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Professional identity construction among software engineering students

A study in India

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Abstract

Purpose – The purpose of this paper is to explore the process in which the software engineering students construct their professional identities.

Design/methodology/approach – The study followed the qualitative method using grounded theory methodology to examine the process of identity construction. Data were collected from final year software engineering students in an iterative manner.

Findings – Based on the present study, the study argues that entry-level identities of students are modified and adjusted in response to their experience of identity violations over the course of their academic program. These violations were caused by their unmet expectations from the academic program. The magnitude of these violations is influenced by their perceived value derived from the training they were receiving.

Research limitations/implications – This paper explains the process of “identity morphing” as a mechanism by which students resolve the conflict/violation of their identities. The emergence and adaptation of different types of identities were examined. This study can be extended to the employees of IT organizations to draw a holistic picture.

Practical implications – The understanding of identity morphing process might enable organizations to enrich their interaction with their employees and thus provide avenues to improve their work-related outcomes.

Originality/value – Previous studies have explored professional identity construction among individuals. However, how software professionals construct their professional identity, during their education years, is relatively unexplored. The present study asserts that professional identities are formed among the students even before they join the organization.

Keywords Grounded theory, Learning, Identity, IS professionals

Paper type Research paper

Introduction

Identity is a powerful construct. It guides life path and decision (Kroger, 2007).

Professional identity research has grown as a field of interest in understanding various facets of work-related behavior. It is defined as the constellation of attributes, beliefs and values people use to define themselves in specialized, skill-based and education-based occupations (Ibarra, 1999). Professional identity signals to others that one possesses unique, skilled or scarce abilities (Van Maanen and Barley, 1984). An individual's professional identity is created as a result of ongoing contact with the working world, giving rise to varying representations of self (Cohen-Scali, 2003). In the present context of shifting boundaries in occupational, organizational and global



work arrangements there is a growing need to understand the process of professional identity construction. This is increasingly important in the context of software professionals as they are argued to be a unique occupational group (Guzman and Stanton, 2009). Past studies indicate that professional identity plays a significant role in determining work behavior of an individual. Professional identity was found to be positively associated with a number of work-related outcomes such as the enactment of professional role (Van Maanen and Schein, 1979), task performance (Carlsen, 2008), self-efficacy (Judge *et al.*, 1998), organizational commitment (Mael and Tetrick, 1992) and career success (Hall *et al.*, 2002). It is also found to be negatively associated with burnout (Pawlowski *et al.*, 2007) and turnover (Kwon *et al.*, 2010). Despite the extant work on professional identity, literature is, relatively silent about the process of professional identity construction especially among software professionals. In fact, Chreim *et al.* (2007) argued for more research to understand the dynamics underlying the process of identity construction. The present study proposes to understand the process through which the professional identity among the software engineering students are constructed, which might offer a better understanding of their professional work behaviors. In the present research, we have focussed on software engineering students for the following reasons.

First, literature claims that two forms of socialization (socialization for work and socialization by work) operate in the construction of the professional identity among the adults. Socialization for work concerns the attitudes, values and cognitive capacities acquired by the adults before entering the working world. Socialization by work on the other hand, reflects the personal qualities in adults that develops through confrontation with the working world (Cohen-Scali, 2003). Along the same lines with the socialization for work, others emphasized that education period is the formative time for professional identity construction and it contributes in developing the commitment toward the profession (Smith and Hatmaker, 2014; Sweitzer, 2009). Consistent with the above argument, we believe that the professional identity construction process among the students begins before they join an organization. Extant literature has demonstrated the evolution of professional identity among HRM graduate students (Hallier and Summers, 2011), among public affairs doctoral students (Smith and Hatmaker, 2014) and among students of psychology (Kullasepp, 2006). The software engineering students are exposed to the professional space through interaction with IT professionals, internship during their study, training in their final year of education, as well as through interaction with their seniors (refer Table AI). These events help the students in drawing an initial understanding of their profession[1]. When they enter the organization after completing their professional program, this entry-level identity is believed to be carried forward and exhibited through the way they do their work (Schein, 1978). Hence, studying the identity construction among these students will provide some useful insights about software professionals.

