

CASE STUDY

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Elements of academic integrity in a cross-cultural middle eastern educational system: Saudi Arabia, Egypt, and Jordan case study

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Abstract

Introduction: Academic integrity is the expectation that members of the academic community, including researchers, teachers, and students, to act with accuracy, honesty, fairness, responsibility, and respect. Academic integrity is an issue of critical importance to academic institutions and has been gaining increasing interest among scholars in the last few years. While contravening academic integrity is known as academic misconduct, cheating is one type of academic misconduct and is generally defined as “any action that dishonestly or unfairly violates rules of research or education.

Case study: The case study presented in this paper describes the elements of academic misconduct in three Middle Eastern countries (Saudi Arabia, Egypt, and Jordan). Four categories of factors were analyzed, namely personal, cultural traits, contextual, and institutional. Moreover, a comparison of factors of misconduct is conducted in the three countries in order to examine how different learning environments and cultures can affect academic cheating. The study also investigates the role of teachers and administration system in enforcing integrity policy in educational institutes.

Discussion and evaluation: An evaluation of the main causes of cheating and plagiarism among students in Saudi Arabia, Egypt, and Jordan is conducted by analyzing students’ response to a 20 questions survey. The nonparametric Dunn’s statistical analysis is performed to compare the variance and frequency of factors that may affect academic integrity. The significant results are reported in terms of the Krushal F statistic and p -value < 0.05 . The evaluation was a useful process that demonstrated the main factors affecting academic integrity in the three countries.



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Conclusion: Survey results show that the role of individual social-demographic and culture factors are significant for predicting misconduct in Saudi Arabia and Egypt but not in Jordan. Most students blamed their misconduct on laziness and willingness to achieve higher education performance. Students are more likely to cheat and plagiarize because they lack the ability or information to tackle assignments. Results illustrate that the cultural impact can be a significant factor in academic misconduct. Integrity policies and the level, at which they have been applied, have a large impact on student attitudes towards cheating and their academic misconduct.

Keywords: Academic misconduct, Integrity policy, Ethics, Middle East

Introduction

Many studies have investigated cheating in exams and plagiarism among students in different countries (Grimes 2004; Jones 2011; Makarova 2019). Cheating has been a major problem in the past and it is a major problem today. Access to technology and online learning have significantly increase cheating cases (Dendir & Maxwell 2020). Cheating could affect the credibility of educational institutions and the quality of its graduates. Apart from being an immoral behavior, students who graduate due to cheating may have not acquired the knowledge, skills or competencies while studying.

A case study regarding academic dishonesty in the Kingdom of Saudi Arabia (KSA) (Razek, 2014) indicated that a large number of students consider cheating as an acceptable norm for survival in educational systems. The students admitted to copying information from Internet, using another student's paper and claiming authorship, and receiving help on assignments, and a significant number of students admitted cheating in exams. The students interviewed did not understand that these incidents were considered cheating behaviors. They primarily attributed academic misconduct to stress and their belief that they would otherwise fail. In the same study students also reported that obtaining high marks in tests is more important than learning the material.

This work focuses on some of the factors behind the non-ethical behavior pertaining to college education that could help in policy-making decisions of ethical management and governance. We have analyzed a number of individual, educational, cultural, social, and institutional aspects that affect academic dishonesty (Muhney et al. 2008) in Saudi Arabia (KSA), Egypt, and Jordan. Additionally, different common styles of cheating are compared among students in the three countries.

Case description

Factors of academic integrity

In this study, we have examined 4 factors that may affect academic integrity, each factor includes a number of sub-factors (dimensions) that independently contribute to the academic integrity. The **first factor** is related to student's individual data like gender and education and it includes four dimensions: 1) gender 2) level of education, 3) academic performance, and 4) years of study. For example, it was reported that female students are less likely to cheat than male students in large public and private colleges (Brown and Emmett 2001). McCabe and Trevino (1997) however, pointed out the increases in test cheating among women and in unpermitted collaboration among all

students on written work. Freshman students are also more prone to cheating than senior students (Harding et al. (2007) and Elias (2009)). In studies by Wei et al. (2014), graduate students reported that they are less likely to cheat than undergraduate because they focus on the impact of their research thesis rather than their grades. Harding et al. 2007 found a negative correlation between cheating and achieving high performance as assessed by GPA or academic achievement.

The **second factor** is related to cultural traits impact on academic behaviors and it includes two dimensions: 1) collectivism versus individualism and 2) pressure from parents. Bulut (2010) studied cooperative learning across several cultures, including Saudi Arabian, Turkish, Brazilian, Korean, and American, and found cooperative learning to be universal. This means that each culture places some degree of emphasis on a cooperative and collectivist nature in their teaching environments. He found the motivation of the individual or group had some effect on whether or not cooperative techniques were employed. Bulut (2010) also found that collectivistic cultures, such as Korean and Saudi Arabian, did not have significantly more involvement with cooperative learning than cultures perceived as less collectivistic. In fact, these cultures had much lower levels of cooperative learning than the other cultures. However, it was found that the Turkish culture employs the most cooperative techniques; the authors suggested this may be due to the integration of both individualistic and collectivistic cultural elements in the Turkish culture. In addition, the educational system in Turkey resembled the Westernized educational system much more than the other cultures included in the study, and many teachers in Turkey were trained in American and European countries. Americans, who are considered highly individualistic, displayed almost as much cooperative techniques as the Turkish. Bulut (2010) suggested some students may view cooperative learning as a way to receive a sense of belonging and acceptance. Pakistan is a collectivistic culture, meaning there is a strong emphasis on the group or society before the individual. This, in turn, makes people more conscious of self-respect and self-esteem (Rehman & Waheed, 2014). Because of this, it is unacceptable to ask direct questions of the student about his or her cheating behavior. Interestingly, researchers in one study asked students about cheating indirectly, using more socially acceptable language such as “seeking help” from a peer during an exam and “collaborating with others” on individual assignments (Rehman & Waheed, 2014). The results indicated that almost half of the students surveyed considered academic dishonesty an “unethical but acceptable” practice in Pakistan.

