

The Degree of Twenty-First Century Skills Application Among Saudi University Students

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Abstract:

The current research aims to identify the degree of twenty-first century skills application among university students in the Kingdom. By determining the level of skills available in the university curricula from the students' point of view, determining the level of application of the skills among university students and indicating the differences reflected in the response of the sample members (gender and specialization). The research sample consisted of (576) male and female students from Saudi universities. The researcher prepared a scale through reviewing several studies related to its construction and application to use it with the participants. This scale consisted of two parts: The first part is a survey measuring the 21st century skills in the university curricula. The second part is the university students' application of the skills of the twenty-first century. The results of the research showed that the skills of the 21st century are available and applicable in the university curricula with a high degree among university students, with statistically significant differences between the literary and scientific disciplines of students in favor of the scientific students. There are no differences between the gender of the participants in possessing the skills of the 21st century, except in flexibility in favor of males.

Keywords: *21st Century Skills, Social Constructivism Theory, Connectivism Theory, University Students, Staff Members*

Introduction:

Society at the present time is characterized by the rapid movement in all aspects of life which has become more developed than before. This requires covering all these aspects with other means in addition to knowledge and information. In the light of the inflation occurring in

society, learners have suffered from controlling, confronting and learning it. This is because the movement of rapid development required a number of skills that students must acquire to be ready to use this knowledge and information in their post-school life (Al-Dubaisi, 2020).

In addition, Teachers and staff members should value these new skills and strive to incorporate them into the curricula and teach them because they are considered central the age (Larson & Miller, 2011). Students need to possess skills that can help them to overcome obstacles and problems facing them during the study such as the skills of using technology, life skills, and others and this is called 21st Century skills (Abdul Razzaq, 2019). The teacher should prepare students to use these skills because of their importance in their scientific and practical lives. This preparation needs to work on developing curricula, teaching instruments used, and assessment methods to be suitable to the skills of the twenty-first century in which people live, in addition ,to teachers and staff members that value this new trend.

Education at the present time is witnessing an accelerating shift of the fundamental changes in the educational system due to the information explosion and the technological revolution which forces the learner to acquire skills to help them keep pace with the development (Alhawri and Alqudsi, 2020). This era concentrates on the knowledge economy, which requires the individual to possess many skills among which are the skills of the twenty-first century, and that they possesses skills that help them to work and live in a cognitive community

environment, and skills that help them to use the technology surrounding them (Khaldi & Kishek, 2020).

The skills of the twenty-first century are not the spur of the moment. Rather, they are skills that leaders in countries are aware of due to their importance and the learner's need for them in researching, auditing, and connecting information. Their importance lies in knowing how to use them to obtain updates in knowledge and information in smart and innovative ways. This means that the individual at the present time will not be able to dispense it in dealing with what is going on around them and in completing their life work, especially their education and learning.

Research problem:

In spite of the availability of the twenty-first century skills in the curricula in the stage of preparing students in general education, their application in different ways, and methods and assessment of its mastery of the transition to higher university education. However, students still face difficulty in the process of applying these skills and working with them (Laird & Nehring & Szczesiul, 2019; Khaldi & Kishek, 2020). This defect may be due to many reasons, for example, the preparation of teachers, as studies have confirmed, the importance of this preparation in developing the skills of the twenty-first century by dealing with students in the classroom or outside it. This helps students to acquire new skills from their teachers (Alhawri & Alqudsi, 2020).

Additionally, it was found that most teachers of Arab countries focus their teaching on the students' needs as a whole and not on the needs of the individual himself. The

student's education is traditional seeking for a certificate without focusing on acquiring the skills that students need in their life after graduation (world bank, 2014). Hence, the role of the teacher is now different and more complex than before. Teachers have become a source of knowledge to help encourage students master their skills to get what they want in the field of learning and education, whether as a supervisor, as a mentor, or as a guide. (Khalil, 2014).

Acquiring and mastering the skills of the twenty-first century needs more application and successive work because of its importance in the development of human resources. Through focusing on the training materials concerned with the skillful as well as the cognitive side. This is an vital matter because of the great importance of these skills in preparing graduates with special characteristics that distinguish them from others. Furthermore, to provide them with reasons for success in dealing with life situations and the labour market in easier and faster ways (Trilling & Fadel, 2009).

Therefore, the problem of the research lies in the lack of some students' mastery of twenty-first century skills when practicing in the context of daily university life. These skills should be mastered by students at the present time because they are among the most important skills which help students face successive changes in different life and practical fields.

Based on the prior information the problem of the study was manifested in the need to study the application level of these skills by university students to ensure their ability to master them and the impact of curricula and teachers in training on these skills through public education.