Second, lack of research in explaining the identity construction during educational experiences motivated us to explore the professional identity construction among the software students. Almost about five decades ago, Hall (1968) had pointed out that “very less is known about the identity changes during the educational experience and even less is known about graduate education.” In their study, Cohen-Scali (2003) suggested that a chosen course of study can influence the ideas young people have regarding their profession. Citing other studies, Cohen-Scali (2003) argued that a chosen course of study actually affects students’ understanding of their profession more than their social background does. While there is literature explaining the process of

professional identity construction (Clarke *et al.*, 2009; Dutton *et al.*, 2006; Slay and Smith, 2011), surprisingly we did not find any research that explores identity construction among software professionals during their education period.

Finally, with the vast body of literature examining software profession and accepting the importance of software professionals in today's economy, there is a need to understand different behavioral aspects of these professionals. Studying the process in which the software professionals construct their professional identity might offer a better understanding of their intentions and behavior.

Theoretical background

Identity and professional identity

Identity is referred to as the meanings attached to a person by self and others (Gecas, 1982). People derive the meanings based on their social identities (i.e. based on their social roles and group memberships) as well as personal identities (i.e. derived from character traits, personal attributes and their conduct) (Ashforth and Mael, 1989). People make identity claims by conveying images that signal how they view themselves or hope to be viewed by others and these identities are constructed and negotiated in social interactions (Slay and Smith, 2011). Similarly, professional identity is often derived from an individual's perception of oneness with or belonging to a profession (Russo, 1998). An individual's self-definition as a member of a profession and the association with the enactment of a professional role is termed as professional identity (Ibarra, 1999; Pratt, 2000). The understanding of a profession might be derived from multiple sources such as individual experiences or membership in professional associations (Brewer and Gardner, 1996; Schein, 1978). In the present study, we adopt a definition which is commonly used in the professional identity work. We define professional identity as a self-descriptive reference to address two questions: their own self-concept (Ashforth and Mael, 1989); and their professional self-concept based on motives, values and experiences regarding their work (Ibarra, 1999; Pratt *et al.*, 2006). Literature suggests that it is essential to understand the environmental conditions under which one's professional identity is developed. In fact, Piore and Safford (2006, p. 319) commented that "it is impossible in today's world to imagine one's profession without incorporating one's social context into it [...]." Thus, in the present study, we explore the construction of professional identity among the software engineering students in the socioeconomic context prevailing in India.

Indian software industry

The Indian software industry has grown exponentially from a mere 1.2 percent of GDP in the financial year 1998 to an estimated 7.5 percent in 2012. Further, India's contribution as a global service provider in international market has also increased from 51 percent in 2009, to 58 percent in 2011 (NASSCOM, 2013). The considerable growth in this industry has impacted labor markets in India. Perhaps more than any other high-tech industry, the software industry relies more intensively upon human capital. This has triggered demand for trained software engineering graduates (Gupta, 2001). To meet the expanding demand of software professionals, Indian education systems churn out "ready-to-hire" pool of software engineering graduates. In the financial year 2012, there was an addition of nearly 4.4 million graduates and postgraduates to the talent pool (NASSCOM, 2013). These contextual factors have motivated us to pursue the present study as Indian socioeconomic settings are fertile ground to theory generation.

Software professionals

The increasing economic growth and the attractive labor markets have impacted individuals' intentions and behavior such as affinity toward the software profession. The growth opportunities available in the software industry have also influenced the turnover of the professionals. For example, turnover of software professionals has been identified as a major issue among IT organizations (Gupta, 2001; Joseph *et al.*, 2007). These factors highlight the need to study the behavior of software professionals in the Indian context. Professional identity plays an important role in forming the behavior of individuals; hence, an understanding of the process of identity construction among the students might offer a better explanation of their behavior as software professionals.

