

Online Learning during the COVID-19 Crisis from the Perspective of Students of Agricultural Sciences

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Received: 13/2/2021

Revised: 27/3/2021

Accepted: 17/6/2021

Published: 1/3/2022

Citation: Shawaqfeh, S. (2022). Online Learning during the COVID-19 Crisis from the Perspective of Students of Agricultural Sciences. *Dirasat: Educational Sciences*, 49(1), 424–433. <https://doi.org/10.35516/edu.v49i1.734>

Abstract

Educational practices and strategies have changed due to the COVID-19 pandemic. Universities nowadays are adopting online education systems. This study aims to evaluate the experience of agricultural sciences students during the COVID-19 pandemic in Jordan with a focus on preparedness, attitude and barriers. An online survey was distributed to 559 students from four different majors at the College of Agriculture Sciences at Jerash University, Jordan. The results showed that there was a statistically significant difference in barrier, attitude, and preparedness scores between different age groups. The results indicate that about 76% of the students were satisfied with the quality of services offered from Jerash University during the COVID-19 lockdown. Students expressed a negative assessment of the practical courses being delivered online. This new experience for students during lockdown identified areas for improvement that can be worked on. Thus, sharing the study results could help to enhance online education with similar settings in colleges throughout the country..

Keywords: Online learning, agricultural sciences, e-learning, COVID-19 pandemic.

التعلم عن بعد - أثناء أزمة كورونا - من منظور طلاب كلية الزراعة في الأردن: استبانة

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جامعة جرش، الأردن.

ملخص

بسبب جائحة كورونا تم تغيير الممارسات والإستراتيجيات التعليمية في الجامعات، وتم التحول إلى أنظمة التعليم عن بعد لضمان إيصال المعلومات والمعرفة التعليمية. وتهدف هذه الدراسة إلى تقييم تجربة طلاب كلية الزراعة خلال جائحة كورونا في الأردن مع التركيز على استعدادهم وسلوكهم والعوائق التي أثرت عليهم. وتم توزيع الاستطلاع عبر الإنترنت على 559 طالباً في 4 تخصصات مختلفة في كلية الزراعة في جامعة جرش. وتم جمع البيانات عبر نماذج إلكتروني، وكانت نسبة الاستجابة 64٪. وأظهرت النتائج عدم وجود فروق بين الجنسين في أي من هذه المجالات. ومع ذلك، كان هناك فرق ذو دلالة إحصائية في درجات العوائق والسلوك والاستعداد بين مختلف الفئات العمرية. أظهرت النتائج عدم وجود فرق ذو دلالة إحصائية في الأقسام الأربعة في مستويات الدراسة المتنوعة أشارت النتائج إلى أن حوالي 76٪ من الطلاب راضون عن جودة الخدمات المقدمة من جامعة جرش خلال فترة الإغلاق. كان لدى الطلاب انطباع سلبي عن التدريبات العملية التي كانت تعطى عبر الإنترنت بدلاً من أن تكون في الميدان. أخيراً، و ذكر الطلاب أن توفر شبكة الإنترنت وجودتها كانت عائق رئيسي أمامهم لتحسين أدائهم. حددت هذه التجربة الجديدة للطلاب خلال فترة الإغلاق الوبائي بعض المجالات التي يمكن العمل عليها وتطويرها. مشاركة نتائج الدراسة قد تساهم في تحسين نوعية التعليم عن بعد في الجامعات الأردنية في حالات وظروف مشابهة. الكلمات الدالة: التعليم عن بعد، العلوم الزراعية، جائحة كورونا، التعليم الزراعي.



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Introduction

Literature Review

With COVID-19 pandemic hitting around the world, educational systems and research studies was impacted directly. As directed by World Health Organization (WHO) many institutes had to close temporarily after the confirmed spread of COVID-19 in many countries (WHO, 2020). Education of around 290.5 million students were disrupting due to the spread of COVID-19 (UNESCO, 2020).

According to a report by Burgess and Sievertsen, Graduate students and their research activities were affected during the lockdown of educational institutions. There was a major interruption in their teaching experience and assessment, which will consequently affect their opportunities to get into excellent and prosperous career environment (Burgess and Sievertsen, 2020).