Research questions:

1. What is the level of the twenty-first century skills that are available in the university curricula of the research sample?
2. What is the level of application of the twenty-first century skills among the research sample?
3. Are there statistically significant differences at the level of (0.05) between the mean scores of specializations (scientific - literary) in the availability level of the twenty-first century skills in the university curricula of the research sample?
4. Are there statistically significant differences at the level of (0.05) between the mean scores of specializations (scientific - literary) in the degree of their possession of the skills of the twenty-first century among the research sample?
5. Are there statistically significant differences at the level of (0.05) between the mean scores of (males - females) in the availability level of the twenty-first century skills found in the university curricula of the research sample?
6. Are there statistically significant differences at the level of (0.05) between the mean scores of (males - females) in the degree of their possession of the skills of the twenty-first century among the research sample?

Research objectives:

The current research aimed at:

1. Determining the level of twenty-first century skills available in the university curricula from the students' point of view.

2. Determining the level of application of the skills of the twenty-first century among university students.
3. Determining the differences in the degree to which the sample members possess the skills of the twenty-first century according to gender (males/females) and specialization (scientific/literary).
4. Developing an initial perception of how to master the skills of the twenty-first century by university students through the curricula presented to them, which focus on the skillful side rather than the cognitive side.

Research significance:

1. Indicating the importance of twenty-first century skills for university students.
2. Preparing courses that help students apply and master the skills of the twenty-first century.

Research delimitations:

The current research is delimited to the following:

Objective delimitations: The level or degree of application of twenty-first century skills among university students in the Kingdom of Saudi Arabia.

Spatial boundaries: A number of Saudi university students in the Kingdom of Saudi Arabia.

Time boundaries: The second semester of the academic year 1441/1442 AH.

Human boundaries: Male and female students at Saudi universities in the higher academic stages of bachelor's, master's, and doctoral degrees.

Research terms:**Twenty-first century skills:**

Khomais (2018) defined them as: “a set of skills that workers in various work environments need to be effective, productive, and even creative members, in addition to mastering the knowledge content necessary to achieve success, in accordance with the developmental and economic requirements of the twenty-first century”(p. 152).

The procedural definition of twenty-first century skills:

They are the skills that depend on (learning and creativity skills, digital culture skills, life, and career skills) which university students should master in order to be in harmony with the requirements of the current era and achieve academic achievement in the educational process.

Theoretical background:**1. Twenty-first century skills:**

Twenty-first century skills are considered one of the most important set of skills that need to be worked on and developed . These skills are essential to the current generations due to their importance in refining their outcomes, preparing them for the labour market, and developing their lives. These skills are the cornerstone of the current educational process because of their impact on helping students take advantage of the existing explosion of information and knowledge which allow them to refine many of their skills and enable them to verify, scrutinize and analyze information to be used in proper ways.

(Corbisiero-Drakos, Reeder, Ricciardi, Zacharia & Harnett, 2021)

The learners need these skills to help them assimilate and work in a society characterized by technology and increasing knowledge.

The acquisition of these skills helps in refining the integrative personality such as; the art of negotiation, the ability to use the new technologies, conducting dialogues, problem solving, creative and critical thinking of topics, and crises management (Moneim 2020). Now, it is difficult for the teacher to manage this knowledge because of its flow and abundance. Textbooks are no longer the basis of the educational content for students, instead, the information has evolved onto the internet. This requires students to master the potential ability to use this information after making sure of its validity and safety. This confirmed the need to be able to use these skills in order to become aware of what is going on around them, to be able to extract information and determine how to deal with it in the light of different cultures, decision-making, and so on (Trilling & Fadel, 2009; Khaldi & Kishek, 2020).

The educational system also encourages students to acquire knowledge and skills to overcome obstacles in life and work through studying curricula, working on developing them, and urging to increase the degree of application of these skills in the classroom. All this helps students to be ready to deal with the increase and acceleration of information and knowledge around them.

Many studies and researchers (Khaldi & Kishek, 2020, Al Maalouf, Alzboon & Ennab, 2018; Al-Dubaisi, 2020,

2020, Alhawri & Alqudsi, 2020; Moneim, 2020) clarified the divisions of skills of the 21st century and agreed that whatever the presentation way of discussing these skills, they are only divided into its own three categories: learning and creativity skills, digital culture skills, life and career skills.

2. The significance of the twenty-first century skills for students and their relationship to theories:

The skills of the twenty-first century are based on many sets of skills that require students to work on and master to meet the cognitive needs of life and the teacher after studying. These skills are divided into many skills that help students to know how to deal with knowledge inflation. Therefore, when referring to the origin of the various skills of the twenty-first century, it is found that they are based on social constructivism theory and communication theory (Khaldi & Kishek, 2020; Al-Tamimi, 2021).

