Do not forget about me, do not forget about you. Usability of a mobile app for professional identity formation

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Abstract
Purpose – Professional Identity Formation is the dynamic evolution to “think, act and feel” to become part of a professional community. This document presents the development and the study that aimed to assess the usability of a m-Learning Identity App (MLIA) focused on the formation of professional identity among undergraduate medical students.
Design/methodology/approach – MLIA development included four phases: Conceptual, prototype, pilot and implementation, before further deployment. The conceptual model was designed by eight faculty members from three Latin American universities. The prototype was developed and tested with stakeholders. The pilot was performed during 5 weeks before the implementation. Cross-sectional data collected during implementation from 138 medical students who completed a survey to assess the usability of MLIA are presented. During deployment, 977 posts were made on Professional Identity Formation, and examples of these posts are presented.
Findings – The prototype and pilot phases demanded improvements. The survey explored (1) Familiarity, (2) Perceived ease of use, (3) Perceived usefulness for Professional Identity Formation, (4) Satisfaction, (5) Intention to reuse (6) Digital aesthetics and (7) Safety. Results from the usability assessment suggest that students perceived MLIA as a secure space with positive aesthetics and ease of use.
Research limitations/implications – Important limitations of the present study include, firstly, that it does not provide information on the effectiveness of the MLIA in shaping professional identity in medical students, it focuses exclusively on its development (conceptual model, prototype, pilot and implementation) and usability. Secondly, the study design did not consider a control group and, therefore, does not provide information on how the App compares with other strategies addressing self-reflection and sharing of meaningful experiences related to professional identity.

Special acknowledgment to the teams of professors and students at the medical schools of Tecnológico de Monterrey (Mexico), Pontificia Universidad Católica de Chile and Universidad de los Andes (Colombia).

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Conflict of interests: None of the researchers have declared a conflict of interest.
Originality/value – MLIA introduces a different approach to education, simulating a secure, easy-to-use, social media with a friendly interface in a safe environment to share academic and motivational moments, transitioning from being to becoming a professional.

Keywords Medical education, Professional identity formation, Usability, Mobile learning

Paper type Research paper

Background
Higher education institutions should transform themselves into lifelong and life-wide learning communities (Blessinger et al., 2022). Lifelong learning involves seeking different ideas to acquire perspectives about the environment, knowledge, skills and interactions (Davis et al., 2014). According to these authors, the essential characteristics of a lifelong learner are self-reflection, questioning, enjoying learning, understanding the dynamic nature of knowledge and engaging in learning by actively seeking learning opportunities (Davis et al., 2014).

Given its critical importance in navigating the contemporary healthcare landscape, Professional Identity Formation stands at the forefront of training students in the health professions. The emphasis on holistic patient care and interdisciplinary collaboration in modern healthcare requires health professionals to extend beyond clinical expertise, including the embodiment of strong interpersonal skills, empathy and ethical conduct (Cruess et al., 2015). Consequently, to respond to the evolving demands of modern healthcare practices the imperative for fostering professional identity among these students intensifies.

Learning communities, intentionally structured groups comprising students and faculty, play a crucial role in fostering students’ professional development, sense of belonging and overall integration (Cruess et al., 2015; Shochet et al., 2019). Particularly in the demanding medical education environment, where stress is prevalent, students benefit significantly from effective mentoring and peer support to navigate daily challenges (Zeine et al., 2014). Wagner et al. (2015) highlight various activities contributing to Professional Identity Formation, including clinical skills training, bedside teaching, integration of basic and clinical sciences, communication skills, professionalism and career advising.

In recent years a pivotal strategy for creating and enhancing learning communities has involved the rapid expansion of mobile learning (m-learning) technology. The integration of mobile devices into undergraduate medical education, functioning as versatile tools that empower learning processes and facilitate the practical application of medical knowledge in everyday spaces is growing. The literature highlights the widespread adoption of m-learning technology among medical students, serving various purposes (Koohestani et al., 2018; Maudsley et al., 2019). Yet, limited evidence is available regarding the role of m-learning technologies on Professional Identity Formation. This underexplored territory presents an intriguing intersection that warrants further investigation, offering a potential avenue for valuable insights into the holistic development of medical students. Exploring this intersection within the context of collaborative learning communities and technological tools has the potential to significantly contribute to our understanding of medical education and Professional Identity Formation.

