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Knowledge gaps amongst students entering higher education in the non-regime North of Syria: Causes and possible solutions

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ABSTRACT

The Syrian education sector has faced many challenges since the outbreak of the conflict in 2011, due to displacement, the destruction of educational institutions, and the emigration of school and university staff. This is reflected in the quality of education from primary school to university, as highlighted in several UN reports published between 2015 and 2019. Consequently, gaps in foundational knowledge hinder students' progression through their degree courses.

This research explores two questions, what knowledge gaps exist in students entering university in mathematics and the sciences and their causes, and solutions to bridge these gaps. .

This study was conducted at two universities established in 2015 in the non-regime-controlled northwest of Syria. Twenty-five university teachers from across the two universities were interviewed, and 165 undergraduates were surveyed.

Our results show that significant discipline-specific-knowledge gaps exist amongst most students entering university. The reasons for which, in addition to a pre-university education disrupted by the war and displacement, include social, psychological and economic factors. We propose that an integrated institutional approach, encompassing psychological, social and economic dimension, as well as educational dimensions, is required to address identified knowledge gaps, supported by relevant organizations.

The study makes an original contribution to the understanding of gaps in knowledge that exist amongst students in northern Syria. It draws attention to the realities of Syrian students and the education sector at the secondary and university levels and identifies ways that academics, institutions and decision makers could address those realities to promote positive outcomes amongst university students.

1. Introduction

The Syrian revolution began in 2011 and escalated into a protracted war, a high intensity internationalized conflict that ranks amongst the most destructive since the Second world war (Milton, 2019). It has caused mass internal and external displacement. The conflict has also had a severe impact on the higher education sector, with much of its infrastructure - physical, human, institutional and social - severely damaged (Barakat & Milton, 2015). Despite this, the education system has continued, albeit compromised, and new universities have opened in northern Syria, offering a variety of specializations in these non-regime controlled areas, to which millions have fled. Even with the efforts made

to meet the educational needs of students in North Syria, reports from non-governmental organizations (NGOs), which are active in the region, indicate that students and academics face substantial difficulties including commuting distances between universities and accommodation for the displaced, and a lack of financial and other resources. Students' knowledge gaps in foundational learning, as a result of war and displacement, have also been documented (Deane, 2016). This paper focuses on the knowledge base of students entering university in northern Syria and how well prepared they are to engage with university-level study and progress through their courses. It focuses specifically on foundational knowledge in mathematics and the sciences.

2. Literature review

The outbreak of the Syrian war and its continuation over ten years has led to the emergence of the worst humanitarian crisis in recent decades, causing the displacement of millions of Syrians inside and outside Syria. More than 7118 schools in Syria were either damaged or destroyed (Unicef, 2016),which has resulted in a generation of children who have dropped out of school – nearly 2 million between the ages of 5–17 years (UNESCO & Team, 2019). This is in stark contrast to pre-2011, when Syria had achieved universal enrollment in primary education and close to universal enrollment in secondary education (International Bureau of Education, 2012; Watkins, 2013). The challenges facing students who are still studying in remaining schools are substantial. There is overcrowding in classrooms, outdated curricula, inadequate quality of teaching and lack of basic educational materials, a situation exacerbated by the migration of qualified teachers to countries of asylum (Waite, 2016). These factors have inevitably generated substantial knowledge gaps amongst students; knowledge gaps that persist as students enter university education (UNESCO, 2016).

In comparison to primary or secondary education, research into the impact conflict has on tertiary (university) education is less well documented. However, recent evidence suggests that contrary to the belief of the international community, the higher education system in Syria has not completely collapsed (Milton, 2019), as in the case of other conflict regions such as Somalia and Afghanistan, as described by Verhoeven (Verhoeven, 2009). Milton notes in his 2019 study on HE in northwest Syria, that educational institutions are still operating, but the quality of education has declined significantly. The reasons cited for this decline are similar to those experienced at primary and secondary levels of education, including the loss of highly qualified staff, with official estimates suggesting that by 2015, Syria had lost a third of its professors. a substantial reduction in government spending on the HE and scientific research sector, poor infrastructure and facilities and low attendance by students at classes due to security fears.

A strong pre-university curriculum is required to help students understand the concepts covered at an advanced level of study at university. The amount and quality of prior knowledge positively influences further knowledge acquisition and the capacity to apply higher order cognitive problem-solving (Dochy, Segers & Buehl, 1999). This is particularly important for applied science education like medicine, dentistry, pharmacy and engineering, where foundational knowledge form an important base for future learning, and which requires new concepts to be integrated with an understanding of pre-existing concepts (Donald, 2002). In addition to prior knowledge, a study conducted in the USA concluded that the educational environment, the quality of teaching staff, and the educational curricula, directly impact knowledge formation amongst students studying sciences like biology (Brown, 2018). Clearly, all these conditions are missing or seriously undermined by the situation of conflict and instability that students and teachers have experienced in Syria over the past decade.

Ongoing conflict also has a dramatic negative impact on the mental health of those exposed to war, leading to series of compromised outcomes including family and peer relations, educational attainment and general life satisfaction (Catani, 2018). For example, a study (Veronese, Pepe, Diab, Abu Jamey & Kagee, 2021) conducted on a sample of Palestinian university students highlighted that living under siege in the Gaza Strip associated with decreased psychological functioning amongst participants. This psychological damage, has been shown, in the specific case of education amongst Syrian students, lower their academic attainment in courses like Mathematics, Science, languages and the Social Sciences compared to achievement pre-war (Ulum & Kara, 2016).