Social Constructivism Theory:

A theory that concentrates on practice and participatory work and reinforces the level of social interaction. It goes back to its founder "Vygotsky" who supported the idea of individual benefit from the development of his knowledge through understanding and knowing how to deal with it (El Mahdy, 2020) and through the development of social relationships that permit transmission to the internal learning level of the learner, and through collecting a large amount of information by the individual in order to be analyzed and discussed. This helps to get access to a critical fundamental perception for decision-making and problem-solving through open

conversations and dialogues between the learner and teacher (Al-Tamimi, 2021).

This theory is considered one of the most important as it supports the integration of work and learning with application, social interaction, the formation of interactive relationships, and building knowledge between societies. This helps the learner to acquire many skills such as self-development, arrangement of ideas after studying them, identifying gaps, and working to solve them. (Afifi, 2020)

Communication Theory:

This theory encourages learning by using new technologies to provide the skill of interpersonal communication or networking, which is a type of twenty-first century skills. Also, it encourages the use of different digital applications in presenting teaching methods in different curricula (Mamdouh & Al-Fifi, 2020). This theory helps in harnessing technologies to be used in learning and teaching. Additionally, it encourages creativity which is fully related to the characteristics of learners in the twenty-first century (Elebid & Alshia, 2018).

Related studies:

Through reviewing many studies in the field of twenty-first century skills, the researcher noticed that most studies concentrate on the availability of twenty-first century skills in curricula such as the study of Khaldi and Kishek(2020), which discussed an enriching critical analysis of science and math curricula of the intermediate stage to know the extent to which the skills of the twenty-first century are

applied and their effectiveness and impact on students in the educational process of acquiring skills. Therefore, the results of the analysis of the curricula in this study revealed a significant lack of 21st century skills, which is the reason for the lack of mastery and development in the level of students. Therefore, this study presented mechanisms that contribute to enriching the curricula with these skills such as; restructuring some lessons, adding a number of activities, and enriching examples to these curricula in order to be appropriate to the needs of the twenty-first century. This indicates the importance of enriching curricula with applications and activities that help students to work on these skills rather than on written tasks based on memorized information that does not help them to overcome any future obstacles in the field of work and life.

UNICEF(2010), conducted a study in which it analyzed the curricula in Palestine in science, geography, and Arabic courses. It was obvious that these courses are not provided with the twenty-first century skills, but they are characterized by deficiency and inaccuracy and do not help students after graduation to distinguish between these skills in their future social and professional lives. This is considered as the main factor in the deterioration of students' levels after the general educational stage due to their inability to deal with inflation and the increase of information, and the inability to understand the use of these skills.

As for the studies that adopt the level of application of twenty-first century skills with all kinds in the educational process whether general or university. 21st century skills have been found in many studies such as the study of (Al-Dubaisi, 2020) which aimed at measuring the performance

of female art education teachers in the elementary stage, at their work in the light of the skills of the twenty-first century from their point of view in Bisha city. The research sample consisted of 70 female teachers of art education. The results of the study pointed out that there were statistically significant differences in the level of teaching performance in the elementary stage of the twenty-first century skills attributed to many years of experience and these differences in favor of the category (5 years or more). The results also pointed out that there are no statistically significant differences in the level of teaching performance of art education female teachers in the elementary stage of the twenty-first century skills depending on the variable of the educational qualification. This means that preparing teachers for such skills needs to be reviewed to enable them to increase the level of their teaching performance through the use of these skills and passing them on to their students.

As for the study of Alhawri and Alqudsi (2020) which aimed to know the role of the teacher in developing the skills of the twenty-first century among secondary school students in Yemen, it was obvious that their role varies according to the applied skill. The study proved that teachers' role in developing cooperation and effective communication skills was higher than average and the critical thinking and digital skills were average or below. The results pointed out that there were statistically significant differences in students' responses attributed to the gender variable in favor of males. This indicated that the teachers' educational background, and their preparation degree affected the preparation of students. The students acquired these skills that are applied by teachers

conscientiously. It was also clear that what is not discussed in classes, projects, and applied activities in the school with teachers is neglected. The study emphasized the need to prepare teachers to be compatible with the skills of the twenty-first century. It also showed that it is necessary to provide appropriate support to schools, provide them with technology, and ask the Ministry of Education to include the skills of the twenty-first century in the curricula.

Nehring, Laird, and Szczesiul (2019) presented their study by measuring the degree of application of twenty-first century skills by students. It was noticed that two-thirds of students in schools were able to acquire twenty-first century skills, while the remaining third was unable to do so due to wrong practices of teachers in their application of those skills in three high Californian schools. This showed that the propagation of misconceptions and wrong applications of using skills by instructors with their students in class had affected them in completing it correctly. This is due to the instructors' lack of awareness or lack of preparation of the 21st century skills.

