A narrative inquiry into the cultivation of professional identity of medical students – through an online knowledge-sharing community

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Research Article

Keywords: professional identity, online community, knowledge sharing, narrative inquiry, interaction, mentor learning

Posted Date: February 7th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-2554713/v1

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Abstract

Cultivating medical talents with professional identity is the ultimate goal of medical education, yet there is a lack of long-term empiric data on the process of cultivation. This longitudinal narrative inquiry study collecting data from chat records, meetings and interviews involved a dynamic online knowledge-sharing community. Through focusing on the evolving characteristics of the online knowledge-sharing community and the changes in medical students’ dentities, this study utilized Clandinin and Huber’s framework to explore how students’ knowledge resonated with the group and developed in the online knowledge-sharing community, and during the process, how professional identity was cultivated in those pre-career years when professional growth opportunities were lacking. Fine-grained analysis showed that in a virtual community that overcame some barriers and formed multi-layered teacher-student relationships, medical students struggled to balance their self-identities and the professional identity by playing a proactive role and changing perspectives to share explicit and tacit knowledge, with blended interaction, facilitating strategies and the mentor’s role as influencing factors. The analysis also identified that the online knowledge-sharing community formed around originating events, with memories reconstuction and multi-layered interactions as the positive features of the way students engaged in online conversations to facilitate their professional identity. Online teacher-student knowledge-sharing communities provide an innovative approach to assisting professional identity formation. The study complements the literature about doctors’ online communities, knowledge sharing and the professional identity of medical students, and has important implications for medical education.

1. Introduction

Professional identity formation has long been recommended as a primary objective of medical education (Cruess et al., 2014). There have been efforts to analyze the development of future doctors’ identity formation with an aim to explore the transformation of members of the lay public into skilled doctors with a professional identity (O’Brien & Irby, 2013). Although most of the medical colleges have medical humanities curricula designed to foster professional identity, too many students still confront the disparities between medical school contexts and clinical workplaces, and experience insufficient support when they sense conflicts between being a doctor and self-identities. This had generated identity confusion and value conflicts in and out of the school with an increasing number of medical educators realize that being a doctor is a journey instead of a result.

Regular studies equip medical education with synthesized educational theories, and present theoretical models with a goal of possessing professional identity, such as a reframed medical education system (Cruess et al., 2014), an experience-based learning model (Dornan et al., 2007) and an amended Miller’s pyramid (Cruess et al., 2016). Compared to medical education literature, learners’ narratives supporting the objective of developing professional identity are remain important, because such narratives are parts of broader longitudinal portfolios (Sharpless et al., 2015; Wong & Trollope-Kumar, 2014) and fueled case studies of medical curricula. Yardley et al. (2020) used large data set of interviews to conduct in-depth analysis and found interwined relationships between identity and responsibility in medical students’
transition years. Hatem and Halpin (2019) used a qualitative approach and concluded that medical students could take a step toward professional identity by writing reflections in the clinical year.

Up to now, researches have showed that narratives become a source of learning and reflecting to develop professional identity, especially during students’ internship. However, equivalent weight is not given to cultivating professional identity at different stages before students become skilled doctors, let alone sufficient attention paid to how a community facilitates students to prepare for being a doctor. Moreover, some forms of peer-learning or mentor-learning in an offline context are apt to be influenced by many factors, such as institutional constraints, frequency of contact and complicated interpersonal relationships.

Therefore, the present study aims a narrative study on the journeys of Chinese medical students for 26 months to find a support to cultivate professional identity. Using an online knowledge-sharing community, this exploratory research focused on medical students’ growth by capturing their narratives of knowledge sharing and learning. Through examining their narratives, the paper illustrates how workplace learning and school learning experiences were shared in the virtual community, why the online knowledge-sharing community contributes to students’ professional growth, how the online community facilitates students’ professional identity formation, and what factors help or hinder members’ engagement in the community. Since the study used an online community to follow up the students from the stage of medical students to the stage of newly qualified doctors, there’s a need to share the narrative beginnings of this community as follows.

When the research started, the community members included second year students in a Chinese medical college and one mentor named Dan whose research agenda was education. Dan worked as their head teacher from their entry to the medical school to their graduation. As a teacher of medical humanities, Dan noticed the neglect of professional values, actions and aspirations in medical curricula and student guidance, and began to explore students’ self-development in regular class meetings by sharing narrative stories of doctors’ growth. An online community was then established by Dan through using Tecent QQ, a messaging application used by 800 million people, to nurture continuous communications with these students. Tencent QQ has attractive functions like anonymity and user invisibility, being popular among the students who shared knowledge with each other to develop professional identity. Fifty-eight students who voluntarily participated in the research became community members. Because positive interactions had been built offline, online discussions were not very perfunctory and humdrum at the beginning. The online community took shape and started to be an approach to cultivate students’ professional identity and be a lens to observe students’ growth. Based on this, it is necessary to present relevant background literature supporting the study.