Parental pressure could be one of the main reasons that lead students to participate in cheating. Some students believe that they can meet their parents' high academic expectations or make them proud by earning high marks through cheating. Meanwhile, some parents become unaware of their children academic capabilities and they tend to put to push their children too much which lead children to cheat for not letting their parents down.

In a study of students enrolled at universities in southern Taiwan, a significant difference was found between the willingness to report a peer's academic dishonesty and friend's academic dishonesty, with students being more willing to report a peer than a friend (Yang et al., 2013). This suggests that morality is less important than the closeness of relationships to students in regards to reporting academic dishonesty. In Chinese culture, there is an emphasis on interpersonal relationships, and sensitivity to

others is typically considered to be more important than reason and obedience to the law, which may explain why students show a loyalty to those they have a close relationship with.

The **third factor** is related to student's attitude and intrinsic motivation to learn and it includes three dimensions: 1) neutralizing attitudes, 2) extrinsic motivation, and 3) main reasons for cheating (ex. Earn high marks, avoid failing and laziness). Anderman, 2007; Vansteenkiste et al. 2006; and Bolin 2004 found that a student's main purpose in earning an academic degree plays a significant role in students' cheating behavior. Kasayira et al. (2007) found a student's with self-determination and attitude to obtain new knowledge are less likely to cheat than students with extrinsic motivation, such as those who are seeking a degree to be promoted or improve their social image like those who are seeking a doctorate degree just for the title. Researchers compared Australian and American students' motivation and found that Americans were more motivated by the grades they achieved, while Australian students were more motivated by the learning experience (Davis et al., 1994). Moreover, Whitley 1998; Diekhoff et al. 1996; and LaBeff et al., 1990) presented a method to predict cheating through noticing students' neutralizing attitude and situationally. Neutralizing includes cheating without having any guilt or blame, which situationally includes the believe that cheating is acceptable due to the existence of some external factors or pressures that affect students' behavior. One study found that South African and Japanese students reported they did not cheat from a fear of punishment and a belief that it would not enhance their scores (Burns et al., 1998). Other researchers suggest that variability in the prevalence of cheating behaviors may be due to the definition of cheating and the methods used to collect data: self-report, observations, or experiments (Yardley et al., 2009).

The **fourth factor** is institutional, which includes whether or not institutional staff members strictly apply integrity policy and honor code on individuals reported to be cheating and it includes two dimensions: 1) teachers' approval/disapproval of cheating and lack of teachers control and 2) academic reasons. Researchers have found that 50% of students believe a staff member would not report incidents of academic dishonesty, and that the most severe punishment a student would receive for engaging in cheating behaviors would be the failure of the assignment involved (De Lambert et al., 2006). Because of this, it may be that students engage in academic dishonesty more often when they believe their behavior will not be reported. It has also been suggested that individuals who engage in academically dishonest behaviors are not as discouraged by feelings of guilt as they are by fear of punishment. According to Burns et al. (1998), students from the United States attributed cheating primarily to external factors. In comparison, South African students did not exhibit as clear a pattern of attribution, but most reported cheating did not necessarily enhance their resulting scores. Differences have been observed between South African and American students' fear of being caught, with South African students showing more fear than Americans. Burns et al. (1998) also looked at the differences between the academic dishonesty trends of Japanese students and American students. Japanese students did report similar reasons for cheating, such as a pressure to receive good grades and as a means to enhance their scores. Japanese students were similar to South African students—and therefore unlike American students—in that they, too, had a greater fear of being caught cheating.

Many researchers emphasized educators and teachers influence on student cheating such as Brimble & Stevenson-Clarke (2005), who found that students are likely to blame the professor for their cheating behavior, stating reasons such as the exam being too difficult. Students who believe an assessment was unfair are more likely to cheat; whereas, when professors show a significant concern about student behaviors, students are less likely to cheat (Kasayira et al., 2007). Kasayira et al. (2007) found extrinsic motivation to pursue a career may increase the likelihood of cheating. They also found students are also more likely to cheat when the course material is perceived as boring or irrelevant. Large class sizes mean that professors cannot accurately gauge the integrity of student work (Asadullah, 2005). Online quizzes induce cheating because students have virtually no checks on their behavior when completing them (Holden et al., 2021).

Teachers may be also exposed to pressures which make them help and encourage cheating in standardized tests. For example, some schools districts link-up teachers' earnings and promotions with students' achievements in exams (Tucker and Stronge 2005).

In addition to the above factors, this study examine different forms of cheating like 1) using electronic devise when not allowed, 2) copying from a book when not allowed, 3) copying partially or completely another person's work.

Methodology

The aim of this work is to conduct a comprehensive comparison of factors of misconduct (individual, cultural, institutional, and contextual) in three countries in the Middle East.