The study of AlMaalouf, Alzboon, and Ennab (2018) introduced perceptions of the faculty members in Jordanian universities of the skills that university students should possess in the 21st century. The sample of the study consisted of 250 staff members. The results of the study indicated that the perceptions of staff members regarding the skills that students should possess in the twenty-first century were high. There were no individual differences attributed to the variable of gender and rank among faculty members. Therefore, the researchers recommended the importance of working on developing the vision of universities and curricula and methods of teaching.

Lastly, the study of Batut (2017) aimed to determine the extent to which graduates of Department of Art Education at Taibah University have acquired the skills of the twenty-first century. The research sample consisted of (71) university students. The results of the study confirmed that the degree of the students' acquisition of communication skills, self-management, and specialized academic thinking is mostly found. As for technology as a skill, it was sometimes found in students. There were no statistically significant differences due to the gender variables and the academic qualification because the same practices between male and female students in the introduced courses quality and the same way they were presented.

When reviewing the previous studies, the researcher found that they varied in terms of objectives, where some of them aimed to find out the extent of the twenty-first century skills in curricula, others aimed at determining the level of their application in the educational process, third aimed at knowing the role of the teacher in developing these skills, and fourth aimed at knowing the perceptions of the staff members regarding the skills that students would prefer to possess.

The studies were also varied in individuals of the samples, some of them chose students as samples while others chose teachers. Therefore, the results also were differed. The researcher benefited from the previous studies in choosing the subject, objectives of the research, the selected sample, and the appropriate statistical method.

Research procedures:**First: Research Methodology:**

The researcher relied on the descriptive correlative approach as it is suitable for the purposes of the current research which depends on collecting and studying information.

Second: Research Tools:

The researcher designed scales with the aim of determining the degree of application of the skills of the twenty-first century among university students in the Kingdom of Saudi Arabia through reviewing several studies related to its construction. These scales consisted of two parts: The first part: a survey measuring the twenty-first century skills in the university curricula.

The second part: the university students' application of the skills of the twenty-first century which is represented in the following:

The first skill: learning and creativity skills: innovation and creativity, critical thinking and problem solving, and communication, sharing or collaboration skills.

The second skill: digital culture skills: information culture, media culture, and information and communication technology (ICT) culture.

The third skill: life and career skills: flexibility and adaptation, initiative and self-guidance, social skills, interaction and understanding of cultures, productivity and accountability, and leadership and sense of responsibility.

Third: The research sample:

The research sample participants consisted of (576) male and female students from Saudi universities.

- Psychometric properties for the scale of Availability of 21st century skills in the university courses.

a. Internal consistency

The internal consistency of the scale of Availability of 21st century skills in the university courses. was calculated as an indication of the integrity of the test structure, through using Pearson's Correlation Coefficient, so as to find the correlation between the item score and the overall score of the scale. Results are as shown in the following table (1):

Table (1)
Correlation coefficients between item score and the overall score of the scale: N = 200

Items	Corrected Item-Total Correlation	Items	Corrected Item-Total Correlation
1	.793**	7	.793**
2	.794**	8	.829**
3	.782**	9	.797**
4	.781**	10	.838**
5	.796**	11	.749**
6	.786**		

** All values are significant at (0.01)

Results indicated that all items were significantly correlated at the level (0.01) between the items' scores and the overall score of the scale, in those items that were agreed upon.

b) Scale Reliability:

The reliability of the scale of Availability of 21st century skills in the university courses. with its various dimensions was calculated through using Cronbach's alpha coefficient as shown in table (2):

Table (2)
Scale Reliability for Availability of 21st century skills in the
university courses scale : N = 200

Variable	No of Items	Cronbach's Alpha
Availability of 21 st century skills in the university courses	11	0.955

Table (2) shows that the reliability coefficient of the scale of Availability of 21st century skills in the university courses implementation came high, which indicates that the scale has a high degree of reliability.

1) Psychometric properties for the scale of **University Students' implementation of 21st Century Skills:**

a) Internal consistency

The internal consistency of the scale of University Students' implementation of 21st Century Skills. was calculated as an indication of the integrity of the test structure, through using Pearson's Correlation Coefficient, so as to find the correlation between the item score and the overall score of the scale. Results are as shown in the following tables (3,4)

Table (3)
Correlation coefficients between item score and the overall score
of the skill N = 200

Ite		Correct	Ite		Correct
1	Innovation and creativity	.737**	1	Critical thinking and problem solving	.665**
2		.823**	2		.800**
3		.819**	3		.737**
4		.744**	4		.776**
5		.781**	5		.686**
6		.809**	6		.775**
7		.804**	7		.785**
1	Communication, sharing or collaboration skills	.737**	1	Information culture	.777**
2		.742**	2		.778**
3		.775**	3		.710**