2. Theoretical Underpinnings

Since the researcher traces the lineage from a multi-phase study on identities by adopting a narrative inquiry research method, the literature review is presented as “the constant interaction between human
thoughts [in theories] and ‘stories to live by’ [in participants] contained in the narrative inquiry” (Clandinin, 2015). Sharing of the participants’ knowledge with all community members can be associated with the theoretical concepts of knowledge sharing and online community. By virtue of the above theories, exploration on different stages of online community in cultivating students’ professional identity leads to the last theoretical underpinning – professional identity. The interaction between theories and practice not only helps to reflect on the research potential of the narratives and thus choose appropriate theoretical bases, but also helps to observe the influence of interwoven factors on the cultivation of professional identity.

2.1 Knowledge sharing and knowledge-sharing community

Knowledge sharing, based on social exchange theory and Maslow’s hierarchy of needs theory, offers information and know-how processed by individuals who collaborate with community members by many ways of processing knowledge – documenting, organizing and capturing (Cummings, 2004). Since those knowledge-sharing communities are meant to be useful, recent researches look at them from different angles and most of the researchers adopt quantitative approaches (Gan et al., 2019; Moon & Lee, 2014; Motiani et al., 2020; Yan et al., 2016).

The quantity and helpfulness of the knowledge shared in the community are associated with personal relationships with other members (Chiu et al., 2006). Maintaining and strengthening social relationships influence individual’s willingness to continue participating in the community (Chen, 2007). The need for social relations and direct ties makes it possible for this knowledge-sharing community to emerge, for the medical students spent one year with the mentor in and out of class before the research. In this community, members shared two dimensions of knowledge – explicit and tacit knowledge (Yan et al., 2016) – to solve problems and develop new ideas within the social network. Their explicit knowledge were structured sets of information such as knowledge recorded or stored in books or research papers, while their tacit knowledge were what they gained from the circumstances, incidents and observations such as personal learning experience and stories. Knowledge sharing allows members to get some intrinsic and extrinsic returns (Kankanhalli et al., 2005) such as reciprocal benefits and reputation feedback. Meanwhile, in order to build a supportive culture, knowledge sharing should involve incentives like recognition and rewards (Yao et al., 2004) so that knowledge transfer becomes possible in the community.

The above characteristics of knowledge-sharing communities explain why members joined and left, and the nature of knowledge – something more than just information – led the researcher to choose Yan et al. (2016)’s classification of knowledge. When still in offline communities, individuals cannot express all their opinions for fear of being criticized or judged. These constraints made the researcher consider expanding the knowledge-sharing community into a boundless setting: an online community.

2.2 Online community
Today, knowledge sharing of different forms has been transformed by social media and portable devices, so it has become more open, flexible and participatory. Online conversations and postings to share knowledge will leave lasting records that can be easily retrieved and searched by community members (Haythornthwaite, 2010). Those online communities provide virtual forums for doctors to be voluntarily engage in to manage work-family balance (Yusof et al., 2021), have strong supportive and reciprocal group norms (Maloney-Krichmar & Preece, 2005), facilitate interaction to motivate knowledge contribution (Wang et al., 2021) and finally result in economic and social returns (Guo et al., 2018).

By engaging in this online community, our future doctors reduced isolation, sought new methods, discussed experiences to increase sense of community (Palmer, 2013) and collaborated with peers to develop skills for working (Archer-Dyer et al., 2014) without being hindered by distance. Many future doctors gave high ratings to online communities for improving the quality of medical education (Gray & Tobin, 2010). Participating in online communities is an opportunity for those future doctors to encourage reflection and professional growth (Kirschner & Lai, 2007). Online communities may provide an alternative to traditional medical teaching and learning.

Online participation needs members to be more connected with others and to have more face-to-face contacts (Laine et al., 2011) because the transition from traditional offline-only means to such blended interaction is more effective than merely online or offline communities. Strategies – such as the active role of facilitators or leaders, the provision of activities, asynchronous and synchronous engagement methods (Ryle, 2007) – are all beneficial or crucial for increasing participation and sustaining the community. Therefore, the study analyzed the factors that helped or hindered participants’ engagement, and the evolving characteristics of the online community.

2.3 Professional identity

This study not only traced the events that influence the community’s development, but also explored diachronic changes in the cultivation of professional identity. As the online community evolved through medical students’ journeys from student to intern to newly qualified doctor, we revealed their professional identity formation in three narrative stages.

In the nurturing stage, participants, who prepared to become interns, experienced puzzles about learning and anxiety about what it takes to be a doctor, which inspired them to find each other with similar aspirations and experiences. Knowledge sharing in the online community was able to help them nurture collaboration and discover experiential knowledge (Mancilla-Amaya et al., 2010) and socialize them into the identity at the collective level (Cruess et al., 2014).