Literature review
Personal and professional identity
Personal identity is the sum of three domains: individual identity, relational identity and collective identity (Cruess et al., 2015). The individual domain comprises personal characteristics, beliefs about oneself and the influence of multiple life experiences. The relational domain expresses the effect on the identity of significant individuals, such as
family members, friends, mentors and coworkers. The collective domain reflects the impact of social groups.

Professional identity is the dynamic evolution through which the student recognizes his/herself as a person who is part of learning and social communities to play a role within professional contexts to lead changes (Olivares et al., 2020). In medicine, it is a lifelong, iterative process whereby a medical student develops a sense of self and embodies the ideals and values of becoming a physician (Bettin, 2021). Developing a professional identity involves internal and external feedback from interactions with teachers, preceptors, patients and other healthcare providers (Bloom, 2022). There is a bidirectional interplay between personal identity and professional identity. According to Bloom (2022), professional identity cannot be stable and resilient if significant conflicts exist with personal identity and vice versa.

Do not forget about you (student self)
Personal identity of the students is typically divided into different stages like the self-knowledge stage that implies awareness of their preferences to select a career based on a deep understanding of their capabilities and growth opportunities as well as having a short-, medium- and long-term agenda (Olivares et al., 2020). Being medically educated and having expertise are key components of the professional self; however, knowledge alone is insufficient, a person should internalize the core values and beliefs of the profession and understand the context of practice (Fitzgerald, 2020). In the long term, professional identity entails a set of ideas about a desired future and how this connects to who one is concerning work (Tomlinson and Jackson, 2021).

Developing self-awareness may serve to crystallize elements of medical students’ professional identities and improving reflection skills can contribute to better patient care and professional practice within healthcare systems (Sharpless et al., 2015). Then, students themselves can influence the process of thinking, acting and feeling like a physician. Curricular short-term efforts should be aligned with a guided reflection that uncovers professional transformation through the medical education process. Professional Identity Formation should move from the hidden curriculum to the visible one (Grundnig et al., 2022).

Do not forget about me (relationships)
Bettin (2021) states that socialization is critical for developing a professional identity in medical students, including formal and informal curriculum, clinical experiences, role modeling, mentorship and narrative reflection. Haidet et al. (2008) describe four premises regarding the impact of relationships on professional identity construction: (1) early influences, (2) gravitation toward relationships with like-minded people, (3) significant stressors and (4) change in the context of proximal relationships. Early influences refer to relationships before medical school (family, mentors, role models, friends and medical professionals) that create concepts of the kind of doctor they want to be. Gravitation is related to previous and new relationships to maintain their identity. Stressors are the interplay between crisis and relationships to address priorities, which leads to the last theme of change, referring to embedded whole new relationships in medical school.

Fitzgerald (2020) states that professional identity cannot be separated from social identity. Social identity is developed aligning the individual’s values and beliefs to the community of practice through extensive social interactions (Chandran et al., 2019). The construction of those communities represents a form of social capital, which refers to the collective resources associated with belonging to a particular group. Social capital denotes in this context the students’ ability to access and leverage relationships in pursuit
of their evolving goals (Bordieu, 1986 in Julien, 2015; Freeland and Charania, 2021). These authors emphasize that relationships play a crucial role in enhancing well-being and broadening opportunities. To build this social capital, students must have:

1. Access to tight-knit webs of support and developmental relations.
2. Exposure to a diverse range of people and professionals.
3. Connections to advisors, coaches, mentors and sponsors.
4. Access to professional networks and support.