Higher-level science and technical knowledge are crucial to socioeconomic development to improve conditions for the country's citizens (Bekele, 2020; Dogbevia, 2014; Owens, 2018). For example, through supporting health services, reconstruction and agricultural activities.

In recognition of the need for building sustainable change (Hargreaves & Goodson, 2006), international and local humanitarian organizations working in conflict areas or in countries of asylum have increased support for training with the aim of moving education from relief to sustainability, taking into account the issue of quality of education as part of their strategy (Mendenhall, 2014; Naylor, 2015; Visconti & Gal, 2018). In countries affected by the Syrian crisis, namely Syria, Jordan, Lebanon and Iraq, UNESCO has established a 'Bridging Learning Gaps for Youth' program that involves a number of initiatives designed to support access to quality education and build resilience within the educational system. These include the provision of accelerated teacher-training programmes and providing access to higher education and technical and vocational learning experiences that are relevant to youths (Deane, 2016; Visconti & Gal, 2018; UNESCO, 2016). Despite the introduction of these initiatives, there are virtually no studies that explore the experiences of students as they transition from pre-university to university education within these conflict settings in Syria. However, anecdotal evidence suggests that transition is challenging as students attempt to navigate the higher learning expected of them, adapt to different approaches to learning, teaching and assessment and develop a new skill set.

In non-conflict countries, school/college to university transition is widely recognized as a crucial period of student development and effective transition can set the foundation for successful study and future achievement (Hultberg, Plos, Hendry & Kjellgren, 2008; Kitching & Hulme, 2013; Krause & Coates, 2008; Merry, 2019). Resources and training to support transition are now increasingly common. However, what of conflict regions like Syria where learning has been severely disrupted through protracted war?

3. Research problem

The war in Syria has directly affected education, with a resulting decline in students' knowledge levels at pre-university levels. This inevitably impacts students' transition and successful achievement through their university studies. Given the importance of a strong foundational understanding of science and mathematics concepts in key vocational courses, important for the country's socioeconomic development (e.g. Medical sciences, Dentistry and Engineering), we focused our study on the identification of knowledge gaps within science and mathematics. Our research focused on the following two key questions:

1) What knowledge gaps are evident amongst students entering university in subjects that require science and mathematics as foundational topics and what are the causes of these gaps?
2) What strategies could be introduced to help bridge identified knowledge gaps?

4. Methodology and methods

This study was conducted with two universities selected as representative of emerging new universities in northwest Syria, an area where the largest number of internally displaced Syrians is concentrated and where a number of universities have been opened since 2015 to respond to the higher education needs of local and displaced communities. Ethics approval was secured from the University of Bristol, one of the two study mentors' institutions. A mixed-methods approach was used. Semi-structured interviews with a total 25 academics drawn from both study universities, who were deemed to be best placed to provide insights into their students' knowledge gaps, potential causes, and to suggest possible solutions to bridge identified gaps were conducted. These were combined with an online survey of 41 students from both institutions.

The interviews ranged from 30 to 60 min, with interview questions designed to address the two main research questions, structured into three sections. The first section focused on the demographic and educational background of the interviewee (e.g. years of teaching experience, specialization). The second focused on students' language-related
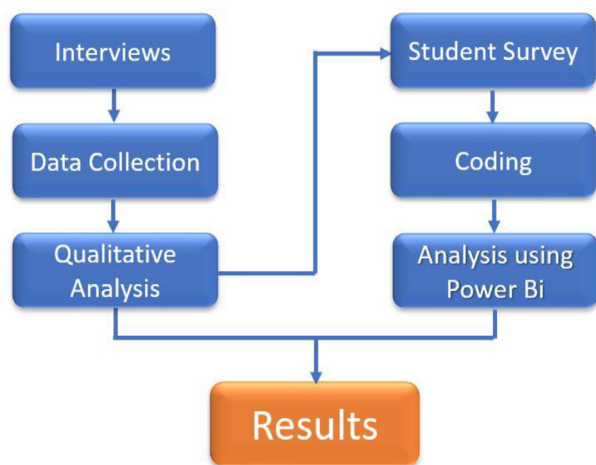
Fig. 1. Research flowchart.

Fig. 2. Academic interviewees by specialization.

Fig. 3. Survey respondents by academic year.

knowledge, i.e. Arabic to allow students to fully grasp scientific concepts, English as the language in which information on scientific developments is mostly published, and Turkish to support the possibility of their furthering their studies outside Syria. The third explored students' subject-specific knowledge gaps at the start of their university careers, reasons for these gaps, mechanisms in place to address them, and strategies that might be implemented to bridge identified gaps. Signed consent forms were received by the study team by email ahead of the interviews. Due to Covid-19, these were held remotely via Zoom and recorded with permission from interviewees. Interview data were subject to thematic analysis following transcription and coding.

To provide more in-depth insights and for the purpose of triangulation of the findings, students from both study universities were surveyed. A survey questionnaire was created in KoBoToolbox to facilitate data coding, with survey questions drawing on the semi-structured interview instrument and Deane's study (Deane, 2016).

