# Relationship between Cognitive Holding Power and Students' Engagement at Faculty of Nursing Suez Canal University

## Esraa Mohammed Soltan<sup>1</sup>, Nadia Mohamed El-Sayed Ghonem<sup>2</sup> & Alaa Mohamed Salah El-Demerdash<sup>3</sup>

<sup>1</sup> Lecturer of Nursing Administration, Faculty of Nursing, Suez Canal University, Ismailia, Egypt.

<sup>2</sup> Professor of Nursing Administration, Faculty of Nursing, Suez Canal University, Ismailia, Egypt.

<sup>3.</sup> Lecturer of Nursing Administration, Faculty of Nursing, Suez Canal University, Ismailia, Egypt.

## Abstract:

Background: Cognitive Holding Power (CHP) and students' engagement are two important constructs influencing nursing students' learning outcomes. Therefore, understanding the relationship between these constructs is important for developing effective educational strategies. Objectives: To study the relationship between CHP and students' engagement at the Faculty of Nursing in Suez Canal University. Design: The study followed a descriptive correlational design. Setting: The study was conducted at the Faculty of Nursing in Suez Canal University, which is located in Ismailia. Participants: Three hundred thirty nursing students participated in the study. Methods: Data were collected using the CHP questionnaire, which measures first-order CHP using thirteen items and second-order CHP using seventeen items, in addition to the Utrecht Work Engagement Scale for students using nine items. **Results:** The first-order CHP scored 46.77  $\pm$  9.48, while the second-order CHP scored 69.06  $\pm$  9.96. The overall engagement scored 3.66  $\pm$  1.24, with dedication scoring the highest mean (3.84  $\pm$  1.38) and absorption scoring the lowest mean (3.37±1.28). A weak positive correlation was found between first-order CHP and engagement (r = 0.243, p = 0.001). In contrast, a moderate positive correlation was found between second-order CHP and engagement (r = 0.426, p = 0.001). Conclusion: There was a significant relationship between the overall CHP and engagement among nursing students. Second-order CHP, which involves higher-order thinking skills, correlates more strongly with engagement than first-order CHP. Recommendations: Adopting educational strategies that balance both types of cognitive tasks and emphasizing activities that promote more profound engagement needs to be encouraged.

## Keywords: Cognitive Holding Power, Educational Strategies, Nursing Education, Problem-Based Learning & Students' Engagement.

## Introduction:

Higher education is the pinnacle of the nursing education system, playing a crucial role in the academic development of nursing students. In this respect, providing high-quality education to nursing students and developing competent nurses are important so that they can deliver safe and highquality care in the future; these are two of the main tasks of nursing education systems. So, many academic institutions adopt several non-traditional educational strategies that motivate independent search, assimilate, learn knowledge, and actively engage nursing students in clinical and academic learning activities. Therefore, exploring factors and variables that positively or negatively affect nursing students' academic performance is necessary (Dube; Mlotshwa, 2018; Ghasemi et al., 2020; Institute of Medicine, 2011).

Non-traditional and interactive educational strategies are more likely to enhance both Cognitive Holding Power (CHP) and students' engagement by considering and improving contexts, surroundings, and instructional techniques (Ahmed & Indurkhya, 2020). CHP is how the environment drives learners to use various cognitive operations to complete the tasks. It also represents a set of characteristics of the learning environments that encourage learners to use specific procedural knowledge levels (Stevenson; Evans, 1994, Stevenson, 1998 & Ahmed; Indurkhya, 2020).

Additionally, there are two types of CHP: first-order and second-order. First-order CHP refers to educational environments where students rely primarily on basic, routine cognitive processes. In such settings, students work on activities that require limited integration or modification of prior knowledge. Their role is primarily passive, focusing on the reproduction or interpretation of declarative knowledge, whereas the teacher is responsible for higher-order thinking. Students may be ignorant of the cognitive techniques used during instruction and are not expected to manage or apply them independently (Stevenson; Evans, 1994 & Ahmed, Indurkhya, 2020). Typical first-order tasks include copying from the teacher, following explicitly demonstrated methods, carrying out directions, and depending on the teacher's knowledge, thoughts, and judgments. While these activities can help acquire basic abilities, they do not promote the development of higher-level, second-order cognitive processes (Stevenson, Evans, 1994 & Alzubi et al., 2022).