Learning communities and m-learning technology in medical education

The relational domain of professional identity in medical education can be shaped by learning communities, such as those developed in m-learning environments. One-way m-learning technologies achieve this by supporting peer-to-peer learning, practicing, presenting findings, efficient time management and lifelong learning with reflective practice. This enriches meta-learning progressions and enhances the possibility of sharing with peers (Maudsley et al., 2019). The present document introduces the m-Learning Identity App (MLIA) Do not forget about you, Do not forget about me, an innovative tool to foster a secure environment that could allow students to enhance the relational domain of professional identity. The MLIA leverages the nature of mobile learning (m-learning) technology as a ubiquitous tool in the daily lives of undergraduate medical students, while facilitating the transition of medical students to clinical settings which involves the development of a clinical mindset, navigating complex learning environments and concurrently advancing their professional identity. The integration of m-learning technology into this process not only aids in bridging the gap between theoretical knowledge and clinical practice but also supports students in adapting to the dynamic and often perplexing nature of real-world healthcare settings. Therefore, this document presents the development and the study that aimed to assess the usability of the MLIA focused on forming professional identity among undergraduate medical students.

Methodology

App development

The MLIA development included four phases: (1) conceptual model, (2) prototype, (3) pilot and (4) implementation as applied by Lucio-Ramirez et al. (2020) for the design of a medical assessment mobile App. Lucio-Ramirez et al. cite Evans and Lindsay’s (2005) quality methods for product design.

The conceptual model was designed from September 2020 to January 2021 by eight faculty members from three Latin American universities: Tecnológico de Monterrey (Mexico), Universidad Pontificia Católica de Chile (Chile) and Universidad de los Andes (Colombia). The design included an iterative process of discussions during weekly meetings between faculty and informatic engineers about how to deploy a professional identity conceptual model (Figure 1) into screens for an App. Both functionality and aesthetics were the focus of the meetings. The perspective of each member was crucial, and we leveraged an interdisciplinary team to incorporate multiple disciplines, experiences and approaches into the final version.

Two informatic engineers at Tecnológico de Monterrey interacted with the faculty group to translate academic formation purposes into App features that were easy to use and aligned with the usability purpose. Developers showed demos and mocks to the academic group to be approved or improved with proper feedback.
As a result of this work, the MLIA has four sections:

1. **Self-reflection**, a welcoming section with questions inviting the student to think of their past, present, and future professional identity.
2. **Learning community groups** for sharing thoughts, insights, concerns, and other triggers or detractors for professional identity development. This virtual safe space allows interaction between faculty and students to build a supportive academic community.
3. **Questionnaires** related to professionalism, wellness, health, and self-knowledge. Administrators may include as many assessments as required by faculty.
4. **Loved ones’ support**. The App allows students to invite family and friends to collect caring messages to remind them how they decided to become physicians.

The MLIA is different from commercial Apps like Facebook or Instagram since it has a formative approach and educational purposes. The conceptual design included a protected space to have open and safe daily communication. The legal remarks and rules for sharing are established to shield information derived from academic partners.

According to Evans and Lindsay (2005), a **prototype** is a model for testing the intended properties of a product under actual operating conditions, including reactions from users. Presenting the prototype to test the interface and navigation is a core component of the usability assessment of an app as Burn et al. (2022) did during the development of a mental health app. The MLIA prototype was prepared between January and April 2021 considering previous recommendations presented by Lucio-Ramírez et al. (2020) such as customizable instruments, availability for both Android and iOS platforms, student profile picture, friendly usability for different faculty generations, and available reports for student, faculty, and steering committee.

The research team reviewed the conceptual model, interface and design features. The **pilot** is required during product design review as part of a small-scale application before the launch for massive commercial use (Evans and Lindsay, 2005). Lucio-Ramírez et al. (2020) and Burn et al. (2022) applied pilots to retrieve stakeholder feedback from their health education apps. The MLIA pilot took place from October to December 2021 with 24 students and 5 faculty members. Participants had informative sessions to explain to them the purpose of the app, installation, and access procedure, as well as detailed application training for each section of the MLIA. They were instructed to navigate through all the functions of the App to test access, navigation, interface, design and usability to achieve its intended purpose.

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**Figure 1.**
Professional identity formation conceptual model for the m-learning identity app (MLIA)
The research team also downloaded the App on their mobile device to assess its technical features for posting new publications, sharing comments, interacting inside groups and answering the questionnaires.

