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From paper forms to smart maps: how a digital welfare system is transforming student support in malaysian polytechnic education

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ABSTRACT

When students are living scattered across different areas of a city instead of staying in campus hostels, colleges face the challenge of ensuring their safety, monitoring their well-being, and providing timely support, especially during emergencies. This paper examines how Politeknik Kuala Terengganu (PKT) answered that question by building the i-Care system, a web-based digital platform that uses GPS mapping to track where students live, monitors their well-being over time, and allows staff to respond quickly during emergencies such as floods. Before i-Care, the institution collected welfare information through paper forms handled by student volunteers. This produced errors in nearly half of all records and left staff poorly equipped to help students when it mattered most. This paper describes how i-Care works, what it has changed, and what other institutions managing large off-campus student populations can learn from PKT's experience. The study also raises honest questions about student privacy and whether all students can access the system fairly. The findings suggest that thoughtful digital tools, when paired with genuine institutional commitment, can transform student welfare management from a reactive, paperwork-heavy process into a proactive and genuinely.

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Introduction

Digital technology has changed nearly every aspect of modern life, and higher education is no exception. Universities and polytechnics around the world are using digital platforms to manage enrolment, deliver classes, and support their students more effectively. In Malaysia, this shift has been encouraged at the national level through the Malaysia Education Blueprint 2015 to 2025, which calls on all higher education institutions to modernize their operations through the thoughtful use of technology (Ministry of Education Malaysia, 2015; Zainudin et al., 2025).

Politeknik Kuala Terengganu, commonly known as PKT, is one institution that took this call seriously, and for an important reason. Unlike many universities and polytechnics that provide hostels on campus, PKT has no on-site accommodation at all. Every student at PKT must find and pay for their own rental housing somewhere in the city of Kuala Terengganu. While this is a common arrangement in Malaysian higher education, it creates a genuine challenge for those responsible for student welfare: when students are spread across dozens of rented homes and apartments throughout a city, keeping track of them, reaching them during

emergencies, and monitoring their well-being becomes very difficult (Hilmy Muslim et al., 2013; Ahmad & Rosli, 2021).

For many years, PKT's Student Affairs Department, known in Malay as the Bahagian Hal Ehwal Pelajar or HEP, relied on a system where members of the Student Representative Council, the Majlis Perwakilan Pelajar or MPP, physically distributed paper forms, collected them back from students, and passed the information to management. This approach had a serious flaw: students move house often, rental arrangements change, and new students arrive throughout the year. By the time forms reached management, much of the information was already outdated. Institutional records confirmed that errors appeared in approximately half of all welfare records collected through this method (PKT HEP Institutional Report, 2025; Nasir et al., 2022). In a welfare system were knowing where a student lives can be a matter of urgency during a flood or health crisis, a 50% error rate is not a minor inconvenience; it is a serious institutional failure.

To solve this problem, PKT built the i-Care system. This is a digital platform that allows students to register their own home address using an online map, keep their details up to date in real time, and share relevant well-being information with welfare staff. The system also gives HEP staff a live dashboard showing where every registered student lives, which students have flagged concerns, and which rental properties have been approved as safe and suitable. This paper examines the i-Care system in detail: how it was designed, what it has achieved, and what lessons it offers for other institutions managing off-campus student populations.

Method

This paper uses a case study approach, which is a well-established research method that examines how something works in its real-world context, rather than in a controlled experimental setting (Yin, 2018). A case study is appropriate here because the i-Care system was designed specifically for PKT's unique circumstances, and understanding its impact properly requires attention to the specific institutional, geographic, and social context in which it operates.

The main sources of information for this paper are official reports produced by PKT's HEP department, technical documentation describing how i-Care was built, and a published academic paper from 2025 titled "Transformasi Digital Pengurusan Kebajikan Pelajar Melalui Sistem i-Care," which means "Digital Transformation of Student Welfare Management Through the i-Care System." These primary sources are supported by a review of peer-reviewed research published over the past ten years, with a particular focus on studies conducted in the Malaysian higher education context. Where this paper draws on institutional performance data, such as the reported 50% error rate under the old system, readers should be aware that this data comes from internal institutional sources and should be treated as indicative. Independent verification through future research would help to establish these figures with greater confidence.