The survey questionnaire consisted of 41 questions aiming to elicit answers on the main reasons for the emergence of knowledge gaps at undergraduate level in the sciences and languages, information on the students and their studies at both the pre-university level and university level, including foreign languages studies, and information on the nature of their housing and displacement experiences, where survey respondents had been displaced.

The survey was disseminated to students studying at both universities, using social media. Survey data were analyzed using Power BI software and Excel following coding using KoBoToolbox. Fig. 1 outlines the study workplan

5. Sample

Recruitment. Potential study interviewees, i.e. academics specializing in the sciences and languages from the two study universities, were contacted with the help of the two universities' administration. Invitation emails, including study information sheets and consent forms, were sent to prospective participants, asking them to contact the study team if they were interested in participating. Twenty-five responded positively and returned signed consent forms to the study team ahead of the interviews. See Fig. 2 for a breakdown of interviewee disciplines.

The student survey targeted natural science undergraduates from both study universities. The demographic information captured on the survey respondents related to their year of study and their subject (see Fig. 3 and Fig. 4).
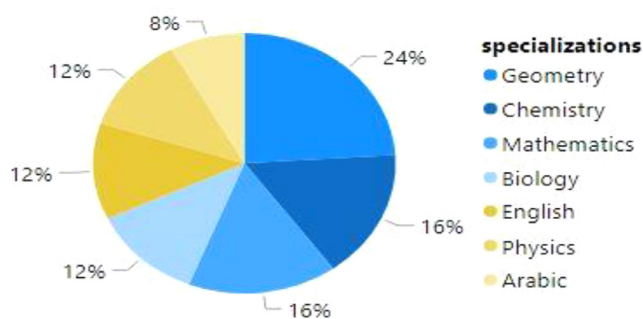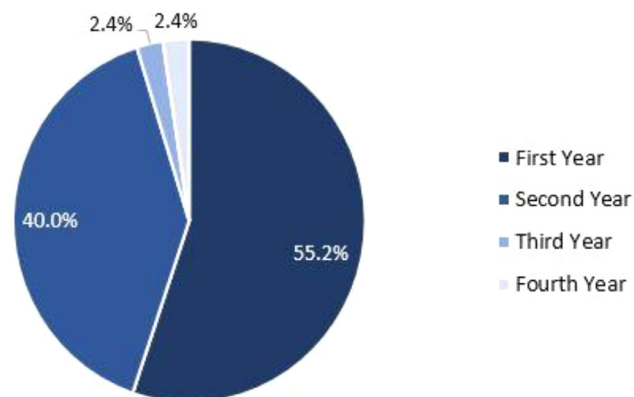
6. Key results

6.1. Knowledge gaps

6.1.1. Knowledge gaps in languages

Academic interviewees reported language gaps amongst students in Arabic, English and Turkish – the latter being the two foreign languages that students study in Syria. They confirmed the importance of a sound knowledge of Arabic in order to understand scientific content, and that the students' main areas of weakness related to Arabic grammar and written Arabic. Interviewees also reported knowledge gaps in English language, limiting students' abilities to research and learn about scientific developments, much of which is published in English. They also noted weakness in Turkish language, which was seen as important because Turkey, as a neighboring country, offer scholarships to Syrian students to allow them to complete their studies in Turkish universities.

"The Arabic language is a bridge to scientific subjects, so it is of paramount importance in the understanding and development of information." (Interview 6)

"Students' Arabic language is weak, which affects their understanding of concepts and the expression of ideas." (Interview 12)

"Students' English language is weak, and this affects their development in scientific disciplines." (Interview 3)

"English language is very important, especially in more advanced [study] years. Students need to develop it." (Interview 4)

"In general, Turkish language amongst students is weak. The Turkish language is important to allow students to continue their studies in Turkey." (Interview 7)

The student-survey results showed that 83% of students self-identified as having Arabic language weaknesses, whilst 27% and 57%
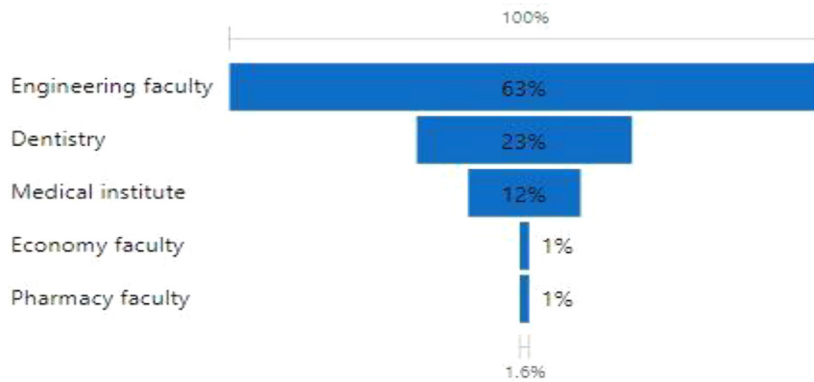
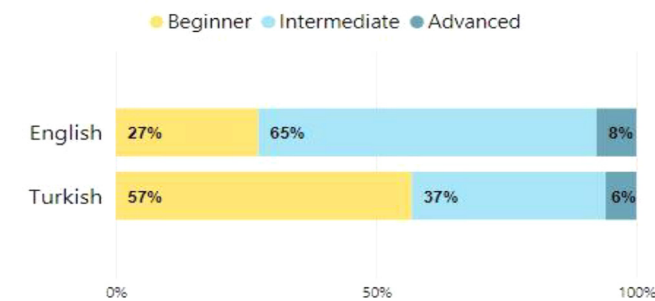**Fig. 4.** Survey respondent by specialization.

