

Article

Impacts of Technology in Learning: Mobile Typing Applications for Writing and Accomplishing Academic Tasks among Arabic-Speaking Undergraduate Students

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Abstract: In recent years, especially during and after the COVID-19 pandemic, the use of mobile applications (apps) has become common in all areas of life for carrying out tasks, facilitating communication, and completing work. Education has been one of the most prominent areas that has presented a strong trend for using mobile apps. For instance, a huge number of Arabic-speaking undergraduate students in Saudi Arabia have been using mobile typing apps to accomplish their academic tasks and for other educational purposes. This phenomenon has influenced the academic writing skills of undergraduate students. In this study, we identify the relationship between academic tasks, academic writing skills, and the use of mobile typing apps among Arabic-speaking undergraduate students by analyzing which skills were affected by typing via mobile apps. A total of 276 Arabic-speaking undergraduate students in Saudi Arabia participated in this study. By applying structural equation modeling to analyze the quantitative data, results revealed that use of mobile typing apps had the strongest effect on the academic writing skills of clarity and cohesiveness. Meanwhile, using mobile typing apps to accomplish academic tasks had less impact on accuracy and vocabulary. Several pedagogical and technical implications are presented at the end of the study.

Keywords: impacts of technology in learning; mobile applications typing; academic tasks; academic writing skills; Arabic-speaking undergraduates; social media apps in learning



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1. Introduction

In recent years, especially during the COVID-19 pandemic, the use of mobile applications (apps) has become common for performing tasks in all areas of life. This technology facilitates communication and enjoyable work experiences. Education has been one of the most prominent areas to present a strong trend towards using mobile apps for multiple purposes [1–7]. While some stakeholders find it essential for learners to maintain the use of manual writing, mobile typing apps have proven more convenient and have been beneficial for most students. For example, Ahmed's study found that vocabulary suggestions on WhatsApp improved the quality of students' essays [8,9]. Especially in higher education, students can achieve success in their academic tasks and can learn at their convenience using mobile typing apps [10–13]. For instance, two studies found that around 95% of Saudi people have access to mobile apps, which allows students in higher education to use several apps to help with their typing, academic tasks, and education [10,14]. Arabian undergraduate students have been using various kinds of mobile apps, including WhatsApp, SMS message apps, Drops, Telegram, or Microsoft Word, that make it easier for them to accomplish their academic tasks anywhere or at any time, so that they can present clear and cohesive typed work [5,15–20]. These mobile typing apps have enabled undergraduate students to download and access educational tools that are important in deepening outcomes in classroom settings. For instance, Drops enables students to enrich their vocabulary, communication techniques, and business negotiation abilities [21]. In general, mobile typing apps have fostered better academic achievements and allowed students to learn at

their convenience. Undergraduate students use them to access information and conduct educational tasks: typing their assignments and presentations, analyzing information, and formulating reports, as well as communicating with instructors and colleagues, collaborating with other learners to complete course projects, discussing methods for assignments with other students, completing quizzes and exams, and evaluating courses [5,10,22–30].

Saudi Arabian students, especially undergraduates, have shown a strong trend towards mobile usage, particularly during the Covid-19 pandemic. They frequently use Blackboard, WhatsApp, or SMS message apps to perform their academic tasks and learning activities [6,7,9,10,31–33]. However, the increased use of mobile apps for typing purposes affects students' writing skills. In many instances, students are unable to write by hand effectively, and as such, they present poor handwriting accompanied by numerous grammatical errors [34,35]. Moreover, some studies have also shown that increased exposure to cell phones among students harms their writing skills, including spelling, grammar, and vocabulary choice [8]. In this context, students' writing and communication skills have been increasingly affected by their use of text messaging. For instance, when typing via mobile apps, students often ignore spelling and may use ordinary language that does not conform to effective writing standards.