In the active stage, the interns’ explicit and tacit knowledge, including recorded knowledge, learning experience, workplace knowledge, observation of clinical teachers and treatment stories, were shared. Talks or descriptions of these knowledge could be particularly valuable for community members (Yan et al., 2016), and facilitated their thinking of what kind of doctors they would be (Park & Hong, 2022). Their professional identity kept developing with the comments and responses they received. Medical students’
reaction to others’ feedback reflected how they understood themselves and what environment they were in. The professional identity developed in their constant reflection and self-adjustment.

In the sustainable stage, medical students became newly qualified doctors. The online community was increasingly characterized by diffusion and weak ties (Wellman, 1996) as they became more adaptable in the current identity. The newly qualified doctors relied less on this community, and had a desire to expand their social circles to acquire more knowledge by integrating into new communities. Though the community was no longer a knowledge-sharing center, such informal learning experience helped students to develop their professional identity (Park & Hong, 2022). So attention needed to be turned to why the online community contributed to the cultivation of medical students’ professional identity in different stages, and in this process, how their professional identity formation was facilitated. These focuses are precisely the intention of this meticulous study.

3. Methodology

3.1 Narrative inquiry

The study was methodologically grounded by Clandinin and Huber (2002)’s method of three-dimensional narrative inquiry which allowed the researcher to think narratively within a metaphorical space (Clandinin & Huber, 2002). Associating the study with three dimensions – interaction, continuity and situation, the researcher explored experience stories, life needs and personal emotions reflected in the process of knowledge-sharing. As for the interaction dimension, what they discussed and commented were socially or personally interpreted, which pointed participants inward and outward. The researcher observed the multi-level relationships among community members and many changes in peer-learning and mentor-learning. The continuity dimension allowed the researcher to move backward and forward in a temporal context, in which medical students’ actions and feelings could be probed from past to future. With regard to the situation dimension, the study compared the communities in their school context or workplace context with this boundless virtual community.

3.2 Participants

The participants majored in clinical medicine and signed directional employment contracts with primary hospitals before college enrollment. The Chinese medical school program for these students is three years long, which indicates that they have relatively less time to form a professional identity. They spent the first two years attending medical courses before changing their roles into interns of general hospitals in the third year. After graduation and hospital examinations, they became primary physicians in the appointed hospitals. Considering this medical education system, it was most suitable to select second year students to examine the three phases of their pre-career years so as to observe the whole process. Their names were omitted to guarantee their anonymity. Their experiences represented typical samples of obvious changes in identities.

3.3 Data collection
The researcher referred to the medical school’s curriculum, course selection, training programs, educational objectives and participants’ profiles in advance. The study was approved by the teaching commission and the institutional review board of the medical college. The participants were informed of the research purposes, contents and ethnics. The data were collected over a period of 26 months from September 2020 to October 2022 through online posting records, offline meetings and interviews. The participants’ identities were coded from No. 1 to No. 58. A total of 9065 pieces of chat records were anonymously collected and themed by examining the mistakes and rationality. Two offline meetings were tape-recorded and all audio data were transcribed. The researcher kept in touch with the members by e-mails and interviews to confirm the transcripts and asked for clarification so as to interpret their sharing and reconstruct their experiences. The participants were welcomed to review the interpretation, volunteer to claim anonymous remarks, and share their thoughts within the community for peer-learning.

3.4 Data analysis

Data extracts were analyzed with the focus on medical students’ identity development in this online community by using interpretive tools of the narrative inquiry method, the technique whereby findings are interpreted in the narrative space. The interpretive tools include negotiating, storying and restorying, classifying and lifting, paralleling and layering (Clandinin & Connelly, 2008, 2012).

Negotiating was purposeful, including constantly explaining with participants what they wanted to achieve in the online community, what was interesting and what was possible in the dialogues; it was also transformational, including the process of negotiation on the changes from field-texts to research-texts with the participants. Storying and restorying revealed the evolution of the dynamic community, the changes in the participants’ knowledge and the development of their professional identity. Classifying and lifting themed the data in different periods, made the participants’ experience known, and reflected on the research process and results. Paralleling and layering provided a rich picture for the researcher who observed the participation of lurkers and the multi-layered relationships among the members.

Additionally, embedded with the tools are the use of fictionalization and metaphors (Clandinin & Connelly, 2012) to guarantee the trustworthiness and exploration of the data. The study fictionalized participants’ names to obscure their identities to avoid placing their relationships at risk and to reduce their fear of identity disclosure. Lesnick (2005) proposes metaphors to convince the profession and corresponding identities, so the study also paid attention to metaphors to deeply understand students’ growth so as to explore more possibilities.

