

Nursing Students' Readiness for Self-Directed Learning and their Sustainable Developmental Behavior

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Abstract

Background: Education is a crucial mean for nursing students to grow themselves in modern societies. Therefore, they must possess the ability of self-directed learning which is a vital component for sustainability in nursing education. **Aim:** This study aimed to assess nursing students' readiness for self-directed learning and their sustainable developmental behavior. **Subjects and Method: Design:** Descriptive correlational research design used in the study. **Setting:** The study was conducted in Faculty of Nursing at Tanta University. **Subject:** Consisted of 945 nursing students of Faculty of Nursing at Tanta University. **Tools:** Two tools were used to collect the data. **Tool I:** Nursing Students' Self-Directed Learning Readiness Scale. **Tool II:** Nursing Students' Sustainable Development Behavior Scale. **Results:** More than three-quarters (78.73%) of nursing students had a high level of self-directed learning readiness. Furthermore, more than two thirds (71.75%) of nursing students had a high level of sustainable development behavior. **Conclusion:** There were statistically positive correlations between overall nursing students' self-directed learning readiness and their perception regarding sustainable development behavior. **Recommendations:** The nursing faculty reinforces nursing students' self-directed learning readiness and keeps the progress of sustainable development behavior through attending workshops and training programs.

Keywords: Nursing Students, Self-Directed Learning Readiness, Sustainable Development Behavior.

Introduction

In colleges and universities, education is a crucial means of accomplishing institutional goals such as improved effectiveness, efficiency, and student learning (Aithal & Aithal, 2020). Learning is the process of acquiring new understanding, knowledge, behaviors, skills, values, attitudes, and preferences (Colomer, Serra, Cañabate, & Bubnys, 2020).

According to Khalid. Bashir, and Amin (2020) self-directed learning (SDL) emphasizes the learning steps. These processes include identifying learning needs, articulating learning aims implicitly, and determining learning resources to select, plan, employ, and assess appropriate outcomes. SDL competence is especially advantageous for those planning to enter a career in which the working environment is rapidly changing, such as medicine, entrepreneurship, information technology, nursing etc (Morris & Rohs, 2023).

Thus, nursing professionals need to be self-directed learners in order to increase their independence, self-confidence in practice, motivation, self-discipline, and goal orientation due to the explosion of information and the continuously growing nursing knowledge (Wong & Kan, 2022).

Self-directed learning readiness (SDLR) is the extent to which the nursing student possesses the ability, attitude, and personal qualities appropriate for SDL (Astuti, Wijaya, Abidin, & Fibriansari, 2023).

There are nine dimensions necessary for self-directed learning readiness: positive orientation to the future; love of learning; ability to use basic study and problem-solving skills; informed acceptance of responsibility for one's own learning; initiative and independence in learning; creativity; openness to learning opportunities; self-concept as an effective

learner; and self-management (Langegård, Kiani, Nielsen, & Svensson, 2021).

Positive orientation to the future is the extent to which nursing students are collectively encouraging and rewarding future-oriented behaviors during the educational process. Love of learning refers to a student's enthusiasm or desire to learn only for its own sake (Poorchangizi, Borhani, Abbaszadeh, Mirzaee, & Farokhzadian, 2019). Ability to use basic study and problem-solving skills was regarded as a set of cognitive abilities to respond to demands or resolve issues as they evolved during the learning process (Ayish & Deveci, 2019). Informed acceptance of responsibility for one's own learning, which is crucial for lifelong learning and professional growth, particularly for nursing students, by overcoming many of the challenges that might come up during their learning process (Avelino, 2021).

Also, nursing students' capacity for initiative and independence in learning refer to their ability to use their own resources and to seek information without constantly following instructions (Bhandari, Chopra, & Singh, 2020). Creativity is defined as the propensity of nursing students to come up with or identify concepts, options, or opportunities during the learning process (Lee, 2021).

Openness to learning opportunities is referred to the disposition of nursing students to focus on free and open educational resources that they can use, modify, and share (Poorchangizi et al., 2019). Self-concept as an effective learner is the perception of nursing students about their traits, actions, and capabilities for learning (Ismail, Ali, & Us, 2022). Self-management refers to a nursing student's capacity to direct their actions, thoughts, and

feelings in a deliberate and beneficial manner during the learning process (Duprez, Beeckman, Van-Hecke, & Verhaeghe, 2020).

Today's highly successful colleges and universities are distinguished by their ability to have their faculties continue to improve their efforts to advance student learning and promote sustainable development behaviors (Sass et al., 2020). Sustainability describes to the ability to meet current requirements without compromising the capacity of future generations to satisfy their own needs. Sustainability seeks to prevent the depletion of natural or physical resources so that they will remain available for the long term (Wright, Ritter, & Wisse-Gonzales, 2022). The main goal of sustainable development is to improve the value of life on earth (Markard, Geels, & Raven, 2020). Many successful colleges and universities have committed to sustainable goals, such as reducing their environmental footprints and conserving resources (Naidoo & Fisher, 2020).

To achieve a higher level of sustainability, it is very important for the university to be concerned with the behavior of its students, employees and teaching staff (Tribelhorn, 2023). Sustainable development behavior can be defined as a set of human activities intended to preserve and maintain both the physical and social environment, thus contributing to the present and future generations' quality of life without endangering the biosphere's resources (Žalėnienė & Pereira, 2021).

According to Badea, Șerban-Opreșcu, Dedu, and Piroșcă (2020) several elements are required to achieve sustainability objectives and put sustainable development into practice. Thus, it is not enough to merely transfer knowledge to students about sustainable behaviors, because a high level

of knowledge does not certify that they will carry out this kind of behavior (Sharpley, 2020).

González-Salamancan, Agudelo, and Salinas (2020) study emphasizes that students should be taught to understand and identify solutions to social, environmental, and economic challenges in order to collectively implement sustainable actions. From an educational perspective, this means involving students in the consulting activity, creating educational plans, organizing events and lectures, and carrying out actions by way of example. Along the academic road, it also identifying and building strong human interactions that lead to meaningful learning to solve socio-environmental issues (HanafieDas et al., 2020). The primary purpose of nursing students' sustainable development behaviors is to contribute significantly to alleviate environmental pollution and reduce the overuse of resources (Radwan & Khalil, 2021).

Significance of study:

Student's perceptions of learning have changed as a result of the advancement of information and communication technology and the rise in virtual learning options (Mi et al., 2020). To be lifelong learners, nursing students must possess the ability of self-directed learning. Nursing students may maintain their professional growth by being flexible, adaptable, and self-directed in their learning. Thus, it aids in the development of implementation skills and self-confidence (Karatas & Arpacı, 2021). As a result, in the field of nursing education, there is increased need for nursing students to update their knowledge, develop their autonomy, think critically and independently, and able to make their own predictions and choices (Pursio, Kankkunen, Sanner-Stiehr, & Kvist, 2021). Nursing students can enhance their

occupational capacities by using the principles of self-directed learning. (Kõiv & Saks, 2023).