Literature has reported that the content the nature of education and training impacts how students construe themselves as professionals (Dahlgren *et al.*, 2006). Professional education that individuals receive before joining any organization influences their perception regarding the profession, thus preparing themselves for the future work (Reid *et al.*, 2008). Previous studies have explored the professional identity construction among different professions such as medical residents (Pratt *et al.*, 2006), teachers (Watson, 2006) and psychologists (Reid *et al.*, 2008). However, the process of professional identity construction hinges on specific characteristics of the profession. Extant work on software professionals suggests that software professionals are different from other professionals on many grounds such as esoteric knowledge, unusual work demands and high-growth needs (Igbaria *et al.*, 1991; Shapiro, 1994; Trice and Bayer, 1993). These factors motivated us to conduct this study as the findings might offer new insights in the context of software engineering students.

Method

Research context

We believe that the emergence of theory is guided by the actors, context and their interpretation by the researcher. With this theoretical perspective, we attempted to observe the daily reality (i.e. what is going on) and based on our interpretation of this reality, we facilitated the natural emergence of theory. Grounded theory (GT) method seems to be appropriate for these types of studies as it allows theory generation based on systematic data collection and data analysis. Interest in GT has increased among the researchers in this field, as evidenced in recent publications in core IT and software journals (Day, 2007; Kunda and Brooks, 2000; Lings and Lundell, 2005; Morisio *et al.*, 2002; Ramesh *et al.*, 2002; Scott *et al.*, 2002). In the present work, we followed GT approach to understand the mechanism of professional identity construction among software engineering students. In order to understand how theoretical sampling is achieved, we followed previous work on professional identity construction (Pratt *et al.*, 2006; Slay and Smith, 2011). We found that extreme case context is widely used while studying professional identity construction. Extreme cases make the issues under consideration "more visible than they might be in other contexts" (Pratt *et al.*, 2006, p. 238) and we found extreme case method to be appropriate for our study (Eisenhardt, 1989).

Respondents were chosen from a top ranked engineering institution in the state of Uttar Pradesh in India, known for its rigor and efficiency in delivering professional education. The institute was chosen after screening a few other institutions. This institute was selected for two reasons. One, the institute is recognized for its high standards at entry level, quality educational resources and excellent placement records. For example, our study was conducted among the students of 2008 batch and in that year, 262,000 candidates appeared for the entrance examination and only top scorers

(7.6 percent) were declared eligible for the admission[2]. Second, one of the authors was familiar with the institution as a former faculty member. This has helped us in understanding the phenomenon and the context in a clear and unambiguous manner. The awareness of institute-level processes and policies helped us to interpret and construe relevant meanings from the responses.

Extending the extreme case argument we have selected the respondents who were pursuing their program in the disciplines of computer science and information technology (termed as software engineering disciplines), as these disciplines were closest to the perceived work identity of software professionals. Also, past studies suggest that individuals adjust and adapt their professional identity during periods of transition (Ibarra, 1999; Nicholson, 1984). The final year software engineering students were chosen for the study as it is the most critical phase in their identity construction process. The transition from software engineering students to software professionals is expected to happen at this stage.

Program content and conduct

The engineering program is a four-year degree program. The first two years of this degree program cover the basic engineering training which is similar across all the branches of engineering and comprises of cross-domain courses. In the final two years, students were exposed to the core courses pertaining to computer sciences and information technology, respectively. The program is conducted on a semester basis, and the curriculum is designed and circulated by the affiliating university. The curriculum attempted to provide a balanced mix of application-based and theory-based content. The pedagogy for the classroom-based courses is through lectures and presentations. Laboratory-based courses were conducted to enable hands-on experience in particular technologies. There was a provision of two-month industry internship in which students were required to work as an intern in any IT organization. The internship was meant to expose them to the actual job scenario and to build a better understanding of the job roles of software professionals. This internship was a prerequisite to enter the final year of their degree program. In their final year they were expected to take a major project which requires them to apply their knowledge and skills to create original working software or some prototype. Also in their final year of study, they are eligible to appear for the campus placement process. These processes are conducted by leading IT and software companies for recruitment of their entry-level software professionals.