Digital Transformation in Education Is About More Than Technology

Researchers who study how organisations change when they go digital have made an important point: true digital transformation is not simply about replacing paper with computers. It is about rethinking how an organisation works and what it values (Vial, 2019). When a university uses technology only to automate what it was already doing, it misses the bigger opportunity. The real gain comes when technology enables an institution to do things it could never do before, or to serve people in fundamentally better ways.

Evidence from higher education backs this up. Carmo et al. (2025) found that well-designed digital administrative systems can reduce processing times by up to 66% and cut operating costs by as much as 75%, while at the same time improving the accuracy of the information institutions use to make decisions. Castro et al. (2020) reviewed dozens of studies and found that the biggest benefits of going digital were not simply speed but the ability to have reliable, current information available at any moment. In the context of student welfare, where the quality of a decision depends entirely on the quality of the information behind it, these findings are directly relevant.

In Malaysia specifically, Zainudin et al. (2025) caution that the benefits of digital transformation will only be fully realised if institutions make sure their systems are accessible to all students, including those from lower-income families or rural backgrounds who may have less reliable internet access or fewer digital devices. This is a concern this paper returns to in the discussion section.

Students who rent private accommodation away from campus face challenges that are quite different from those of students living in hostels. Research in Malaysia has shown that off-campus students are more likely to face safety risks, poor living conditions, and a sense of isolation from campus life (Hilmy Muslim et al., 2013). Because they are not physically on campus, their institution often has little visibility into their day-to-day situation, which makes it harder to offer timely help when something goes wrong.

Hilmy Muslim et al. (2012) found that students in private rental housing often feel cut off from the social fabric of their institution, reporting higher levels of loneliness and reduced sense of belonging compared to students in campus residences. These feelings can affect academic performance and mental health in ways that may not become visible to staff until a crisis has already developed. This pattern has been observed in other countries as well, confirming that it is a structural challenge faced by any institution with a large off-campus population (Bewick et al., 2010).

The COVID-19 pandemic exposed the consequences of this challenge in a particularly sharp way. Nasir et al. (2022) studied how Malaysian polytechnics managed their off-campus students during the lockdown periods of 2020 and 2021 and found that many institutions simply could not reach or locate a significant portion of their student body. Students who had moved, changed phone numbers, or were living in unregistered accommodation fell out of institutional view entirely. This experience made clear that a reliable, real-time system for tracking student locations and maintaining welfare contact is not a luxury but a basic requirement for institutions with dispersed student populations (Masrek et al., 2022; Abd Aziz et al., 2023).

Researchers in positive psychology have argued for some time that genuine well-being is not simply the absence of suffering. Keyes (2007) proposed a model showing that mental health exists on a continuum, with one end characterised by struggling and the other by what he called flourishing. An institution that only steps in when a student is in crisis is operating at the low end of this continuum. A truly effective welfare system should be working continuously to help students move toward the flourishing end.

Seligman (2011) developed what is known as the PERMA model, which identifies five building blocks of human well-being: Positive Emotions, Engagement, Relationships, Meaning, and Achievement. Higher education institutions that take this model seriously design welfare systems not just to record and respond to problems, but to actively monitor whether students are connected, motivated, and finding purpose in what they do (Kern et al., 2015; Larcombe et al., 2023). The i-Care system's wellness monitoring module was built with this kind of proactive approach in mind, aiming to identify students who may be drifting into difficulty before the situation becomes serious.

Results and Discussions

The i-Care system is a website that works on any device with an internet browser, including smartphones, tablets, and laptops. It was built using PHP and MySQL, two widely used technologies that power many websites and online databases around the world. Both are free and open-source, which means PKT did not need to pay expensive software licensing fees, and there is a large global community of developers able to help maintain and update the system over time (Masrek et al., 2022; PKT HEP Institutional Report, 2025).