The present study includes a descriptive assessment of the MLIA’s usability during the implementation. It was conducted with the participation of medical students from Universidad de los Andes (Colombia), Tecnológico de Monterrey (Mexico) and Pontificia Universidad Católica de Chile (Chile). Finally, the deployment phase was achieved in the following months with the participation of all students enrolled in the MLIA. It was reviewed and approved by the Institutional Review Board of all three institutions and constitutes the analysis of cross-sectional data obtained during the first term of 2022. The usability survey was an anonymous, self-conducted, electronic questionnaire sent out with an informed consent form to all enrolled students.

Participants
For the implementation phase, the eligible population consisted of 232 students who were enrolled (63 from Universidad de los Andes, 44 from Tecnológico de Monterrey and 125 from Pontificia Universidad Católica de Chile), in the MLIA from January to May 2022. Inclusion criteria required students to be formally registered in the 5th year of their medical program and to be enrolled in the App. All students enrolled in the MLIA were invited to participate, and the survey was conducted in May 2022 after they had experience with the App during one semester. There were no exclusion criteria and participants provided informed consent. The sampling strategy was based on a total sample approach and, since no effect measurements were planned, no power calculation was performed.

MLIA usability assessment
The MLIA usability assessment in this study was performed by a survey. This kind of assessment has been previously used by Briz-Ponce and Garcia Peñalvo (2015) and Johnson et al. (2022) in the evaluation of technology acceptance in medical education. Socio-demographic variables included were age and sex (male/female). Regarding the MLIA, the students completed the assessment, addressing the following components adapted from Choi (2020): (1) Familiarity, (2) Perceived ease of use, (3) Perceived usefulness for Professional Identity Formation, (4) Satisfaction and (5) Intention to reuse. Since Choi’s (2020) instrument refers to a food App, two additional components were included from medical digital education: (6) Digital aesthetics and (7) Safety, adapted from Olivares et al. (2021).

As presented in Table 1, the adaptation of the instrument did not modify the structure, approach or extent of the original instrument hence it was considered that the psychometric performance was not diminished, and its validity was retained. To determine the internal consistency and reliability of the instrument Cronbach’s alpha coefficient was used, which resulted in 0.99. According to Vogt (2007), an alpha coefficient above 0.70 is favorable.

The adapted survey had 34 items using a 5-point Likert scale (1–5) per question and two open questions: (1) What did you like the most about the App? and (2) Which aspects of the App do you think could be improved? Scoring for the Likert scale was calculated as a mean for the corresponding component with varying numbers of questions per component in the following way (1) Familiarity: two questions, (2) Perceived ease of use: six questions, (3) Perceived usefulness for Professional Identity Formation: ten questions, (4) Satisfaction: four questions, (5) Intention to reuse: three questions (6) Digital aesthetics: seven questions and (7) Safety: two questions. Lastly, even though this report focuses on the implementation phase, during the deployment phase 977 posts were made about Professional Identity Formation, and here we present some of the posts related to the student-self from past, present and future, and the relationships or social capital within the clinical context and student learning. These posts
are an example of the kind of remote interactions in contrast to what can be found on other social media platforms.

**Data analysis**
Analyses were performed using R version 4.3.0 (R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics were estimated accordingly for each variable type, and the normality of distribution in the outcome variables was assessed using the Shapiro–