Sample and procedure

Fendt and Sachs (2008) argued in support of GT as an essential research method for the development of new insights. Further, they describe the “constant comparison,” in which data collection and analysis are done in an iterative process, and “theoretical sampling,” in which data collection decisions are progressional and subject to the theory in construction. These approaches are invaluable to determine the quality in research on how individuals construct meaning from inter subjective experiences. We decided to conclude our data collection once theoretical saturation was achieved, i.e. no new theoretical categories were emerging from further data collection. Along with interviews, secondary information about the institution and the relevant departments (where the study was conducted) were gathered for a better understanding of the context.

Data collection was done through interviews. The average duration of the interviews was 45-60 minutes. A total of 24 respondents participated in this study and all of them were in the final year of their engineering program. Overall 55 interviews were conducted and the responses were verbatim transcribed within 24 hours of interviews conduction. Interviews were conducted in English language. All the respondents received their education in English and were proficient in both spoken and written language usage. It took us six months starting from August 2011 till January 2012 to conduct the interviews. Questions were framed to capture various key areas like their motivation to join the professional program, their aspirations, expectations and career objectives. Throughout, using open ended questions, we tried to understand the various elements of their identity construction such as self-assigned meaning, socialization and peer influence (refer Appendix 3 for sample questions). As suggested in GT methodology, data analysis and data collection were conducted simultaneously. As a result, several follow-up interviews were taken to ensure the validity of emerging theoretical categories. Multiple interviews have also enabled unbiased interpretation of the narratives (refer Appendix 1). On an average, every respondent was interviewed twice. We interviewed 16 male and eight female participants; average age of the participants was 22.5 years and average CGPA was 7 on a ten-point scale. All the respondents were employable and fulfilled the eligibility criteria for appearing in placement activities of leading IT recruiters.

Data analysis

In a desire to offer new insights to the process of identity construction among software engineering students, we followed the work of Gioia *et al.* (2010). They argued that a GT has to satisfy two fundamental purposes. One, it has to demonstrate the key themes that are identified and second, it has to reveal the dynamic relationships.

We followed the constant comparative method for our data analysis process (Glaser and Strauss, 1967). We analyzed our interview data in an iterative fashion, moving back and forth between transcribed data and the emergent categories. We adopted the stepwise process to generate theory in accordance with the four-stage approach explained by Glaser and Strauss (1967) and followed by other qualitative researchers in the context of professional identity construction (Ladge *et al.*, 2012; Pratt *et al.*, 2006). These four stages are comparing incidents applicable to each category; integrating categories and their properties; delimiting the theory; and writing the theory. We have included an example to illustrate the coding process adopted for data passages and narratives (refer Appendix 1).

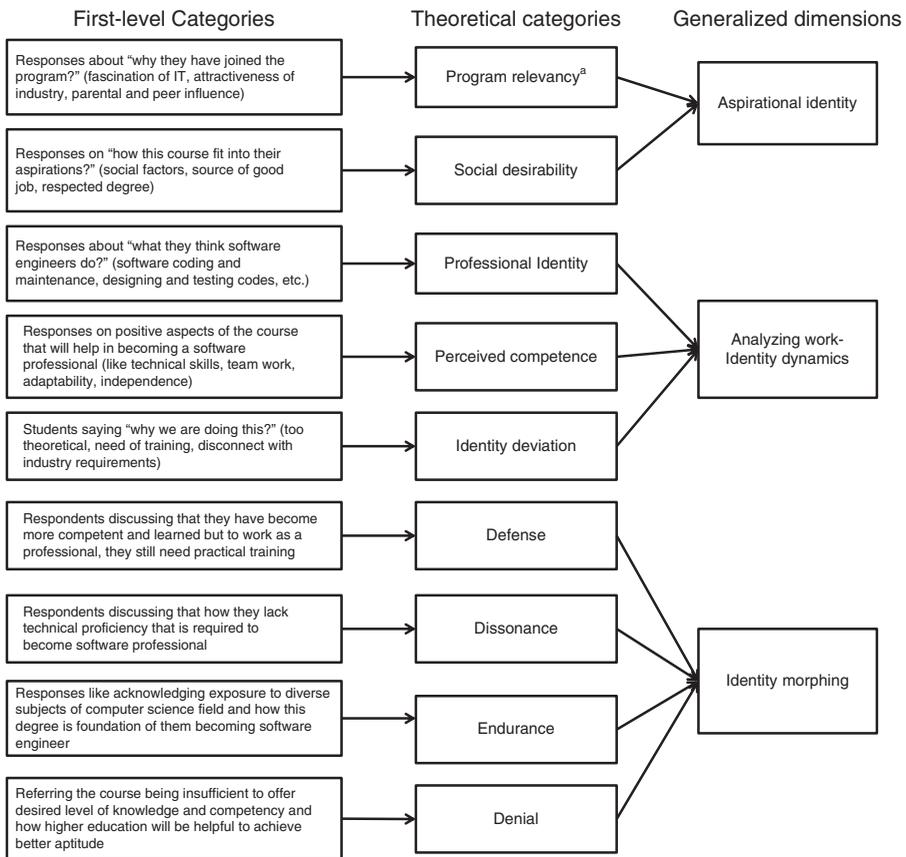
We started our data analysis along with our data collection. The coding process followed after transcribing first five interviews. Sets of codes, based on similar incidents and opinions, were developed as they emerged from the transcriptions. For instance, respondents describing what they acquired as skills from their professional program were collated. All the similar responses such as “improved communication,” “acquired team work skills,” “better aptitude” were put into a common theoretical category. We employed an iterative process for fitting data into categories and verifying it with data continuously to modify or abandon categories.