Second-order CHP, conversely, describes learning situations in which students must deal with unexpected challenges while applying conceptual understanding and complicated reasoning skills. These contexts require students to analyze situations, make goals, and use second-order techniques like problem-solving, critical thinking, and metacognitive monitoring. Students are encouraged to select, organize, combine, adapt, and evaluate methods rather than just repeating them (Stevenson; Evans, 1994 & Ahmed; Indurkhya, 2020).

Second-order tasks include connecting to prior information, developing and testing solutions, measuring efficacy, and reflecting on outcomes. These environments actively encourage the development and use of second-order thinking skills, allowing students to take control of their cognitive processes and become more self-sufficient and adaptable problem solvers (Stevenson; Evans, 1994 & Alzubi et al., 2022).

In addition to what educational institutions undertake to foster student participation, **Janosz** (2012) defines students' engagement as their physical and cognitive investment in the energy of the learning process. This concept also refers to the amount of effort learners spend on particular learning activities, including going to class, doing hands-on work, interacting with teachers or other students to get the desired results, and studying (**Groccia, 2018**).

engagement has three dimensions: Students' emotional, behavioral, and cognitive. Emotional engagement entails learners' affective communication and their practices on campus. Behavioral engagement, on the other hand, encompasses effort, dedication, attention, questioning, and classroom communication. Subsequently, cognitive engagement is psychological involvement in learning. comprehending, and mastering knowledge and abilities (Information Resources Management Association, 2021).

Students' engagement in their educational environments is crucial in advancing their learning outcomes in higher education systems (Li & Xue, 2023). According to the Organization for Economic Cooperation and Development's (2024) report, students must be enthusiastic, motivated, eager to learn new things, and believe they can succeed; otherwise, they cannot transfer their raw potential into high-level abilities.

However, students' engagement is a key factor in understanding students' behavior during the teachinglearning process, which may reveal how well educational approaches work. Nursing educators could use it as a powerful tool to develop instructional strategies that optimize their students' learning experiences (**Delfino**, 2019).

## Significance of the study:

There has been no previous research on CHP among nursing students; therefore, there is a gap in our understanding of its relationship to students' engagement. Literature from various disciplines suggests that the CHP encourages learners to participate in diverse learning activities (Ahmed & Indurkhya, 2020). As such, CHP and students' engagement could affect students' ability to achieve the desired educational outcomes within the interactive Problem-Based Learning (PBL) system. So, it is important to study the relationship between students' CHP and their engagement at the Faculty of Nursing Suez Canal University, which adopts PBL as a principal educational strategy.

This research aims to study the relationship between CHP and students' engagement at the Faculty of Nursing in Suez Canal University.

## **Objectives:**

- 1. Assess CHP among students at Faculty of Nursing in Suez Canal University.
- 2. Assess students' engagement at Faculty of Nursing in Suez Canal University.
- 3. Explore the relationship between CHP and students' engagement at Faculty of Nursing in Suez Canal University.

### **Research question:**

Is there a relationship between CHP and students' engagement at Faculty of Nursing in Suez Canal University?

## Methods

### **Research Design:**

The current study adopted a descriptive correlational design.

### Study setting:

The study was conducted at the Faculty of Nursing, Suez Canal University, which is located in Ismailia. It consisted of two buildings: an educational building and an administrative building. In 2006, it came into existence. On 19/7/2017, it received its first accreditation; on 21/6/2023, it received a second one. **Target population:** 

All students from each of the four academic years during the second term of the 2023/2024 academic year, totaling 2315 students.

## Sampling technique:

A simple random sampling technique was used in this study.

## Sample size:

The sample size was determined using **Thompson's** (2012) formula.



= 329.6 = 330

n = sample size = 329.6 = 330

N = population size = 2315

d = the error rate is 0.05

z = the standard score corresponding to the significance level is 0.95 and is equal to 1.96. p = availability of property and neutral = 0.50.

### Instruments

The first tool: It consists of two parts:

# Part one is the sociodemographic characteristics of students:

It includes questions regarding students' age, academic years, and gender.