The feature that makes i-Care different from a standard student database is its use of digital maps. When students register on the system, they are asked to drop a pin on a Google Maps interface showing exactly where their rental home is located, in the same way a person might pin a destination when asking for directions on their phone. This produces a precise GPS location for every registered student, which is far more useful than a written street address that might be vague, misspelled, or out of date. Students can update their location whenever they move, so the system always reflects where they actually live (PKT HEP Institutional Report, 2025; Mohd Yusuf et al., 2023).

The i-Care system was built around four clear goals. The first is to make welfare data more accurate. Under the old paper system, student volunteers collected forms manually, which was slow and introduced many opportunities for error. With i-Care, students enter and update their own information directly, removing the need for human intermediaries and greatly reducing the chance of mistakes (Carmo et al., 2025; Abd Aziz et al., 2023).

The second goal is to help staff monitor student well-being on an ongoing basis. The system includes a dedicated Wellness module where staff can log concerns about individual students, record the outcomes of welfare interactions, and track patterns over time. Rather than waiting for a student to come forward with a problem, staff can use this module to identify students who may be struggling before the situation becomes a crisis. This reflects the positive psychology principles discussed in Section 2.3, aiming to move students toward flourishing rather than simply managing problems after they occur (Keyes, 2007; Seligman, 2011; Larcombe et al., 2023).

The third goal is to help students find safe and suitable housing. A Housing module within i-Care maintains a list of rental properties that have been checked and approved by the institution, complete with information about rent, capacity, proximity to campus, and safety features. For students who are new to Kuala Terengganu and unfamiliar with the rental market, having access to this kind of verified information is genuinely valuable

and helps reduce the risk of students ending up in unsafe or exploitative accommodation (Hilmy Muslim et al., 2013; Nor Azlan et al., 2022).

The fourth goal is to track health and safety compliance. A module called StaySafe allows staff to record and monitor students' vaccination status and adherence to health guidelines. This was particularly important during the COVID-19 pandemic and continues to be a relevant part of institutional responsibility in Malaysian higher education (Nasir et al., 2022; Md Noor et al., 2021).

The most immediate improvement brought about by i-Care has been in the quality of student welfare data. When nearly half of all welfare records contained errors, staff were essentially trying to find and help students using information they knew was unreliable. In an emergency such as a flood, an unreliable address can mean the difference between reaching a student in time and not finding them at all. By moving to a model where students enter and update their own information, the system has addressed this problem at its root. Students know where they live. They also have a clear personal interest in making sure the institution can reach them when needed (PKT HEP Institutional Report, 2025).

The GPS mapping feature has made emergency response significantly faster. Kuala Terengganu is a city that experiences regular flooding, particularly during the monsoon season. Before i-Care, when a flood warning was issued, staff had to work through incomplete and often incorrect paper records to figure out which students might be affected. With i-Care, they can see immediately on a map exactly which students live in flood-prone areas, contact them directly, and coordinate help where it is most needed. Beyond emergency response, the map also allows staff to identify areas where students are living in poorly lit streets, near high-crime zones, or in buildings with known safety problems, enabling preventive action rather than crisis response (PKT HEP Institutional Report, 2025; Mohd Yusuf et al., 2023; Ahmad & Rosli, 2021).

The administrative dashboard has changed how welfare staff spend their working day. Before i-Care, much of a welfare officer's time was spent chasing, correcting, and filing paper records. Now, the same information is available on a single screen, updated in real time, and organised in a way that makes it easy to act on. Staff can see at a glance which students have open welfare concerns, which rental properties are approved, and which students are overdue for health compliance checks. This shift from paperwork to people-centred work is precisely what researchers mean when they describe the practical benefit of digital transformation in education (Carmo et al., 2025; Castro et al., 2020).

The PKT experience illustrates something important: when digital tools are designed thoughtfully, they do not just make existing processes faster. They change the relationship between an institution and its students in meaningful ways. Under the old paper-based system, students were passive subjects of welfare management. Information about them was collected by others, stored by others, and acted upon by others, often inaccurately. Under i-Care, students are active participants. They register their own information, update it when things change, and in doing so, contribute directly to the quality of the care they receive. This shift from passive to active reflects a broader value: that students are capable, knowledgeable people whose own understanding of their situation is the most reliable starting point for any welfare intervention (Bovill, 2020; Healey et al., 2014; Cook-Sather et al., 2023).