Fig. 5. Students' self-identified English and Turkish language levels.

Fig. 6. Students self-identified subject-related knowledge gaps.

of students self-identified as having a beginners' level understanding of English and Turkish (Fig. 5).

6.1.2. Knowledge gaps in foundational science

Of the academics interviewed, 65% confirmed the presence of knowledge gaps amongst students in the early stages of university study. These gaps were mainly in the basic sciences (mathematics, biology, physics, chemistry). They reported that these manifested themselves as the misunderstanding of terms and basic concepts, affecting their understanding of university lectures, which would continue to impact their learning as they progressed through to more advanced stages of university study if not addressed.

The academics added that such foundations were required in all specialized subjects in the branches of engineering and even medicine, and that continued failure to grasp and understand them would prevent students from progressing in their areas of specialization and future work.

"There are some students who seem to be learning basic science terms for the first time." (Interviewee 12)

"Students suffer from a deficit in basic information in chemistry. Some of them lack basic knowledge of chemical symbols, the balance of equations, the mechanism of a chemical reaction, and how to balance two sides of a chemical equation." (Interviewee 1)

"There are students who are unable to solve equations and inequalities, and other basic principles of mathematics, which prevents them from progressing in their specialized subjects". (Interviewee 4)

"There are errors in their understanding of basic terminology, such as cell and its vital functions and its organelle, as well as in their understanding of the integration of biology with sciences such as physics and chemistry." (Interviewee 12)

A majority of the survey students also highlighted gaps in their understanding of scientific subjects, as Fig. 6 shows.
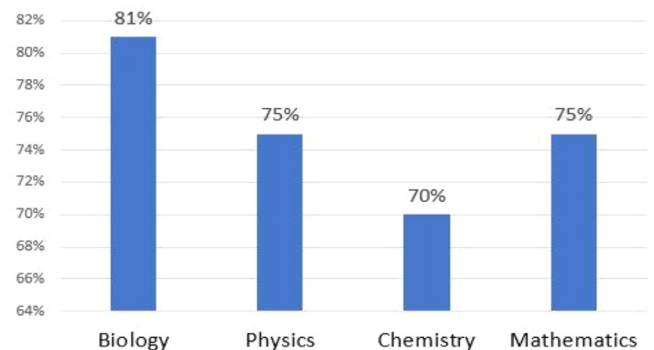
6.2. Causes of student knowledge gaps

Academic interviewees reported many reasons for the knowledge gaps observed amongst their students, the most prominent of which were:

6.2.1. Repeated displacement with resulting drop-out of studies for some classes

Interviewees confirmed mass displacement to the area, including multiple-displacements one area to another several times, with students missing schooling due to the absence of educational institutions in the areas to which they were displaced. Schooling was also missed due to lack of security and economic instability and the psychological impact of conflict and displacement. Interviewees reported that since the natural sciences and languages were subjects in which knowledge was gained cumulatively, interruptions in schooling inevitably led to knowledge gaps in these subjects. These issues were highlighted by participant academics who said:

"The displacement of students from one region to another has led to a decrease in their interest in education and a decline in their educational levels." (Interviewee 5)

"Repeated displacement led to student instability and drop out from a number of classes, negatively affecting their personality and education." (Interviewee 16)

In terms of the student survey, 75% of respondents confirmed that they and their families were displaced several times, with an average of 4 displacements, and 38.18% confirmed they had been forced by circumstances to drop out of several classes.

6.2.2. Extreme poverty, poor living conditions, and the need to work

Interviewees also reported that many people in northern Syria lived in extreme poverty. They said that people were displaced and had no
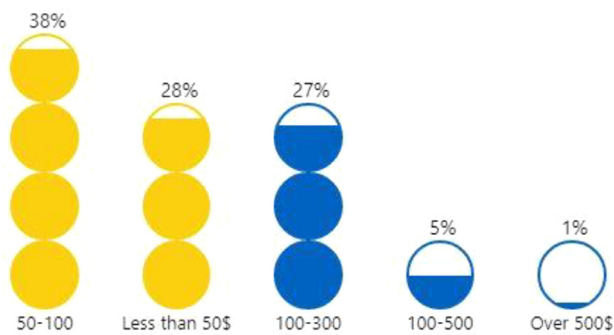
Fig. 7. Students' monthly family income.

work. Some lived in camps or single rooms because they were unable to rent accommodation. This extreme poverty and poor living conditions affected children's education. Education was no longer a priority, the goal was to survive.

"Commitment to study is almost non-existent amongst most students, their priority is to live." (Interviewee 2)

"When there is a lack of the most important necessities of life, there is no interest in other areas. Poverty and poor living have led to a lack of interest in education." (Interviewee 8)

"They don't have room in their homes to study, so how can they study?" (Interviewee 19)

To establish students' standards of living, we asked them about their monthly income in US dollars. Fig. 7 shows that approximately 60% of students' families have an average monthly income of 100 dollars or less.

Fig. 8 shows the type of accommodation students live in, with 62.4% in rented accommodation and 19.4% in camps for the displaced.

The academics interviewed reported that poverty forced students to work to provide for their' and the families' needs, with resulting absences and periods of drop-out from university, impacting their higher education learning and knowledge gain. The survey students revealed that 30% of them worked and studied at the same time.