Nursing education and the transmission of knowledge are essential for achieving sustainability in nursing (Eliades et al., 2022). Nursing students must first acquire fundamental knowledge through self-directed learning before they are capable of understanding the principles of sustainable development (Shaw, Walpole, McLean, Alvarez-Nieto, & Woollard, 2021). When necessary information and abilities have been built up, nursing students may make suitable environmental decisions regarding their behaviors (Eliades et al., 2022). Thus, the current study will be conducted to investigate nursing students' readiness for self-directed learning and their sustainable developmental behavior.

Aim of the study

Assess nursing students' readiness for self-directed learning and their sustainable developmental behavior.

Research Questions:

1. What are the undergraduate nursing students' levels of self-directed learning readiness?
2. What are the levels of nursing students' sustainable developmental behavior?
3. What is the relationship between nursing students' readiness for self-directed learning and their sustainable developmental behavior?

Subjects and Method

Research design:

A descriptive correlation research study design was used in the present study.

Setting:

The current study was carried out at Faculty of Nursing Tanta University.

Subjects:

The study's participants were recruited by proportionate stratified random sampling.

In this study, each academic year was considered as a stratum and the samples were selected based on the proportion of the number of nursing students in each academic year (2022/2023). It had taken as following (first level=220, second level=283, third level=228, and fourth level=214). The total number of the study sample was (945) who were enrolled during data collection time.

Tools of data collection:

To achieve the aim of study, the following two tools were used;

Tool I: Self-Directed Learning Readiness Scale:

This tool was developed by investigator based on Delahaye & Smith, (1995); Guglielmino, (1978) and related literature (Sulasiwi, et al., 2019; Ojekou & Okanlawon, 2019). It consisted of two parts as follow:

Part I: Personal data of undergraduate nursing students: including their age, gender, number of courses had been studied, pattern of education, and last academic achievement.

Part 2: Student self-directed learning readiness scale: It consisted of 59 items categorized into nine dimensions:

- Positive orientation to the future
- Love of learning
- Ability to use basic study and problem-solving skill
- Informed acceptance of responsibility of one's own learning
- Initiative and independence in learning
- Creativity
- Openness to learning opportunities
- Self-concept as an effective learner
- Self-management

Scoring system:

Nursing students' responses were measured on a five-point Likert Scale ranging from (1) Almost never true to

(5) Almost always true. The total score of SDLR was calculated by summing of all categories and then will be calculated according to statistical cut-off point where:

- High SDLR level $\geq 75\%$
- Moderate SDLR level 60% - 75%
- Low SDLR level $< 60\%$

Tool II: Sustainable Development Behavior Scale:

This tool was adapted by investigator based on **Temminck, et al., (2015); Dumitru, et al., (2015)** and related literature (**Sorour & Elkholy, 2021**). It consisted of 21 items categorized into three domains:

- Environmental domain
- Economical domain
- Social domain

Scoring system:

All the answers were allocated on a 5-point Likert Scale that ranged from (1) “not at all” to (5) “a great extent”. The total score was calculated by summing of all categories and then will be calculated according to statistical cut-off point where:

- Score from (63-105) considered “high sustainable behavior level”.
- Score from (42-62) denoted “moderate sustainable behavior level”.
- Score from (21 – 41) pointed for “low sustainable behavior level”.

Results

Table (1): Represents the personal characteristics of nursing students. As noticed in the table, the nursing students’ ages ranged between 18 up to 25 years old, with the mean age of 20.86 ± 1.33 . About two-thirds (64.44%) of the total nursing students were females. Around one third (29.95%) of the nursing students were in third level. While near to quarter (23.6%) of them had been studied 32 courses and more than three-quarters (76.4%) of them had non-credit hours as a pattern of education.

Also, more than half (59.37%) of nursing students had excellent degree or "A" as a last academic achievement.

Figure (1): Reveals the nursing students' levels of self-directed learning readiness. This figure shows that more than three-quarters (78.73%) of nursing students had a high level of self-directed learning readiness. As well 18.62% of nursing students had a moderate level of self-directed learning readiness, while the lowest percent (2.65%) of them had a low level of self-directed learning readiness.

Table (2): Indicates the levels of self-directed learning readiness among nursing students. It showed that more than three-quarters of nursing students (80.42 %, 79.47%, and 79.37%) had a high level of love of learning, initiative and independence in learning and self-management, respectively. Moreover, near to quarter of nursing students (22.01%, 21.59%) had a moderate level of ability to use basic study and problem-solving skills and informed acceptance of responsibility for one's own learning, respectively.

Figure (2): Describes the nursing students' levels of sustainable development behavior. This figure shows that more than two thirds (71.75%) of nursing students had a high level of sustainable development behavior. Additionally, 20.11% of them had a moderate level of sustainable development behavior and only (8.15%) of them had a low level of sustainable development behavior.

Table (3): Indicates the levels of sustainable development behavior among nursing students. It demonstrated that more than three-quarters (80.0%) of nursing students had a high level of economical domain. Additionally, near to three-quarters (73.23%) of nursing students had a high level of social domain and more than two-

thirds (68.89%) of nursing students had a high level of environmental domain.

Table (4): Donates the relation between nursing students' levels of self-directed learning readiness and their personal characteristics. Based on this table, there wasn't statistically significant difference between nursing students' personal characteristics and their overall levels of self-directed learning readiness except with their pattern of education at ($p=0.036$).

Table (5): Points out the relation between nursing students' levels of sustainable development behavior and their personal characteristics. Accordingly, there was statistically significant difference between nursing students' personal characteristics and their overall levels of sustainable development behavior except with their last academic achievement at ($p=0.435$).

Figure (3): Illustrates correlation between total of self-directed learning readiness and total of sustainable development behavior in nursing students. It indicates a highly significant positive correlation between total of self-directed learning readiness and total of sustainable development behavior in nursing students at ($p < 0.001$) and ($r = 0.787$)

Table (1): Personal characteristics of nursing students (n = 945)

Personal characteristics	Nursing students	
	No.	%
Age:		
18-19	206	21.79
20-21	423	44.76
22-23≤	316	33.44
Min.-Max.	18.0-25.0	
Mean ± SD	20.86 ± 1.33	
Median	21.0	
Sex:		
Female	609	64.44
Male	336	35.56
Level:		
Second	220	23.28
Third	283	29.95
Fourth	228	24.13
Internship	214	22.65
Number of courses that had been studied:		
Less than 15 courses	12	1.27
15 courses	208	22.01
Less than 32 courses	61	6.46
32 courses	223	23.60
Less than 45 courses	30	3.17
45 courses	196	20.74
Less than 57 courses	24	2.54
57 courses	191	20.21
Pattern of education:		
Credit hours	223	23.60
Non-Credit hours	722	76.40
last academic achievement:		
Excellent or A	561	59.37
Very good or B, B +	354	37.46
Good or C	24	2.54
Pass or D	6	0.63