The study investigated how different countries learning environments have different causes and effects to cheating, and these differences will be discussed. The following ideas are used to frame the guidelines of this work:

Can individual's gender, motivation of studying, and level of education be significant factors in affecting students' academic misconduct, and do these factors have different influence in different educational systems and in different countries?

How do teachers and administration respond to cheating cases and how much do they enforce integrity policy in their own educational systems? and

What is the effectiveness of the current integrity system in the 3 countries educational system?

The sample

This study included public and private educational institutes in KSA, Egypt, and Jordan. The general approach to the sample was to compare three of the major countries in the Middle East, Egypt with relatively high population (100 million citizens) but low national income, KSA with less population compared to Egypt (32.9 million citizens) and high national income, and Jordan with low population (Jordan – 9.7 million citizens) and low national income compared to Egypt and KSA. The three countries were chosen such that they represent a sample of most of the cultures in the Middle East. KSA can be used to represent Arabian Gulf countries like United Arab Emirates, Kuwait, Qatar, Bahrain, and Oman where very similar education systems are adopted and people living

in those countries are having very close cultural background. Egypt has a well-established education system and large influence in the Arabian Gulf and North African regions with many Egyptian teachers, professors, and administrative personals work. Jordan represents some other small countries in the region including Palestine, Lebanon, and parts of Syria with mostly similar cultural background and very close educational system.

Meanwhile, this sample was determined also by the authors' opportunities to conduct their survey in these countries. To evaluate the integrity systems, documents related to those systems were analyzed (academic regulations and ethical codes) in each institute. To evaluate the robustness of those integrity systems, interviews were conducted with students, teachers, and administration (5 interviews in the two countries).

The survey sample contains 939 people who are currently-enrolled college students or have already graduated from college in the three countries: Saudi Arabia, Egypt, and Jordan. The survey was conducted in Arabic, native language in the three countries. The distribution of the students within each country is shown in the Fig. 1. As shown, ~ 43% (404) of the sample is collected from KSA, ~ 36% (339) from Egypt and the remaining ~ 21% (196) from Jordan.

The survey

The purpose of this survey is to explore and compare the main causes of cheating and plagiarism in the educational systems in the three countries mentioned above.

The survey (Table 1) consists of twenty questions in total that include both open-ended and close-ended questions. Six questions with 5-point scale variables (1 = never, 5 = always), one with 3-point scale, two with 6-point scale, two with 7-point scale, Eight questions with binary answers (No, Yes), two multiple answer questions, and One question with insert a number format.

Survey questions description along with the number of responders, mean and standard deviation of each of the single answered questions within each country are represented in Tables 1 and 2.

Four questions measured different forms of cheating on exams. This includes using electronic devices during tests or exams, copying from a book when not allowed, partially copying another person's work, and completely copying another person's work.