*"Half the students work, so don't attend lessons." (*Interview 23)

6.2.3. Poor pre-university teaching processes

Interviewees emphasized the poor condition of schools, their limited number leading to overcrowding, the loss of important topics from the curricula with a resulting gap between pre-university education and university education, all reasons for students' knowledge gaps.

The issue of weakness in teaching is due to the loss of expert teachers. Most of those now teaching do not have college degrees or teaching experience.

"The lack of adequate schools, the lack of qualified teaching staff at secondary level." (Interviewee 1)

"Pre-university education has become weaker than before, as certain topics are not covered in textbooks." (Interviewee 12)

According to the student survey, 33% of students confirmed that important topics were deleted from school syllabi.

6.2.4. Challenges facing universities

The academic interviewees recognized that a large number of Syria's educated had left Syria as a result of the war, as had happened in Iraq (Morand-Ferron & Quinn, 2011) and other conflict-affected countries. This had led to a shortage of university teaching staff in northern Syria, and the teaching of university subjects by non-specialists.

"A number of teachers and academics emigrated from Syria, which has led to an insufficient number of specialists in northern Syria and resulting weakness in students." (Interviewee 11)

6.3. Challenges facing students

6.3.1. Psychological challenges

University students in northwest Syria face many psychological problems, as confirmed by the participating academics. Psychological problems result from the loss of loved ones including family members, war disabilities, fear of travelling to and from the university, financial destitution, and an inability to meet basic needs, all of which are outcomes of war, as well as the lack of solutions to address the problems faced by local communities and residents, as confirmed by participating academics:

"These problems are exacerbated by the inability of some university teachers to deal positively with their students' various psychological problems, … they treat them as ordinary students who don't have any psychological problems. These students are considered to be in a very special situation, different from [most of] their counterparts in the rest … of the world." (Interviewee 20)

"The teaching burden on university lecturers is increased as they are forced to explain the lecture several times, due to their inability to concentrate as result of numerous psychological problems." (Interviewee 15)

6.3.2. Technical challenges

Participating academics also highlighted other challenges such as the lack of electricity in students' homes or the fact that, even when available, students couldn't afford to pay for it. The lack of internet access and the inability to afford computers for study were an additional compounding reasons for gaps in students' knowledge.

"The lack of electricity and its high cost, and the lack of internet and its high cost increase the psychological pressure on students." (Interviewee 22)

"The inability of students to buy computers and, consequently, their lack of experience and computer skills, may also increase knowledge gaps amongst students, especially in disciplines that require computers, such as engineering amongst others." (Interviewee 18)

The student survey also revealed the weakness of the internet in the region, with 68% of respondents lacking internet access (see Fig. 9), as well as the lack of computer skills, with 20% stating that their computer skills were weak and only 7% of students claiming to have 'excellent' computer skills (see Fig. 10).

6.3.3. Financial challenges

Participating academics stressed that most students also suffered from the high costs of transport to and from the university, in addition to the high cost of housing, and were often unable to pay university fees. Although some international organizations offer scholarships to cover university fees, housing and other costs, they are few in number.

"Our students suffer from their inability to pay university fees and housing costs, and their inability to bring the basic supplies needed for any student at the university, as international organizations offer very few full scholarships and partial scholarships to our students, despite their difficult circumstances." (Interviewee 12)

The student survey showed that only 2.42% of the respondents received financial grants.

6.4. Methods to bridge the gaps

6.4.1. Existing methods used by university teachers

Participating academics shared their concerns about students' knowledge gaps and stressed that they went to great efforts to develop
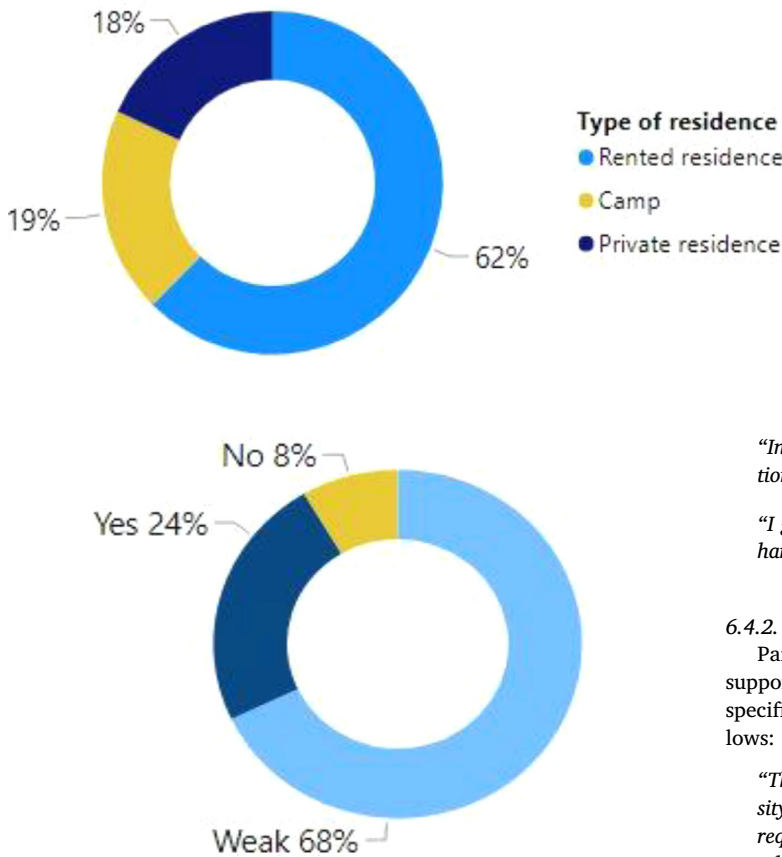
Fig. 8. Students' accommodation by type.
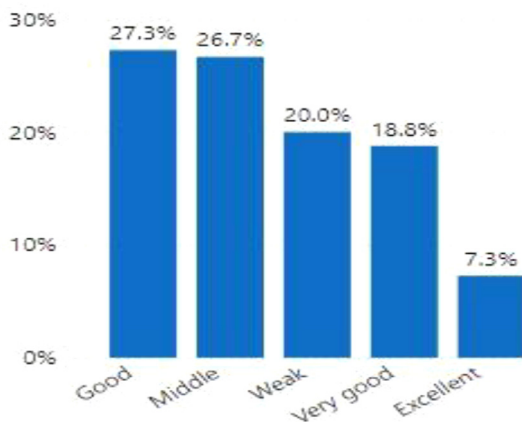