As recommended by Mustafa 2020, different institutions should start to utilize the available learning methods of distance learning and other educational applications and platforms. These were implemented variably to assure that similar education opportunity is available to all students with minimal discrepancies. Identifying these variables will help evaluating the students' experience during the closure time.

Furthermore, Toquero, 2020 suggested that this pandemic alerted higher education institutions to the need to upgrade its educational strategies to deliver knowledge and skills with the available emerging technologies outside the conventional classrooms. This transformation towards distance learning tools and online platforms was deemed necessary and there were no exceptions. Therefore, educational institutions must benefit from the available online distance learning resources to overcome the challenges that came with the lockdown.

Even though online distance learning had been developed and used for promoting agriculture education for farmers (Raut and Sharma, 2009), The new challenge to implement these strategies to undergraduate students' education were extraordinary. There should be a new crafted plan and strategies to provide the same level of comprehensive education to graduates without compromising the quality of knowledge and skills.

Goal of the study

This study aims to evaluate the Agriculture student distance online learning experience during the COVID-19 pandemic. The focus is to evaluate agriculture sciences students' attitude, preparedness, and perceived barriers toward online distance learning throughout COVID-19 pandemic.

Questions of the study

This study will answer several questions associated with the transformation experience towards distance online learning:

- 1- Was the college ready to adapt to the new norm in education?
- 2- What was the attitude of the agriculture college students towards the experience?
- 3- What was the perceived barriers and challenges facing the online distance learning?

Significance of the study

This study is necessary as this model of transformation from traditional to distance online education is relatively new and only few publications that evaluate such an experience. This study may be important to many educational institutions that have similar experience. The results of the study can be utilized by university and college administration to include in their future strategic planning.

Methodology

Online survey was conducted in November 2020. The study sample included students from all agriculture sciences majors (plant production and protection, animal production and protection, nutrition and food science, agriculture

economics and extension) from both genders, and the four undergraduate levels at the College of Agriculture, Jerash University, Jerash, Jordan. A valid survey questionnaire was adopted from a recent publication with minor modifications, the survey questions was reviewed by experts for content validity. The questionnaire consisted of three major domains; students' preparedness, attitude and barriers to online learning. The questionnaire followed a 5-likert scale were strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). (shawaqfeh et.al, 2020). The composite scores for preparedness, attitude and barriers were the average of nine, twenty-four, and twelve questions, respectively.

The online survey questionnaire was sent to 559 students through e-mails and school group messages, 358 responded to the survey within required time.

Statistical Analysis:

The categorical variables were presented as frequency and proportions and continuous variables were presented as mean and standard deviation. Independent samples *t*-test was used to compare the mean difference between gender and total scores of barriers, preparedness, and attitude. Correlation Coefficient (*r*) test was used to find the correlation between age and total scores of barriers, preparedness, and attitude. One-way analysis of variance (ANOVA) was performed to address students' attitudes toward the online learning at different levels of sociodemographic characteristics. One-way ANOVA was used to find the association between total scores of preparedness, barriers, and attitude with different undergraduate levels (year in the program), and Bonferroni post-hoc test was used for intergroup comparisons between different undergraduate levels (year in the program). All data were compiled using Microsoft Excel 2010 [Microsoft Ltd., USA] and data were analyzed using SPSS 20.0 version [IBS Ltd., USA]. The statistical significance was fixed at *p*-value < 0.05.

Results

Socio-demographic Characteristics

In this study, we have recruited and incorporated 358 participants. The response rate was 64% out of 559. In that, majority of the participants 283 (79.1%) were males. The overall average age of the participants was 27.1 ± 8.2 (Range: 18 – 65) years. Most of the participants were lying in the age-group of 21 – 40 years and very few 4 (1.1%) in the age-group of >50 years. Among 358 participants, 162 (45.3%) were in the plant production & protection major and followed by 128 (35.8%) were in the major of nutrition & food sciences. Above 1/4th of the participants 11 (31.3%) were in the 3rd level. The average means total scores of barrier, attitude and preparedness were shown in **Table – 1**.