#### Part two is a CHP questionnaire:

It was created by **Stevenson & Evans**, (1994) and contains 30 items. Thirteen items make up the first-order CHP, which measures the propensity of students to complete tasks according to teacher instructions. These items are (5, 6, 8, 9, 16, 17, 18, 20, 23, 24, 26, 28, 30). The second-order CHP was assessed using the other seventeen questions centered on students' propensity to learn concerning their accountability for thinking and learning tasks. These items are (1, 2, 3, 4, 7, 10, 11, 12, 13, 14, 15, 19, 21, 22, 25, 27, 29) (Stevenson; Evans, 1994 & Stevenson, 1998).

### Scoring system:

The questionnaire used a Likert scale with five points, assigning values as follows: "always = 5, often = 4, sometimes = 3, rarely = 2, and never = 1." The minimum score for first-order CHP was 13, and the maximum score was 65. Second-order CHP's minimum and maximum scores were 17 and 85, respectively (Stevenson; Evans, 1994 & Stevenson, 1998).

# The second tool: Utrecht Work Engagement Scale for Students (UWES-S):

The UWES–S was created by **Schaufeli et al., (2006)** to evaluate students' engagement. It is a nine-item self–report scale divided into three dimensions, each of which has three items: (Items 1–3: vigor; Items 4–6: dedication; Items 7–9: absorption). The researchers translated it into Arabic based on existing literature.

#### Scoring system:

The scoring is based on a Likert scale with seven points, with "always = 6, very often = 5, often = 4, sometimes = 3, rarely = 2, almost = 1, and never = 0" (Schaufeli et al., 2006). The tool provides three halfscores and one overall score. To calculate the partial scores, the items corresponding to each subscale are grouped and divided by the number of items in the subscale. The overall score ranges between 0 and 6 points. Higher scores suggest increased students' engagement (Domínguez-Salas et al., 2022).

## Tools' validity and reliability

The original CHP questionnaire is a valid and reliable instrument (Stevenson; Evans, 1994). Al-Khafaji; Abas (2018) translated it into Arabic. It had a construct validity, and its reliability coefficient ( $\alpha$ ) was 0.88 for the Arabic environment (Al-Khafaji & Abas, 2018).

Confirmatory factor analysis showed that the original version of UWES-S is valid, and the three scale scores were consistent and reliable over time (Schaufeli et al., 2006) & Fong; Ho, (2015) found that the total score of UWES-S is very reliable, with an average Cronbach's  $\alpha$  of 0.92. Fong; Ho, (2015) found that the UWES-S total score has high reliability (average Cronbach's  $\alpha = 0.92$ ). The total reliability coefficients (Cronbach's Alpha) for the CHP questionnaire and UWES-S in this study were 0.93 and 0.88, respectively.

## **Pilot study:**

Before data collection, a pilot study was conducted with 33 students (10 %) from the target population. It was carried out to test the tools' clarity, applicability, and feasibility and identify the obstacles and problems that may be encountered. Its purpose was to estimate the time required for data collection.

### **Fieldwork:**

The researchers reviewed the related literature about the various aspects of the research problem. The researchers invited the students to a Telegram group. The researchers provided a brief explanation of the study and its aim. The researchers sent the links to the electronic informed consent and the questionnaires to the students; also, the researchers were in contact with them to clarify any ambiguous issues. The researchers then collected data from participants online using Google Forms for one month. We obtained official permission for data collection from the faculty administration to conduct the study in the selected setting.

### **Ethical Considerations:**

The study proposal was approved by the Research Ethics Committee at the Faculty of Nursing, Suez

Canal University (Code 256\*2/2024). Before starting

the study, students gave their electronic written informed consent, and the researchers took ethical considerations about data confidentiality into account. The researchers informed the participants that they would only use the questionnaire responses for research purposes. Furthermore, their responses were not shared with anyone outside the study team. The current study also utilized ethical and legal concepts to ensure fairness and autonomy for its participants. Furthermore, participants in this study were free to leave at any time.

## **Data Analysis:**

The data collected were coded and converted into coding sheets. Then, statistical analysis was performed using the SPSS package version 22. The Kolmogorov-Smirnov test was used to verify normality at the 0.05 level. Significant variables at P < 0.001 indicated nonparametric data. Descriptive statistics such as mean score, standard deviation, and frequency distribution were used to characterize various features of variables. The correlation between the variables was measured using the Spearman correlation test. P-values < 0.05 indicate statistical significance.