Various studies have discussed the use of mobile typing apps and academic writing skills, with focus on different aspects. For instance, one study investigated instructors' attitudes towards students who complete academic tasks and assignments using mobile typing apps, such as SMS message apps [17]. They discovered that mobile typing apps had no significant impact on academic writing skills. Another study found that WhatsApp effectively improved undergraduate students' writing and reading skills in Yemen [9]. Students found the application more interesting because they could choose different versions of keyboards and receive suggestions for vocabulary. Another study examined the influence of mobile typing apps, such as SMS message apps, on undergraduate students' writing skills in Pakistan [36]. They noted that this usage negatively influenced students' academic writing skills, especially in spelling. A study from Saudi Arabia discussed the effect of using SMS message apps and social media through mobile apps on Saudi students' academic writing, and indicated that although mobile phone usage played a role in improving comfort while working and shortened the time required to complete academic tasks, it also affected students' ability to spell words correctly and build sentences within their academic reports [37]. On the other hand, other studies have discussed the use of mobile apps in teaching, learning, and improving the language skills of students, including their writing [20,38–43]. For instance, one study stated that using mobile apps such as SMS message apps and email for educational purposes has improved the academic writing of students, especially in terms of grammar and vocabulary [44]. In addition, another study indicated that using mobile apps such as internet search engines and Microsoft Word applications when teaching another language, such as English, has improved the writing skills of native Arabic-speaking students, including in grammar, cohesiveness, clarity of sentences, and vocabulary choices [19].

The current literature addresses the use of mobile apps and their impact on multiple aspects of academic writing skills and academic tasks. Thus far, however, limited studies have considered which academic writing skills are most affected by the use of mobile typing apps to accomplish academic tasks among undergraduate students, specifically among Arabic speakers in Saudi Arabia. The researcher hopes that the results of this study will provide insights into how these mobile typing apps affect the academic writing skills of undergraduate students during their work on academic tasks. This paper therefore offers a set of various suggestions for practices and activities that instructors can share with their students, to use while completing their academic tasks via mobile typing apps. Furthermore, the results of this study may help students to understand how their experiences, practices, and activities with regards to mobile typing apps influence their academic writing skills. The aim of this study was to identify the relationship between academic tasks, academic writing skills, and the use of mobile typing apps among Arabic-speaking undergraduate

students in Saudi Arabia. Our results may contribute to the existing literature by providing data on the academic writing skills most affected by the use of mobile typing apps, from the perspective of undergraduate students. Thus, this study addresses the following research questions:

1. To what extent does the use of mobile typing apps to accomplish academic tasks affect Arabic-speaking undergraduate students' academic writing skills?
2. What is the relationship between academic tasks, academic writing skills, and the use of mobile typing apps among Arabic-speaking undergraduate students?
3. Among Arabic-speaking undergraduate students, which academic writing skills are particularly affected by using mobile typing apps?

2. Conceptual Framework and Hypotheses

The development of the conceptual model in this study was informed by the technological acceptance model, which state that two major factors determine whether the potential users of a certain technology are likely to accept it: perceived usefulness and ease of use [45]. In this context, the users are students and instructors whose tendency to embrace different mobile typing apps while undertaking academic tasks is based on their ability to integrate them easily into daily practice. In most cases, user-friendly apps have become more popular because the students do not have to spend a long time trying to understand key features. Additionally, the model explains why some instructors consider mobile typing apps difficult or unacceptable for use in learning environments. Their lack of adequate training leads them to perceive negatively the ease of use and usefulness. Consequently, they hold the belief that such technologies could have adverse impacts on students' academic writing skills.

Therefore, based on the above-mentioned model, this study was conducted through a conceptual framework that included three variables: academic tasks, academic writing skills, and use of mobile typing apps (see Figure 1).

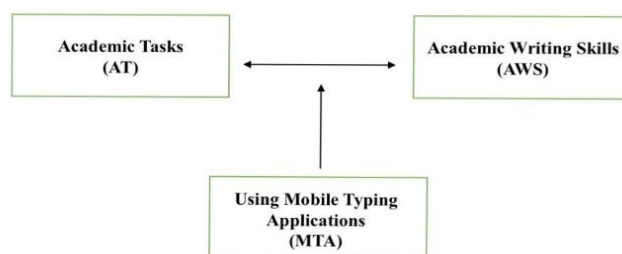


Figure 1. Conceptual framework.

In this study, the term academic tasks (AT) is defined as assignments, tests, projects, or discussions issued to students by instructors. Students can complete their academic tasks by typing on digital devices while writing their essays or can discuss the assignments on digital devices [46].

Academic writing skills (AWS) in this study include four skills: accuracy (AWS1), which describes the writing abilities of students in terms of grammar and spelling; clarity (AWS2), which refers to students' capacity to clarify and organize sub-ideas in a manner that is logical, appropriate, and clear; cohesiveness (AWS3), which describes appropriate use of linking words, punctuation, and phrase ordering while writing; and vocabulary (AWS4), indicating the ability to employ appropriate phrases and words, abbreviations, and symbols [47]. Table 1 shows the sub-items under each of the academic writing skills mention above [47–49].

