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The Critical Role of Critical Thinking in Education and Decision-making: Current Situation, Challenges and Prospects

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ABSTRACT: Critical thinking has incomparable advantages of traditional teaching thinking for cultivating innovative and applied medical talents. This paper summarizes the domestic and international critical thinking scales by using literature search and analysis, compares the assessment tools of entry-based, situational choice, open-ended, and mixed assessment methods, and clarifies the application of the domestic and international critical thinking scales. Critical thinking influencing factors were analyzed from the perspectives of demographic, clinical and other factors, which in turn provided reference for the localized development and application of the Critical Thinking Scale in China.

KEYWORDS: critical thinking; influencing factors; nursing education; measurement tools; nursing students

I. INTRODUCTION

In the early 1970s, the United States began the "non-formal logic and critical thinking movement" of thinking skills education reform, and gradually made the cultivation and improvement of students' critical thinking skills one of the goals of higher education. Critical thinking is not just a Western product but belongs to all existing cultures in the world. Critical thinking experts call for attention and research on how human critical thinking skills and dispositions may be manifested in different places and by people of different traditions and cultures. Both China and the West recognize the need for critical thinking and advocate the integration of learning and thinking. In China, in the context of the new medical science, critical thinking, as an important foundation of innovative thinking, plays an important role in cultivating students' scientific and technological innovation and cognitive ability, and has a close relationship with students' job-seeking and employment, as well as their academic achievements. At the same time, the research of critical thinking in China is later than abroad, and the foundation of research content, research methods, and measurement tools needs to be improved.

Nursing has adopted an evidence-based paradigm, creating a higher demand for critical thinking skills, leading to increased expertise and proficiency in nursing care (Kavanagh, 2021). Nursing education guidelines in China emphasize the importance of critical thinking as the basis for clinical decision-making and problem-solving in nursing. It is considered to be a sign of improving the overall quality of nursing talents in the 21st century(Huang et al., 2023). In fact, in the "Nursing Professional Higher Education Standards" revised by the American Association for Advanced Nursing Education in 1998, critical thinking was defined as one of the core competencies in nursing professional education. At the "China Nursing Discipline Development Conference" held in Beijing, China in November 2022, Professor Liu Depei, academician of the Chinese Academy of Engineering, emphasized that Chinese nursing education should enhance the cultivation of nurses' critical thinking ability to provide high-quality and efficient health services, so as to meet the needs of public health need. (Shirazi & Heidari, 2019) Nursing educators are encouraged to assess students' learning styles, preferences, and issues and to foster appropriate learning experiences that lead them to think critically.

Research on critical thinking scales for nursing students started late in China, and the evaluation tools used are relatively limited, with a few self-developed tools that are not mature enough and whose applicability needs to be verified. This paper examines and organizes the relevant literature on critical thinking tools, aiming to provide reference for the measurement and assessment of critical thinking skills in Chinese nursing education.

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1. The concept and characteristics of critical thinking

The idea of critical thinking originated from the Socratic dialogue, and the definition of critical thinking can be traced back to the reflective thinking proposed by Dewey (2022), that is, the emphasis on the systematic testing of hypotheses and the active, continuous, and meticulous thinking according to its supporting reasons and the further conclusions pointed to. Dewey, Ennis, Hitchcock and others have defined critical thinking (Ennis, 1964; Heard et al., 2020; Hitchcock, 2018). Ennis sees critical thinking as an ability that focuses on rational, reflective thinking in deciding what to believe or do. This definition has a profound influence on the subsequent development of critical thinking, but the description of inference is relatively simple, and it is difficult to comprehensively summarize the connotation of critical thinking. Later, English scholar Moseley et al. (2005) defined critical thinking from a philosophical perspective, which refers to the process of actively and skillfully explaining, using, analyzing, synthesizing, and evaluating the information that governs beliefs and behaviors. Chinese scholars represented by Luo Qingxu also hold the same view (MacNeill et al., 2020). This definition sees critical thinking as a process that emphasizes the importance of evaluation but lacks consideration of situations such as factors that contradict inferences.