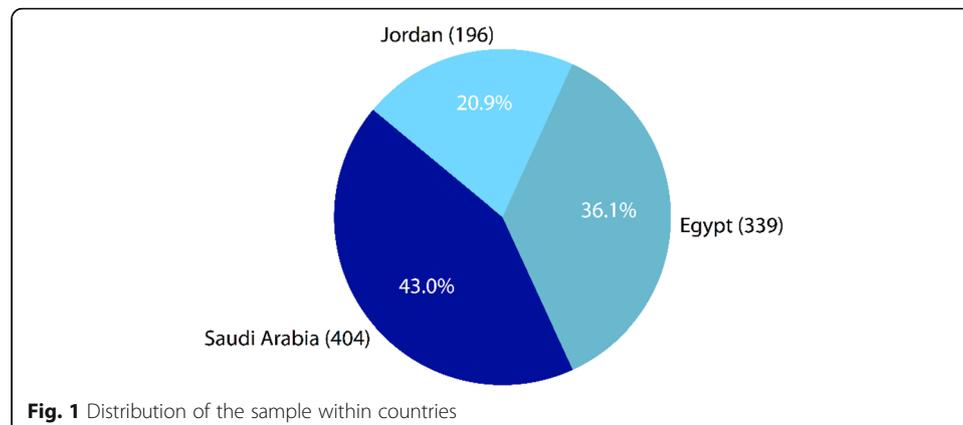


Table 1 Survey questions definitions

Code	Definition	Answer
Q1	Using course notes when not allowed. • On a scale from 1 to 5, where 1 means never and 5 means many times, have you ever used course notes or a text book in exams when not allowed?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Q2	Using electronic devices when not allowed. • On a scale from 1 to 5, where 1 means never and 5 means many times, have you ever used a mobile phone or other electronic device in exams when not allowed?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Q3	Using stolen copies of tests and assignments. • On a scale from 1 to 5, where 1 means never and 5 means many times, have you ever received and used a leaked exam or a quiz, when not authorized to use?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Q4	Copying exams answers • On a scale from 1 to 5, where 1 means never and 5 means many times, have you copied exams' answers from a classmate or from a book during an exam?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Q5	Copying completely another person's work. • Have you ever completely plagiarized another person's work?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Q6	Copying partially another person's work. • Have you ever partially plagiarized another person's work?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Q7	Gender • What is your gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female
Q8	Pressure from parents. • Does parental pressure for high marks lead children to cheat?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Q9	Ethnicity. • What is your ethnicity?	<input type="checkbox"/> Saudi Arabian <input type="checkbox"/> Egyptian <input type="checkbox"/> Jordanian
Q10	Level of education. • What is your level of education?	<input type="checkbox"/> School <input type="checkbox"/> First year of college <input type="checkbox"/> Second year of college <input type="checkbox"/> Third year of college <input type="checkbox"/> Fourth year of college <input type="checkbox"/> Fifth year of college <input type="checkbox"/> College graduate
Q11	On a scale from 1 to 5, where 1 means weak and 5 means excellent Academic performance. • What is/was your academic performance?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Q12	Collectivism versus individualism. • Do you have to be highly competitive in order to get the distinction in the study?	<input type="checkbox"/> No, and I even have to help others to improve their academic performance. <input type="checkbox"/> Yes, and I collaborate with others only to improve my academic performance.
Q13	Extrinsic motivation. • What is the purpose of studying?	<input type="checkbox"/> Learning <input type="checkbox"/> Earning a degree
Q14	Lack of teachers' control. • Did some teachers allow you to cheat in exams	<input type="checkbox"/> Never <input type="checkbox"/> Some did.
Q15	Neutralizing attitudes. Do you tend to use neutralization to motivate your decision to plagiarize other people work?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Q16	Main reasons of cheating. • What is the main reason of cheating among students?	<input type="checkbox"/> To earn high marks <input type="checkbox"/> To avoid failing in exams. <input type="checkbox"/> Curriculum is too long or too difficult <input type="checkbox"/> Exams are too difficult <input type="checkbox"/> No time to study <input type="checkbox"/> Laziness to study
Q17	Social reasons of cheating. • For which of the following social reasons students cheat?	<input type="checkbox"/> To earn high marks <input type="checkbox"/> To avoid failing in exams. <input type="checkbox"/> Curriculum is too long or too difficult <input type="checkbox"/> Exams are too difficult <input type="checkbox"/> No time to study <input type="checkbox"/> Laziness to study
Q18	Reasons for plagiarism. • What is the main reason for plagiarism?	<input type="checkbox"/> To earn high marks <input type="checkbox"/> It is too difficult to write literature or scientific articles in your own words. <input type="checkbox"/> Worried that writing in my own words will not be good enough <input type="checkbox"/> No enough ideas to write on my own words <input type="checkbox"/> I do not have the skills to write on my own words <input type="checkbox"/> I do not have the time <input type="checkbox"/> Laziness to study
Q19	Academic reasons of cheating • What are the academic reasons for cheatings?	<input type="checkbox"/> Most of the students cheat. <input type="checkbox"/> No punishment <input type="checkbox"/> Curriculum is too long or too difficult <input type="checkbox"/> Teachers do not have or not able to stop cheating. <input type="checkbox"/> No school rules to control cheating.
Q20	Years of study. • How many years of study you have completed?	Insert a number

Table 2 Multiple Comparison of medians-Dunn's Test, Significance at 0.05 level (see Additional file 1: Appendix A).

	Group1	Group2	P-value	Reject
Q1	Egypt	KSA	1	F
	Egypt	Jordan	0.226	F
	KSA	Jordan	0.758	F
Q2	Egypt	KSA	4.34E-07	T
	Egypt	Jordan	0.199	F
	KSA	Jordan	0.029	T
Q3	Egypt	KSA	1.27E-22	T
	Egypt	Jordan	0.871	F
	KSA	Jordan	1.94E-12	T
Q5	Egypt	KSA	0.095	F
	Egypt	Jordan	0.011	T
	KSA	Jordan	0.916	F
Q6	Egypt	KSA	0.044	T
	Egypt	Jordan	0.006	T
	KSA	Jordan	1	F
Q7	Egypt	KSA	1.34E-28	T
	Egypt	Jordan	8.16E-23	T
	KSA	Jordan	1	F
Q8	Egypt	KSA	1.33E-08	T
	Egypt	Jordan	0.003	T
	KSA	Jordan	0.262	F
Q10	Egypt	KSA	1.09E-27	T
	Egypt	Jordan	2.26E-04	T
	KSA	Jordan	3.27E-07	T
Q12	Egypt	KSA	0.0001	T
	Egypt	Jordan	1	F
	KSA	Jordan	0.0001	T
Q14	Egypt	KSA	4.69E-11	T
	Egypt	Jordan	0.265	F
	KSA	Jordan	1.41E-12	T
Q17	Egypt	KSA	7.30E-07	T
	Egypt	Jordan	0.920	F
	KSA	Jordan	0.003	T
Q19	Egypt	KSA	4.86E-13	T
	Egypt	Jordan	0.000002	T
	KSA	Jordan	0.580	F
Q20	Egypt	KSA	1.47E-17	T
	Egypt	Jordan	0.0035	T
	KSA	Jordan	0.0002	T

Two questions addressed plagiarism (full and partial). For measuring incidence of plagiarism, two 5-point scale variables were used. The first is for full plagiarism (passing off an entire work of another person as one's own), and the second is for partial plagiarism (using parts of someone else's material without acknowledging the source). The variable for partial plagiarism was then recoded as binary, because this type of behavior is more common among students (according to our results) than full plagiarism. Any frequency of plagiarism was recoded as "1" while no plagiarism occurrences (answer "never" on the survey) was referenced as "0". These variables would later be used for measuring the frequency of cheating and plagiarism.

Discussion and evaluation

Statistical analysis is performed to compare the variance and frequency of dimensions/factors that may affect academic integrity.