### **Results:**

able (1). Demographic characteristics of the studied sample (n = 550)									
Age		Standard deviation		Minimum			-		
Mean							Maximum		Median
20.33		1.45			17		23		20
Academic	year								
First-year		Second-year			Third-year			Fourth-year	
Number	Percentage	Number	Percentage		Number	Percentage		Number	Percentage
89	27	97	29.4		77	23.3		67	20.3
Gender									
Male Female									
Number	Number Percentage				Number			Percentage	
152 46.1				178			53.9		

Table (1): Demographic characteristics of the studied sample (n = 330)

## Table (2): Descriptive statistics of CHP among nursing students (n = 330)

	Items	Mean	Standard deviation
1.	I let the teacher tell me what to do.	4.13	0.8
2.	I feel I have to copy what the teacher does	2.99	1.25
3.	I get all my information from the teacher	3.38	1.08
4.	The teacher encourages students to copy what he (she) does.	3.52	1.21
5.	The teacher encourages students to do what they are told.	3.85	1.02
6.	I feel I have to work exactly as I am shown.	3.74	1.16
7.	I rely on the teacher to show me the links between things.	3.66	1.08
8.	I copy what the teacher does	3.03	1.27
9.	I accept my results without question.	3.35	1.18
10.	I do things my way.	3.93	0.99
11.	The teacher encourages students to do their own work exactly as they are shown.	3.96	0.95
12.	I rely on the teacher for new ideas	3.28	1.15
13.	I work exactly as I am shown.	3.95	1.05
First	- order CHP mean score + SD	46.77	9.48
1.	I ask questions to check my results.	4.00	0.91
2.	I feel I have to try out new ideas.	4.29	0.87
3.	The teacher encourages students to find links between the things they learn	3.77	0.07
4.	I feel I have to find out information for myself.	4.16	0.82
5.	I check my results against things I know.	4.38	0.62
6.	I feel I have to ask questions to check my results.	3.8	1.09
7.	The teacher encourages students to try out new ideas	3.88	1.03
8.	I feel I have to check my results against things I know.	4.15	0.85
9.	I find links between the things I learn.	4.12	0.87
10.	I do what I want to do.	4.13	0.66
11.	The teacher encourages students to find out things for themselves.	3.86	1.05
12.	I try out new ideas	4.22	0.60

Soltan et al.,

	Items	Mean	Standard deviation
13.	The teacher encourages students to ask questions to check their results.	3.90	0.97
14.	I feel I have to find links between the things I learn.	4.11	0.81
15.	I feel I have to do what the teacher tells me	4.25	0.75
16.	I find information out for myself.	4.22	0.78
17.	The teacher encourages students to check their results against things they know.	3.80	1.03
Seco	nd-order CHP mean score + SD	69.06	9.96

Table	(3):	Descriptive	statistics	of nursing	students'	engagement	(n = 33)	30)
	(-)-			01 II 01 01 0			(	,

	Items	Mean	Standard deviation
1.	When I study, I feel mentally strong	4.10	1.77
2.	When I study, I feel like I am bursting with energy.	3.58	1.75
3.	I am inspired by my studies.	4.82	1.18
Vigor		3.76	1.57
4.	When I study, I feel strong and vigorous.	3.59	1.03
5.	I find my studies to be full of meaning and purpose.	4.82	1.18
6.	6. When I am studying, I forget everything around me.		1.81
Dedication		3.84	1.38
7.	I am enthusiastic about my studies.	3.47	1.78
8.	I am happy when I'm studying intensively.	3.30	1.94
9.	I can get carried away by my studies.	3.42	1.87
Ab	sorption	3.37	1.28
То	tal students' engagement	3.66	1.24

# Table (4): Correlation between first-and second-orders CHP and total students' engagement and its dimensions (n = 330)

	First-o	rder CHP	Second-order CHP		
	r	P value	r	P value	
Vigor	0.182	0.001**	0.373	0.001**	
Dedication	0.235	0.001**	0.409	0.001**	
Absorption	0.244	0.001**	0.358	0.001**	
Total students' engagement	0.243	0.001*	0.426	0.001*	
Absorption Total students' engagement	0.244 0.243	0.001** 0.001*	0.358 0.426	0.001**	

Spearman's test p value < 0.05

**Table (1):** Indicates that the age of the study group ranged between 17 and 23 years old. The mean score of their age was  $20.33 \pm 1.45$ . The second-year students represented the greatest percentage of the sample (29.4 %), while the fourth-year students represented the lowest percentage (20.3 %). The female percentage exceeds half the sample (53.9 %).