<table>
<thead>
<tr>
<th>Components</th>
<th>Survey prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarity</td>
<td>I am familiar with the -MLIA- due to my experience with educational applications I am familiar with -MLIA- due to my experience sharing clinical field experiences</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>The -MLIA- is easy to use It is easy to gain experience in using the -MLIA- Learning to use the -MLIA- is easy The -MLIA- is flexible for interaction My interaction with -MLIA- is clear and understandable It is easy to interact with -MLIA-</td>
</tr>
<tr>
<td>Perceived usefulness for professional identity formation</td>
<td>The -MLIA- reminds me why I decided to become a doctor The -MLIA- is useful to reflect on my professional identity and professionalism The assessments are understandable and guide me in the self-reflection The app helps me to reflect on my future as a doctor The app improves my learning performance by sharing clinical experiences The app helps me to have a learning community The topics shared are of my interest The tags of the topics are appropriate The interaction with my mentor helped me focus on principles and values The app is useful for receiving professional mentoring</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Overall, I am satisfied with -MLIA- The -MLIA- meets my expectations I would recommend -MLIA- to other colleagues</td>
</tr>
<tr>
<td>Intention to reuse</td>
<td>It is very likely that I will continue using -MLIA- I intend to use the application -MLIA- as much as possible I will use -MLIA- whenever I need to share my experiences and reflections from clinical practice</td>
</tr>
<tr>
<td>Digital aesthetics</td>
<td>I find what I'm looking for easily The instructions are clear The visual quality of the texts (typography, layout, colors) is appropriate The graphic design of the MLIA is attractive The use of -MLIA- is reliable, as it does not have technical failures The font size, colors and image resolution are appropriate Navigation in the application is structured, simple and ergonomic</td>
</tr>
<tr>
<td>Safety</td>
<td>The -MLIA- allows me to share experiences in a safe learning environment I have confidence that the information will be handled according to the privacy notice</td>
</tr>
</tbody>
</table>

**Source(s):** This version is authors' own creation. Some items were adapted from Choi (2020)

Table 1. Survey prompts to assess the usefulness of the m-learning identity app (MLIA)
Wilk test. Given the different contexts among the institutions participating in the study, differences between groups based on the country of origin were tested using two-sided Wilcoxon rank sum tests. As the proportion of missing data was considerably low, data imputation methods were not used. Understanding that in the subgroup analysis, multiple comparisons were performed, a Bonferroni correction was selected as the main method to reduce the chance of finding random differences, however, a Holm’s correction analysis was also conducted. The two open questions were short-answer and were analyzed using word clouds. The posts are presented as direct quotations of the interactions in the MLIA.

Results
Findings from prototype and pilot phases
This section shows the tool the students interacted with (Figure 2) and represents the results from the prototype and pilot phases mentioned in the methodology section. It is presented in

<table>
<thead>
<tr>
<th>Self-Reflection</th>
<th>Learning communities</th>
<th>New Post</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Figure 2.**
MLIA images from two sections

**Source(s):** Authors’ own creation
the original language (Spanish) with sample screens from two sections. After the prototype phase, some of the recommendations from the research team to developers were:

1. Fixing buttons and texts overlap.
2. Adding forward and back buttons.
3. Saving own and other comments and posts.
4. Pushing notifications.
5. Including screens for faculty and mentors to visualize students’ reflections and communication.

Whilst in the *pilot* phase, after five weeks of experimenting with the app, participants recommended the following:

1. Enhancing comments’ display to scroll to earlier posts.
2. Including a full keyboard display.
3. Changing labels’ appearance.
4. Tagging comments with topics to easily search by category.
5. Sharing participant university adscription.

**App assessment from the implementation phase**

The current study presents the findings of the usability questionnaire (Table 2). Of the 232 students invited, the response rate was 59.48% (138 students). Participants were 69 females (50.00%) and 69 males (50.00%) with a mean age of 24 years.

Perceived ease of use, safety and digital aesthetics received the highest scores, all considered part of the digital platform design (*Olivares et al., 2021*) as presented in *Figure 3*. For *Johnson et al. (2022)* ease of use is one of the top three usability components identified in the assessment methods for Apps in healthcare education. *Intention to reuse* had the lowest score and we hypothesize this responds to the App being designed for academic purposes only, instead of for further use.

The assessment of *Familiarity* (mean 4.14) included two items related to being familiar with the App because of previous experiences with learning Apps and because of previous opportunities to share clinical experiences. Positive results about the *Perceived ease of use* (mean = 4.41) of the App relate to technical and learning abilities. Findings suggest that students were highly familiar with the use of digital tools and platforms. The population consisted of participants who have always existed in the reality of technology and digital