Table 1. Distribution of socio-demographic and mean total scores of barrier, attitude and preparedness among the participants

Socio-demographic Variables	No. of Participants (n)	Percentage (%)
Gender		
Male	283	79.1
Female	75	20.9
Age (in years) Mean \pm SD	27.1 \pm 8.2 (18 – 65)	
Age – Groups (years)		
≤ 20	54	15.1
21 – 30	211	58.9
31 – 40	60	16.8
41 – 50	29	8.1
> 50	4	1.1

Socio-demographic Variables	No. of Participants (n)	Percentage (%)
Major		
Nutrition and Food Sciences	128	35.8
Agriculture Economics	37	10.3
Animal Production & Protection	31	8.7
Plant Production & Protection	162	45.3
Undergraduate Level (by Year)		
1	79	22.1
2	112	31.3
3	89	24.9
4	78	21.8
Survey Domains		
Barrier Total Score	37.5 ± 10.5 (12 – 60)	
Attitude Total Score	78.7 ± 21.5 (24 – 120)	
Preparedness Total Score	31.1 ± 8.5 (9 – 45)	

Gender effect on barrier, preparedness and attitude total score

In this section, the scores from the survey for all domains were calculated and compared among males and females participants. The average score for barriers, preparedness and attitude are shown in **Table – 2**.

Table 2 .Comparison of mean between gender and total score of barrier, attitude, and preparedness among the participants

	Gender	N	Mean	Std. Deviation	t - value	P - value
Barrier total score	Male	283	37.40	10.64	-0.225	0.822
	Female	75	37.71	10.07		
Attitude total score	Male	283	30.96	8.51	-0.562	0.575
	Female	75	31.59	8.59		
Preparedness total score	Male	283	79.16	21.45	0.759	0.448
	Female	75	77.04	21.69		

In males, the mean score for barriers was (37.40 ± 10.64), for attitude was (30.96 ± 8.51), and for preparedness was (79.16 ± 21.45). In females, the mean score for barriers was (37.71 ± 10.07), for attitude was (31.59 ± 8.59), and for preparedness was (77.04 ± 21.69).

For Barriers domain, the difference was not statistically significant with t – value = -0.225 and p – value 0.822 (>0.05). For Attitude domain, the difference was not statistically significant with t – value = -0.562 and p – value 0.575 (>0.05). For Preparedness domain, the difference was not statistically significant with t – value = 0.759 and p – value 0.448 (>0.05).

As summary, there was no statistically significant difference between males and females towards any of the survey domains.

Age effect on barrier, attitude and preparedness total score

In this section, the scores from the survey for all domains were calculated and compared among different age groups of participants. The participants were classified into five age groups as shown in Table 1. The average scores for barriers, attitude, and preparedness are shown in **Table – 3**.

Table 3. Comparison of mean between total scores of barrier, attitude and preparedness with age groups

	Age – Groups (in years)	N	Mean	Std. Deviation	95% Confidence Interval for Mean		p-value
					Lower Bound	Upper Bound	
Barrier total score	≤20 Years	54	39.72	11.70	36.53	42.92	0.004
	21 - 30 Years	211	38.38	9.96	37.03	39.73	
	31 - 40 Years	60	33.13	11.01	30.29	35.98	
	41 - 50 Years	29	35.76	8.24	32.63	38.89	
	>50 Years	4	35.75	14.55	12.60	58.90	
	Total	358	37.46	10.51	36.37	38.56	
Attitude total score	≤20 Years	54	68.93	24.93	62.12	75.73	0.0001
	21 - 30 Years	211	77.73	20.63	74.93	80.52	
	31 - 40 Years	60	90.77	16.94	86.39	95.14	
	41 - 50 Years	29	82.66	15.52	76.75	88.56	
	>50 Years	4	53.75	25.04	13.91	93.59	
	Total	358	78.72	21.49	76.48	80.95	
Preparedness total score	≤20 Years	54	27.37	9.82	24.69	30.05	0.0001
	21 - 30 Years	211	30.64	8.22	29.52	31.75	
	31 - 40 Years	60	35.10	6.82	33.34	36.86	
	41 - 50 Years	29	34.24	6.62	31.73	36.76	
	>50 Years	4	22.75	9.54	7.58	37.92	
	Total	358	31.09	8.52	30.21	31.98	

The mean comparison between total scores of barrier, attitude and preparedness and age-groups showed a statistically significance with $p\text{-value} < 0.05$.