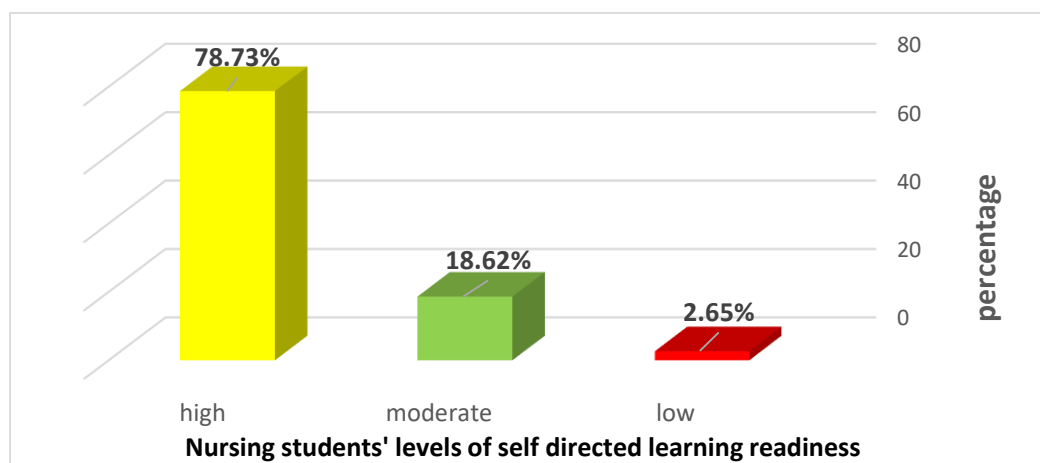


Figure (1): Nursing students' levels of self-directed learning readiness (n = 945)

Table (2): Levels of self-directed learning readiness among nursing students (n = 945)

Dimensions of self-directed learning readiness	Nursing students' levels					
	High		Moderate		Low	
	No.	%	No.	%	No.	%
Positive orientation to the future	738	78.10	153	16.19	54	5.71
Love of learning	760	80.42	131	13.86	54	5.71
Ability to use basic study and problem-solving skills	690	73.02	208	22.01	47	4.97
Informed acceptance of responsibility for one's own learning	701	74.18	204	21.59	40	4.23
Initiative and independence in learning	751	79.47	150	15.87	44	4.66
Creativity	728	77.04	175	18.52	42	4.44
Openness to learning opportunities	738	78.1	171	18.1	36	3.81
Self-concept as an effective learner	745	78.84	163	17.25	37	3.92
Self-management	750	79.37	152	16.08	43	4.55
Overall self-directed learning readiness	744	78.73	176	18.62	25	2.65

-High (>75%)

-Moderate (60% -75%)

-Low (<60%)

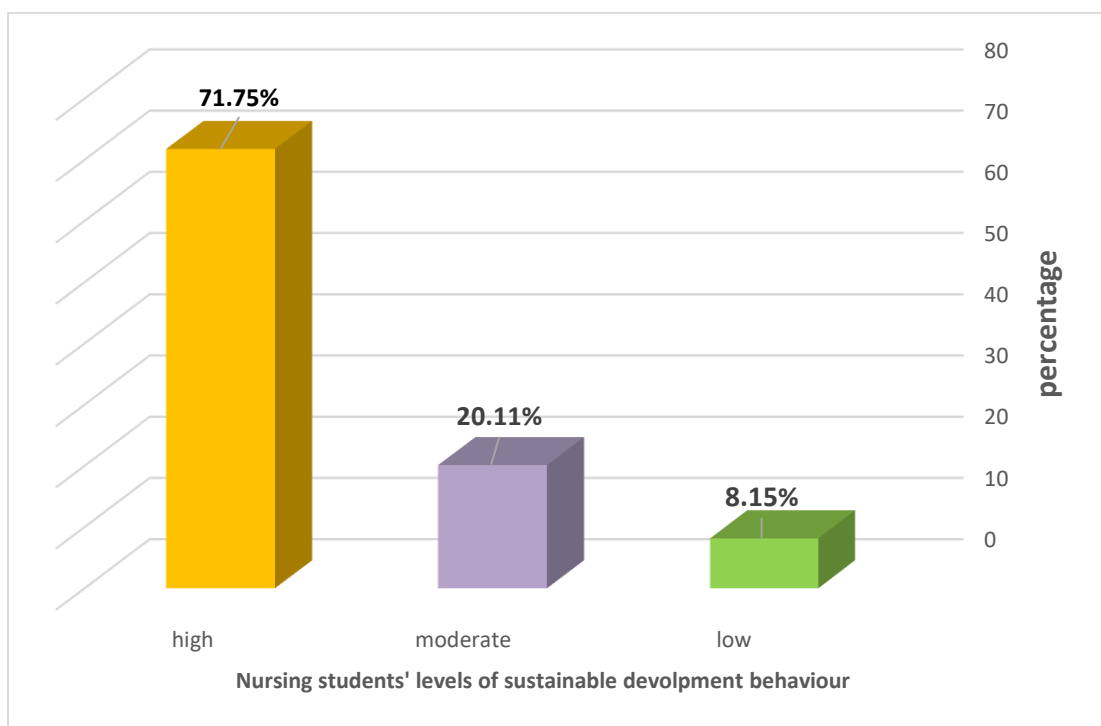


Figure (2): Nursing students' levels of sustainable development behavior (n = 945)

Table (3): Levels of sustainable development behavior among nursing students (n = 945)

Domains of sustainable development behavior	Nursing students' levels					
	High		Moderate		Low	
	No.	%	No.	%	No.	%
Environmental domain	651	68.89	190	20.11	104	11.01
Economical domain	756	80.0	143	15.13	46	4.87
Social domain	692	73.23	179	18.94	74	7.83
Overall impact of sustainable development behavior	678	71.75	190	20.11	77	8.15

-High (>75%)

- Moderate (60% -75%)

-Low (<60%)

Table (4): Relation between nursing students' levels of self-directed learning readiness and their personal characteristics (n = 945)