Table 1. Survey elements.

Survey Elements	Elements' Items
MTA for AT I use mobile typing apps to accomplish the following academic tasks and learning purposes:	1- Communicating with instructors regarding course content and assessment methods. 2- Discussing course content and assessment methods with other students. 3- Cooperating with other students to complete course projects. 4- Completing tests. 5- Evaluating the course. 6- Inquiring about general academic topics including admission and registration systems and regulations, activities, duties, or committees).
AWS1 (Accuracy) When I use mobile typing applications to accomplish academic tasks and for learning purposes, I:	1- Carefully consider grammatical rules when writing (typing) with mobile apps.
AWS2 (Clarity) When I use mobile typing applications to accomplish academic tasks and for learning purposes, I:	2- Carefully consider spelling rules when writing (typing) with mobile apps.
AWS3 (Cohesiveness) When I use mobile typing applications to accomplish academic tasks and for learning purposes, I:	1- Commit to the idea of the main topic without deviating from it when writing (typing) with mobile apps.
AWS4 (Vocabulary) When I use mobile typing applications to accomplish academic tasks and for learning purposes, I:	2- Arrange my thoughts in a logical manner when writing with mobile apps.
	3- Clearly articulate my thoughts when writing with mobile apps.
	1- Use appropriate linking terms when writing with mobile apps.
	2- Arrange my thoughts into sequence points when writing with mobile apps.
	3- Use punctuation when writing with mobile apps.
	1- Use simple basic vocabulary when writing (typing) with mobile apps.
	2- Using academic vocabulary when writing (typing) with mobile apps.
	3- Use appropriate expressions for my intended meaning in a brief manner when writing (typing) with mobile apps.
	4- Use abbreviations and symbols when writing (typing) with mobile apps.

In this study, use of mobile typing apps (MTA) refers to using typing apps on mobile electronic devices such as smartphones, laptops, or tablets to perform and accomplish ATs. [50,51]. Mobile typing apps are usually software units with broad functions. For instance, mobile apps such as Facebook Messenger, Gmail, WhatsApp, Telegram, Instagram, Twitter, and Google involve typing features, so students can use these mobile typing apps to communicate or search for critical information.

The review of the previous literature indicates that there is a relationship between these variables. In the current study, ATs were determined to be an independent variable, AWS were determined to be a dependent variable, and MTA was determined to be a mediator variable.

Therefore, the following hypotheses were proposed:

H1: *Using mobile typing apps to accomplish academic tasks has a negative effect on Arabic-speaking undergraduate students' academic writing.*

H2: *There is a significant relationship between academic tasks, academic writing skills, and use of mobile typing apps among Arabic-speaking undergraduate students.*

H3: *Using mobile typing apps to accomplish academic tasks has a significant impact on the academic writing skill of accuracy among Arabic-speaking undergraduate students, according to their own perspectives.*

H4: *Using mobile typing apps to accomplish academic tasks has a significant impact on the academic writing skill of clarity among Arabic-speaking undergraduate students, according to their own perspectives.*

H5: *Using mobile typing apps to accomplish academic tasks has a significant impact on the academic writing skill of cohesiveness among Arabic-speaking undergraduate students, according to their own perspectives.*

H6: *Using mobile typing apps to accomplish academic tasks has a significant impact on the academic writing skill of vocabulary among Arabic-speaking undergraduate students, according to their own perspectives.*

3. Method

3.1. Procedure and Research Sample

To conduct this study, the quantitative method was applied. An analytical structural equation modeling (SEM) method was used for this study [50–52]. After obtaining ethical approval from the Research Ethics Committee, the research survey received responses from 276 respondents during the second semester in 2022. The respondents were Arabic-speaking undergraduate students at King Faisal University, from several majors including art, education, science, computer science, law, agriculture, and business. Only 10 of these respondents (3.6%) were male, and the rest were female. Only one of the respondents was aged below 18 years, while the majority (75%) ranged from 18 to 22. All respondents indicated having used mobile apps to write their academic tasks. Therefore, the responses were representative of the population targeted for the research.