Table (2): Shows that the total mean score for first-order CHP is  $46.77 \pm 9.48$ . Additionally, the total mean score for second-order CHP is  $69.06 \pm 9.96$ .

**Table (3):** Shows that the total mean score of engagement is  $3.66 \pm 1.24$ . Furthermore, the dedication score is the highest mean score ( $3.84 \pm 1.38$ ), while the absorption score is the lowest mean score ( $3.37 \pm 1.28$ ).

**Table (4):** Shows a weak positive correlation between first-order CHP and the three dimensions of engagement (vigor, dedication, absorption). P = 0.001 for the three dimensions and r = 0.182, 0.235, 0.244 respectively. There is a moderate positive correlation

between second-order CHP and the three dimensions of engagement (vigor, dedication, absorption). P = 0.001 for the three dimensions and r = 0. 373, 0.409, 0.358 respectively. Also, there is a weak positive significant correlation between first-order CHP and students' engagement (r = 0.243, P value = 0.001) and a moderate positive significant correlation between second-order CHP and students' engagement (r = 0.426, P value = 0.001).

## **Discussion:**

Regarding CHP among students in this study, the total mean score for first-order CHP among nursing students was  $46.77 \pm 9.48$ . The current study reveals a higher mean score for first-order CHP than **Ahmed & Indurkhya's (2020)** pre-test findings, which reported a mean score of  $29.00 \pm 7.68$ . Additionally, the current study finding is higher than the findings of **Abdelsamea et al. (2014)**, who reported a mean score of  $39.53 \pm 6.45$ . The higher average score for first-

order CHP in this study suggests that the teaching methods at Suez Canal University's Faculty of Nursing are working well. However, there is room for improvement to enhance first-order cognitive skills even more.

Furthermore, the total mean score of second-order CHP was  $69.06 \pm 9.96$ . The current study shows a higher mean score for second-order CHP compared to the pre-test findings of Ahmed & Indurkhya (2020), who reported a mean score of  $36.36 \pm 10.68$ . Also, the current finding is greater than the findings of Abdelsamea et al., (2014), who reported a mean score of  $53.76 \pm 10.35$ . The higher mean score for second-order CHP observed in the current study can be attributed to two factors, including firstly, the adoption of the PBL strategy. According to Chen et al., (2024), Arviani et al., (2023), & Gönc et al., (2017), PBL improves theoretical knowledge, practical skills, and self-directed learning-all of which are essential elements of second-order CHP. Second, the variety of courses and their cognitive requirements may lead to student experiences (Azouz & Al-Harbi, 2024).

Overall, the current study student had high scores in both first- and second-order CHP, indicating the student's academic flexibility, allowing them to adapt to the educational situation (learning environment) they are in (**Al-Khafaji & Abas, 2018**).

Concerning students' engagement, the current study revealed an overall mean score of  $3.66 \pm 1.24$ , indicating a moderate level of engagement among nursing students. This result agrees with **Rodríguez-González et al. (2023)**, who reported that the total score of students' engagement was  $3.37 \pm 0.90$ , indicating an average level. The moderate level of students' engagement in the present study highlights the importance of taking the needed measures to improve nursing students' engagement. In this regard, **Wang et al. (2023)** indicated that students' engagement is associated with increased levels of academic retention and success. Therefore, it is necessary to maintain positive engagement.

Regarding engagement subscales, the current study indicated that dedication achieved the highest mean score of  $3.84 \pm 1.38$ , whereas absorption scored the lowest mean of  $3.37 \pm 1.28$ . This result agrees with **Rodríguez-González et al. (2023)**, who reported that the dedication subscale scored the highest mean score of  $4.37 \pm 5.20$ , whereas the absorption subscale recorded the lowest mean score of  $2.84 \pm 3.50$ .