At present, the widely adopted definition of critical thinking given by the Delphi Report of the American Philosophical Society comes from the consensus of many scholars in philosophy, psychology, education and so on Critical thinking, which consists of both critical thinking tendencies and critical thinking skills, refers to purposeful, self-regulating judgments that lead to interpretation, analysis, evaluation, inference, and an explanation of the evidence, concepts, methods, criteria, or situational considerations on which judgments are based. The definition of critical thinking in this report makes up for what Ennis, Richard Paul and others lack in their definitions.

Chinese scholars represented by Zhong Qiquan also hold the same view. He posited that critical thinking is a kind of higher-order thinking. Compared with non-critical thinkers, critical thinkers can put forward appropriate questions and detect the merits, rationality and adequacy of existing ideas in the process of exploration and argument. They are also able to make reasonable decisions based on existing judgments.

Hence, based on the literature, this study believes that critical thinking is a cognitive process that involves analyzing, evaluating, and synthesizing information and ideas to form well-reasoned judgments and make informed decisions. It is a way of thinking critically that involves questioning, scrutinizing, and evaluating presumptions, arguments, and supporting data rather than just taking information at face value.

Furthermore, according to Zeb et al., (2022), critical thinking has the following dimensions: Systematicity and analyticity, Inquisitiveness and conversance, Maturity and skepticism.

Using a combination of the spirit of inquiry and understanding the perspectives of others, nursing students can gain a more complete understanding of the patient's situation by listening and observing, gathering key information, and integrating it with nursing knowledge and practice guidelines. They can make sound, evidence-based care decisions and communicate and collaborate effectively with patients and healthcare teams. Through the application of this dimension, nursing students can provide high-quality, safe and reliable nursing services that truly care for the health and well-being of patients (Cortez et al., 2023).

The ability of nursing students to apply maturity and skepticism is particularly important when dealing with clinical cases. Maturity enables them to think independently, not be influenced by the views of others, and not readily accept superficial conclusions or conventional ideas (Liu et al., 2022). They actively question and review the patient's situation, constantly seeking insight to ensure that comprehensive and accurate care decisions are made. Skepticism causes nursing students to be cautious and skeptical about the information and evidence gathered. Instead of trusting medical information or the opinions of others, they will actively seek out more evidence and data, identify, analyze and debate to ensure that the care measures taken are based on reliable and valid evidence (Cheng et al., 2022).

Using both maturity and skepticism, nursing students are able to assess a patient's situation and needs more comprehensively, not only focusing on superficial symptoms but also gaining insight into the patient's background, psychological and social factors, etc. They take a number of factors and conduct systematic analysis and judgment into account to develop the best care

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plan and intervention (Cheng et al., 2022; Zeb et al., 2022).

2. Influencing Factors of Critical Thinking

According to the literature review, this study found that critical thinking ability is affected by many factors, such as gender, family situation, self-efficiency, degree of learning engagement, and external environment.

Li (2022) conducted a random sample survey of 1075 college students in China based on the California Critical Thinking Disposition Inventory (CCTDI), and the results showed that women's critical thinking disposition is slightly higher than that of men. However, combined with the 5E learning cycle (Engage, Explore, Explain, Elaborate, Evaluate) and local wisdom, Ramdani et al. (2021) analyzed students' critical thinking ability from a gender perspective and found that male students responded faster and had higher self-confidence when solving problems than female students. The results showed a statistical association between critical thinking and gender (Rahman, 2019).