Fig. 9. Student access to the internet.

Fig. 10. Students' self-assessment of computer skills.

and implement educational strategies to help bridge the gaps. These included introducing a curriculum on basic information before starting the course proper, provision of additional catch-up homework and tests, increasing practical applications such as MATLAB and GeoGebra, and directing students to online resources, e.g. lessons and videos. In addition, some academics also supported students with psychological counselling to try to encourage their interest in studying.

Views expressed by the participants include:

"I use various methods, including simplifying lectures and repetitions in order to consolidate basic concepts, in addition to increasing the number of tests for students in order to obtain feedback that can be useful in modifying my method of explanation." (Interviewee 17)

"Increasing the number of examples during the explanation, giving additional lectures before exams." (Interviewee 8)

"I give psychological counselling to students to encourage them to study hard." (Interviewee 16)

6.4.2. Existing university-level mechanisms

Participating academics confirmed the availability of university-supported mechanisms to allow students to enhance their subject-specific knowledge as they transitioned into university, described as follows:

"There are some formal and informal mechanisms, created by the university to bridge gaps such as holding courses for new students to fill the gaps, requesting teachers to bridge the gaps right from the beginning, providing additional classes for students, liaising with international organizations to develop laboratories." (Interviewee 5)

"Our university is trying hard to contract specialized Syrian academics who are in Turkey." (Interviewee 17)

"Our university offered intensive courses for newcomers in mathematics and physics." (Interviewee 19)

6.5. Additional strategies proposed by participating academics

Study interviewees also proposed new strategies to help bridge knowledge gaps at both the pre-university and university stages.

6.5.1. At the pre-university stage

The need to run preparatory courses for students, especially in scientific disciplines such as mathematics, physics and chemistry, before they entered university. 57% of the academics reported needing qualified teachers at the secondary and preparatory stages to support scientific courses.

Academics highlighted the need for curriculum development and standardization across the northern region of Syria, with 26% of interviewees indicating the need to establish a higher education council responsible for overseeing educational processes in all related areas, such as curriculum development and the appointment of teaching faculty, as well as to work to increase the number of available schools. 30% of academics stressed the need to support secondary students financially to allow them to study properly and 13% indicated the need to build laboratories in the secondary schools to enable students to put theory into practice. Some confirmed the availability of downloadable online applications to allow students to simulate laboratory experiments in the sciences. Others also pointed out the need to master English language at secondary school to be able to continue their studies at the university level.
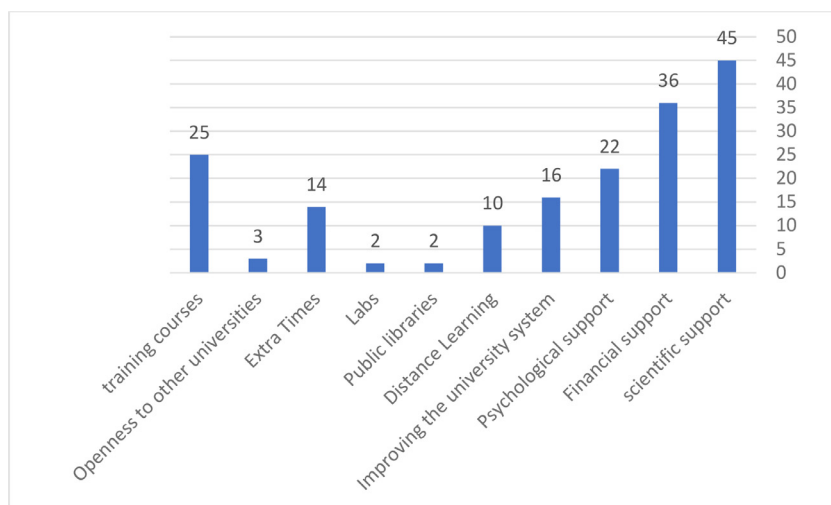
Fig. 11. Proposed solutions to help bridge knowledge gaps.