The adopted PBL strategy contributed to the higher dedication scores of nursing students in the current study. In this regard, **Amerstorfer & Freiin von Münster-Kistner (2021)** suggested that the PBL approach increased most students' dedication, mainly due to the rotating roles that students play in it. Conversely, a lower score for students' absorptionthat refers to a learner's ability to be completely attentive and engrossed in their work (Schaufeli & Bakker, 2003)-requires taking the needed measures to enhance it, like using adaptive learning tools that personalize learning and provide each student with what he or she needs according to their level of knowledge (Contrino et al., 2024).

Consequently, all engagement subscales in the current study needed improvement. Overall, it is critical to recognize that students' engagement levels are influenced by various interconnected factors that must be considered, including educational institution characteristics, learning technology, teaching methods, student motivation, mental attention, participation in extracurricular activities, selfdirectedness in learning, and students' feelings of satisfaction (**Heydari et al., 2015; Ghasemi et al., 2018**).

Regarding the correlation between first-order CHP and students' engagement, this study displayed a weak positive significant correlation between firstorder CHP and students' engagement. First-order CHP encompasses surface cognitive activities that require minimal student processing and involvement. This weak positive correlation indicates that while these activities exert some influence on students' engagement, they are insufficient to enhance it significantly. In this regard, Cristea et al. (2025) clarified that surface learning activities mainly focus on meeting course requirements with minimal students' engagement. Furthermore, Floyd et al., (2009) concluded that surface learning activities had no significant link with engagement, which agrees with the idea that a surface approach to learning is a survival method in which the student merely attempts to pass courses with low effort.

Concerning the correlation between second-order CHP and students' engagement, this study's results displayed a moderate, positive, significant correlation second-order between CHP and students' engagement. This stronger correlation suggests that tasks requiring more profound cognitive engagement, characteristic of second-order CHP, have a more substantial impact on students' engagement. Secondorder CHP necessitates more complex cognitive processes like critical thinking and problem-solving. The moderate positive correlation observed in the study indicates that students are more engaged when involved in activities that challenge their thinking at a deeper level. This finding aligns with several studies indicating that engagement is associated with deep learning (Ebrahim; Van Wyk, 2024 & Mattanah et al., 2024).

Overall, the strong positive connections between firstorder and second-order CHP and various parts of students' engagement back up earlier studies showing that better thinking strategies can boost students' participation. For instance, a study by **Alzubi et al.** (2022) found that systemic intelligence, encompassing perceptual, cognitive, social, and behavioral facets, significantly predicts CHP among university students. This finding underscores the importance of fostering environments that promote complex cognitive engagement.

Furthermore, research indicates that instructional approaches like the flipped classroom can enhance CHP. **Ahmed & Indurkhya (2020)** demonstrated that flipped classroom settings improved students' first-order CHP by providing flexible learning environments that encourage active participation. While their study primarily noted improvements in first-order CHP, the potential for such environments to also foster second-order CHP warrants further exploration.

The differences in the relationship between first- and second-order CHPs generally indicate the importance of basic tasks. However, we must combine them with more challenging activities to maintain students' engagement. This combination of approaches can help balance maintaining essential understanding and encouraging higher-order thinking skills necessary for deep learning.

### Limitations of the study:

The study's limitations include its descriptive correlational methodology, which establishes relationships but cannot show causality between CHP and students' engagement. Also, data were collected during a single academic term. Variations in engagement across the semester (e.g., during exams or clinical rotations) were not assessed.

## **Conclusion:**

The findings of this study showed high levels of both first-order and second-order CHP among nursing students. Furthermore, the overall engagement level among students is moderate. Furthermore, there is a weak positive correlation between first-order CHP and engagement and a moderate positive correlation between second-order CHP and engagement.

## **Recommendations:**

Based on the findings of this study, it is recommended to

• Develop and implement teaching strategies that enhance both first-order and second-order CHP, with particular emphasis on second-order CHP due to its stronger correlation with students' engagement.

- Strengthen the PBL approach and incorporate additional interactive and student-centered learning methods, particularly those that enhance student absorption levels.
- Implement adaptive learning tools and varied teaching methods for personalizing the learning experience and maintaining student interest.
- Monitor and assess students' engagement levels regularly, provide opportunities for self-directed learning, and create situations that allow students to connect theoretical knowledge with practical applications.