In contrast, Marni et al.'s study (2020) created an assessment instrument for 285 (N=285) respondents, comprising 78 male and 207 female students, based on the critical thinking indicators of Facione et al.'s study (2000). According to first-year students' survey findings, there are no appreciable variations in students' critical thinking abilities based on knowledge groups or gender. Their research proposed a new paradigm that said critical thinking abilities were necessary for all pupils, independent of gender or science cluster. TThe same result was also shown in the quantitative study by Ng et al. (2022), which examined the effects of gender role orientation (masculinity and femininity temperament) on nursing behavior and critical thinking in student nurses. The study included 449 male and female nursing students (male = 139, female = 310). The students were measured using the Taiwan Critical Thinking Disposition Inventory (CTDI), the Care Evaluation Report Assessment Q Ranking Scale (CARE-Q), and the Behm Sex Role Inventory (BSRI). The data showed that students with higher levels of masculinity and caring had more critical thinking (ß = 0.24 and.37, respectively; p <.001). However, there was no significant correlation found between the critical thinking skills of students and their gender, age, femininity, or clinical practice experience (ß = -0.01, ß = 0.09, ß =.10, and ß = 0.01, respectively; p >0.05). Furthermore, students who expressed higher levels of femininity and masculinity also demonstrated more compassionate behavior (ß = 0.38 and ß = 22 respectively; p < 001). The caring behavior of students was not significantly correlated with their age, gender, or clinical practice experience (p > 0.05; ß = -0.05,.03, and.04, respectively). Al-BiRuNi's study from 2022 and Rajabalee et al.'s study from 2021 analyzed those data once again and concluded that gender disparities in critical thinking abilities are significant at high levels but not at intermediate or low levels.

Other studies have shown that the self-efficiency of nursing students affects their level of critical thinking. It may be due to the enhanced sense of identity and satisfaction of the profession in the study, internship and clinical nursing practice, and the positive and positive professional outlook obtained, and the individual recognizes the value of their existence (Nakano et al., 2021; Tong et al., 2023). Mousazadeh et al.'s (2021) research show that students with a high degree of satisfaction with this major have a relatively high level of critical thinking. It is also believed that it may be due to love and identification with the profession that they are more rational when encountering problems and tend to respond positively to solve problems.

Bangun and Pragholapati's study (2021) have shown that students who regard this major as a lifelong career have higher scores in terms of intellectual curiosity, self-confidence, and systematic dimensions of critical thinking. The findings of Gogus et al. (2019) also supported this view. They compared with students who regard this major as other jobs, students who regard it as a lifelong career have more enthusiasm for essential work and a stronger interest in learning and are more active in the face of choices, confusion, and doubts. attitude to solve problems, so as to participate in cognitive reasoning activities more actively.

More importantly, Siburian et al.'s study (2019) has shown that among Chinese college students, studies using a joint measurement of critical thinking scales and learning engagement show that learning engagement is positively correlated with critical thinking levels. To be more specific, Polat et al.'s research (2019) show that rational decision-making style is positively correlated with critical thinking and its dimensions. Avoidant decision-making style was negatively correlated with critical thinking and its dimensions.

Through reviewing the literature, critical thinking has been reported in the literature related

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to socio-demographics, one-child situation, family well-being and total family income, clubs and sports activities, age, institution, education level, motivation to study, and professional identity (Al-BiRuNi, 2022; Rajabalee et al., 2021). In the literature analysis, most of the studies explained the relationship between critical thinking and other influencing factors, but each study only mentioned a few of these aspects and lacked a comprehensive and systematic approach to critical thinking. However, most of the reported studies focused on the critical thinking of medical students and lacked systematic research on the aspects of critical thinking influencing factors of nursing students (Manuaba et al., 2022).

3. Development, application and influencing factors of the critical thinking scale

In this part, through literature review, we mainly discuss the scales successfully used by past researchers to measure critical thinking, such as the California Critical Thinking Disposition Inventor (CCTDI), Critical Thinking Disposition (CTD), Critical Thinking Disposition Instrument- Chinese Version (CTDI-CV), the Critical Thinking Assessment Test (CTA) scale, The California Critical Thinking Skills Test (CCTST) and Validation of Yoon's Critical Thinking Disposition Instrument (YCTD).