In **barrier domain**, the highest score was for students with ≤ 20 years old (39.72 ± 11.70) and the lowest score was for students 31-40 years old (33.13 ± 11.01). The group comparison was statistically significant between all age groups $p\text{-value} = 0.004$

In the **Bonferroni Post-hoc analysis** for the barrier total score with age groups, the inter age group ≤ 20 years was statistically significantly different with both age groups 21-30 years and 31 – 40 years. In addition, age group 21 – 30 years was also statistically significantly different with age group 31 – 40 years; However, age group 41 – 50 years showed no significant difference with any inter age-groups.

The **correlation** between age mean and barrier total score mean showed negative correlation ($r = -0.150$) with high statistical significance at $p\text{-value} = 0.004$ (< 0.01).

In **attitude domain**, the highest score was for students with 31 - 40 Years (90.77 ± 16.94) and the lowest score was for students > 50 years old (53.75 ± 25.04). The group comparison was statistically significant between all age groups $p\text{-value} = 0.0001$

In the **Bonferroni Post-hoc analysis** for the attitude total score with age groups, the inter age group ≤ 20 years was statistically significantly different with both age groups 31 – 40 and 41 – 50 years. In addition, age group 21 – 30 years was also statistically significantly different with age group 31 – 40 years; the age-group 31 – 40 years showed statistically significant difference with age groups ≤ 20 , 21 – 30 and > 50 years; Finally, the age-group > 50 years has shown a statistically significant difference with the age-group 31 – 40 years only.

The **correlation** between age mean and attitude total score mean showed positive correlation ($r = 0.158$) with high statistical significance at $p\text{-value} = 0.003$ (< 0.01).

In **preparedness domain**, the highest score was for students with 31-40 years old (35.10 ± 6.82) and the lowest score was for students >50 Years (22.75 ± 9.54). The group comparison was statistically significant between all age groups p -value = 0.004

In the **Bonferroni Post-hoc analysis** for the preparedness total score with age groups, the inter age group ≤ 20 years was statistically significantly different with both the age-groups 31 – 40 years, 41 – 50 years. The age-group 21 – 30 years, has shown statistically significant difference with the age-group 31 – 40 years only; The age group 31 – 40 years showed a statistically significant difference with ≤ 20 , 21 – 30, and >50 years of age-groups; Finally, the age group >50 years showed statistically significantly difference with 31 – 40 years of age-group only.

The **correlation** between age mean and preparedness total score mean showed positive correlation (r) = 0.189 with high statistical significance at p – value = 0.0001 (<0.001).

Effect of major on barrier, attitude and preparedness total score

In this section, the scores from the survey for all domains were calculated and compared among different majors of participants. The participants were classified into four groups as shown in Table 1. These majors were: nutrition and food sciences, agriculture economics, animal production and protection, and plant production and protection.

The mean comparison between majors and total scores of barrier, attitude and preparedness showed no statistical significance with p -value >0.05 as shown in **Table – 4**.

Table 4. Comparison of mean between total scores of barrier, attitude and preparedness with major classifications

	Majors	N	Mean	Std. Deviation	95% Confidence Interval for		p - value
					Mean		
					Lower Bound	Upper Bound	
Barrier total score	Nutrition & Food Sciences	128	37.40	10.69	35.53	39.27	0.953
	Agriculture Economics	37	37.97	10.40	34.50	41.44	
	Animal Production & Protection	31	38.26	8.50	35.14	41.38	
	Plant Production & Protection	162	37.25	10.81	35.57	38.92	
	Total	358	37.46	10.51	36.37	38.56	
Attitude total score	Nutrition & Food Sciences	128	78.55	22.20	74.66	82.43	0.325
	Agriculture Economics	37	80.84	19.52	74.33	87.35	
	Animal Production & Protection	31	72.23	18.99	65.26	79.19	
	Plant Production & Protection	162	79.60	21.75	76.23	82.98	
	Total	358	78.72	21.49	76.48	80.95	
Preparedness total score	Nutrition & Food Sciences	128	31.28	8.80	29.74	32.82	0.066
	Agriculture Economics	37	33.14	8.47	30.31	35.96	
	Animal Production & Protection	31	27.68	7.81	24.81	30.54	
	Plant Production & Protection	162	31.14	8.31	29.85	32.43	
	Total	358	31.09	8.52	30.21	31.98	

In **barrier domain**, the highest score was for students of animal production and protection major (38.26 ± 8.5) and the lowest score was for students of plant production and protection (37.25 ± 10.81). However, the group comparison was not statistically significant between all major groups p -value = 0.953. **Bonferroni Post-hoc analysis** between different majors showed no statistical significance in barrier total scores.