Variability in country results

Analysis on single and multiple answers survey questions is performed to get a better understanding of which of the three countries is more affected with cheating and plagiarism factors.

Single answer questions

In order to test the effect of the three countries on the cheating and plagiarism factors, an analysis of variance was conducted on all the questions and reports the F statistic along with p -value. The significant results were reported in terms of the Krushal F statistic and p -value with significance level of 0.05.

To get a deeper understanding of which pairs of the three countries is affected by each of the significant cheating factors (as defined in section 2), we performed the multiple comparisons of means using nonparametric test entitled "Dunn's test". This test does not assume the data is coming from particular distribution.

We test the three following null hypotheses:

H_0 : The median of a factor/dimension that can influence academic integrity in Egypt has same distribution as in KSA.

H_0 : The median of a factor/dimension that can influence academic integrity in Egypt has same distribution as in Jordon.

H_0 : The median of a factor/dimension that can influence academic integrity in KSA has same distribution as in Jordon.

Where factors and dimensions are as identified in section 1.

Table 2 shows the results of this test in terms of p -values. Rejecting (True or False) the null hypothesis is represented in the last column entitled 'reject' of Table 2, where family-wise error rate was adjusted by using Bonferroni correction.

Egypt and KSA

Results indicate that at 0.05 level of significance, cheating on an exam factors including, gender (Q7), level of education (Q10), and years of study (Q20) [**first factor**], pressure

from parents (Q8), collectivism (Q12) versus individualism, social (Q17) [**second factor**], academic reasons (Q19), lack of teachers' control (Q14) [**fourth factor**], the use of electronic devices when not allowed in a test (Q2), copying partially or completely another person materials (Q6) [**forms of cheating**] have different means of distributions in Egypt and KSA.

Egypt and Jordan

There is no evidence at this level of significance that the distribution of cheating on an exam and test via gender (Q7) [**first factor**], pressure from parents (Q8) [**second factor**], electronic devices (Q2), academic reasons (Q19) [**fourth factor**] are different between Egypt and Jordan copying completely or partially another person work (Q5, 6) [**styles of cheating**].

Jordan and KSA

Results indicate that at 0.05 level of significance, cheating on an exam factors including, gender (Q7), level of education (Q10), and years of study (Q20) [**first factor**], pressure from parents (Q8) [**second factor**], academic reasons (Q19) [**fourth factor**], copying partially or completely another person materials (Q5,6) [**styles of cheating**], have different means of distributions in Jordan and KSA.

Note that years of study (Q20) and levels of education (Q10) distribution are different between any pairs of the countries at 0.05 level of significance.

Compared to Egypt and Jordan, KSA maintains advanced and robust Internet and mobile phones digital infrastructure (CTIC, 2021). Meanwhile, average annual income is higher in KSA compared to Egypt and Jordan (GASTAT, 2021), thereby KSA students have an access to high-end mobile phones, laptops, and wireless electronics compared to their peers in Egypt and Jordan. Moreover, students in schools and higher education institutes have a reliable access to the Internet in their classrooms. Jordan per capita income (~ \$ 4282) is a little higher than Egypt (~\$3547) (WBG, the World Bank Group, 2021), however students in Jordan still do not have an access to a reliable digital networks in schools and some public educational institutes. This limited access to high-end digital networks make it harder for students in Egypt and Jordan to cheat using electronic devices compared to KSA. Additionally, booming population, low national income, and high unemployment rates (WBG, the World Bank Group, 2021) make it is very competitive for students to secure a place in the Egyptian higher education system. For the same reason parents put high pressure on children to earn high marks in order to secure admittance in the Egyptian universities, which make students cheat to get high marks. Large number of students per class in Egypt limits teachers' ability to control cheating compared to KSA and Jordan. Egypt and Jordan are ahead of KSA in giving females opportunities for education and work. With KSA started to place women empowerment as one of its national's priorities (Smith 2020), KSA give females more educational opportunities and females try to prove themselves by earning higher marks than males. This competitive environment can lead to cheating from both genders.

Multiple answer questions

The survey contains two multiple-answer questions addressing the main reasons of cheating and plagiarism according to the students from different countries. The proportion distribution of these main reasons is shown in Figs. 2 and 3. In all three countries, ~ 50–60% of the students cheat Q (16) because of laziness [third factor]. However, a student’s main reasons for misbehaving are to not fail in a test or exam. Moreover, the majority of KSA students (~ 70%) care about grades more than Egyptian (~ 47%) and Jordanian (~ 56%) students.

An interesting difference occurs in the distribution of whether a student cheats because of their jobs. Less than 10% of Egyptian students blame their misbehaving on having another job compared to 20% in KSA and 30% in Jordan.

As for plagiarism Q (18), ~ 50% of the KSA student sample use plagiarism due to laziness and ~ 55% care about grades. This percentage in KSA students is significantly higher than Egypt and Jordan (~ 40% - 45%). Only 15% of Egypt’s students considered writing on their own is hard as opposed to Jordan and KSA students (~ 30%). A majority of Egyptian student sample consider their laziness and willingness to get high grades encourage to plagiarize. Around 55% of the students in KSA expressed not having the ability or the information on the assignment compared to 64% in Egypt and 61% in Jordan.