4. Findings

4.1 Narratives of the nurturing stage

In the first stage, medical students scrupulously chose their topics and waited for others’ learning experience, therefore, lots of them were “lurkers” or “observers”. As the topics gradually expanded, they found anonymity was comfortable and were willing to share knowledge to help the confused. The salient
features are that the mentor played a critical role in guiding and mediating the dialogues, and there were more lurkers than active members. The following three excerpts illustrate how the students tried to solve difficulties together to build hidden and unrecorded knowledge, and how they built relationships with other group members.

Excerpt 1

Student ID07: Back in my childhood, doing experiments was my lifelong dream but every time I lifted the rabbit out of the cage and injected it with anesthetic, it struggled so violently that the seeds of fear grew rapidly. Every scream and struggle made me feel extremely uncomfortable. I realized my dream was not cool but cruel. Though I'm not a freshman any more, it still makes me under pressure. (2020-11-08)

Dan: We'll find its significance later probably because we can't experiment on human in such cases.

Student ID14: Maybe you can find peace in your heart as long as you use the expertise to help more people when you become a real doctor.

Student ID38: It has much in common with Biology that we've learned in the senior high school. It can remind you of your past school life. You'll have a growing interest.

Student ID07 faced a huge conflict between his childhood dream of becoming a doctor and his inability to accept the loss of life. He tried to resolve this contradiction, seeking a way to gain courage and restoring confidence in doing experiments. After the mentor’s comment, some offered their tried solutions while one student expressed similar confusion. He agreed with Student ID38 and decided to give it a try. It is noteworthy that later he admitted he spoke more in the group than before, as if he wanted to return the kindness of others.

Excerpt 2

Student ID13: To study medicine requires memorizing many complex conceptions and elusive knowledge. It fits all my stereotypes. But it wasn’t long before I realized that it was just my prejudice. (2021-03-29)

Dan: How have your views changed?

Student ID13: I took part in a research project, working with other medical majors.

Dan: What impressed you most?

Student ID13: I just didn’t expect to work with people who were not majors of clinical medicine. It’s challenging.

Dan: Does anybody have similar experience? Working with other majors?
Student ID26: You can always believe in teamwork. The psychological drama “Blue Balloon” was performed by us from different majors. We’ve insisted on communication and made so many compromises.

Student ID05: Attending elective courses is a good choice. There were lots of different majors in the same class. I met some talented people who shared similar interests with me. I hope someday I’ll work with them.

Student ID13 had a sense of belonging to his major and trusted his classmates, but had less experience with teamwork. He was confused about what kind of relationship to have with his teammates of other majors, such as partnership, competition, or a remain-unchanged relationship. Under Dan’s guidance, he made his difficulties explicit, got advice from the community and figured out how to balance the relationships later.

Excerpt 3

Student ID28: I just don’t understand why you work so hard. Passing all examinations and getting credits are my goals. Perhaps I am not as capable as you. (2021-06-07)

Dan: If you want to be a good doctor, you need to be wary of such feeling.

Student ID28: Why

Dan: Lack of confidence is a stumbling block to becoming a doctor. Also, just getting a diploma is a betrayal of what you were meant to be. You still have a dream, don’t you?

Student ID28: Yes, it’s true. Perhaps I know why I often come here to read the messages. Some of you are really excellent. I am just an ugly duckling.

Student ID49: Doctors are senior intellectuals who are the smartest. You are a future doctor. How can you be an ugly duckling? You are a swan.

In this excerpt, Student ID28 seemed to show fatigue with his studies. The knowledge and experience shared by the members made him feel inadequate and doubtful about his approaches and goals of studying medicine. But he found that the community was an anonymous place, so he boldly “complained” about the efforts and hardships of medical students. Dan’s constant listening and timely response allowed the participants to express themselves openly while Dan gave instructions and encouragement along the path of their growth.

It is worth noting that the metaphor of “ugly duckling” was mentioned by another member later in the interviews but appeared in a new appearance. As Student ID57 put it:

I read the messages every day, and I find that some of what I read is what I am experiencing, and I’ve applied it to my actual study. But I rarely post ... and only contribute when I need to ask a question. For
now, I'm still an ugly duckling, waiting for growth. (2021-06-29)

Such members learned by “lurking” at first. As Whittaker et. Al (1998) asserted, lurking allows members to participate in community activities legally, and there exists “transition mechanism” for members to learn about new knowledge or social milieu. In this case, such lurkers indirectly experienced being a future doctor, gaining the group identity.

Thus it can be seen that the knowledge-sharing community of medical students has the originating events (Craig, 2007) of drawing future doctors together in one group to perceive reciprocity and similarity with other community members. When the students feel their problems were respected and responded to, they were more willing to participate in community activities, trying to be a seeker or a giver of information (Shelly & Chen, 2017). Under the circumstances, the knowledge-sharing community provides them with guidance and self-growth through a more attractive channel – anonymous and invisible – which allows individuals gradually gains adaptation and identification of being a doctor, finally being conducive to self-affirmation after dialogues and negotiations.