Ite		Correct	Ite		Correct		
4		.780**	4		.845**		
5		.845**	5		.827**		
6		.846**	6		.825**		
7		.875**	7		.859**		
8		.833**	8		.685**		
9		.765**	9		.718**		
1		Media culture	.693**		1	ICT culture	.773**
2			.742**		2		.722**
3	.714**		3	.783**			
4	.803**		4	.804**			
5	.813**		5	.752**			
6	.746**		6	.762**			
7	.744**						
1	Flexibility and adaptation	.732**	1	Social skills, interaction and understanding of cultures	.835**		
2		.854**	2		.873**		
3		.803**	3		.882**		
4		.788**	4		.867**		
5		.826**	5		.810**		
1	Initiative and self-guidance	.817**	1	Productivity and accountability	.828**		
2		.742**	2		.847**		
3		.800**	3		.867**		
4		.847**	4		.810**		
5		.770**	5		.838**		
6		.787**	6		.830**		
7		.778**	7		.769**		
8		.490**					
1	Leadership and sense of responsibility	.698**	6	Leadership and sense of responsibility	.819**		
2		.827**	7		.769**		
3		.848**	8		.821**		
4		.848**	9		.768**		
5		.813**					

**** All values are significant at (0.01)**

Results indicated that all items were significantly correlated at the level (0.01) between the items' scores and the overall score of the agreed items

Table (4): Correlation coefficients between skills score and the overall score of the scale: N = 200

skills	Total score
Innovation and creativity	.876**
Critical thinking and problem solving	.864**
Communication, sharing or collaboration skills	.872**
Information culture	.906**
Media culture	.898**
. ICT culture	.906**
Flexibility and adaptation	.884**
Social skills, interaction and understanding of cultures	.887**
Initiative and self-guidance	.920**
Productivity and accountability	.902**
Leadership and sense of responsibility	.905**

Results indicated that all items were significantly correlated at the level (0.01) between the items' scores and the overall score of the scale, in items that were agreed upon.

2- Scale Reliability:

The reliability of the scale of University Students' implementation of 21st Century Skills with its various dimensions was calculated through using Cronbach's alpha coefficient as shown in table (5)

Table (5): Scale Reliability for University Students' implementation of 21st Century Skills scale N = 200

Variable	N of Items	Cronbach's Alpha
Innovation and creativity	7	0.934
Critical thinking and problem solving	7	0.916
Communication, sharing or collaboration skills	9	0.949
Information culture	9	0.941
Media culture	7	0.919
ICT culture	6	0.917
Flexibility and adaptation	5	0.923
Social skills, interaction and understanding of cultures	5	0.946
Initiative and self-guidance	8	0.924
Productivity and accountability	7	0.949
Leadership and sense of responsibility	9	0.950
the overall score of the skills	79	0.990

Table (5) shows that the reliability coefficient of the scale of 21st Century Skills implementation came high, which indicates that the scale has a high level of reliability.

Research findings

1- Answer to the question: What is the level of Availability of 21st century skills in the university courses of the research sample?

To answer this question, the researcher used the one sample t-test to compare the hypothetical mean and the true mean to identify the level of Availability of 21st century skills in the university courses. Table (6) shows the results of this question:

Table (6): Results of the level of psychological pressures with its dimensions (n = 576)

Dimension	Hypothetical mean	True mean	Standard Deviation	T-value	Sig.	Level
Availability of 21 st century skills in the university courses	33	43.27	10.59	23.26	0.00	High

Table (6) shows the following:

- There are statistically significant differences between the real mean and the hypothetical mean of the research sample on Availability of 21st century skills in the university courses in favor of the true mean, which indicates that the level of the research sample on Availability of 21st century skills in the university courses variable is high.

2- Answer to the question: What is the level of University Students' implementation of 21st Century Skills with its dimensions to the research sample?

To answer this question, the researcher used the one sample t-test to compare the hypothetical mean and the true mean to identify the level of University Students' implementation of 21st Century Skills with its dimensions among the sample. Table (7) shows the results of this question:

Table (7): Results of the level of University Students' implementation of 21st Century Skills with its dimensions among the sample (n = 576)