It is interesting that students in the three countries consider laziness as one of the main reasons for cheating or for plagiarizing their work (Fig. 2). Many of the students do not want to put enough time to study. Reluctant to study could be because students are either not interested in a specific subject or in their major. This is common in many Egyptian universities, where students are forced to pick a specific major based solely on their marks in one exam (high school national exam) that they have to take at the end of grade 12.

It is interesting to find out (Fig. 3) that only a small percentage of the students think that the length and difficulty of the material is not the major reason that make students cheat.

Dominant exam misbehavior factors

Across all the observations of the three countries, 110 observations have missing values. In order to reduce bias and errors in applying any of the imputation techniques, a decision was made to remove those observations from the analysis.

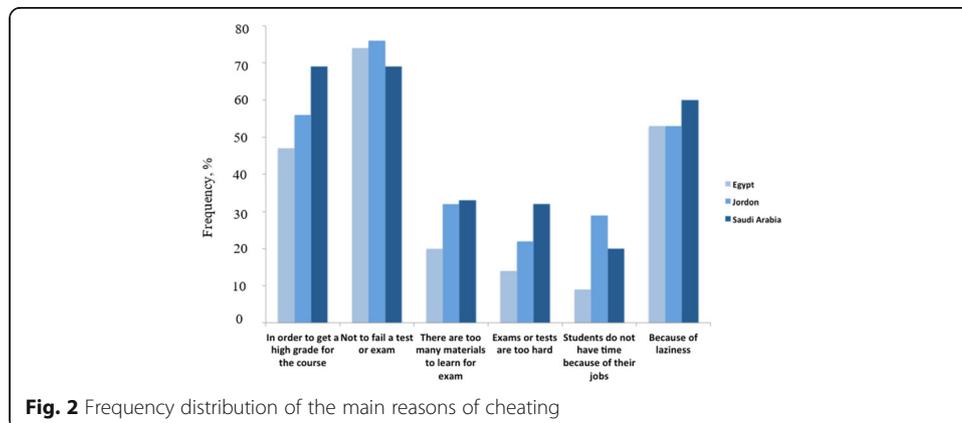
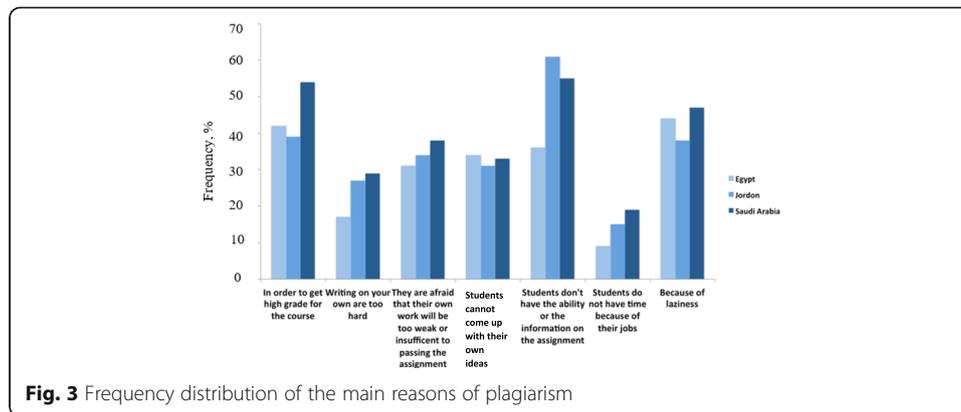


Fig. 2 Frequency distribution of the main reasons of cheating



To further explain, the differences we observed and reported above, we examined the roles of different factors in cheating and plagiarism behavior.

The first group of factors of cheating included individual characteristics such as gender, years of studying. The second group included educational context such as level of education, and rate of academic performance. The third group included motivational and contextual factors like neutralization attitudes, classroom environment and so forth.

Egypt, Jordan, and KSA were compared separately. Different feature selection methods were implemented in order to get the subset of features that best explains the variation in cheating factors.

These statistical methods are Recursive Feature Elimination (RFE), Linear Regression, Lasso and Ridge, and Random Forest. We then rank the features using the mean rank ordering of all methods. Below is a brief explanation of each method.

Feature selection is one of the important steps to apply in model building. It enables us to rank the features that explain most of the variability observed in the outcome. Different methods are then implemented to reduce the number of features in the final model. The methods RFE, Lasso, Random Forest, and Ridge regression used in this analysis are some of the robust methods used to trim down the number of features. For this analysis, there is no particular reason on why we choose one method over the other. All four methods were implemented to show that the final features were chosen carefully by applying and averaging many validated techniques for measuring features' importance. The assumptions tested are the ones specific for building linear regression models and testing the importance of each feature using the t test.

Recursive Feature Elimination or RFE uses a model (e.g. linear Regression or SVM) to select either the best or worst-performing feature, and then excludes this feature. The whole process is then iterated until all features in the dataset are used up (or up to a user-defined limit).

Lasso

This method picks out the top performing features, while forcing other features to be close to zero. It is useful when reducing the number of features is required, but not necessarily for data interpretation, since it might erroneously indicate that some features do not have a strong relationship with the output variable.

Random forest

This is an impurity based ranking that is typically aggressive in the sense that there is a sharp drop-off of scores after the first few top ones (whereas for the other ranking methods, the drop-off is clearly not that aggressive).

Ridge regression

This method forces regression coefficients to spread out similarly between correlated variables.

The mean rank obtained by applying all methods of feature selection along with final parameter estimates for each country (with confidence interval limits) is represented in the results. A stepwise selection excluding all non-significant features at 0.05 level of significance has been applied on the top of features selection.