We also deduced emotions and dispositions through the language they used and context they were referring to during their conversations. First-level key themes were then summarized into more abstract and normative theoretical categories. These categories evolved based on shared interpretations of data narrations among the coders. We resolved our disagreements through discussions, iterations of transcripts analysis and following the extant literature.

We followed a thorough peer review process to ensure that the categories are naturally emerging from the data and is not affected by the biases and pre-existing conceptions of the researcher (refer Appendix 1). Identity morphing (see Figure 1), for instance, was identified as a theoretical phenomenon and the name, identity morphing was selected after discussions with our peers[3]. Further description of the data analysis process is illustrated in Figure A1.

Findings

Our findings show how software engineering students experience systematic changes in their professional identities during their professional program. In Figure 1, we present results of our data analysis process by illustrating categories of data in three levels of abstraction, as recommended in GT methodology. The figure also shows how we moved from early themes and codes to more conceptual and theoretically abstract categories. On the left hand side, the figure illustrates the broad theoretical



Note: ^aProgram relevancy refers to the relevance of the program for fulfilling their career aspirations

Sources: The illustration for this data structure diagram is adapted from Gioia and Thomas (1996), Pratt (2000) and Ladge *et al.* (2012)

Figure 1.
Illustration of data structure

categories and as we move rightwards the categories become more abstract to form the generalizable dimensions.

Our analysis indicated that the identity construction process is influenced by the students' evaluation of work-identity dynamics which might lead to some form of identity morphing. The details of the identity construction process are discussed in the subsequent sections of the paper.

Entry-level motivation: aspirational identity

Many of our participants accepted that the lucrative career option available in IT industry motivated them to join the program. Students perceived the program as a medium to access the growth opportunities available in IT industry. Entering a professional engineering program was explained as a promising career path. Placement services offered by top engineering institutes enable them to get a job offer before they complete their degree:

[...] diverse career options available in the engineering field made me interested in this degree [...] jobs are abundant and before getting our degree we end up getting job offers [...]
(Respondent 9, male).

[...] IT offers better prospects in India as compared to other branches of engineering. Every year IT companies offer the maximum number of jobs and the salaries offered are also decent
(Respondent 22, male).

These responses indicated that the students decided to join the professional education for benefits such as job prospects. The future opportunities and relative advantage of computer science and information technology streams over other engineering streams motivated them to choose this career path. In many cases career choices were not made on the basis of the existing capabilities and interests of the respondents but on the future prospects. We also found that social desirability and social acceptance play a role in determining students' career choices. The perception of social actors regarding career and profession impacted the decisions made by the students:

It is a program where everyone gets reasonable acceptances in the society [...] all my cousins are settled in large MNCs [...] I want my parents to be proud of me [...] they want me to work in a top IT firm in some metro city [...] when you work in sophisticated offices and live in metropolitan cities, people think you must be doing something great [...] (Respondent 14, female).