The California Critical Thinking Disposition Inventory (CCTDI) is a widely used instrument for assessing critical thinking abilities. The critical thinking theory established by the American Philosophical Association served as the foundation for the scale's development by University of California nursing researchers (Kuhn, 1999). College students as well as general populations are the subjects of the CCTDI, a measurement instrument intended to identify critical thinking emotions and attitudes. There are 75 items on the scale and 7 dimensions in all. Truth-seeking, open-mindedness, analysis, system, self-confidence, questioning, and maturity are the seven aspects. The CCTDI scale has strong validity, with a Cronbach's value of 0.90. It is extensively used worldwide and has been developed in several languages (Wahyudi et al., 2023; Wu et al., 2023) To assess students' academic performance and the relationship between learning outcomes and critical thinking, the CCTDI is frequently used in conjunction with the Health Science Reasoning Test (HSRT) and the California Critical Thinking Skills Scale (CCTST) (Serna, Zheng, & Hand, 2021). Identifying the ways in which a student's critical thinking abilities, critical thinking disposition, and personal qualities support their success and greatness throughout their first year of the Doctor of Pharmacy program In order to evaluate their critical thinking, disposition, and top five Signature Themes, three cohorts of student pharmacists were chosen and given the Health Sciences Reasoning Test, the California Critical Thinking Disposition Inventory (CCTDI), and the StrengthsFinder2.0 evaluation (Comer et al., 2019). The findings demonstrated that the Signature Themes of Achiever and Learner, as well as CCTDI Open-mindedness, were independent predictors of excellence. A few Signature Themes and age were unfavorable independent indicators of performance.

Ng et al. (2022) evaluated the critical thinking dispositions and cognitive skills of college students in an Asian setting using a cross-sectional correlation research including 209 Chinese community college students in the field of Chinese medical education. Utilized were the California Critical Thinking Skills Test (CCTST), the California Critical Thinking Disposition Inventory (CCTDI), and an academic and sociodemographic profile questionnaire for the students. The average critical thinking cognitive ability level, according to the results, was 17.82 ± 4.10, which was at the top end of the moderate range. The mean CCTDI score was 278.81 ± 22.61. Four subscales—open-mindedness, analyticalness, confidence in reasoning, and inquisitiveness—showed a good tendency toward critical thinking. The four important factors related with their critical thinking cognitive skills were found to be the critical thinking subject grade level, CCTDI truth-seeking, CCTDI analyticity, and HKDSE total score (i.e., university entrance test total score) based on regression analysis. The results have important ramifications for program design and curriculum reviews, as well as for adding components of critical thinking to a different course to help students build their critical thinking skills for sustainable growth. Studies, on the other hand, have also expressed opposing views.

The second measurement of critical thinking is the Critical Thinking Disposition (CTD) scale developed by Researchers from the American Nursing Administration Center (Profetto-McGrath et al., 2003), the purpose of which is to facilitate the management of American nursing institutions to measure the critical thinking level of nursing staff and evaluate whether nurses have the ability to be a critical thinker. The scale consists of 5

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dimensions and 25 items. The 5 dimensions are problem identification, clinical decision-making, priority, clinical application and reflection. The subjects of CTD are nurses, and the Collenbach coefficient is 0.97. As a critical thinking assessment tool developed by the American Nursing Professional Advisory Committee, it is often used to evaluate and test the effectiveness and labor achievements of nurses (Elsaied Ahmad El Bardeny et al., 2023).

The third tool was created by Korean researchers Liu et al. (2022) from their master's thesis. After testing and refinement, the scale was formalized as Yoon's Critical Thinking Disposition (YCTD). There are 27 elements on the scale and 5 dimensions in all. The five aspects include intellectual curiosity, intellectual fairness, objectivity, prudence, systematicness, healthy skepticism, and confidence in critical thinking. The inclination toward critical thinking gets stronger the higher the subject's score. Based on virtual standardized patient test findings, a cross-sectional study conducted in China employed YCTD to determine the degree of medical history gathering and the factors influencing it among nursing undergraduates. The study's findings demonstrated that employing the VSP as a technique for history-taking assessment can lead to a comparatively objective, standardized, and consistent evaluation of history-taking instruction. Liu et al. (2022) conducted a confirmatory study in which they surveyed 138 nursing students in South Korea, categorized as primary and advanced, to investigate the association between problem-solving, autonomous learning, and critical thinking among nursing students enrolled in online courses during the COVID-19 pandemic. Results revealed significant positive correlations among critical thinking, self-directed learning, and problem-solving. Furthermore, self-directed learning ($\beta = 0.78$, $p < 0.001$) had a significant mediating effect on the relationship between critical thinking and problem-solving ability ($Z = 5.10$, $p < 0.001$).