6.5.2. At the undergraduate stage

Participants made suggestions to address knowledge gaps of their undergraduate students, including the need to attract and recruit more qualified, specialized and experienced academics in their universities. This strategy had already been adopted by the universities at the time of the study but needed to be accelerated, along with the introduction of in-house professional development programmes for existing staff. Some participants suggested that the universities should revisit their policies on admissions, raising entry-level grades and requirements for those looking to study scientific and medical degrees, i.e. only those who have a science-focused baccalaureate. As for raising the language ability, the academics highlighted the need to strengthen English language courses so that the students could access important materials in English, including English language internet sites, and use scientific applications. Some suggested supporting students financially with university accommodation and monthly stipends to allow students to focus on their studies.

Fig. 11 summarizes some of the proposed strategies that might be implemented to address scientific and linguistic gaps, central to which additional mathematics and language courses, financial and psychological support.

7. Conclusion

This study focused on two specific questions, the first relating to core knowledge gaps in the sciences amongst students registering for university, and the second, looking at initiatives and practices that might be implemented to help bridge these identified gaps.

Three key findings emerge from our study. One, there are substantial gaps amongst science students' understanding of foundational concepts as they start university, and this is exacerbated through a decline in primary (Arabic) and secondary language training (English) as a medium of learning. Second, it is clear that these gaps are a consequence predominantly of war. These include a combination of (i) disrupted access to education through multiple displacements and school closures, (ii) significantly weakened learning and teaching environments due to destroyed educational infrastructure, and the loss of qualified schoolteachers to both internal and external displacement, and (iii) psychosocial trauma or physical injury and disability. On top of these, the vast majority of students live in extreme poverty and as such combine work with studies to meet basic needs of food and shelter for themselves and their families. All of these factors result in often prolonged, periods of missed schooling. Such periods of lost schooling impact particularly on foundational science knowledge that requires continuity in the curricula and knowledge to be built cumulatively over a period of time. Given the lack of access to computer and internet facilities for a good proportion

of the students we surveyed, the move to online learning necessitated by Covid-19 will have brought further challenges, leading to additional lost learning (David et al., 2020).

Thirdly, our study highlights that there are several initiatives in place to support students in their learning as they enter university. However, in the main these are approaches deployed by individual academics rather than institution-wide strategies designed to systematically support student transition into and successful progression through the university. Of the support methods that are being utilized, these predominantly focus on knowledge deficits (e.g. additional lessons or learning material), with little consideration of the wider psychosocial, and economic challenges the students face. How effective these individual, learning-focused strategies are in supporting transition and continuation through university are unclear.

Good mental health is an important contributor to good academic performance and exposure to conflict-related violence has been linked to poorer academic performance. For example, (Brück, Di Maio & Miaari, 2019) studying the effect of the Israeli-Palestinian conflict on various educational outcomes found that students were less likely to pass exams when exposed to violence. Similar patterns have also been reported in relation to impoverishment, with reduced educational attainment correlating with a reduction in household financial resources due to conflict (Dabalen & Paul, 2014). The latter has been linked to, for example, the demand for students to work to earn to support household incomes at the detriment of their education (Justino, Leone & Salardi, 2014).

Given the impact of psychological distress and financial hardship on educational attainment, we propose that any initiatives to fill knowledge gaps must take a holistic view of the contributory factors and provide for psychological, social and economic needs, as well as educational. The value of an integrated approach is advocated by Yamada and Matsushima in their 2020 study in Myanmar, in which these authors highlight that to support education, a strategy must also support students' material, social and psychological needs (Yamada & Matsushima, 2020).

We also propose that given the multitude of issues and the magnitude of the problem that needs to be addressed, that support should not be left to individual academics. Instead, the development of a coherent institution-wide strategy is necessary to support student transition and successful progression through their studies incorporating some of the suggestions put forward by the academics we interviewed, for example, inclusion of pre-preparatory courses, scholarships and grants and provision of psychosocial trauma treatment. Whilst such measures are likely to achieve some success, we also advocate that a wider view of the situation is required, necessitating stronger links to be forged between pre and university level training, standardization of secondary school curricula and improved professional development for school and university

staff. Working partnership with NGOs, international educators (Badaiwi et al., 2020) and neighbouring countries that are currently supporting education for Syrian refugees (Visconti & Gal, 2018) would facilitate access to expertise and resources allowing initiatives to be developed and deployed more rapidly. These developments are critical to improving the quality of education, and to enable students to access and progress successfully through higher level learning and in turn contribute to the development of society. All the while recognizing that establishing security is an essential first step to developing a comprehensively educated society.

Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

References

Barakat, S., & Milton, S. (2015). Houses of wisdom matter: The responsibility to protect and rebuild higher education in the Arab world. 16.

Bekele, D. (2020). Mini review on importance of education and training in science, technology and innovation in developing countries. *General Internal Medicine and Clinical Innovations, 5*. 10.15761/GIMCI.1000185.

Brown, S. (2018). How do you solve a problem like transition? A qualitative evaluation of additional support classes at three university Biology departments. 25, 9.

Brück, T., Di Maio, M., & Miaari, S. H. (2019). Learning the hard way: The effect of violent conflict on student academic achievement. *Journal of the European Economic Association, 17*(5), 1502–1537. 10.1093/jeea/jvy051.

Catani, C. (2018). Mental health of children living in war zones: A risk and protection perspective. *World psychiatry : Official journal of the World Psychiatric Association (WPA), 17*(1), 104–105. 10.1002/wps.20496.

Dabalen, A. L., & Paul, S. (2014). Estimating the Effects of Conflict on Education in Côte d'Ivoire. *The Journal of Development Studies, 50*(12), 1631–1646. 10.1080/00220388.2014.959501.