Personal characteristics	Levels of self-directed learning readiness in nursing students						Test of Sig.	P.value
	High (n = 744)		Moderate (n =176)		Low (n = 25)			
	No.	%	No.	%	No.	%		
Age								
18-19	169	22.7 2	36	20.45	1	4	X ² = 6.404	0.170
20-21	329	44.2 2	78	44.32	16	64		
22-23≤	246	33.0 6	62	35.23	8	32		
Sex								
Female	486	65.3 2	109	61.93	14	56	X ² =1.513	0.469
Male	258	34.6 8	67	38.07	11	44		
Level								
Second	182	24.4 6	37	21.02	1	4	X ² =11.15 9	0.084
Third	227	30.5 1	47	26.7	9	36		
Fourth	175	23.5 2	43	24.43	10	40		
Internship	160	21.5 1	49	27.84	5	20		
Number of courses that had been studied:								
Less than 15 courses	9	1.21	3	1.7	0	0.0	X ² =18.82 0	0.172
15 courses	173	23.2 5	34	19.32	1	4		
Less than 32 courses	52	6.99	9	5.11	0	0.0		
32 courses	175	23.5 2	39	22.15	9	36		
Less than 45 courses	23	3.09	7	3.98	0	0.0		
45 courses	151	20.3	35	19.89	10	40		
Less than 57 courses	19	2.55	4	2.27	1	4		
57 courses	142	19.0 9	45	25.57	4	16		
Pattern of education:								
Credit hours	185	24.8 7	37	21.02	1	4	X ² = 6.636	0.036*
Non-Credit hours	559	75.1 3	139	78.98	24	96		
Last academic achievement:								
Excellent or A	451	60.6 2	96	54.54	14	56	X ² =6.353	

Very good or B, B+	266	35.75	77	43.75	11	44	0.385
Good or C	22	2.96	2	1.13	0	0.0	
Pass or D	5	0.67	1	0.59	0	0.0	

- χ^2 :test of significance significant at $p \leq 0.05$.

*: Statistically

Table (5): Relation between nursing students' levels of sustainable development behavior and their personal characteristics (n = 945)

Personal characteristics	Levels of sustainable development behavior in nursing students						Test of Sig.	P. value
	High (n = 678)		Moderate (n =190)		Low (n =77)			
	No.	%	No.	%	No.	%		
Age								
18-19	165	24.34	34	17.89	7	9.09	$\chi^2=$ 11.615	0.02*
20-21	295	43.51	88	46.32	40	51.95		
22-23<	218	32.15	68	35.79	30	38.96		
Sex								
Female	428	63.13	136	71.58	45	58.44	$\chi^2=$ 5.945	0.05*
Male	250	36.87	54	28.42	32	41.56		
Level								
Second	177	26.11	35	18.42	8	10.39	$\chi^2=$ 28.105	<0.001*
Third	203	29.94	52	27.37	28	36.36		
Fourth	170	25.07	44	23.16	14	18.18		
Internship	128	18.88	59	31.05	27	35.06		
Number of courses that had been studied:								
Less than 15courses	10	1.47	2	1.05	0	0.0	$\chi^2=$ 33.091	0.003*
15 courses	167	24.63	33	17.37	8	10.39		
Less than 32 courses	47	6.93	11	5.79	3	3.9		
32 courses	156	23.01	42	22.11	25	32.47		
Less than 45 courses	23	3.39	7	3.68	0	0.0		
45 courses	146	21.53	36	18.95	14	18.18		
Less than 57 courses	15	2.21	7	3.68	2	2.6		
57 courses	114	16.81	52	27.37	25	32.47		
Pattern of education:								
Credit hours	179	26.4	36	18.95	8	10.39	$\chi^2=$ 12.685	0.002*
Non-Credit hours	499	73.6	154	81.05	69	89.61		
Last academic achievement:								
Excellent or A	394	58.11	117	61.58	50	64.94	$\chi^2=$ 5.895	0.435
Very good or B, B+	258	38.05	69	36.32	27	35.06		
Good or C	20	2.95	4	2.11	0	0.0		
Pass or D	6	0.88	0	0.0	0	0.0		

χ^2 :test of significance

*: Statistically significant at $p \leq 0.05$.

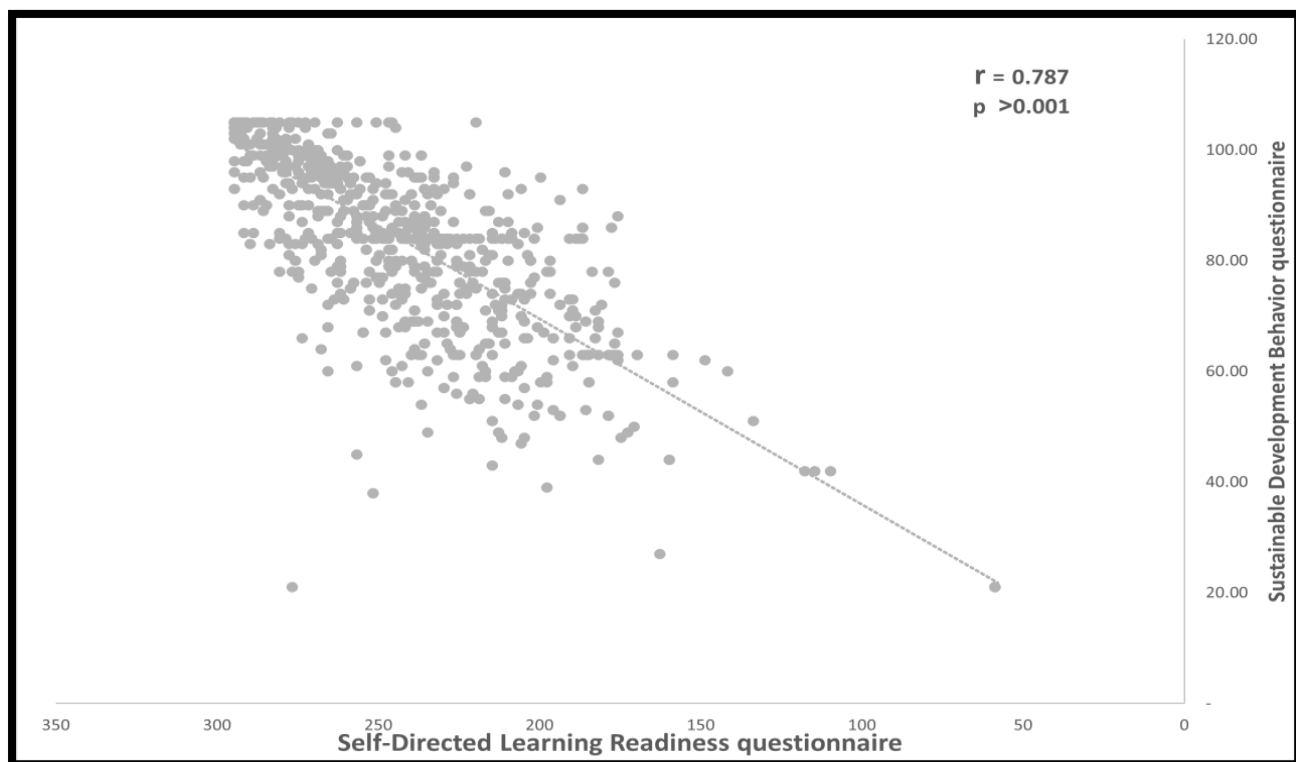


Figure (1): Correlation between total of self-directed learning readiness and total of sustainable development behavior in nursing students (n=945)

Discussion

The capacity for self-learning is essential for undergraduate students to participate in lifelong learning. Being self-directed in their own education not only helps students acquire professionalism, self-confidence, and implementation competencies, but it also keeps them flexible, adaptable, and open to change as they continue their professional growth. Hence, self-directed learning (SDL) is a key component of sustainability in nursing education. In light of this, nursing students need to be ready for a new professional role in sustainable development, so it's important to evaluate their attitudes and behaviors towards sustainability (Álvarez-Nieto, Álvarez-García, Parra-Anguita, Sanz-Martos, & López-Medina, 2022).