### 4.2 Narratives of the active stage

In July 2021, there was a noticeable increase in the number of dialogues as the students moved to hospitals and officially entered internship programs. The heated discussions centered around new surroundings and interns’ experience, lasting about five months until internship assessments and back-to-school arrangements had been put on the agenda from May to June 2022. In June 2022, the interns returned to campus for the graduation ceremony and gathered for three days, with all the community members attending two consecutive days of discussion.

Through the quantitative analysis of chat records and discussions, the following conclusions can be drawn: (1) 79% of the participants were active in the online dialogues while 12% of them admitted they were lurkers but constantly on the lookout for messages. (2) As shown in Fig. 1, the number of chat records in this stage were significantly more than those in the other two stages. The record number reached 788 and 706, being the two highest points in the two-year establishment of the community; (3) In the two offline meetings, 7 participants who claimed they were lurkers, were active because their speaking time accounted for about 18% of the total meeting time (8 hours). In terms of the average speaking time of all members, they spoke 29 minutes longer than expected.

The above analysis helps us summarize the factors contributing to an active online community: (1) Participants come together as a community to identify learning goals in the social networking environment, such as accumulating new knowledge during the transition from medical students to interns. (2) They connect with others by using habitual tools and by agreeing to complete certain tasks, such as sharing observation from workplace learning (788 pieces of chat records), or organization of activities for the return to school (704 pieces of chat records), which initiates the cognitive process of social mediation (Gunawardena et al., 2009). (3) Online community is not equivalent to online instruction,
for it needs the stimulus of face-to-face interaction to augment communication to continue their learning (Gray & Tobin, 2010).

The field texts show that one obvious catalyst for the community's development is the emergence of memories reconstruction (Kerby, 1991). Memory is not an exact copy of the original experience, but a way of how to perceive acquired knowledge from working and learning experience. Events of study and work remain in memory and are open to interpretation over time, not just a single correct version. Through knowledge sharing, participants construct and reconstruct, at the level of both individual reflection and group resonance, to reunderstand the past and establish other possibilities for the future. In this process, memories are fused with collective communication in the virtual space. It's obvious in the following dialogues among the members.

Excerpt 4

Student ID26: In the orthopaedic operating room, the nurse and I covered the patient with the quilt, fixed the patient and helped to make preoperative preparation. The nurse said the temperature of the operating room was low, so do not let the patient catch cold before operation. I immediately thought of the sterile sheets for use in the room. At first, I thought all of these were just to keep the surgical requirements aseptic and protect patients and doctors. Now I realized I had been neglecting the patient’s feeling. (2021-10-27)

Student ID52: I am so envious that you have such deep thinking.

Student ID31: This is what we learned about “humanistic care”.

Student ID26: I believe we can find opportunities for deep thinking in daily work.

Dan: This warm doctor-patient relationship is one of the concerns of general practice.

Student ID02: Sure. One impressive detail in my workplace learning was that my teacher always warmed the stethoscope before using it.

Student ID06: Really? It’s a lot better than doctors showing their compassion for the patients. Sometimes so-called “caring” turns out to be a strange kind of compassion.

In above field texts, Student ID26 didn't present his recollection of the operating room experience as a paraphrase of general knowledge, but rather as a point of inquiry to retell what he had learned. Other participants tried to reconstruct more or less coherent stories about the event, recalling knowledge about humanistic care and the medical behavior of the internship mentor. This coherence may depend more on the reflective things that community members add to the memories than on the basic materials of the memories themselves. As Freeman (2009) explained, they placed past experiences in relation to everything that had happened ever since, understanding and reunderstanding from the perspective of the
present with the benefit of “hindsight”. Such memories reconstruction triggered medical students’ views on the doctor-patient perspective, as well as their reflections on the empathy and compassion of doctors.

Apparently, another catalyst is the multi-layered interactions which may bring reflection on experience. Participants shared medical knowledge as a way of introspection and discussed it with the mentor and peers as part of the “becoming a doctor” process. Multi-layered interactions are often fraught with uncertainty, complexity and tension, which evoke group resonance. Here's another trigger story:

Student ID21: When inserting a gastric tube into an old man who had received percutaneous gallbladder drainage, my teacher paused and comforted him several times. I did not think too much at that moment. But later when I was having my dinner, I suddenly had a feeling: in the face of disease and pain, the doctor should be the patron saint of patients. Patient’s feelings should also be taken into account. (2021-12-13)

Although this excerpt took place at a different time, it is highly likely that Student ID21 was influenced by the previous multi-layered interactions, which enabled this intern to not only recall his observation on the medical behavior of his teacher, but also reinterpret the responsibilities of doctors by hindsight. He even used the metaphor of the “patron saint” to interpret the image of doctors, reflecting his anticipation for the future. The online resonance between the members occurs when a variety of experiences meet medical knowledge in a particular context.