In **Attitude domain**, the highest score was for students of agriculture economics major (80.84 ± 19.52) and the lowest score was for students of animal production and protection major (72.23 ± 18.99). However, the group comparison was not statistically significant between all major groups p -value = 0.325. **Bonferroni Post-hoc analysis** between different majors showed no statistical significance in attitude total scores.

In **preparedness domain**, the highest score was for students of agriculture economics major (33.14 ± 8.47) and the lowest score was for students of animal production and protection major (27.68 ± 7.81). However, the group comparison was not statistically significant between all major groups $p\text{-value} = 0.066$. **Bonferroni Post-hoc analysis** preparedness total score showed a statistically significant difference ($p\text{-value} \leq 0.05$) between agriculture economics and animal production.

Undergraduate level effect on barrier, attitude and preparedness total score

In this section, the scores from the survey for all domains were calculated and compared among different undergraduate levels of participants. The participants were classified into four groups as shown in Table 1. These years were: 1 to 4.

The mean comparison between total scores of barrier, attitude and preparedness and undergraduate level showed no statistical significance with $p\text{-value} > 0.05$ as shown in **Table – 5**.

Table 5. Comparison of mean between total scores of barrier, attitude and preparedness with undergraduate level

	Undergraduate Level	N	Mean	Std. Deviation	95% Confidence Interval for Mean		p - value
					Lower Bound	Upper Bound	
Barrier total score	1	79	37.90	10.76	35.49	40.31	0.314
	2	112	38.69	9.82	36.85	40.53	
	3	89	36.87	11.47	34.45	39.28	
	4	78	35.95	10.02	33.69	38.21	
	Total	358	37.46	10.51	36.37	38.56	
Attitude total score	1	79	80.20	20.24	75.67	84.74	0.590
	2	112	76.41	22.43	72.21	80.61	
	3	89	79.64	22.59	74.88	84.40	
	4	78	79.46	20.16	74.92	84.01	
	Total	358	78.72	21.49	76.48	80.95	
Preparedness total score	1	79	31.82	8.25	29.98	33.67	0.310
	2	112	29.86	8.80	28.21	31.50	
	3	89	31.38	9.16	29.45	33.31	
	4	78	31.81	7.52	30.11	33.50	
	Total	358	31.09	8.52	30.21	31.98	

In **barrier domain**, the highest score was for students of second year level students (38.69 ± 9.82) and the lowest score was for students of fourth year level students (35.95 ± 10.02). However, the group comparison was not statistically significant between all major groups $p\text{-value} = 0.314$. **Bonferroni Post-hoc analysis** between different majors showed no statistical significance in barrier total scores.

In **Attitude domain**, the highest score was for students of first year level students (80.20 ± 20.24) and the lowest score was for students of second year level students (76.41 ± 22.43). However, the group comparison was not statistically significant between all major groups $p\text{-value} = 0.590$. **Bonferroni Post-hoc analysis** between different undergraduate level showed no statistical significance in attitude total scores.

In **preparedness domain**, the highest score was for students of first year level students (31.82 ± 8.52) and the lowest score was for students of second year level students (29.86 ± 8.8). However, the group comparison was not statistically significant between all major groups $p\text{-value} = 0.310$. **Bonferroni Post-hoc analysis** between different undergraduate level showed no statistical significance in preparedness total scores.

Discussion:

The Covid-19 pandemic has caused large change in educational and institutional systems around the world. About 290.5 million students were not attending schools due to the spread of COVID-19 (UNESCO, 2020). Universities had to move toward online distance learning systems immediately for education to continue running in the new normal post-COVID-19 life (Radwan & Radwan, 2020).