The fourth instrument is The California Critical Thinking Skills Test (CCTST) which be used as a common context to measure the critical thinking level of adults and college students (Jiang et al., 2022). The content of the scale tends to be neutral and is not restricted by subject, gender, profession and cultural background. The single-item selection method of the CCTST scale ensures the validity of the test at the structural and formal levels. The scale has a total of 5 dimensions and 34 multiple-choice questions. The 5 dimensions are elucidation, analysis, inference, evaluation, analysis and self-regulation. The Collenbach coefficient of CCTST is 0.87, which is widely used in the world (Teo et al., 2023). Hazaymeh and Alomery (2022) used the CCTST to measure nursing students' before and after scores on the concept mapping teaching method. Findings show that concept mapping, as a teaching activity, facilitates the development of critical thinking among nursing students. He conducted a systematic review on the impact of simulation teaching on clinical reasoning-related skills of nursing undergraduates, and concluded that the reflective writing level of nursing undergraduates was jointly measured by California Critical Thinking Disposition Inventory (CCTDI) and CCTST. The study found that reflective writing has a significant impact on critical thinking, very helpful.

Based on the California Critical Thinking Skills Test (CCTST) scale, the HSRT scale is suitable for measuring the critical thinking and clinical reasoning skills of health science students and related personnel was developed by (Meyer, 2023). Subjects select answers based on professional medical scenario descriptions. The scale has a total of 5 dimensions and 33 multiple-choice questions, and the 5 dimensions are analysis, reasoning, explanation, induction, and deduction. The Cronbach's coefficient of HSRT was 0.81, and the overall reliability coefficient was 0.81. HSRT is mostly used to measure the critical thinking level and clinical reasoning ability of researchers in the medical field and students majoring in health sciences.

Considering that some information may be lost in translation from different languages, this research has been trying to find the Chinese version of the scale with high reliability and validity in the literature reviewed. Luckily, Wang et al.'s team (2019) developed the Critical Thinking Disposition Instrument- Chinese Version (CTDI-CV) scale to evaluate the setting and teaching methods of Chinese nursing courses more objectively. The scale has a total of 7 dimensions and 70 items. The 7 dimensions are truth-seeking, open-mindedness, analytical ability, systematic ability, self-confidence in critical thinking, curiosity and cognitive maturity. The Cronbach's coefficient of the CTDI-CV scale was 0.90, and the internal consistency was high. (Wu et al., 2023) used this scale to measure the critical thinking level of 113 students from Yanshan University in China, to measure the cultivation of students' critical thinking in Chinese higher education and to test the learning effect. The score of critical thinking disposition inventory-Chinese version (CTDI-CV) and score of

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test were compared after teaching by t-test. The total CTDI-CV score of the experimental group was higher than that of the control group after teaching, and the score of truth seeking and analysis ability was also better than that of the control group [(284.89±35.73) vs. (264.13±27.12), (36.26±6.11) vs. (32.42±6.11), (44.42±5.99) vs (40.54±5.32), all P<0.05]. In addition, the total scores and case analysis scores of students in the experimental group were higher than those in the control group [(91.19±4.04) vs (88.14±3.46), (31.84±3.70) vs. (28.23±4.23), all P<0.05]. The results showed that Clinical reasoning teaching to medical students has a positive effect on the cultivation of students' critical thinking abilities. It can stimulate students' desire to find the truth and improve their ability to analyze and reason about clinical diseases. Other researchers like Chi et al. (2022), they used CTDI-CV to measure the critical thinking level of Chinese nursing students and found that extended case teaching promoted the development of critical thinking of nursing students.

4. Relationship between critical thinking and learning engagement

In the study of Rajabalee et al. (2021), the student feedback of 665 students was coded and analyzed from both quantitative and qualitative perspectives for learner experience perspective, student satisfaction, and student engagement The relationship between degree and critical thinking. The results showed that the associations between satisfaction and engagement, and between engagement and students' propensity to think critically, were significant and positively correlated. Also, in the process of exploring the learning model with scientific literacy, the team found a relationship between student participation and students' learning outcomes. There is a significant correlation between academic performance and thinking ability (Sutiani, 2021).