3.2. Measurement

The survey was used to measure undergraduate students' perspectives about the relationship between their academic writing skills and the use of mobile typing apps to accomplish their academic tasks. The survey contained three sections, the first of which was intended to collect the demographic information of the research sample. The second included questions aimed at gathering data about using mobile typing apps to perform or accomplish academic tasks and for learning purposes. Six items were used to collect information about using mobile typing apps to accomplish academic tasks. The third section collected information about four academic writing skills. Two items collected information about AWS1, accuracy; three items collected information about AWS2, clarity; three items focused on AWS3, cohesiveness; and the final part involved four items for collecting data about AWS4, vocabulary. Table 1 shows the survey elements and items for each element. Thus, this study has three variables: AT, AWS, and MTA, as shown in Figure 1. All were measured on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree).

3.3. Reliability and Validity of the Instrument

3.3.1. Reliability Analysis

The survey used the Likert scale to measure the respondent's perceptions. Consequently, a reliability test was performed to determine whether the responses had the desirable precision, internal consistency, and accuracy [53,54]. Table 2 shows the reliability analysis results for each of the five constructs.

Table 2. Reliability Analysis.

Construct	Cronbach Alpha	No. of Items
Using mobile typing applications (MTA 1–6)	0.65	6
Academic writing skill: Accuracy (AWS1)	0.72	2
Academic writing skill: Clarity (AWS2)	0.67	3
Academic writing skill: Cohesiveness (AWS3)	0.65	3
Academic writing skill: Vocabulary (AWS4)	0.68	4
All variables	0.81	18
Average scores	0.721	5

A Cronbach's alpha value of 0.70 was taken as the minimum score for the responses to be internally consistent. Based on the results in Table 2, variables MTA 1–6, AWS2, and AWS3 did not meet the minimum threshold. However, the average score for these constructs had a satisfactory score of 0.72. Consequently, the study used the average scores for these constructs in the subsequent analysis.

3.3.2. Correlation Test

The study conducted a correlation analysis evaluating the relationship between the average scores. The correlation coefficients are presented in Table 3.

Table 3. Correlation Coefficients for the Average Scores.

		Correlations				
		AVG_MTA	AVG_AWRS1	AVG_AWRS2	AVG_AWRS3	AVG_AWRS4
AVG_MTA	Pearson correlation	1	0.144 *	0.243 **	0.231 **	0.145 *
	Sig. (2-tailed)		0.017	<0.001	<0.001	0.016
	N	276	276	276	276	276
AVG_AWRS1	Pearson correlation	0.144 *	1	0.450 **	0.421 **	0.243 **
	Sig. (2-tailed)	0.017		<0.001	<0.001	<0.001
	N	276	276	276	276	276
AVG_AWRS2	Pearson correlation	0.243 **	0.450 **	1	0.625 **	0.347 **
	Sig. (2-tailed)	<0.001	<0.001		<0.001	<0.001
	N	276	276	276	276	276
AVG_AWRS3	Pearson correlation	0.231 **	0.421 **	0.625 **	1	0.557 **
	Sig. (2-tailed)	<0.001	<0.001	<0.001		<0.001
	N	276	276	276	276	276
AVG_AWRS4	Pearson correlation	0.145 *	0.243 **	0.347 **	0.557 **	1
	Sig. (2-tailed)	0.016	<0.001	<0.001	<0.001	
	N	276	276	276	276	276

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

The average scores had a significant correlation coefficient with each other. The strong correlation made it inappropriate to use linear regression to test the significance of these AWS variables [55,56]. Therefore, non-parametric data analysis methods were the most reliable for analyzing the dataset.

3.3.3. Goodness of Fit Test

A goodness of fit test was conducted to determine whether the average scores represented the expected distribution of the population parameters. The test hypothesized that the responses obtained from the survey had no relationship with the observed dataset [57]. The correlation results are displayed in Table 4.

Table 4. The Goodness of Fit Test.

Test Statistics					
	AVG_MTA	AVG_AWRS1	AVG_AWRS2	AVG_AWRS3	AVG_AWRS4
Chi-Square	124.696	195.000	153.217	189.739	168.348
df	17	8	11	12	14
Asymp. Sig.	<0.001	<0.001	<0.001	<0.001	<0.001

The five variables had a p -value of less than 5%. Therefore, the average responses had a significant relationship with the expected population. Consequently, the dataset was representative of the population.