In this study about 76 % of the student were satisfied with the quality of services offered from Jerash University during the COVID-19 lockdown and that is not surprising. University and College continuously provided the students and faculty with proper and highly important technical support, from the start of the pandemic in March up to the time of this survey (November) which is about 8 months, Jerash University delivered around 3273 zoom meeting, students submitted about 2849 assignments, faculty recorded and uploaded about 12990 videos of live lectures on the university learning management system (LMS). The college of agriculture alone uploaded about 1350 videos of live lectures and about 323 live zoom meeting.

Our current study indicate that 63.6% of the students don't have prior experience to online learning systems, the results showed a good preparedness scores and that can be explained from the good knowledge of basic computer skills. According to recent article, developing of preparedness among learners can be done through changing and reshaping of educational curriculum goals to keep up with new learning techniques (Cahapay,2020).

Among the responses of the student 56.3 % were unhappy with the online practical session, that mainly focus on learning field work and hand skill, and it is understandable as it is very critical for the 4th year students who are about to graduate and get involved in the real working environment that required a lot of practical skills, same results was reported by (Thapa et al., 2020), which reported online learning negatively impacted practical field work that can't be possible in online classes.

In this study 61% of the students indicated that communicating with faculty and other students was doable during the pandemic and lockdown, in addition faculty were ready to help in answering questions in timely manner. Communicating with the instructors and motivation can be distinguished between achievement levels of students as reported by (Filcher C, and Miller Greg, 2000).The percentage of students preferring in class learning method was about 50% , other study in Jordan reported that achievement score for students was higher in the online classes compared to in class learning system. (Sowan and Idhail, 2014), while other study reported the preference of undergraduate students to in class learning compared to online learning system (Kemp and Grieve, 2014).

There were statistically difference between age groups, this can be explained by wide range of age groups within our students in different departments. Our university admission policy attracts students from various age groups that includes workers and employers in governmental job and in private companies, as well as students with associate degrees (diploma). The average age of students was 27.1 ± 8.2 with a wide range of ages from 18-65 years old. This may explain the significant difference in some domains between age groups as shown in results.

However, all three domains were not statistically different throughout both genders, our four departments, and throughout the different levels of study, as similar setting were implemented during the lockdown period.

The subgroup analysis revealed some interesting variation in responses for all domains, the middle age group (31-40) students were reporting less barriers, better attitude and preparedness in comparison to either young age or old age students.

As anticipated, there were no gender effects on any of the survey domains. Similarly, the major of study as well as the undergraduate level were not different in all three domains. These results may be explained by the central governess of the college of agriculture to all departments that have the same distance learning tools, platforms, as well as assessment models.

With online learning depending mainly on the availability of good network quality, student mentioned this point as the main barrier for them to attend classes on time and perform better in their assignments and projects. The network providers are working with the university as well as other educational institutions to improve the quality of services provided for educational purposes.

Limitations of the Study

This is a survey questionnaire study that is not free of limitation. The observational, opinion-based study can compromise the quality of the results, however, the relatively high response rate to the survey increases the validity and reliability of these results. The participation was voluntarily, and the groups were not equally distributed; majority were male students, middle aged, and mid-level in their study. Universities should find ways to adapt to the new era of technology use post COVID-19 Pandemic. (Teras et.al 2020) The transformation from traditional classroom / field education to distance learning was imposed to all university students through the central government and this might add some challenges to students to adapt to the fast-changing environment with COVID-19 pandemic.

Sharing our student experience with different colleges of agriculture and others in the country could help to improve distance learning model of education and enhance the tools to be used and adapted further in similar situations.

Conclusion

This study reported the preparedness, attitude and barriers expressed by the college of agriculture students toward distance online learning experience implemented through COVID-19 pandemic lockdown. The goal of this study was ultimately towards improvement of quality of educational experience. The results indicated a satisfactory preparedness, positive attitude and acceptable perception of barriers. This real-life new experience for our students during pandemic lockdown identified areas for improvement. College administration may utilize these information for further planning and quality improvement.

Recommendations

Based on the presented results of this study we recommend the following:

- 1- Improve the infrastructure within college by adapting updated electronic educational platforms.
- 2- Improve student's skills and capabilities to utilize university electronic platforms through training sessions.
- 3- Local internet providers should support the college students with affordable plans to ease access to distance online learning.

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