Therefore, we believe that community members maintain a relational space (Clandinin, 2015) – a space with a reciprocal and caring attitude. This space is given by the active virtual community which is open and safe. It brings with itself responsibilities in which it is important for medical students to pay attention to peers’ internship stories, to be present in the telling of their experiences, and to respond to or empathize with what they share with hindsight. If participants only put themselves in the position of solving problems and try to wait for others’ sharing, the active online space will decay prematurely. In short, multi-layered interactions and memories reconstruction are equally important for the maintenance of the active stage.

4.3 Narratives of the sustainable stage

From July to October in 2022, participation has decreased gradually, as the focus of chats shifted to the unified recruitment exams from assigned hospitals, with occasional discussions on preparation for future career development or small talks to maintain relationships. At this stage, all the participants were interviewed and confirmed with the researcher the accuracy of the original field texts. The interview used semi-open questions, including their future plans and feelings.

When our participants described current work and life, their feelings most closely resembled those of Erickson’s “generativity” (Erikson, 1959) in this life stage, where students gradually identified the people and things they wanted to devote their passion and energy to, and were prepared to invest in them continuously, forming a professional identity from interns to doctors. These include establishing a sense of belonging through communities, actively acquiring more information to help clinical decision-making,
reflecting on learning experience, and improving consultation techniques from patients’ perspective. The following excerpt illustrates the specific manifestation of “generativity” through a medical student’s experience of trying to change roles.

Student ID07: Now I’m in a couple of online work groups that keep me informed, but I miss when our group was lively. In those days I was afraid of doing animal experiments, but some of them recommended relevant books, some gave advice, and some even shared videos. They’re not talking now. I miss them. During my internship, I got into the habit of reading the messages to see what they were doing. Whether I am suitable to be a doctor is not the most important question for me. To be a good doctor is what I really want. (2022-08-18)

It can be seen that integrating into the identity of a doctor is carried out through a series of participation. The online community provides a broader platform and help for Student ID07, which also applies to other members. Students draw on the experience of others, resort to observation, and then gradually identify with their own profession as they engage in supported practice. But how often and how they use online communities depend on long-term patterns of interaction between this e-group and individuals, and are influenced by many factors that extend well into the future. These include the pressure to further study, assessment of professional fundamentals and clinical competence, community dynamics, the mentor’s enthusiasm and responsibility, and whether each individual is respected. These were rarely revealed publicly, but found in students’ reflection journals:

Student ID34: Anonymity helps me to reduce pressure, so I’ve learned to communicate with Dan, but you know, I usually do not initiate any contact with teachers. Plus, it’s interesting that everyone in the group has their own learning perspectives and experiences. I got more or less a response from them. It’s important to me. Now I’m in an online group including my old classmates and a few new colleagues. I’ll try to communicate with them in a similar fashion. (2022-09-16)

Use of terms such as “getting a response” or “communicate” suggest that the students were often pretty sure that what they want from an online knowledge-sharing community is the accumulation of knowledge conducive to career growth. Students can be seen as active learners in such a non-competitive environment. The need for professional progress will facilitate the integration of the spirit of online knowledge-sharing communities into the career of new doctors, thus helping them to improve clinical thinking ability and learning initiative. The interview data revealed that after becoming newly qualified doctors, all of the participants took the initiative to search knowledge-sharing communities to discuss clinical practice issues; 62% recruited trusted people and became the founders of knowledge-sharing communities; 59% said that knowledge-sharing communities would become one of their research topics; 76% considered improving their professional level so as to become future mentors.

Through above ways of spreading knowledge-sharing communities, the online community had been divided into multiple subgroups after medical students officially worked and integrated into the social atmosphere of hospitals. According to Albion and Weaver’s concept of online communities (Albion & Weaver, 2006), when a class is broken into smaller groups to form subgroups, the size and makeup of
these subgroups have a marked impact on group dynamics. The ties between members weakened. Therefore, the current community was reduced too far and its activity actually became too low to maintain the momentum, which led to the gradual disappearance of motivation, so it entered the phase of dissolution. The researcher believe that dissolution of the community precedes its spread because medical students seemed no longer anxious about their professional identity and knew how to utilize knowledge-sharing communities to further professional growth. As Student ID39 reflected:

I want to go to a community with a stronger sense of academic knowledge, and get in touch with the knowledge that will help me in continuing education. This community has helped me grow, but I have bigger goals. (2022-10-08)

With the establishment of professional identity, the students lacked continuous motivation to stay in the current community, but their integration and spreading of the knowledge-sharing community are like establishing a “dense network of relationships” (Dholakia et al., 2004) for the sake of career development, during which they expanded existing relationships to achieve broader career goals. Online knowledge-sharing communities support students’ professional growth in another way.