In terms of learning engagement behaviour, Huang (2021) found through investigation and research that learning participation behaviour is an intermediary variable for learning motivation to affect the development of critical thinking of college students (Huang, 2021). In terms of the cognition of learning engagement, Din & Creativity (2020) research confirmed that college students' deep learning methods are significantly positively correlated with critical thinking (Din & Creativity, 2020).

Jenßen et al., (2021) based on cognitive emotion theory, self-efficacy theory and the control-value theory of academic emotion, explored the development status and characteristics of critical thinking of high school students, as well as the role of academic emotion and academic self-efficacy in critical thinking. The chain mediation effect of thinking on academic achievement. He conducted a survey of 1169 high school students in a middle school in Jiangsu Province, China by using the California Critical Thinking Disposition Questionnaire, the Academic Emotion Scale, and the Academic Self-Efficacy Scale. The results show that high school students' academic emotions, learning engagement and academic self-efficacy play a two-way chain mediating role in the impact of critical thinking on academic achievement.

II. CONCLUSION

In this essay, it delve into the critical role of critical thinking in education and decision making. By examining the current situation, we recognize that critical thinking is not only a key tool for fostering the holistic development of students, but also an indispensable element in driving efficient decision-making. However, we also realize that there are some challenges in practice, such as adjustments in the education system and application challenges at the decision-making level. Of course, despite the challenges, we are confident about the future of critical thinking in education and decision-making. As society continues to evolve and change, critical thinking will continue to play a key role in providing insights for individuals and organizations to cope with complex problems. We therefore call on educational institutions, policymakers and business leaders to work together to build a learning and working environment that focuses on critical thinking to drive a smarter and more sustainable future.

REFERENCES

[1]. Al-BiRuNi, J. I. P. F. (2022). Gender analysis in measurement materials: Critical thinking ability and science processing skills. Jurnal Ilmiah Pendidikan Fisika Al-Biruni,11(1), 113-128.

[2]. Bangun, A. V., & Pragholapati, A. J. K. L. S. (2021). Enhancing critical thinking skills in nursing higher education in preparation for the industrial revolution 4.0. 793-804.