<table>
<thead>
<tr>
<th>Component</th>
<th>Mean</th>
<th>Median</th>
<th>Interquartile range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarity</td>
<td>4.11</td>
<td>4.50</td>
<td>[3.50, 5.00]</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>4.41</td>
<td>4.67</td>
<td>[4.00, 5.00]</td>
</tr>
<tr>
<td>Perceived usefulness for professional identity formation</td>
<td>4.15</td>
<td>4.20</td>
<td>[3.60, 4.90]</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>4.11</td>
<td>4.25</td>
<td>[3.50, 5.00]</td>
</tr>
<tr>
<td>Intention to reuse</td>
<td>2.78</td>
<td>2.67</td>
<td>[1.67, 4.00]</td>
</tr>
<tr>
<td>Digital aesthetics</td>
<td>4.26</td>
<td>4.43</td>
<td>[3.86, 4.86]</td>
</tr>
<tr>
<td>Safety</td>
<td>4.49</td>
<td>5.00</td>
<td>[4.00, 5.00]</td>
</tr>
</tbody>
</table>

*Source(s):* Authors’ own creation

**Table 2.** General results for usability components

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**Professional identity formation**
media; they are used to quickly sharing information in the context of continuous communication through a variety of devices and equate the importance of online contact to that of personal interaction (Dolot, 2018). Moreover, they learn through digital resources (Scott et al., 2017) such as Learning Management Systems (LMS), mobile applications and online platforms, and communicate and share their everyday lives with others using Internet-based technology such as WhatsApp©.

Perceived usefulness for Professional Identity Formation was assessed (mean = 4.15). Usefulness is considered the second most important attribute of a mobile App for healthcare education (Johnson et al., 2022). This component is the quality dimension that focuses on the academic content of the learning technology (Olivares et al., 2021). Results regarding this component show that students acknowledge that reflection activities in the App involve individual and collective aspects; these findings go along with what Bloom (2022) describes as the relational element in identity formation. Furthermore, students recognized the importance of mentors’ company during the reflection process, which coincides with what was described by Wagner et al. (2015). It can be hypothesized that Professional Identity Formation could be actively promoted by medical schools instead of understanding it as part of the hidden curriculum; this has been previously discussed by Grundnig et al. (2022).

About the Satisfaction component explored, students reported that their expectations were met because the App was easy to use and it allowed them to “interact, read each other, share experiences, and reflect” (Student 3, 2022). Even though participants manifested that they would not reuse the MLIA (see below), they would recommend it to other medical students as they consider that the App contributed to their academic formation. These results are similar to those of Herbstreit et al. (2021) who describe that students show satisfaction with the use of mobile support in learning within other educational scenarios, reporting it as a strategy that is easy to use and facilitates communication processes and orientation. Positive effects of mobile support impacting the learning process have also been described by Chase et al. (2018).

**Figure 3.**
MLIA survey usability results

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**Note(s):** MFAM: Mean Familiarity, MPEU: Mean Perceived ease of use, MPU: Mean Perceived usefulness for Professional Identity, MSAT: Mean Satisfaction, MIRU: Mean Intention to reuse, MAES: Mean Digital aesthetics, MSAF: Mean Safety Score

**Source(s):** Authors’ own creation
The Intention to reuse component accounted for three questions on how likely the participant was to (1) use the App again, (2) use it as much as possible and (3) use it every time they wanted to share their clinical experiences. Findings suggested that the users would be less likely to reuse the App after the end of the study. Briz-Ponce and García-Peñalvo (2015) found that others’ recommendations and technology efficacy are key determinants for using Apps for learning. Choi (2020) recommends boosting the frequency of user experiences to enhance familiarity and intention to reuse. To increase technology appropriation for more daily interactions and posts, the App was introduced as part of students’ clinical practice and seminar scenarios within the structure of their academic clinical courses.

Regarding Digital aesthetics (mean = 4.26), items covered clarity of the instructions, texts, colors and browsing through the App as earlier recommended by Olivares et al. (2021). This variable was in the top three highest scores from the assessment. Results show that the m-learning Identity App had a visually attractive friendly design which facilitated the involvement and participation of students.

The items related to safety (mean = 4.49) captured the students’ trust in managing their information as classified and covered. The developers considered it highly important to create an environment of confidence with no shame or bullying. The App was trusted by the users (Students and teachers) and, in this sense, it allowed the interactions to be carried out in an environment of security and confidentiality. The confidentiality of the information is critical in the use of mobile applications because it can be the main barrier to its use by medical students (Jebraili et al., 2017).