5. Discussion

5.1 Proactive role and fluid perspectives of community members

We explored work and study experiences narrated and shared by medical students at different stages. Answering the first research question, the researcher found that participants shared learning and working experiences in two ways through the online community. First, the members played a proactive role in sharing knowledge. When students involved in medical courses engage in corresponding network groups, it is not uncommon for them to keep silent or ask for routine knowledge transactions rather than knowledge sharing, not to mention social-emotional information exchange (Matzat, 2013). In the particular study, the online community provided a narrative space – a miniature of time and space – for members to engage in knowledge-sharing activities anonymously with other individuals who wanted privacy but were willing to share experience. It’s a safe place that allowed for the resonance of members’ ongoing experiences and for various responses to produce reciprocity and refine knowledge. Students’ active knowledge sharing, therefore, promoted to create a common secondary discourse (Gunawardena et al., 2009) in this place. Their comments and responses constituted a cohesive culture (Gang, 2020). The influence of this positive culture on students was a dynamic process, which fueled members’ ever-changing knowledge and stimulated the willingness to share knowledge.

Second, the members inclined to change their perspectives, expanding their focus from self-cognition to others’ difficulties and gains. Usually students’ understandings of learning and working experiences were open and even ambiguous, but deeper and authentic understandings could be achieved through interactions. Students took fluid and changing perspectives as they grew in the narrative timeline of the
community. A point of interest is that though members expanded their focus, they didn’t expect to exchange emotional support with one another to seek for “empathy” or “appreciation” (Hara & Hew, 2007). Most sought for their own professional development by constructing and refining knowledge, and strove for finding their places in the medical culture. The online community served as a structure for a knowledge organization, as well as a vehicle for an educational process.

5.2 Barriers to overcome and new teacher-student relationship

Our second research question has something to do with the nature and nurture of the online knowledge-sharing community. Its nature helped the participants to get over some barriers such as fear of potential conflicts, Confucian culture heritage and propaganda of positive energy. Originally, talking openly or detailedly about oneself in public was too direct and too explicit because it’s not in line with the Asian culture. Also, the society perceives doctors to be strong, uncomplaining and responsible for promoting social stability. In an unconstrained bridging space (Craig, 2004), community members preferred the option of anonymity to shun cultural influences. They discussed their difficulties and bewilderment online without being questioned about their learning attitudes and working abilities, and vented negative feelings without being criticized. In Student ID28’s case, if he complained to others that the medical students around him worked too hard, they might question his lack of commitment to the medical profession. If Student ID13 discussed with his classmates the experience of participating in his tutor’s research project, or if Student ID02 recounted to her classmates the details of her internship teacher’s patient guidance, jealousy and cynicism might be aroused.

When nurturing such an online community, the researcher assume a new teacher-student relationship can foster and strengthen the community through multi-meaning structures (Gang, 2020). Due to the delay of network sharing, members can devote themselves to revealing and presenting the multi-meaning structure of experience, that is, trying to reveal the meaning of experience from multiple perspectives so as to build a system of analysis and understanding. For students, the events in any one scene have multiple meanings. Each member’s interpretation of the experience is different. For example, Student ID26’s operating room observation led to divergent discussion; a plea for help to overcome Student ID07’s fear of doing animal experiments was met with a variety of responses. Traditional mentor learning and peer learning are mainly one-to-one and thus bilateral, but this new teacher-student relationship became multi-layered. Therefore, the researcher believe that it can stimulate students to find and analyze problems. As Bruner (2006) said, this kind of problem-awareness is deeply related to dilemma and process. For this reason, it is a new relationship for medical students to see their working and learning experiences changing over time and space in the chat logs and these experiences can interact with their own.

5.3 Balance between self-identities and professional identity
In terms of the third research question, the fine-grained analysis revealed the interaction between individuals and the community group. Individuals in the community had their own will and freedom of choice, kept to their own beliefs, and had their own expectation of becoming doctors. Meanwhile, their self-identities linked to the world of others, including knowledge offered to others and obligation of peer support, thus these self-identities gradually merged into the professional identity that the whole group has developed. This process is a contextual change of identity from individual medical student to the physician community, which Hogg and White considers to be “deindividuation” (Hogg & White, 1995).

Medical students acquired social perceptions of doctors by resonating with one another, and pursued the future of being good doctors by cultivating multilayered relationships with peers and the mentor, so as to be prepared for the role of doctor. So Student ID13 finally took the initiative to cooperate with other majors, and Student ID28 realized how important his dream was and now he was on the road to becoming a “swan”. An individual's professional identity develops dynamically in an effort to achieve a balance between self-identity and social identities. The evolution of the online community witnessed and facilitated such an effort.