For other Malaysian polytechnics and vocational institutions considering a similar approach, PKT's experience offers an encouraging model. The technologies used to build i-Care, namely PHP, MySQL, and Google Maps, are freely available and widely understood. Any institution with a competent IT team and genuine commitment from management could develop a comparable system without needing to spend large sums on proprietary software. The more important requirement is not technical but cultural: staff need training and support, students need to trust that the system is genuinely there to help them, and management needs to see digital welfare systems not as an IT project but as a long-term investment in student well-being (Zainudin et al., 2025; Masrek et al., 2022; Md Noor et al., 2021).

Two challenges, however, deserve honest acknowledgement. The first is the digital divide. A system that requires students to use a smartphone and a reliable internet connection to register their welfare information will not work equally well for all students. Those from lower-income families, rural backgrounds, or communities with limited connectivity may find it harder to participate fully. If institutions move their welfare systems entirely online without addressing this gap, they risk excluding the students who most need support. Any institution adopting a model like i-Care should pair it with active digital literacy support and ensure that students who face access barriers have alternative ways to engage with the system (Zainudin et al., 2025; Ahmad Fauzi et al., 2023).

The second challenge is data privacy. The i-Care system collects detailed information about where students live and how they are doing emotionally and psychologically. Students have a right to know clearly what

information is being held about them, who can see it, how long it will be kept, and under what circumstances it might be shared. Malaysian institutions are bound by national data protection legislation, and full compliance with these requirements is non-negotiable. Beyond legal compliance, institutions should work actively to build student trust by being transparent, honest, and consistent in how they handle personal data. Privacy should not be an afterthought but a design principle from the very beginning (Ibrahim et al., 2024; Md Noor et al., 2021).

Figure 1. Main Page

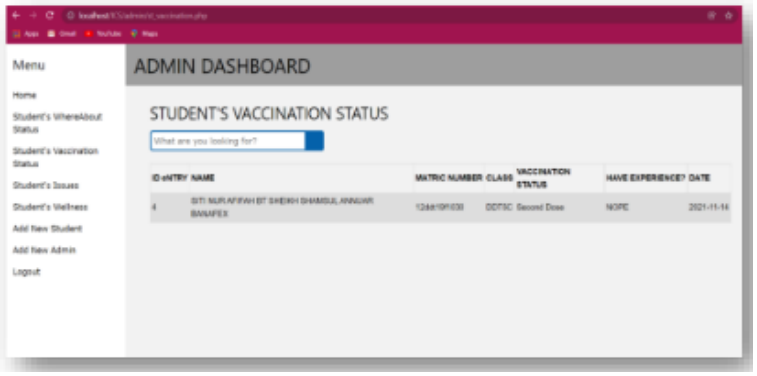

Figure 2. Admin Dashbord

Figure 3. House Rent Menu

Conclusions

PKT's i-Care system shows what becomes possible when an institution is willing to genuinely rethink how it serves its students, rather than simply digitalising the same old processes. Before i-Care, welfare management at PKT was slow, error-prone, and reactive. After i-Care, staff have accurate, real-time information, can respond quickly to emergencies, and can monitor student well-being in a continuous and structured way. For a polytechnic whose entire student body lives off campus, this is a transformation that directly affects student safety and quality of life. The lessons here extend well beyond PKT. Any higher education institution managing

a large off-campus population faces the same fundamental challenge: how do you care for students you cannot see? Digital tools like i-Care offer a practical, affordable, and meaningful answer to that question. But technology on its own is never enough. The institutions that will benefit most from systems like i-Care are those that combine good technology with genuine commitment to fairness, inclusion, and student trust. Future research should move beyond institutional self-reporting to gather independent data on how i-Care has affected student welfare outcomes over time. It should also examine how students themselves experience and feel about the system, whether they feel it genuinely helps them or whether they have concerns about surveillance and privacy. Comparative studies across multiple Malaysian polytechnics would help determine how context-specific the PKT model is and how it might need to be adapted for different institutional settings. These questions matter because the ultimate goal of any welfare system is not efficiency for its own sake, but the genuine well-being of every student it serves.

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