The present study results revealed that more than three-quarters of nursing students had a high level of self-directed learning readiness. This study result may be interpreted by that more than two-thirds of nursing students were female, who are more likely to take initiatives to be self-developed than male due to personality differences. Also, around two-thirds of nursing students have excellent or "A" degree as the last academic achievement since there is positive relation between SDLR and academic success.

Along with the present finding, Govindan, Singh, Ling, and Sekar (2023) who revealed a high readiness for SDL among students. On the other hand, Ahmad, Saad, Aminuddin, and Abdullah (2023) who incongruent with these results and found that the majority of students fall into the "Below average" category of SDLR.

The present study results demonstrated that the majority of nursing students had a high level of positive orientation to the future. This result means that they did their best to achieve their long-term objectives. On the same scene, Dai, Teo, Rappa, and Huang (2020) showed that a

positive attitude is a significant predictor of the intention to continue learning in the future. On the other hand, Yuwita and Ambarwati, (2023) who displayed that most of the students had undesirable attitudes about learning English words.

The present study results demonstrated that the majority of nursing students love their learning in a high level. This result means that they find the learning to be enjoyable and admire people who never stop learning. At the same line, Anwar et al., (2021) who revealed that the participants possess a high level of desire of learning in SDLR. Besides, Heo and Han, (2022) who stated that a decrease in motivation among online learners could lead to a reduction in their SDLR.

The present study results showed that the majority of nursing students had a high level of the ability to use basic study and problem-solving skills. This result may be due to that they think it is crucial to learn how to acquire knowledge. Along with the present finding, Sari, (2022) who noted that students who engaged in self-directed learning were able to improve their academic performance. While Thuy and Thuy, (2022) contradicted this result, who found that students' level of SDLR in solving problems is poor.

The present study results showed that the majority of nursing students had a high level of informed acceptance of responsibility for one's own learning. This finding may be explained by that they believe that it's their responsibility if they didn't grow as learners.

This result is supported by, Slam, (2021) who shown that students who have more academic responsibilities also exhibit more powerful self-belief. Also, this result is inconsistent with Ozkan and Er, (2020) who stated that participants' behaviors within the framework of learning responsibility indicate a strong negative relation with their preparedness for their career.

The present study results revealed that a high percentage of nursing students had a high level of initiative and independence in their learning. This finding clarified that they were capable of finding methods to learn everything they'd like. This result is similar to the result of a study by **Gorostiaga et al., (2019)** who displayed that proactiveness, effectiveness, and educational orientation are the dimensions associated with entrepreneurship. On the other hand, **Allam, Hassan, Mohideen, Ramlan, and Kamal (2020)** who demonstrated that low level of self-directed learning in undergraduate students.

The present study results revealed that a high percentage of nursing students had a high level of creativity. This finding showed that they enjoy trying new things, even when they were unsure of how they would come out. This result confirmed by **Schutte and Malouff, (2020)** who found that a higher level of curiosity was significantly linked with those participants who had a higher level of creativity.

The present study results revealed that a high percentage of nursing students had a high level of openness to learning opportunities. This finding illustrated that they were enthusiastic about what they were learning. Along with the present finding, **Van-Ness et al., (2020)** they confirmed that openness to new experiences is an important feature that characterizes proactive persons. This result is inconsistent with **Chomeya, Phansri, and Piyakun (2022)** who reported that students from Thailand scored low on openness to learning alternatives.

The present study results revealed that a high percentage of nursing students had a high level of self-concept as effective learners. This finding explained that they had the capacity to learn practically anything they needed to know on their own. This result was consistent with the findings of **Wolters and Brady, (2021)** who demonstrate that students who are good at

managing their time can actively control tasks that are considered essential.

The present study results reported that a high percentage of nursing students had a high level of self-management. This finding clarified that they had self-control and depended on themselves to continue their education. This result is supported by **Jasim, (2020)** who demonstrated that self-management helps students develop into successful learners. On the other hand, **Ansong, Eisensmith, Okumu, and Chowa (2019)** who confirmed that students who lack confidence in their own abilities may be less willing to strive for academic achievement.

The present study results displayed that more than two-thirds of nursing students had a sustainable development behavior in high level. This study result may be interpreted by that around two-thirds of nursing students were women, who are more likely than men to take the charge to improve themselves because of variations in personality. As well as, around two-thirds of nursing students have an excellent or "A" degree as their last academic achievement because sustainable development behavior and academic achievement are positively related to each other. Along with the present finding, **Aronsson et al., (2020)** who highlighted that participant in sustainability-focused training may find it easier to integrate change management and sustainable development. Also, **Tsarfati and Cojocar, (2022)** who indicated that participants who had easy access to computers and a wide range of professional experience would enhance nursing practice and care quality.

On the other side, the present study's findings are incongruent with those of **Leppanen, Kvist, McDermott, and Kankkunen (2022)** who revealed participants' knowledge of sustainable development (SD) principles was poor.

The present study results revealed that a high percentage of nursing students had a high level regarding the environmental domain of sustainable development behavior. This finding explained that they were aware of the effects of environmental changes on faculty workflow. Along with the present finding, **Ryan, Dubrow, and Sherman (2020)** indicated that students in Sweden and the US were aware of the negative effects of climate change, While **Moselhy, Galal, and Abdel Elrahman (2022)** who noticed that two-thirds of the Egyptian student participants were unaware of the idea of carbon footprints.

The present study results assured that a high percentage of nursing students had a high level regarding the economic domain of sustainable development behavior. This finding explained that they behave in the manner leading to energy conservation. At the same line, **Ergin et al., (2021)** who explored what nursing students did on a personal level to combat climate change, and discovered a variety of actions like forest management. Nevertheless, **Ismail and AbdElkhalek, (2021)** revealed that behavioral economics had a minor role in creating environmental policies for sustainable development in Egypt.

The present study results pointed out that a high percentage of nursing students had a high level regarding the social domain of sustainable development behavior. This finding may be due to they encourage friends to practice pro-environmental behavior at the faculty. On the same scene, the study's results of **Algabar et al., (2023)** who found that participants' attitudes had a high level of sustainable consciousness (SC). This result disagrees with **Yli-Panula, Jeronen, Vesterkvist, and Tolonen (2021)** who showed that the social dimension of sustainable development had a lower level than the other dimensions.