## **References:**

- Abdelsamea, M., Eldardeer, A., Eldowy, M. & Verma, S. (2014): Exploring the relationships among metalearning, cognitive holding power and English writing skills of pre-service teachers in Egypt. International Journal of English Language & Translation Studies, 2(2), 46-58.
- Ahmed, M. & Indurkhya, B. (2020): Investigating cognitive holding power and equity in the flipped classroom. Heliyon, 6(8), e04672. https://doi.org/10.1016/j.heliyon.2020.e04672
- Al-Khafaji, Z. & Abas, A.K. (2018): Cognitive Holding Power among University students. Journal of Basra Researches for Human Sciences, 43(3-C), 96-116.
- Alzubi, E., Attiat, M. & Al-Adamat, O. (2022): Systemic intelligence predictors of cognitive flexibility and cognitive holding power among university students. Cypriot Journal of Educational Sciences. https://doi.org/10.18844/cjes.v17i2.6835
- Amerstorfer, C. & Freiin von Münster-Kistner, C. (2021): Student perceptions of academic engagement and student-teacher relationships in problem-based learning. Frontiers in psychology, 12, 713057.

https://doi.org/10.3389/fpsyg.2021.713057

Arviani, F., Wahyudin, D. & Dewi, L. (2023): The Effectiveness of Problem Based Learning Model in Improving Students' Higher Order Thinking Skills. JPI (Jurnal Pendidikan Indonesia), 12(4), 627-635.

https://doi.org/10.23887/jpiundiksha.v12i4.65606

- Azouz, A. & Al-Harbi, N. (2024): Successful Intelligence and its Relationship to the Cognitive Holding Power among Umm Al-Qura University Female Students. Journal of Educational and Psychological Sciences, 8(10), 101-122. https://doi.org/10.26389/AJSRP.A190424
- Chen, T., Zhao, Y., Huang, F., Liu, Q., Li, Y., Alolga, R. & Ma, G. (2024): The effect of problem-based learning on improving problemsolving, self-directed learning, and critical

thinking ability for the pharmacy students: A randomized controlled trial and meta-analysis. PloS one, 19(12), e0314017. https://doi.org/10.1371/journal.pone.0314017

- Contrino, M., Reyes-Millán, M., Vázquez-Villegas, P. & Membrillo-Hernández, J. (2024): Using an adaptive learning tool to improve student performance and satisfaction in online and faceto-face education for a more personalized approach. Smart Learning Environments, 11(1), 6. https://doi.org/10.1186/s40561-024-00292-y
- Cristea, T., Heikkinen, S., Snijders, C., Saqr, M., Matzat, U., Conijn, R., & Kleingeld, A. (2025): Dynamics of self-regulated learning: The effectiveness of students' strategies across course periods. Computers & Education, 228, 105233. https://doi.org/10.1016/j.compedu.2025.105233
- **Delfino, A. (2019):** Students' engagement and academic performance of students of Partido State University. Asian Journal of University Education, 15(1), 1-16.
- Domínguez-Salas, S., Rodríguez-Domínguez, C., Arcos-Romero, A., Allande-Cussó, R., García-Iglesias, J. & Gómez-Salgado, J. (2022): Psychometric properties of the Utrecht Work Engagement Scale (UWES-9) in a sample of active health care professionals in Spain. Psychology Research and Behavior Management, 15, 3461-3472. https://doi.org/10.2147/PRBM.S387242
- **Dube, M. & Mlotshwa, P. (2018):** Factors influencing enrolled nursing students' academic performance at a selected private nursing education institution in KwaZulu-Natal. Curationis, 41(1), e1-e7. https://doi.org/10.4102/curationis.v41i1.1850
- **Ebrahim, S. & Van Wyk, J. (2024):** Engagement and learning approaches among medical students in an online surgical teaching programme: A cross-sectional study. Surgery open science, 22, 53–60.