### 5.4 Blended interaction, facilitating strategies and mentor's role

When the researcher analyzes what factors helped or hindered members’ engagement, there's a need to return to the origin and evolution of this community.

First, blended interaction is needed so that members’ trust and feelings of belonging can be enhanced by online chatting and offline meetings. According to Laine et al. (2011) and Matzat (2013), face-to-face contacts, which had been made frequently before students graduated, guaranteed members’ social-emotional information exchanges and pro-social behaviors. In the study, less offline contacts reduced the desire to communicate, which became more apparent when students formally entered the workforce, as shown in Fig. 2. Offline meetings are beneficial and supplemental for the online knowledge-sharing community, since the online community is the affiliation and extension of regular medical courses. Hence, blended interaction contributes to the smooth development of the online community and further enrich the members’ activities and engagement.

Second, from observation on students’ online participation, facilitating strategies, such as provision of tasks and recognition from others (likes and rewards), are beneficial in sustaining the community. The chatting records reached two peaks in the study by providing tasks: (1) Discussion of work scenarios when students moved to hospitals in July 2021; (2) Discussion about back-to-school arrangements in June 2022. In some chatting moments, members won the recognition because they elicited multiple likes from others: (1) Student ID26 uploaded the video of their psychological drama “Blue Balloon”; (2) Student ID44 filmed Vlog doing the experiment. Cash rewards were used between members when valuable knowledge sharing occurred. The amount was usually very small, directed or sent randomly in a “red packet” function, so students' enthusiasm was high, which often sparked another wave of discussion.
These facilitating strategies fortified members’ relationships and helped the online community sustain itself in a healthy and friendly way.

Third, the mentor’s role is vital in the community. When the online community was created, the mentor was the head teacher who had frequent contacts both online and offline with the students. In the first stage, members were willing to establish a relationship of mutual trust with the mentor. Most of the conversations originally took place between the mentor and the students, which became the inducement for the dialogues among other members. It laid the foundation for further communication. Two features emerged with the evolution of the community: the mentor’s role as a “bridge” ensured the dialogues developed vigorously; the mentor tried to avoid being a skillful “bystander”, that is, the mentor had to be careful not to engage in moral interrogation, or not to label vivid narratives as didactic because it may provoke students’ resistance. The reason was that postings not only conveyed positive signals, but also produced negative messages (e.g. dislike of hospitals’ depressing environment, feeling disrespected and untrusted as interns). The mentor should not wear an armor of objectivity to hold top-down position of authority. Acting as “disciplinarian” or “placebo” would be a hampering factor for the community because it crossed the line. The mentor’s role motivated the vitality of the community, and students may imitate the cultural ecology of the current community when they expanded to other knowledge-sharing communities. The study ends with Dan’s view on medical education in the two-day discussion:

The transformation from medical student to doctor is a process from quantitative change to qualitative change. If medical students consciously participate in online knowledge-sharing communities, whether it is to accumulate knowledge for future use, or to capture close observation of the words and actions from senior doctors, sharing can reduce the loneliness of professional growth, and provide motivation to continue working.

6. Limitations And Directions For Further Research

Limitations of this study include the uncertainty of reporting on specific participants and the small number of participants. The researcher attempted to develop a new approach to cultivate the professional identity of medical students, but the need for anonymity of the members in this approach partially limited the study, so the number of participants was reduced to follow up each community member. As a result, the study may be criticized for not having a large sample size. Future research could explore the use of other collaborative techniques or the different ways of creating a knowledge-sharing community, or it could continue to track the progress of individual cases so as to broaden the understanding of how to make online knowledge-sharing communities more effective.

In addition, in order to develop an online community in a short period of time, the community was created and guided by students’ trusted headteacher. In this case, the researcher avoided conflicts and constraints that the school environment may bring, so the students were free from the complexity of social environment. Further research may consider the possibility of transferring positive characteristics of multi-layered interaction and memories reconstruction to classroom teaching or school contexts, so
the study of online knowledge-sharing communities can be broadened and deepened to promote the effectiveness of developing a professional identity.

**Statements And Declarations**

**Funding:**

This work was supported by Hangzhou Medical College Teaching Commission (Grant No. XJJG202216)

**Competing Interests:**

The author has no competing interests to declare that are relevant to the content of this article.

**Author contributions:**

Shanshan Li carried out the conception and design of the research in 2019. After spending two years in the acquisition of data from 2020 to 2022, Shanshan Li obtained funding successfully, performed the narrative analysis and statistical analysis, drafted and revised the manuscript.

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Figures

Figure 1

Monthly chat records with two peaks

Figure 2

Average chat records of blended interaction