The current study's data analysis explains that there wasn't statistically significant difference

between nursing students' personal characteristics and their overall levels of self-directed learning readiness except with their pattern of education.

Additionally, the data analysis of the present study clarifies that there was a statistically significant difference between the socio-demographic characteristics of nursing students and their levels of sustainable development behavior except with their last academic achievement.

As observed in this study, there was a correlation between nursing students' levels of self-directed learning readiness and their levels of sustainable development behavior. This study result might be interpreted by that self-directed learning enhances nursing students' innovative and critical thinking abilities, which are the cornerstones of enabling nursing students to engage in sustainability. Nursing students can sustain their behaviors by being flexible, adaptable, and self-directed in their learning. Hence, self-directed learning readiness is an essential element of sustainability in nursing students' education.

Along with the present finding, **Čiarnienė, Vienažindienė, and Adamonienė (2020)** who revealed that learning had an important impact on ecological and economical sustainable behaviors and attitudes among their participants. In addition, **loeng, (2020)** who supported that it is essential for students to have faith in their abilities to study, which will in turn help them achieve their objectives, be more persistent, and become lifelong learners. At the same line, **Álvarez-Nieto et al., (2022)** who signified that an improvement in the environmental consciousness and attitudes of nursing students towards sustainability and climate change as their education progresses.

Conclusion

Based on the results of this study, there were statistically positive correlations between overall nursing students' self-directed learning

readiness and their perception regarding sustainable development behavior.

Recommendations

The findings of the present study directed to recommend the following:

For the faculty's administration

- Improve educational facilities and infrastructure
- Educational initiatives and training programs have the power to increase awareness about sustainable development.
- Set up rules and strategies that support sustainable competencies.

For the faculty's staff

- Offer good educational activities that can increase the readiness for self-directed learning.
- Inclusion of subjects to support sustainability in nursing curricula.

For nursing students

- Participate in a range of self-directed learning activities.
- Choose healthy alternatives that will make them more productive.

Further research

- Future research should take into account additional factors that may affect self-directed learning readiness like different prior knowledge, and intelligence levels.
- Future studies are required to investigate nursing educators' perspectives on sustainability.

References

- Ahmad, B. E., Saad, Z. A., Aminuddin, A. S., & Abdullah, M. A (2023). Self-directed learning of Malay undergraduate students. *Studies in Self-Access Learning Journal*, 14(3), 244–266. <https://Doi.org/10.37237/140302>
- Aithal, P. S., & Aithal, S. (2020). Analysis of the Indian national education policy 2020 towards achieving its objectives. *International Journal of Management, Technology, and Social Sciences (IJMITS)*, 5(2), 19-41. Retrieved from: <https://dx.Doi.org/10.2139/ssrn.3676074>
- Algabar, A. A., Ghadery, S. H., Mohamed, L. K., & Abou Shaheen, R. (2023). Role of nurse managers' sustainable management behaviors in building sustainability consciousness among nurses. *Tanta Scientific Nursing Journal*, 30(3), 246-261. <https://Doi.org/10.21608/tsnj.2023.307832>
- Allam, S. S., Hassan, M. S., Mohideen, R. S., Ramlan, A. F., & Kamal, R. M. (2020). Online distance learning readiness during Covid-19 outbreak among undergraduate students. *International Journal of Academic Research in Business and Social Sciences*, 10(5), 642–657. <http://dx.Doi.org/10.6007/IJARBS/v10-i5/7236>
- Álvarez-Nieto, C., Álvarez-García, C., Parra-Anguita, L., Sanz-Martos, S., & López-Medina, I. M. (2022). Effectiveness of scenario-based learning and augmented reality for nursing students' attitudes and awareness toward climate change and sustainability. *BMC Nursing*, 21(1), 245. <https://Doi.org/10.1186/s12912-022-01023-9>
- Ansong, D., Eisensmith, S. R., Okumu, M., & Chowa, G. A. (2019). The importance of self-efficacy and educational aspirations for academic achievement in resource-limited countries: Evidence from Ghana. *Journal of Adolescence*, 70, 13-23. <https://Doi.org/10.1016/j.adolescence.2018.11.003>
- Anwar, S., Hussain, M., Afzal, M., & Gilani, S. A. (2021). Assessment of enhancement in self-management, self-control and learning desire as a result of

- self-directed learning readiness in nursing students. *Journal of Advanced Psychology*, 3(1), 33-44. <https://Doi.org/10.47941/japsy.565>
- Aronsson, J., Clarke, D., Grose, J., & Richardson, J. (2020). Student nurses exposed to sustainability education can challenge practice: A cohort study. *Nurse Health Science Journal*, 22(3), 803-811. <https://Doi.org/10.1111/nhs.12734>
 - Astuti, A., Wijaya, D., Abidin, Z., & Fibriansari, R. D. (2023). How to build self-directed learning readiness (SDLR) as the foundation for nursing students to be lifelong learners? A scoping review. University of Jember, Indonesia. Proceeding International Agronursing Conference (5th IANC) *UNEJ e-Proceeding*, 5(1), 126-138. Retrieved from: <https://jurnal.unej.ac.id/index.php/prosiding/article/view/40216>
 - Avelino, F. (2021). Theories of power and social change. Power contestations and their implications for research on social change and innovation. *Journal of Political Power*, 14(3), 425-48. <https://Doi.org/10.1080/2158379X.2021.1875307>
 - Ayish, N., & Deveci, T. (2019). Student perceptions of responsibility for their own learning and for supporting peers' learning in a project-based learning environment. *International Journal of Teaching and Learning in Higher Education*, 31(2), 224-37.
 - Badea, L., Șerban-Oprescu, G. L., Dedu, S., & Piroșcă, G. I. (2020). The impact of education for sustainable development on Romanian economics and business students' behavior. *Sustainability*, 12(19), 8169. <https://Doi.org/10.3390/su12198169>
 - Bhandari, B., Chopra, D., & Singh, K. (2020). Self-directed learning: Assessment of students' abilities and their perspective. *Advances in Physiology Education*, 44(3), 383-386. <https://Doi.org/10.1152/advan.00010.2020>
 - Chomeya, R., Phansri, G., & Piyakun, A. (2022). Students' self-directed learning behavior: Cross cultural research (Thailand and Australia). *Kasetsart Journal of Social Sciences*, 43(2), 279-284. <https://so04.tci-thaijo.org/index.php/kjss/article/view/258484>
 - Čiarnienė, R., Vienažindienė, M., & Adamonienė, R. (2020). Sustainable behavior: Evidence from Lithuania. *Engineering Management in Production and Services*, 12(1), 80-92. <https://Doi:10.2478/emj-2020-0007>
 - Colomer, J., Serra, T., Cañabate, D., & Bubnys, R. (2020). Reflective learning in higher education: Active methodologies for transformative practices. *Sustainability*, 12(9), 3827. <https://Doi.org/10.3390/su12093827>
 - Dai, H. M., Teo, T., Rappa, N. A., & Huang, F. (2020). Explaining Chinese university students' continuance learning intention in the MOOC setting: A modified expectation confirmation model perspective. *Computers & Education*, 150, 103850. <https://Doi.org/10.1016/j.compedu.2020.103850>
 - Delahaye, B. L., & Smith, H. E. (1995). The validity of the learning preference assessment. *Adult Education Quarterly*, 45, 159-73. <https://Doi.org/10.1177/074171369504503003>
 - Dumitru, A., & Uzzell, D. (2015). Sustainable behavior in the workplace:

- The role of universities in promoting pro-environmental behavior. Doctorate Thesis, University of ACoruna. Retrieved from:
<http://dx.Doi.org/10.33578/jtlee.v5i2.7934>
- Duprez, V., Beeckman, D., Van-Hecke, A., & Verhaeghe, S. (2020). Nurses' perceptions of success in self-management support: An exploratory qualitative study. *Research in Nursing & Health*, 43(3), 274-283. <https://Doi.org/10.1002/nur.22018>
 - Eliades, F., Doula, M. K., Papamichael, I., Vardopoulos, I., Voukkali, I., & Zorpas, A. A. (2022). Carving out a niche in the sustainability confluence for environmental education centers in Cyprus and Greece. *Sustainability*, 14(14), 8368. <https://Doi.org/10.3390/su14148368>
 - Ergin, E., Altinel, B., & Aktas, E. (2021). A mixed method study on global warming, climate change and the role of public health nurses from the perspective of nursing students. *Nurse Education Today*, 107, 105144. <https://Doi.org/10.1016/j.nedt.2021.105144>
 - González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key competences, education for sustainable development and strategies for the development of 21st century skills. A systematic literature review. *Sustainability*, 12(24), 10366. <https://Doi.org/10.3390/su122410366>
 - Gorostiaga, A., Aliri, J., Ulacia, I., Soroa, G., Balluerka, N., & Muela, A. (2019). Assessment of entrepreneurial orientation in vocational training students: Development of a new scale and relationships with self-efficacy and personal initiative. *Front. Psychol*, 10, 1125. <https://Doi:10.3389/fpsyg.2019.01125>
 - Govindan, S. N., Singh, H. K., Ling, L.W., & Sekar, M. (2023). Effect of blended self-directed learning on nursing students: Quasi-experimental approach. *Journal of Education and Health Promotion*, 12, 229. https://Doi:10.4103/jehp.jehp_209_23
 - Guglielmino, L. M. (1978). Development of the self-directed learning readiness scale. Dissertation, University of Georgia. Dissertation Abstracts International, 38, 6467A.
 - Hanafie-Das, S. W., Halik, A., Iman, B., Tahir, M., Hamid, E., & Kenre, I. (2020). Developing a sociocultural approach in learning management system through modle in the era of the Covid-19. *International Journal of Innovation, Creativity and Change*, 13(27), 941-958. <https://repository.iainpare.ac.id/id/eprint/1945>
 - Heo, J., & Han, S. (2022). Challenges and problems on self-directed learning readiness in non-face-to-face educational settings during COVID-19. *OBM Neurobiology*, 6(4), 1-11. <http://dx.Doi.org/10.21926/obm.neurobio.1.2204141>
 - Ismail, I. H., & AbdElkhalek, A. A. (2021). Insights from behavioral economics to enhance the environmental dimension of sustainable development. *New England Medical Monthly*, 09(01). <https://Doi.org/10.24052/IJBED/V09N01/ART-02>
 - Ismail, I., Ali, H., & Us, K. A. (2022). Factors affecting critical and holistic thinking in Islamic education in Indonesia: Self-concept, system, tradition, culture. *Dinasti International Journal of Management Science*, 3(3), 407-37. <https://Doi.org/10.31933/dijms.v3i3>
 - Jasim, B. J. (2020). Evaluation of students' self-management and academic achievement in the university of Baghdad.

- Medico-Legal Update*, 20(3), 578.
<http://www.medicolegalupdate.org/>
- Karatas, K., & Arpacı, I. (2021). The role of self-directed learning, metacognition, and 21st century skills predicting the readiness for online learning. *Contemporary Educational Technology*, 13(3).
<https://Doi.org/10.30935/cedtech/10786>
 - Khalid, M., Bashir, S., & Amin, H. (2020). Relationship between self-directed learning (SDL) and academic achievement of university students: A case of online distance learning and traditional universities. *Bulletin of Education and Research*, 42(2), 131-148.
 - Kõiv, K., & Saks, K. (2023). The role of self-directed learning while supporting NEET-youth: Theoretical model based on systematic literature review. *International Journal of Adolescence and Youth*, 28(1), 2242446.
<https://Doi.org/10.1080/02673843.2023.242446>
 - Langedård, U., Kiani, K., Nielsen, S. J., & Svensson, P. A. (2021). Nursing students' experiences of a pedagogical transition from campus learning to distance learning using digital tools. *BMC Nursing*, 20(1), 1-10. <https://Doi.org/10.1186/s12912-021-00542-1>
 - Lee, K. (2021). Openness and innovation in online higher education. *Open learning. The Journal of Open, Distance and E-learning*, 36(2), 112-32.
<https://Doi.org/10.1080/02680513.2020.1713737>
 - Leppanen, T., Kvist, T., McDermott, R., & Kankkunen, P. (2022). Nurses' and nurse managers' perceptions of sustainable development in perioperative work: A qualitative study. *Journal of Clinical Nursing*, 31(7), 1061-72.
<https://Doi.org/10.1111/jocn.15970>
 - Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*, 1-12.
<https://Doi.org/10.1080/02680513.2022.2026213>
 - Mi, L., Qiao, L., Xu, T., Gan, X., Yang, H., & Hou, J. (2020). Promoting sustainable development: The impact of differences in cultural values on residents' pro-environmental behaviors. *Sustainable Development*, 28(6), 1539-1553.
<https://Doi.org/10.1002/sd.2103>
 - Moselhy, M. G., Galal, D., & Abdel Elrahman, E. (2022). Carbon foot-print' knowledge and calculation among nursing students. *Egyptian Journal of Nursing & Health Sciences*, 3(1), 20–44.
 - Naidoo, R., & Fisher, B. (2020). Reset sustainable development goals for a pandemic world. *Nature*, 583(7815), 198-201. <https://Doi.org/10.1038/d41586-020-01999-x>
 - Markard, J., Geels, F. W., & Raven, R. (2020). Challenges in the acceleration of sustainability transitions. *Environmental Research Letters*, 15(8), 081001.
 - Ojekou, G. P., & Okanlawon, F. A. (2019). Nursing students' readiness for self-directed learning and its effect on learning outcome in south-west Nigeria. *Open Journal of Nursing*, 9(6), 586-601.
<https://Doi.org/10.4236/ojn.2019.96048>
 - Ozkan, U. B., & Er, K. O. (2020). The relationship between prospective teachers' learning responsibility and their readiness for teaching profession. *World Journal of Education*, 10(3), 199-207.
<https://Doi.org/10.5430/wje.v10n3p199>
 - Poorchangizi, B., Borhani, F., Abbaszadeh, A., Mirzaee, M., & Farokhzadian, J. (2019). Professional values of nurses and nursing students: A comparative study.