Addressing the qualitative component, the final deployment received 977 posts evidencing the App’s focus on Professional Identity Formation and showing the nature of the interactions between students and how they differ from mobile Apps currently available. They had the opportunity to mirror their own formation process and accessed tight-knit webs of support and developmental medical relations with peers and mentors (Freeland and Charania, 2021). Table 3 shows some examples of their messages in the learning community group. Participation through reflection and sharing of meaningful experiences is a way to “think aloud” and to express learning experiences and moments through “written notes”. These have been identified as important assessment strategies in medical education (Daniel et al., 2019).

The word cloud analysis of the open questions showed that students appreciate the ease-of-use of the App and the space to share experiences with others (Question a). However, when asked about the features of the App that required improvement, students most often reported difficulties navigating the App and desiring a higher character limit, among others (Figure 4).

Despite the contextual differences in their place of training the results remained consistent, especially for the Perceived Usefulness of the App, which is encouraging since it shows that the App might be applicable in diverse Latin American Medical Schools. Even though students included in the current analysis come from different medical schools and contextual factors might influence the perception of the App, a stratified analysis was conducted with significant differences only in the design component. Even after conducting a sensitivity analysis, only the design component retained statistical significance. Furthermore, the qualitative analysis showed that similar experiences were shared by all participants regardless of their country of origin.

Limitations: Important limitations of the present study include, firstly, that it does not provide information on the effectiveness of the MLIA in shaping professional identity in medical students, it focuses exclusively on its development (conceptual model, prototype, pilot and implementation) and usability. Secondly, the study design did not consider a control group and, therefore, does not provide information on how the App compares with other strategies addressing self-reflection and sharing of meaningful experiences related to professional identity.
Conclusions
This document presents an innovative tool to support the development of professional identity and professionalism, simulating a social media interface that provides a safe environment and includes coaching and learning communities. The assessment of MLIA’s usability was overall positive, its strengths were focused on safety, ease of use and professional identity formation whilst its lowest scoring related to intention to reuse. Remarkably, results regarding ease-of-use were discrepant, as the score obtained by the item in the survey was high, yet short answers to an open question referred to the need to improve the App’s navigability and ease-of-use.

Table 3.
Examples of post messages shared in the learning community forum

<table>
<thead>
<tr>
<th>Professional identity formation</th>
<th>Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not forget about you (student-self)</td>
<td>Past self</td>
</tr>
<tr>
<td></td>
<td>Present self</td>
</tr>
<tr>
<td></td>
<td>Future self</td>
</tr>
<tr>
<td>Do not forget about me (relationships)</td>
<td>Patient</td>
</tr>
<tr>
<td></td>
<td>Learning community</td>
</tr>
<tr>
<td></td>
<td>Mentor</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not forget about me (relationships)</td>
<td>Mentor</td>
</tr>
</tbody>
</table>

Source(s): Authors’ own creation

Figure 4.
Word cloud results

Source(s): Authors’ own creation
The strengths of the study suggest the feasibility of implementing an App, that in the future, could help students explore the complex concept of professional identity interactively. Additionally, the project’s design and implementation in three leading Latin American universities showed consistent results across different contexts. A challenge of the study was that the MLIA was designed for research and academic purposes, and the students used it only during the timeframe related to the design and development phases. Hence, the results are limited to the implementation period which might relate to some of the findings related to the intention to reuse. For other universities that intend to introduce a new academic App, having a formal course attached to the App can be an asset as it provides extrinsic motivators, adequate context and support from faculty.

In sum, this study encourages the use of digital resources, like MLIA, to approach similar abstract constructs in medical education. This publication suggests that it is feasible to implement digital tools that can benefit other aspects of students’ interactions in clinical settings, such as cultivating an interest in communication and reflective practice, essential aspects in the construction of professional identity. These interactions can promote the development of social capital, helping students to think about themselves and new opportunities. However, further research is required to assess medium and long-term impact on students. Future direction in this field of work can include qualitative approaches to usability results, especially the intention to reuse MLIA, as well as evaluating the effect of the educational experience of using this App in Professional Identity Formation.

References


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