Egypt analysis results

On the left panel of Fig. 4a, one can see the top three features are related to individuals and academic characteristics. These features are academic performance (Q11), gender (Q7), and level of education (Q10) (first factor). Note that lack of teach control (Q4 and Q14) [**fourth factor**] was excluded because of its insignificance at a 0.05 significance level when performing a t-test which is testing the null hypothesis ($H_0: B = 0$).

By fitting multiple linear regression, 79% of the variation in cheating is explained by the top three factors.

Given the rate of academic performance and level of education are constant, males increase the estimated rate of cheating by 1.27 on average. Furthermore, given the gender and the level of education are fixed, on average.

Given the gender (Q7) and academic performance (Q11) are fixed, on average, every unit increase in level of education (Going from Graduate to undergraduate), the estimated unit of cheating increased by 0.43.

KSA analysis results

Applying feature selection to the KSA Country, results are very similar to those of the Egypt sample analysis.

The top three selected features selected are academic performance (Q11), gender (Q7), and level of education (Q10) (first factor). Note that extrinsic motivation (Q13) [**third factor**] is excluded because of its insignificance at level of 0.05 when performing t-test for testing the null hypothesis ($H_0: B = 0$) (Fig. 4b).

Similar results to Egypt with change in values for parameter estimates appear in KSA. Given the rate of academic performance and level of education are constant, males increase the estimated rate of cheating by 3 on average. This result approximately is doubled what we saw in Egypt.

Given the gender and the level of education (Q10) are fixed.

Given the gender and the academic performance (Q11) rate are fixed, on average, every unit increase in level of education (Q10) (Going from Graduate to undergraduate), the estimated unit of cheating increased by 0.25. This effect is less than Egypt.

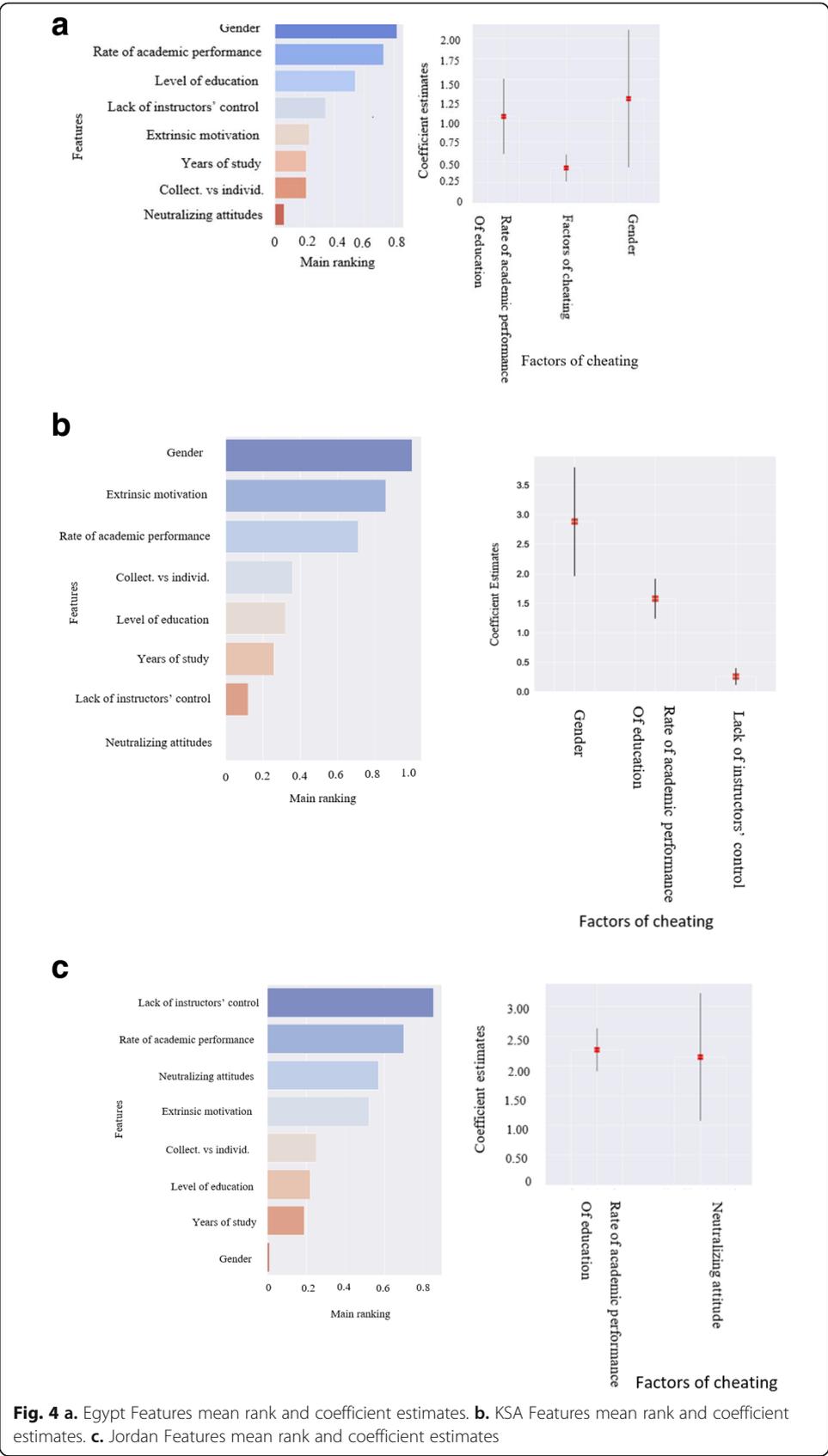


Fig. 4 a. Egypt Features mean rank and coefficient estimates. **b.** KSA Features mean rank and coefficient estimates. **c.** Jordan Features mean rank and coefficient estimates