- BMC Medical Education*, 19, 1-7.
<https://doi.org/10.1186/s12909-019-1878-2>
- Pursio, K., Kankkunen, P., Sanner-Stiehr, E., & Kvist, T. (2021). Professional autonomy in nursing: An integrative review. *Journal of Nursing Management*, 29(6), 1565-1577.
<https://doi.org/10.1111/jonm.13282>
 - Radwan, A. F., & Khalil, E. M. (2021). Knowledge, attitude and practice toward sustainability among university students in UAE. *International Journal of Sustainability in Higher Education*, 22(5), 964-981. <https://doi.org/10.1108/IJSHE-06-2020-0229>
 - Ryan, E. C., Dubrow, R., & Sherman, J. D. (2020). Medical, nursing, and physician assistant student knowledge and attitudes toward climate change, pollution, and resource conservation in health care. *BMC Medical Education*, 20(1), 200. <https://doi.org/10.1186/s12909-020-02099-0>
 - Sari, D. M. (2022). Digital literacy and academic performance of students' self-directed learning readiness. *Elite Journal: International Journal of Education, Language, and Literature*, 2(3), 127-136. <https://doi.org/10.26740/elitejournal.v2n3.p127-136>
 - Sass, W., Boeve-dePauw, J., Olsson, D., Gericke, N., De-Maeyer, S., & VanPetegem, P. (2020). Redefining action competence: The case of sustainable development. *The Journal of Environmental Education*, 51(4), 292-305. <https://doi.org/10.1080/00958964.2020.1765132>
 - Schutte, N. S., & Malouff, J. M. (2020). A meta-analysis of the relationship between curiosity and creativity. *The Journal of Creative Behavior*, 54(4), 940-947. <https://doi.org/10.1002/jocb.421>
 - Sharpley, R. (2020). Tourism, sustainable development and the theoretical divide: 20 years on. *Journal of Sustainable Tourism*, 28(11), 1932-1946. <https://doi.org/10.1080/09669582.2020.1779732>
 - Shaw, E., Walpole, S., McLean, M., Alvarez-Nieto, C., & Woollard, R. (2021). AMEE consensus statement: Planetary health and education for sustainable healthcare. *Medical Teacher*, 43(3), 272-286. <https://doi.org/10.1080/0142159X.2020.1860207>
 - Slam, Z. (2021). Model of IVAM for enhancing responsibility of young citizens in Pancasila education. *Emerging Trends in Technology for Education in an Uncertain World*. Routledge, 111-118. <https://www.taylorfrancis.com/chapters/edit/10.1201/9781003219248-14/model-ivam-enhancing-responsibility-young-citizens-pancasila-education-slam>
 - Thuy, D. T., & Thuy, T. T. (2022). Assessment of self-directed learning readiness among undergraduates of teacher education in Vietnam. In *The IAFOR Conference on Educational Research & Innovation 2022 Official Conference Proceedings*. Retrieved from: <https://doi.org/10.22492/issn.2435-1202.2022.10>
 - Sorour, M., & Elkholy, S. (2021). Relationship between servant leadership and its' role on staff nurses' creativity and sustainable development behavior. *Assiut Scientific Nursing Journal*, 9(24), 87-99. <https://doi.org/10.21608/asnj.2021.64644.1140>
 - Sulasiwi, I. F., Handayanto, S. K., & Wartono, W. (2019). Development of self-rating scale instrument of self-directed

- learning skills for high school students. *Journal Penelitian Dan Evaluasi Pendidikan*, 23(1), 1-11. <http://dx.Doi.org/10.21831/pep.v23i1.18130>
- Temminck, E., Mearns, K., & Fruhen, L. (2015). Motivating employees towards sustainable behavior. *Business Strategy Environment Journal*, 24(1), 12. <https://Doi.org/10.1002/bse.1827>
 - Tribelhorn, S. K. (2023). Preliminary investigation of sustainability awareness and activities among academic libraries in the United States. *The Journal of Academic Librarianship*, 49(3), 102661. <https://Doi.org/10.1016/j.acalib.2022.102661>
 - Tsarfati, B., & Cojocar, D. (2022). The importance of receiving training in computerized technology for nurses to maintain sustainability in the health system. *Sustainability*, 14(23), 15958. <https://Doi.org/10.3390/su142315958>
 - Van-Ness, R. K., Seifert, C. F., Marler, J. H., Wales, W. J., & Hughes, M. E. (2020). Proactive entrepreneurs: Who are they and how are they different? *The Journal of Entrepreneurship*, 29(1), 148-175. <https://Doi.org/10.1177/0971355719893504>
 - Wolters, C. A., & Brady, A. C. (2021). College students' time management: A self-regulated learning perspective. *Educational Psychology Review*, 33(4), 1319-10351. <https://Doi.org/10.1007/s10648-020-09519-z>
 - Wong, F. M., & Kan, C. W. (2022). Online problem-based learning intervention on self-directed learning and problem-solving through group work: A waitlist-controlled trial. *International Journal of Environmental Research and Public Health*, 19(2), 720. <https://Doi.org/10.3390/ijerph19020720>
 - Wright, C., Ritter, L. J., & Wisse-Gonzales, C. (2022). Cultivating a collaborative culture for ensuring sustainable development goals in higher education: An integrative case study. *Sustainability*, 14(3), 1273. <https://Doi.org/10.3390/su14031273>
 - Yli-Panula, E., Jeronen, E., Vesterkvist, S., & Tolonen, P. (2021). Finnish subject student teachers' views on their social competencies at the end of their educational studies. *Quality Education*, 63. <https://Doi.org/10.3390/books978-3-03897-893-0-4>
 - Yuwita, M. R., & Ambarwati, N. D. (2023). Exploring university students' attitudes towards their English accent and native English accents. *Linguistics and Literature Journal*, 4(1), 21-27. http://jim.teknokrat.ac.id/index.php/linguistics_and_literature/index
 - Žalėnienė, I., & Pereira, P. (2021). Higher education for sustainability: A global perspective. *Geography and Sustainability*, 2(2), 99-106. <https://Doi.org/10.1016/j.geosus.2021.05.001>