4. Results

The aim of this study was to identify the association between academic writing skills and use of mobile typing apps to accomplish academic tasks in a population of Arabic-speaking undergraduate students, by analyzing which skills were highly affected by typing via mobile apps.

4.1. SEM Analysis

The average scores for the three constructs were used for constructing SEMs. These models were employed to determine each variable's direct, indirect, and total effect on the students' academic writing skills [52,58,59]. The models followed the conceptual model for the research, and were applied to answer the research questions.

4.1.1. Impact of MTA for AT on AWS

The first model analyzed the relationship between MTA and AWS for Arabic-speaking undergraduate students. This model assumed that MTA has a bi-directional effect on AWS1–4. The Analysis of Moment Structures (AMOS Software) program's output for this model showed the standardized effects, as depicted in Figure 2.

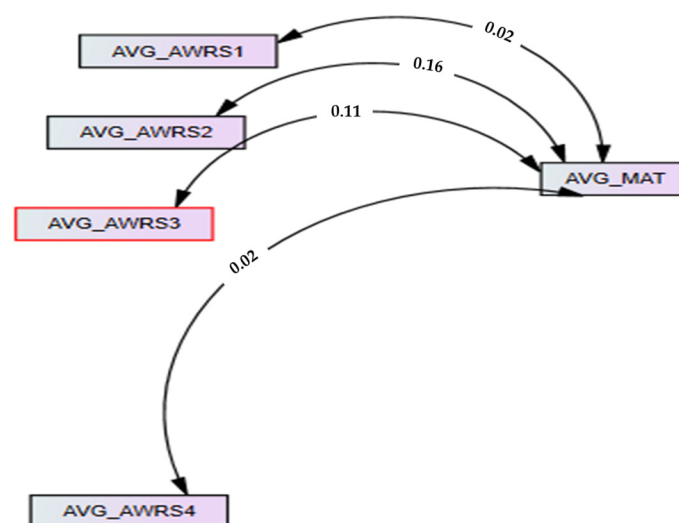


Figure 2. Structural equation model for MTA and AWS.

Figure 2 shows that MTA for AT had the strongest effect on AWRS2, which reflects committing to the idea of the main topic and not deviating from it when typing with mobile apps. The use of these apps had the least effect on enhancing AWRS1, indicating carefully considering the spelling rules when typing with mobile apps, and AWRS4, using abbreviations and symbols when typing with mobile apps. Table 5 shows the model's effects.

Table 5. Direct, Indirect, and Total Effects of Each Variable.

	AVG_MTA	AVG_AWRS1	AVG_AWRS2	AVG_AWRS3	AVG_AWRS4
AVG_MTA	0.00	0.02	0.16	0.11	0.02
AVG_AWRS1	0.02	0.00	0.00	0.00	0.00
AVG_AWRS2	0.16	0.00	0.00	0.00	0.00
AVG_AWRS3	0.11	0.00	0.00	0.00	0.00
AVG_AWRS4	0.02	0.00	0.00	0.00	0.00

Since the model did not have an indirect effect, the direct effects of each variable equal its total effects. The coefficient estimates of the regression model are significant at the 5% level.

Therefore, MTA for AT has a significant impact on enhancing Arabic-speaking undergraduate students' AWS. For example, the results indicated that students sometimes considered the standards of academic writing and sometimes did not when using mobile typing apps to accomplish their tasks.

4.1.2. Mediating Influence of MTA for TA on AWS

A new model was developed to depict the mediating influence of MTA for TA on AWS. Figure 3 shows the standardized effects estimate for the model.

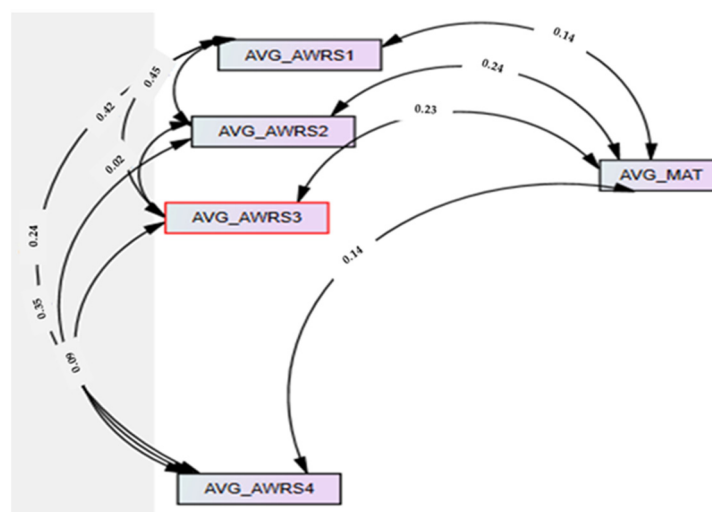


Figure 3. Mediating influence of MTA on AWS.