Jordan analysis results

For Jordan, educational and contextual characteristics play big roles as factors for cheating. As shown in Fig. 4c, unlike Egypt and KSA, the most important features are lack of teach control (Q14) [**fourth factor**], academic performance (Q11) [**first factor**], neutralization attitudes (Q15) [**third factor**], and extrinsic motivation (Q13) [**third factor**]. By applying stepwise selection, on average, 83% of estimated variation in cheating is explained by neutralization attitudes (Q15) and academic performance (Q11).

Given a fixed rate of performance academic, the increase unit in neutralizing attitudes (Q15) (a student can't finish his education without copying someone else work) will increase the estimated cheating by 2 units. Approximately, on average, same increase in unit of cheating is observed if rate of academic performance decreases by one rate with "Neutralizing attitude" being fixed.

Conclusions

This study explored the elements of cheating and academic misconduct in Saudi Arabia, Egypt, and Jordan. Results strongly indicate that students are more likely to cheat and plagiarize because they lack the ability or satisfactory information to tackle assignments given to them. The ill behavior was justified through laziness and willingness to have higher education performance.

Examining the factors explaining the variation in cheating for each country. Gender plays a significant role in academic cheating in both KSA and Egypt, where males with a low performance level tend to cheat more than females with a low performance level. Males are found to increase the rate of academic cheating by ~3 and 1.27 times in KSA and Egypt respectively. In the contrary, in Jordan gender is not the main factor that increases academic cheating, where other factors like neutralization attitude and lack of teachers' control are found to be more significant.

The survey shows that ~78% of the Egyptian students sample believe that pressure from parents on their children to achieve high marks in exams can lead to increasing rates of academic cheating compared to ~56% and ~70% of the Saudi Arabian and Jordanian students samples who think the same. This is attributed to the high competitive environment in the Egyptian educational system stimulated by high students' population (~649, 387 student in grade 12 during 2020/2021 academic year (MOE, 2021), limited admission opportunities to the Egyptian public and private universities, and the high unemployment rates. This make parents concern that their children may not be able to secure a place in higher educational system, thereby not able to secure a good job in the future.

A difference in the forms of cheating (at 0.05 significance) is found between Egypt in using not allowed electronic devices and in copying partially or completely another person's work. Similarly between Jordan and KSA a difference in the forms of cheating (at 0.05 significance) is found and Jordan copying partially or completely another person's work. Interestingly, no difference was observed in the forms of cheating between Egypt and KSA at 0.05 significance level. High-end electronic devices along with reliable Internet accessibility for Saudi Arabian students increased cheating using electronic devices and via digital networks in KSA compared to Egypt and Jordan.

The sample mean of "Years of study" and "Level of education" for students surveyed in all three countries are significantly different in all pairs.

Statistical analysis show that violating integrity policy is led by Egyptian teachers, where data shows that ~75% of Egyptian students sample mentioned that their teachers helped them in academic cheating in comparison to ~47.6% and 40% mentioned by Saudi Arabian and Jordanian students. Students' responses on lack of teachers' control are insignificant between Jordan and KSA, while it is significantly different between Egypt and KSA, and between Egypt and Jordan.

A significant difference in factors of cheating between Egypt, Jordan, and KSA is observed in most of the survey questions. No significant difference in using course notes when not allowed between all pairs of the three countries Jordan, Egypt and KSA is detected (at 0.05 significance level).

The sample median of "Years of study" and "level of education" for students surveyed in all three countries are significantly different in all pairs. Students' responses on lack of teachers' control are insignificant between Jordan and Saudi Arabia. Students' responses on Lack of teacher's control reasons for cheating are significantly different between Egypt and Jordan.

Students justify their cheating and plagiarism behavior to their willingness to succeed and have higher grades in the exam in all countries. Approximately 50% of KSA students in the survey expressed laziness that lead to misbehaving.

In Jordan, higher numbers of students are workers and they blame their job time, in addition to not having information needed in the assignment for misbehaving. Those two factors might be correlated as working might lead to missing some classes and therefore feeling that the professor did not cover all material needed to pass the course.

The lowest percentage of student workers exists in Egypt. Therefore, they do not feel tests are hard or materials are not covered. However, the majority of them blame misbehaving on laziness and fear to fail in the exam.

Results indicate some of the factors behind the non-ethical behavior pertaining to education institutes that could help in policy-making decisions of ethical management.

Abbreviations

KSA: Kingdom of Saudi Arabia; RFE: Recursive Feature Elimination; HSD: Honestly Significance difference; H0: Null hypothesis

Supplementary Information

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Additional file 1. Appendix A. Multiple comparisons of means.

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Author's contributions

Ashraf Farahat = Data collection, data analysis, writing, review and editing of manuscript. The author read and approved the final manuscript.

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Availability of data and materials

All data used in this study will be available upon request from the corresponding author.

Declarations

Competing interests

The authors declare that they have no competing interests.

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