Deane, S. (2016). Syria's lost generation: Refugee education provision and societal security in an ongoing conflict emergency. *IDS Bulletin, 47*(3). 10.19088/1968-2016.143.

Dochy, F., Segers, M., & Buehl, M. M. (1999). The relation between assessment practices and outcomes of studies: The case of research on prior knowledge. *Review of Educational Research, 69*(2), 145–186. 10.3102/00346543069002145.

Dogbevia, M. (2014). *Science education to foster development and peace in a post conflict african country*. Materials of Workshop at George Mason University.

Donald, J. G. (2002). *Learning to think: Disciplinary perspectives. the jossey-bass higher and adult education series*. Jossey-Bass, Inc.

Hargreaves, A., & Goodson, I. (2006). Educational change over time? The sustainability and nonsustainability of three decades of secondary school change and continuity. *Educational Administration Quarterly, 42*(1), 3–41. 10.1177/0013161X05277975.

Hultberg, J., Plos, K., Hendry, G. D., & Kjellgren, K. I. (2008). Scaffolding students' transition to higher education: Parallel introductory courses for students and teachers. *Journal of Further and Higher Education, 32*(1), 47–57. 10.1080/03098770701781440.

International Bureau of Education. (2012,. March 2). World Data on Education: Seventh edition 2010-11 . http://www.ibe.unesco.org/en/document/world-data-education-seventh-edition-2010-11. IBE/2011/CP/WDE/SY.

Justino, P., Leone, M., & Salardi, P. (2014). Short- and long-term impact of violence on education: The case of timor leste. *The World Bank Economic Review, 28*(2), 320–353. 10.1093/wber/lht007.

Kitching, H.J., .& Hulme, J.A. (.2013). Bridging the gap: Facilitating students' transition from pre- tertiary to university psychology education. 36.

Krause, K., & Coates, H. (2008). Students' engagement in first-year university. *Assessment & Evaluation in Higher Education, 33*(5), 493–505. 10.1080/02602930701698892.

Mendenhall, M. A. (2014). Education sustainability in the relief-development transition: Challenges for international organizations working in countries affected by conflict. *International Journal of Educational Development, 35*, 67–77. 10.1016/j.ijedudev.2012.08.006.

Merry, S. (2019). E., Kyndt, V., Donche, K., Trigwell& S., Lindblom-Ylanne (eds.) (2017) Higher education transitions: Theory and research. London: Routledge. Innovative Practice in Higher Education, 3(3), Article 3. http://journals.staffs.ac.uk/index.php/ipihe/article/view/191

Milton, S. (2019). Syrian higher education during conflict: Survival, protection, and regime security. *International Journal of Educational Development, 64*, 38–47. 10.1016/j.ijedudev.2018.11.003.

Morand-Ferron, J., & Quinn, J. L. (2011). Larger groups of passerines are more efficient problem solvers in the wild. *Proceedings of the National Academy of Sciences, 108*(38), 15898–15903. 10.1073/pnas.1111560108.

Naylor, R. (2015). Curriculum development in fragile states to encourage peace and reduction of conflict. 15. *Governance. Social Development. Humanitarian. Conflict. GSDRC.*.

Owens, B. (2018). Science and technology education. *Nature, 562*(7725), S1. 10.1038/d41586-018-06829-9.

Ulum, Ö., & Kara, Ö. (2016). The effects of war on syrian refugees' academic achievement. *The Journal of Academic Social Science Studies, 48*, 413–423. 10.9761/JASSS3584.

UNESCO, & Team, G. E. M. R.. (2019). *Global education monitoring report, 2019: Arab states: Migration, displacement and education: Building bridges, not walls*. UNESCO Publishing.

Unicef. (2016). *Syria education sector analysis: The effects of the crisis on education in areas controlled by opposition groups (2010-2015)*. Middle East and North Africa: UNICEF.

Verhoeven, H. (2009). The self-fulfilling prophecy of failed states: Somalia, state collapse and the global war on terror. *Journal of Eastern African Studies, 3*(3), 405–425. 10.1080/17531050903273719.

Veronese, G., Pepe, A., Diab, M., Abu Jamey, Y., & Kagee, A. (2021). Living under siege: Resilience, hopelessness, and psychological distress among Palestinian students in the Gaza Strip. *Global Mental Health, 8*, E40. 10.1017/gmh.2021.37.

Visconti, L., & Gal, D. (2018). Regional collaboration to strengthen education for nationals & Syrian refugees in Arabic speaking host countries. *International Journal of Educational Development, 61*, 106–116. 10.1016/j.ijedudev.2017.10.022.

Waite, D. (2016). The where and what of education today: A leadership perspective. *International Journal of Leadership in Education, 19*(1), 101–109. 10.1080/13603124.2015.1096080.

Watkins, K. (2013). *Education without borders: A summary. a report from lebanon on syria's out of school children*. London: A World at School Available at: Www. Odi. Org. Uk/Sites/Odi. Org. Uk/Files/Odi-Assets/Publications-Opinionfiles/8575.

Yamada, H., & Matsushima, M. (2020). Impacts of long-lasting civil conflicts on education: Evidence from the 2014 Census of Myanmar. *Journal of Asian Economics, 71*, Article 101250. 10.1016/j.asieco.2020.101250.