Based on Figure 3, the inclusion of the mediating influence increased the standardized impact on the model.

MTA for AT had the highest effect on AWRS2, followed by AWRS3.

Table 6 shows MTA's direct, indirect, and total effects on AWS.

Table 6. Direct, Indirect, and Total Effects.

	AVG_MTA	AVG_AWRS1	AVG_AWRS2	AVG_AWRS3	AVG_AWRS4
AVG_MTA	0.00	0.14	0.24	0.23	0.14
AVG_AWRS1	0.14	0.00	0.45	0.02	0.24
AVG_AWRS2	0.24	0.45	0.00	0.62	0.09
AVG_AWRS3	0.23	0.02	0.02	0.02	0.35
AVG_AWRS4	0.14	0.24	0.09	0.35	0.00

4.1.3. Most Affected AWS by MTA for AT

Based on Table 6, AWS2 and AWS3 were the most affected skills in the model. These effects were significant at the 5% level. MTA for AT also had a significant impact on AWS1 and AWS4. However, these effects were much less than those on AWS2 and AWS3.

In summary, the initial model showed that MTA for AT significantly influenced the Arabic-speaking undergraduate students' AWS. In addition, these findings imply the presence of a bidirectional influence on MTA for AT on AWS. The first model proved that MTA has the strongest effect on AWS2. In the second model, the introduction of the mediating influence of these variables led to the emergence of AWS2 and AWS3 as the most affected skills.

5. Discussion

The researcher used a quantitative method to examine the impacts on academic writing skills of using mobile typing apps to perform academic tasks among Arabic-speaking undergraduate students in Saudi Arabia. The findings of this study indicate that using mobile typing apps to perform academic tasks has a significant impact on enhancing Arabic-speaking undergraduate students' academic writing skills. This is consistent with other studies reporting that typing via mobile apps enhanced and improved the academic writing of undergraduate students [19,40]. Hence, these findings lead us to reject H1, which suggested that using mobile typing apps to accomplish academic tasks would have a negative effect on Arabic-speaking undergraduate students' academic writing skills.

The findings of this study also showed that Arabic-speaking undergraduate students use mobile apps on a daily basis. They are often required to type to communicate and search the internet to carry out their assignments and projects. However, a positive correlation was identified between the use of mobile typing apps, students' academic writing skills, and attaining success in academic tasks [60]. For example, there is a bidirectional influence on academic writing skills associated with the use of mobile typing apps to accomplish academic tasks. This finding was in line with multiple studies [1,7,10,26], leading us to accept H2, which assumed a significant relationship between academic tasks, academic writing skills, and use of mobile typing apps among Arabic-speaking undergraduate students.

In addition, the findings of this study also indicated a significant effect on academic writing skills among Arabic-speaking undergraduates in Saudi Arabia associated with using mobile typing applications to accomplish academic tasks, and this effect varied from high to low. This leads us to accept hypotheses H3, H4, H5, and H6, which state that use of mobile typing apps to perform academic tasks has a significant impact on academic writing skills (accuracy, clarity, coherence, and vocabulary). For instance, the study showed that mobile apps had the strongest positive effect on enabling students to type their tasks or assignments clearly and cohesively. This result was confirmed by studies [19,61] reporting that typing via mobile apps had a significant influence on students' academic writing, especially with regard to clarity.

Cohesiveness of written information was found to be one of the academic writing skills most affected by the use of mobile apps to accomplish academic tasks. This agrees with previous studies reporting that students who used mobile apps when taking exams scored lower than students who took the exams by writing manually, due to frequent punctuation and linking word errors [19]. Furthermore, this study found that among Arabic-speaking undergraduate students in Saudi Arabia, clarity was one of the academic writing skills least impacted by using mobile typing apps to perform academic tasks. This finding conflicted with the results of that same study, which reported that students who used mobile apps when taking exams scored lower than students who took the exams by writing manually, in this case often due to spelling and capitalization mistakes [19,61].

