in daily life in training courses and programmes in a planned and programmed manner because identifying logical fallacies is one of the critical thinking skills and is essential to being a scientifically literate and logical citizen (Saribas & Ertan, 2020).

As for radical thinking, the results showed that the arithmetic mean of the sample individuals reached 103 degrees, with a standard deviation of 3.17. When compared to the hypothetical mean of the test, which reached 80, it was found that the arithmetic mean was higher than the hypothetical mean of the radical thinking test, as the *t*-value reached 11.79, which is higher than the tabular *t*-value of 1.96, at a significance level of 5%, with a degree of freedom of 399.

In line with these findings, radical thinking is a characteristic of philosophical thinking that seeks to explore reality or ideas to their roots, to find their foundations as a whole and raise them to the surface to appear ideal (Djibran et al., 2022). Thus, a person's poor capacity for differentiation and criticism is a sign of radical thinking (Purser, 2018). People with a basic and innate skepticism should never assume that things are entirely true, proven, or so sacred that further research is necessary to alter their validity and sanctity. (Filz et al., 2021). Junot Díaz refers to radicalism as the desire to reach towards an unimaginable future, arguing that it may provide 'our best weapon against despair', even when despair seems justified (Fitzpatrick, 2019).

The concept of radical thinking has acquired a negative connotation in many security policies. However, it is worth noting that this construction is closely related to time and place, and the cultural and religious context in terms of its

use (Kuusisto et al., 2021). In recent years, the growth of radical thinking in higher education has been observed based on the results of surveys conducted by some countries. These studies attempt to provide recommendations so that radical thinking in higher education is not contagious (Waseso & Anggitiyas, 2021). The emergence of radical (extremist) ideas is very dangerous to life, so it needs to be supervised by universities. Radical extremist thinking makes society chaotic and indifferent, so it needs to return to understanding the process of consensus through critical thinking (Aulia & Nurussakinah, 2023).

Conclusion

Due to the city's past experiences and the devastation it endured (during ISIS's takeover of the city), people's perspectives in general and students' perspectives in particular as members of society were impacted. These biased and distorted ideas were gradually formed and entrenched, resulting in the formation of a twisted way of thinking that had an impact on the students' awareness and perception and as a result, the emergence of radical but extremely idealistic ideas that foresee comprehensive radical solutions that are almost magical and incompatible with the facts of society today. The findings of this research can be briefly stated as follows:

- The second-year students of the colleges of the University of Mosul have twisted and radical thinking patterns.
- There is a strong direct relationship between the twisted thinking pattern and the radical thinking one among university students.
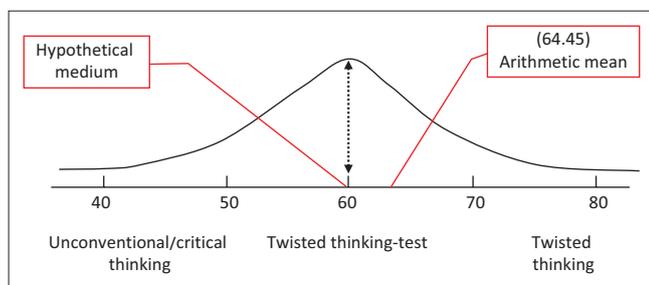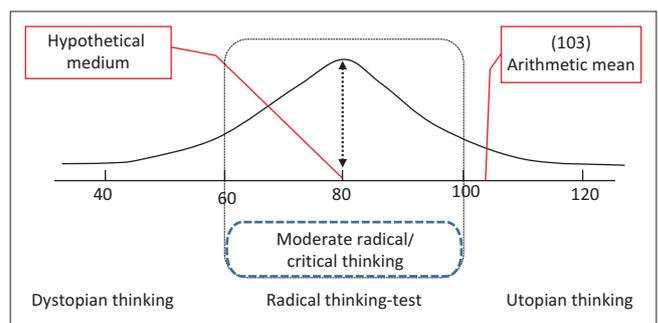
FIGURE 2: Location of the sample individuals' degrees on the normal distribution curve (*radical thinking-test*).

TABLE 4: The relationship between twisted thinking and radical thinking and the level of significance.

Significance at 0.05 level	T-value		Correlation coefficient value	Sample
	The tabulated one	The calculated one		
There is a significant relationship	1.96	14.82	0.78	400

FIGURE 1: Location of the sample individuals' degrees on the normal distribution curve (*twisted thinking-test*).

TABLE 3: The arithmetic and hypothetical means, standard deviation, calculated and tabulated *t*-value for the research sample (radical thinking).

No. of sample members	Arithmetic mean	Standard deviation	Hypothetical medium	T-value		Significance level
				The tabulated one	The calculated one	
400	103	3.17	80	1.96	11.79	Function

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