Dimensions	Hypothetical mean	True mean	Standard Deviation	T-value	Sig.	Level
Innovation and creativity	21	30.14	5.70	38.48	0.00	High
Critical thinking and problem solving	21	29.31	6.08	32.77	0.00	High
Communication, sharing or collaboration skills	27	39.17	7.44	39.24	0.00	High
Information culture	27	37.56	7.54	33.62	0.00	High
Media culture	21	29.55	5.67	36.19	0.00	High
ICT culture	18	25.60	4.76	38.07	0.00	High
Flexibility and adaptation	15	21.18	4.03	36.77	0.00	High
Social skills, interaction and understanding of cultures	15	21.35	4.32	35.22	0.00	High
Initiative and self-guidance	24	32.90	6.65	32.11	0.00	High
Productivity and accountability	21	29.64	5.85	35.40	0.00	High
Leadership and sense of responsibility	27	38.13	7.38	36.20	0.00	High
University Students' implementation of 21st Century Skills As a whole	237	334.56	58.50	40.02	0.00	High

Table (7) shows the following:

-There are statistically significant differences between the real mean and the hypothetical mean of the research sample on University Students' implementation of 21st Century Skills as a whole ,with its dimensions (Innovation and creativity, Critical thinking and problem solving,

Communication, sharing or collaboration skills, Information culture, Media culture, ICT culture, Flexibility and adaptation, Social skills, interaction and understanding of cultures, Initiative and self-guidance, Productivity and accountability, Leadership and sense of responsibility) in favor of the real mean, which means that the level of the research sample on the variable of University Students' implementation of 21st Century Skills with its dimensions is high.

3- Answer to the question: Are there statistically significant differences with respect to the Specialization variable (literary and scientific) on Availability of 21st century skills in the university courses variable of the research sample?

In order to verify the significance of the differences between the mean scores of both the sample on the Specialization variable (literary and scientific) on Availability of 21st century skills in the university courses variable, the t-test "Independent Samples Test" was used to show the differences between the means of two independent, homogeneous groups that are not equal in number.

Table (8): Results of t-test for the statistically significant differences with respect to the Specialization variable (literary and scientific) on Availability of 21st century skills in the university courses variable (n = 576)

Sample	Dependent Variable	Mean	Standard Deviation	T-value	Degree of freedom	Sig. Level
literary	Availability of 21 st century skills in the university courses	41.06	9.84	3.88	574	0.00
scientific		44.57	10.81			

Table (8) shows the following:

- There are statistically significant differences between the mean scores of the Specialization variable (literary and scientific) on Availability of 21st century skills in the university courses variable of the sample?

Decisions.

As the mean of the literary sample is (41.06) with a (9.84) standard deviation; whereas, the mean of the scientific sample is (44.57), with a (10.81) standard deviation, and the t- value is (3.88), which is significant at the (0.01) level, at (574) degrees of freedom. This means that the scientific sample received more Availability of 21st century skills in the university courses, than the literary sample.

4- Answer to the question: Are there statistically significant differences with respect to the Specialization variable (literary and scientific) on University Students' implementation of 21st Century Skills variable with its dimensions to the research sample?

In order to verify the significance of the differences between the mean scores of both the sample on the Specialization variable (literary and scientific) on University Students' implementation of 21st Century Skills variable , the t-test "Independent Samples Test" was used to show the differences between the means of two independent, homogeneous groups that are not equal in number.

Table (9): Results of t-test for the statistically significant differences with respect to the Specialization variable (literary and scientific) on University Students' implementation of 21st Century Skills variable with its dimensions (n = 576)

Sample	Dependent Variable	Mean	Standard Deviation	T-value	Degree of freedom	Sig. Level
literary	Innovation and creativity	29.7477	5.39186	1.27	574	0.202
scientific		30.3757	5.87141			
literary	Critical thinking and problem solving	28.8037	5.86778	1.54	574	0.123
scientific		29.6133	6.20112			
literary	Communication, sharing or collaboration skills	39.1495	7.33351	0.05	574	0.959
scientific		39.1823	7.51544			
literary	Information culture	36.3084	7.24282	3.11	574	0.002
scientific		38.3149	7.62815			
literary	Media culture	29.2056	5.41904	1.12	574	0.260
scientific		29.7569	5.81206			
literary	ICT culture	25.1776	4.62858	1.63	574	0.103
scientific		25.8508	4.87345			
literary	Flexibility and adaptation	20.9159	3.64665	1.22	574	0.221
scientific		21.3425	4.24640			
literary	Initiative and self-guidance	32.5981	5.83958	0.85	574	0.393
scientific		33.0884	7.09671			
literary	Social skills, interaction and understanding of cultures	21.2991	4.27289	0.23	574	0.815
scientific		21.3867	4.36869			
literary	Productivity and accountability	29.5421	5.56022	0.31	574	0.752
scientific		29.7017	6.03494			
literary	Leadership and sense of responsibility	37.7944	7.14930	0.84	574	0.399
scientific		38.3315	7.51586			
literary	University Students' implementation of 21 st Century Skills As a whole	330.542	54.3040	1.27	574	0.205
scientific		336.944	60.8069			

Table (9) shows the following:

- There are no statistically significant differences between the mean scores of the Specialization variable (literary and

scientific) on University Students' implementation of 21st Century Skills as a whole, with its dimensions (Innovation and creativity, Critical thinking and problem solving, Communication, sharing or collaboration skills, Media culture, ICT culture, Flexibility and adaptation, Social skills, interaction and understanding of cultures, Initiative and self-guidance, Productivity and accountability, Leadership and sense of responsibility) of the sample?