https://doi.org/10.1016/j.sopen.2024.10.010

- Floyd, K., Harrington, S. & Santiago, J. (2009): The effect of engagement and perceived course value on deep and surface learning strategies. Informing Science, 12, 181.
- Fong, T. & Ho, R. (2015): Dimensionality of the 9-item Utrecht Work Engagement Scale revisited: A Bayesian structural equation modeling approach. Journal of Occupational Health, 57(4), 353-358.
- Ghasemi, M. R., Moonaghi, H. K. & Heydari, A. (2020): Strategies for sustaining and enhancing nursing students' engagement in academic and clinical settings: a narrative review. Korean

Journal of Medical Education, 32(2), 103-117. https://doi.org/10.3946/kjme.2020.159

- Ghasemi, M.R., Moonaghi, H.K. & Heydari, A. (2018): Student-related factors affecting academic engagement: A qualitative study exploring the experiences of Iranian undergraduate nursing students. Electronic Physician, 10, 7078-7085.
- Gönc, V., Lorber, M. & Nerat, J. (2017): Experience of Problem-Based Learning for Raising Quality of Nursing Study. InTech. doi: 10.5772/67427
- Groccia, J. (2018): What is students' engagement?. New Directions for Teaching and Learning, 2018(154), 11-20.
- Heydari, A., Rad, M. & Ghasemi, M. (2015): Academic Engagement Concept and its Affecting Factors in Medical Education: A Review Study. Strides in Development of Medical Education, 12(2), 366-376.
- **Information Resources Management Association** (Ed.). (2021): Research anthology on developing effective online learning courses. Hershey, PA: IGI Global.
- Institute of Medicine. (2011): The future of nursing: Leading change, advancing health. Washington, DC: National Academies Press. https://doi.org/10.17226/12956
- Janosz, M. (2012): Part IV Commentary: Outcomes of engagement and Engagement as an outcome: some consensus, divergences, and unanswered questions. In Springer eBooks (pp. 695– 703). https://doi.org/10.1007/978-1-4614-2018-7\_33
- Li, J. & Xue, E. (2023): Dynamic interaction between student learning behaviour and learning of environment: Meta-analysis students' engagement and influencing factors. its Behavioral Sciences, 13(1), 59. https://doi.org/10.3390/bs13010059
- Mattanah, J., Holt, L., Feinn, R., Bowley, O., Marszalek, K., Albert, E., & Katzenberg, C. (2024): Faculty-student rapport, students' engagement, and approaches to collegiate learning: exploring a mediational model. Current Psychology, 43(28), 23505-23516. https://doi.org/10.1007/s12144-024-06096-0
- **Organization for Economic Cooperation and Development. (2024):** Education GPS, Students' engagement and motivation. Retrieved from http://gpseducation.oecd.org
- Rodríguez-González, R., Martínez-Santos, A., De La Fuente, N., López-Pérez, M. & Fernandez-De-La-Iglesia, J. (2023): Identifying engagement and associated factors in nursing students: An exploratory study. Journal of professional nursing: official journal of the American Association of

Colleges of Nursing, 48, 77–83. https://doi.org/10.1016/j.profnurs.2023.06.003

- Schaufeli, W., Bakker, A. & Salanova, M. (2006): The measurement of work engagement with a short questionnaire: A cross-national study. Educational and Psychological Measurement, 66(4), 701-716.
- Schaufeli, W.B. & Bakker, A., (2003): The Utrecht Work Engagement Scale (UWES) [unpublished manuscript]. Utrecht (The Netherlands): Utrecht University.
- **Stevenson, J. (1998):** Performance of the cognitive holding power questionnaire in schools. Learning and Instruction, 8(5), 393-410.
- Stevenson, J. & Evans, G. (1994): Conceptualization and measurement of cognitive holding power. Journal of Educational Measurement, 31(2), 161-181.
- Thompson, S. (2012): Sampling (Vol. 755). Hoboken, NJ: John Wiley & Sons.
- Wang, Y., Zhou, Y., Li, T. & Wang, Y. (2023): A cross-sectional study in college-based nursing education: The influence of core self-evaluation and career calling on study engagement in nursing undergraduates. Nursing Open, 10(6), 3561-3569. https://doi.org/10.1002/nop2.1598

This is an open access article under <u>Creative Commons by Attribution Non-</u> <u>Commercial (CC BY-NC 3.0)</u> (<u>https://creativecommons.org/licenses/by-nc/3.0/</u>)