Moreover, the current study found that using mobile typing apps to accomplish academic tasks had the least effect on accuracy and vocabulary in writing. This may be due to certain mobile typing apps contributing to reducing the rate of spelling and grammatical errors while writing, by providing suggestions for word choice and spelling.

Thus, use of these apps enables undergraduate students to identify mistakes, edit their work, locate grammatical errors before submitting their assignments, and proofread their work properly [19,61,62]. As a result, students often avoid writing mistakes when using mobile apps for academic tasks. However, their use of mobile typing apps to accomplish academic tasks affects their handwriting skills [62], and students may make grammatical errors when writing their assignments by hand. They may also fail to identify spelling mistakes and present poor handwriting that is not easily readable. Hence, instructors should realize that although this is a time of widespread usage of technology and particular mobile apps in fields of education, they must ensure that students use appropriate academic

writing skills while completing academic tasks and assignments by hand, as they do not receive suggested modifications in these situations.

6. Implications

This study has shed light on the relationship between academic tasks, academic writing skills, and use of mobile typing apps among Arabic-speaking undergraduate students in Saudi Arabia. A thorough analysis of academic writing skills showed that they were significantly affected by typing via mobile apps, which makes it possible for instructors to understand ways in which they can optimize their students' writing experiences. Instructors can drive desirable improvements in students' writing experiences and outcomes if they possess strong competencies for technological adoption. They should be willing to implement changes in their conventional instructional approaches, to ensure a balance between digital and manual writing tasks [21]. They can focus more on issuing academic tasks, such as assignments, quizzes, or discussions that require students to present their work handwritten, with a focus on academic writing skills. Emphasis on coherence, clarity, and creativity is necessary to help students develop meaningful essays as opposed to merely focusing on task completion. Thus, instructors should remind their students to consider these skills when using mobile typing apps for learning purposes. At the same time, it is essential that instructors provide their students with diverse and practical opportunities to apply academic writing standards using diverse mobile apps. In addition, instructors can also provide their students with the names of mobile typing apps that can assist them with adhering to academic writing standards in their academic tasks.

7. Conclusions, Limitation and Future Work

As described above, in the past few years there has been an increased usage of mobile apps particularly in the field of education. For instance, a huge number of Arabic-speaking undergraduate students in Saudi Arabia have been using mobile typing apps to accomplish academic tasks and for other educational purposes. This development has influenced the academic writing skills of undergraduate students. This study proved that the use of mobile typing apps has the strongest effect on the academic writing skills of clarity and cohesiveness among Arabic-speaking undergraduate students in Saudi Arabia. In addition, the use of mobile typing apps for academic tasks also had a significant impact on the academic writing skills of accuracy and vocabulary, although not to the extent as the effects on clarity and cohesiveness. This shows that it is important for instructors to continually ensure that they issue assignments to students that require them to write with due regard for academic writing skills.

This study had many limitations. For instance, this research used quantitative methods through a survey questionnaire. Thus, it may not have obtained details or deep information for understanding the relationship between using mobile typing apps, academic tasks, and academic writing skills in Arabic-speaking undergraduate students in Saudi Arabia. Therefore, it would be better in future studies to apply a mixed method by using other instruments, including interview and observation. In addition, future studies should also investigate the effects of students' gender, age, and experience. Lastly, we suggest that future research should look at how instructors see the possible benefits of mobile typing apps and digital tools to help and improve their students' academic writing skills, as well as reporting the characteristics and features of mobile typing apps.

By distributing a survey questionnaire to Arabic-speaking undergraduate students, this study explored their perspectives about the use of mobile apps to accomplish and write their academic tasks, and the impact of this use on the vocabulary, accuracy, clarity, and coherence of the content in those tasks. There was no independent assessment of students' written texts. Therefore, future studies should include an assessment of undergraduate students' writing skills by using dependent variable measures defined and operationalized within the methods. In addition, for example, two people should be trained to score texts

with a rubric. Each scorer can score each text independently, and then the two scorers meet to resolve disagreements to attain 95% to 100% agreement.

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Institutional Review Board Statement: The study was conducted with approval by the Institutional Review Board (or Ethics Committee) of the Research Ethics Committee (REC) of King Faisal University (protocol code KFU-REC-2022-JUN-ETH-CS104).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data is not available due to confidentiality concerns.

Conflicts of Interest: The author declares no conflict of interest.

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