- There are statistically significant differences between the mean scores of the Specialization variable (literary and scientific) on the dimension of (Information culture) In favor of the scientific sample

Decisions.

As the mean of the literary sample is (330.54) with a (54.30) standard deviation; whereas, the mean of the scientific sample is (336.94), with a (60.80) standard deviation, and the t- value is (1.27), which is no significant, at (574) degrees of freedom. This means that the scientific sample received equal on University Students' implementation of 21st Century Skills As a whole , with the literary sample.

5- Answer to the question: Are there statistically significant differences with respect to the Gender variable (Male and Female) on Availability of 21st century skills in the university courses variable with its dimensions to the sample?

In order to verify the significance of the differences between the mean scores of both the sample on the Gender variable (Male and Female) on Availability of 21st century skills in the university courses variable , the t-test "Independent Samples Test" was used to show the

differences between the means of two independent, homogeneous groups that are not equal in number.

Table (10): Results of t-test for the statistically significant differences with respect to the Gender variable (Male and Female) on Availability of 21st century skills in the university courses variable (n = 576)

Sample	Dependent Variable	Mean	Standard Deviation	T-value	Degree of freedom	Sig. Level
Male	Availability of 21 st century skills in the university courses	44.22	12.83	1.71	574	0.089
Female		42.67	8.90			

Table (10) shows the following:

- There are no statistically significant differences between the mean scores of the Gender variable (Male and Female) on Availability of 21st century skills in the university courses variable to the sample?

Decisions.

As the mean of the Male sample is (44.0622 with a (12.83) standard deviation; whereas, the mean of the scientific sample is (42.67), with a (8.90) standard deviation, and the t- value is (1.71), which is not significant, at (574) levels of freedom. This means that the Male sample received equal Availability of 21st century skills in the university courses, with the literary Female sample.

6- Answer to the question: Are there statistically significant differences with respect to the Gender variable (Male and Female) on University Students' implementation of 21st Century Skills variable with its dimensions to the sample?

In order to verify the significance of the differences between the mean scores of both the sample on the Gender variable (Male and Female) on University Students' implementation of 21st Century Skills variable, the t-test "Independent Samples Test" was used to show the differences between the means of two independent, homogeneous groups that are not equal in number.

Table (11): Results of t-test for the statistically significant differences with respect to the Gender variable (Male and Female) on University Students' implementation of 21st Century Skills variable with its dimensions (n = 576)

Sample	Dependent Variable	Mean	Standard Deviation	T-value	Degree of freedom	Sig. Level
Male	Innovation and creativity	30.1455	6.53314	0.01	574	0.992
Female		30.1404	5.13013			
Male	Critical thinking and problem solving	29.8636	6.74314	1.71	574	0.088
Female		28.9719	5.62633			
Male	Communication, sharing or collaboration skills	39.0727	8.31317	0.25	574	0.805
Female		39.2303	6.86020			
Male	Information culture	37.3000	8.48910	0.67	574	0.501
Female		37.7360	6.90237			
Male	Media culture	29.8273	6.29250	0.92	574	0.360
Female		29.3820	5.25197			
Male	ICT culture	25.8364	5.21769	0.93	574	0.354
Female		25.4551	4.50861			
Male	Flexibility and adaptation	21.6727	4.16138	2.29	574	0.02
Female		20.8820	3.93219			
Male	Initiative and self-guidance	33.4545	7.05055	1.55	574	0.120
Female		32.5674	6.38735			
Male	Social skills, interaction and understanding of cultures	21.0364	4.77613	1.38	574	0.166
Female		21.5506	4.02390			
Male	Productivity and accountability	29.8545	6.01951	0.67	574	0.499
Female		29.5112	5.76169			
Male	Leadership and sense of responsibility	38.1091	8.12499	0.58	574	0.954
Female		38.1461	6.89160			
Male	University Students' implementation of 21 st Century Skills As a whole	336.1727	66.06595	0.52	574	0.605
Female		333.5730	53.38236			

Table (11) shows the following:

- There are no statistically significant differences between the mean scores of the Gender variable (Male and Female) on University Students' implementation of 21st Century Skills as a whole, with its dimensions (Innovation and creativity, Critical thinking and problem solving, Communication, sharing or collaboration skills, Media culture, ICT culture, Information culture, Social skills, interaction and understanding of cultures, Initiative and self-guidance, Productivity and accountability, Leadership and sense of responsibility) to the sample?