[3]. Cheng, M. W.et. (2022). A new theoretical model through which to examine student residence life outcomes. In Evolving Landscape of Residential Education: Enhancing Students' Learning in University Residential Halls (pp. 15-23). Springer.
[4]. Comer, R. D., Schweiger, T. A., & Shelton, P. J. A. J. o. P. E. (2019). Impact of students' strengths, critical thinking skills and disposition on academic success in the first year of a PharmD program. 83(1).
[5]. Cortez, C. P., Osenar-Rosqueta, A. M. F., & Prudente, M. S. J. I. J. o. E. R. (2023). Cooperative-flipped classroom under online modality: Enhancing students' mathematics achievement and critical thinking attitude. 120, 102213.
[6]. Dewey, J. (2022). How we think.
[7]. Din, M. J. T. S., & Creativity. (2020). Evaluating university students' critical thinking ability as reflected in their critical reading skill: A study at bachelor level in Pakistan. 35, 100627.
[8]. GOGUS, A., Göğüş, N. G., & BAHADIR, E. J. P. Ü. E. F. D. (2019). Intersections between critical thinking skills and reflective thinking skills toward problem solving. 49, 1-19.
[9]. Heard, J., Scoular, C., Duckworth, D., Ramalingam, D., & Teo, I. (2020). Critical thinking: Skill development framework.
[10]. Huang, Y. M., Silitonga, L. M., & Wu, T. T. (2022). Applying a business simulation game in a flipped classroom to enhance engagement, learning achievement, and higher-order thinking skills. Computers & Education, 183, 104494.
[11]. Jenßen, L., Gierlinger, F., & Eilerts, K. J. J. o. D. L. i. T. E. (2021). Pre-service teachers' enjoyment and ICT teaching self-efficacy in mathematics–an application of control-value theory. 37(3), 183-195.
[12]. Kavanagh, J. M. J. O. J. o. I. i. N. (2021). Crisis in Competency: A Defining Moment in Nursing Education. 26(1).
[13]. Kuhn, D. J. E. r. (1999). A developmental model of critical thinking. 28(2), 16-46.
[14]. Li, N. J. T. A.-P. E. R. (2022). Reasonable or unwarranted? Benevolent gender prejudice in education in China. 31(2), 155-163.
[15]. Liu, Y., Pásztor, A. J. T. S., & Creativity. (2022). Effects of problem-based learning instructional intervention on critical thinking in higher education: A meta-analysis. 45, 101069.
[16]. MacNeill, L. A., Pérez-Edgar, K. J. T. e. o. c., & development, a. (2020). Temperament and emotion. 1-12.
[17]. Meyer, H. M. J. J. o. P. N. (2023). Understanding emotional intelligence and its relationship to clinical reasoning in senior nursing students: A mixed methods study. 46, 187-196.
[18]. Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J., & Newton, D. P. (2005). Frameworks for thinking: a handbook for teaching and learning. Cambridge University Press.
[19]. Mousazadeh, N., Momennasab, M., Sharif Nia, H., Nazari, R., & Hajihosseini, F. J. E. R. I. (2021). Effective factors in critical thinking disposition in nursing students. 2021, 1-6.
[20]. Nakano, T. d. C., Oliveira, K. d. S., & Zaia, P. J. P. T. e. P. (2021). Gender differences in creativity: A systematic literature review. 37, e372116.
[21]. Ng, S.-Y., Cheung, K., & Cheng, H.-L. J. S. (2022). Critical thinking cognitive skills and their associated factors in Chinese community college students in Hong Kong. 14(3), 1127.
[22]. Polat, Ş., Kutlu, L., Ay, F., Purİsa, S., & Erkan, H. A. J. J. J. o. N. S. (2019). Decision- making styles, anxiety levels, and critical thinking levels of nurses. 16(3), 309-321.
[23]. Rahman, M. M. J. R., MM . 21st Century Skill "Problem Solving": Defining the Concept. Asian Journal of Interdisciplinary Research. (2019). 21st century skill'problem solving': Defining the concept. 2(1), 64-74.
[24]. Rajabalee, Y. B., Santally, M. I. J. E., & Technologies, I. (2021). Learner satisfaction, engagement and performances in an online module: Implications for institutional e-learning policy. 26(3), 2623-2656.
[25]. Rajabalee, Y. B., Santally, M. I. J. E., & Technologies, I. (2021). Learner satisfaction, engagement and performances in an online module: Implications for institutional e-learning policy. 26(3), 2623-2656.
[26]. Ramdani, A., Jufri, A., Gunawan, G., Fahrurrozi, M., & Yustiqvar, M. J. J. P. I. I. (2021). Analysis of Students' Critical Thinking Skills in terms of Gender Using Science Teaching Materials Based on The

5E Learning Cycle Integrated with Local Wisdom. 10(2), 187-199.
[27]. Serrano, M. Á., Molins, F., & Alacreu-Crespo, A. (2022). Human Decision-Making Evaluation: From Classical Methods to Neurocomputational Models. In Algorithms and Computational Techniques Applied to Industry (pp. 163-181). Springer.
[28]. Shirazi, F., & Heidari, S. J. T. j. o. n. r. (2019). The relationship between critical thinking skills and learning styles and academic achievement of nursing students. 27(4), e38.
[29]. Siburian, J., Corebima, A. D., & Saptasari, M. J. E. J. o. E. R. (2019). The correlation between critical and creative thinking skills on cognitive learning results. 19(81), 99-114.
[30]. Wang, X., Sun, X., Huang, T., He, R., Hao, W., & Zhang, L. J. B. M. E. (2019). Development and validation of the critical thinking disposition inventory for Chinese medical college students (CTDI-M). 19(1), 1-14.
[31]. Wu, H.-L., Lu, D.-F., & Tsay, P.-K. J. T. J. o. C. E. i. N. (2023). Critical Thinking Disposition and Influencing Factors Among New Graduate Nurses. 54(5), 233-240.
[32]. Zeb, M. A., Mahboob, U., & Shaheen, N. J. P. j. o. m. s. (2022). Effect of team-based learning on critical thinking: A quasi-experimental study. 38(8), 2234.