- There are statistically significant differences between the mean scores of Information culture on the dimension of (Flexibility and adaptation) In favor of a Male sample

Decisions.

As the mean of the Male sample is (336.17) with a (66.06) standard deviation; whereas, the mean of the Female sample is (333.57), with a (53.38) standard deviation, and the t- value is (1.71), which is no significant, at (574) degrees of freedom. This means that the Male sample received equal on University Students' implementation of 21st Century Skills As a whole , with the Female sample.

Discussion of the results:

The research has confirmed the following results:

- 1) The availability of a high level of twenty-first century skills in Saudi university curricula. The researcher considers that this is a logical result, as based on her work as a staff member. She noticed the degree of the universities' interest in integrating these skills into the university curricula in order to prepare students for their working lives through providing them with many

life and information skills. This result is different from the result of the study of Khaldi and Kishek (2020) which pointed out that there is no compatibility in the mathematics and science curricula for secondary school students in Palestine with the skills of the twenty-first century. This study showed that there is a lack in presenting these skills within curricula that require their use in a large way and the researchers' belief in the role of these skills in preparing students scientifically and practically after graduation. This result is also different from the study of UNESCO (2010) which confirmed the absence of the skills of the twenty-first century in science, geography, and Arabic courses for students in Palestine.

- 2) The availability of a very high level of students' application or possession of the twenty-first century skills in Saudi universities. This result is consistent with the previous result that confirmed the availability of a high level of twenty-first century skills in Saudi university curricula. According to the researcher's opinion, this result confirms the students' success in acquiring these skills. This indicates the effectiveness of the presence of these skills within university educational curricula. This result agreed with the study of Laird & Nehring & Szczesiul (2019) which confirmed that two-thirds of students acquired twenty-first century skills in high schools in California, as well as the study of Batut (2017) Which confirmed that the degree of the students' acquisition of communication skills, self-management, and specialized academic thinking is mostly found.

- 3) There were differences between students of literary and scientific specialization about the availability of skills in university curricula in favor of the scientific students. This may be due to the specialization's curricula and its requirements which necessitate the student to work more through the use of 21st century skills with regard to the application of projects and research to the courses in the scientific curricula more than in the literary courses.
- 4) There were no differences between students of the scientific and literary specialization in possessing any of the twenty-first century skills. This can be attributed to the unification of the study plans for all specializations with regard to the twenty-first century skills, as they were included in the general requirements for all students in all disciplines.
- 5) There were no differences between males and females in their appreciation of the availability of twenty-first century skills in university curricula. This indicates the great awareness that exists among male and female students. This result agreed with the result of the study of Al Maalouf, Alzboon, & Ennab (2018) which showed the perceptions of faculty members regarding the skills of the twenty-first century were high among students because of their interest in learning and working to develop themselves through the acquisition of these skills.
- 6) Finally, there were no differences between males and females in possessing the skills of the twenty-first century except for the skill of flexibility in favor of males. This confirmed the presence of great awareness among students with the gender difference, but the

females are usually characterized by emotion than males, which makes them less flexible than males in some things that require reasoning. This result agreed with the result of the study of Batut (2017) which found no differences attributed to gender variables in the degree of students' acquisition of twenty-first century skills, while it is different from the result of the study of Alhawri and Alqudsi (2020) which found differences attributed to the gender variable with regard to the teacher's role in developing the twenty-first century skills among secondary school students. It proved that there are individual differences between males and females in favor of males in the critical thinking axis, and the researcher attributed the reason for this result to boldness and sharpness in the manner of speaking and speech more than women, and the superiority of females over males in the leadership and decision-making axis which the state provides them with empowerment.

Recommendations:

In the light of the results found out by the researcher in her current research, there are a number of recommendations:

1. Universities should prepare staff members to focus on the skilful side of students while explaining courses through workshops, training courses and enrichment meetings.
2. Staff members should focus on the evaluation aspect of the twenty-first century skills of students, with emphasizing the necessity of practicing and acquiring them to be the central pillar in evaluating the results of their work and projects.

3. Inclusion of these skills in the courses with skillful and practical scope helps to benefit from them in a wider and more completed range.
4. Using alternative assessment methods on a permanent basis for these skills so that they become the judge to complete their work accurately and clearly by following these skills. Therefore, practicing these skills by students becomes a habit at work.

Suggestions for Further Research:

1. Conducting an applied study to measure the effectiveness of 21st century skills in one of the courses.
2. Conducting a study to measure the staff members' viewpoints on 21st century skills and how to measure these skills among students.
3. Conducting a survey of the curricula and the mechanisms of applying the skills of the 21st century on them.

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