Some of our participants admitted that peer pressure and parental influence impacted their decision of choosing the present professional education and subsequent career. We found that families of the participants played an important role in deciding the career- and education-related choices of the students. The majority of the participants received funds from their families for pursuing their studies. One of the respondents put it during one of the conversations, "My father is an engineer [...] I was always inspired to be one." Many participants in our study mentioned that they followed what programs their friends and classmates were joining. There were certain participants who responded that at the time of choosing this program, they had a very limited role in taking the decision, and the decision was made primarily by parents or guardians in their respective families:

[...] Because everyone in my friend circle was joining this program, I joined this program. Also, at the time of choosing this program, I have no knowledge about other fields and options. My parents also wanted me to join a program where I have better future prospects
(Respondent 19, male).

[...] during my senior secondary education my father always use to tell me to prepare for engineering entrance exam [...] I did well and join the program as soon as my results were declared (Respondent 7, male).

When asked about the content of the professional program, most of the students agreed that at the time of joining they did not have much knowledge about what they will be learning. However, there were a fair number of responses where students attributed their inherent interest in IT and computer science engineering as a reason to opt this profession:

I was always a computer enthusiast [...] even in school, I was among the best performers.

[...]back in senior secondary my teachers use to tell me that I will be very successful in IT [...] my codes were always error free and I use to enjoy experimenting with programming languages (Respondent 4, male).

We concluded from the responses that opting software profession as their career choice was affected by multiple factors. We grouped these factors into the theoretical category of aspirational identity (see Figure 1). We found individual interest and career preferences, social desirability and peer pressure as a significant source of aspirational identity. The responses also indicated that the students have different understanding of the program they were joining and their expectation of the program were also varied. We expect that these individual-level differences will lead to difference in their professional identity construction process.

Analyzing work-identity dynamics

Professional identity. Over the course of their professional program, students develop an understanding of the profession. We found that each respondent had a very similar notion about the profession. They mentioned that a typical software professional is responsible for developing and maintaining software systems and also supporting organizational functions that enable development of software systems. The internship program has also helped them in constructing the job description of software professionals. They ascribed a shared meaning of “professional identity” among themselves. The construction of their professional identity was affected by the evaluation of the similarities between their own understandings of software professionals and their present professional experiences.

This identity kept evolving over the duration of their professional education. Although their notion toward what a software professional does was similar, they differed much on how they perceive their own professional identities. There were instances where their expressed opinions were contrasting and even mutually antagonistic:

[...] I do not understand why there is so much of dissatisfaction among some of my class mates [...] whatever we are studying is going to be the foundation of our knowledge in our professional lives ahead (Respondent 22, male).

On the other hand, there were responses which were critical toward the courses taught to them. These contrasting views indicated that exposure to identical environment and resources might not lead to similar identity construction. Despite sharing a similar understanding of professional identity, identity construction was charting an entirely different path among these respondents:

[...] some of us think that reading books and performing in exams is enough for becoming a professional [...] this program clearly lacks in professional perspective (Respondent 15, male).

Perceived competence. Perceptions regarding the acquired skills and competences affected the sense-making process of the respondents:

My branch of study being IT, I became aware of the leading technologies and their underlying concepts. After joining this program my outlook towards work took a technical leap and things were clearer from a technical point of view. I feel more confident professionally [...] (Respondent 17, female).

I gained knowledge about different programming languages and softwares, their development and implementation [...] I can say that I have acquired a lot of professional and personal level skills that will stay with me always (Respondent 23, Male).

We found perceived competence as a bridging factor in the professional identity construction process. A more detailed description of the role of perceived competence in professional identity construction is discussed in the following sections.

Identity deviation. It was evident from the data that there was a clear dynamics between their perception about what a software professional does and what they were learning. Data were able to explain how their entry-level expectations differ from what they were encountering in this program. They derive the understanding of their own professional identity with the help of their work-identity comparisons. These comparisons were made between their observed work-role of software professionals with what they were experiencing in this program. The comparison was made to determine whether this program is sufficient in providing the skills and competencies required to become a software professional.

Students customize and modify their identities to accommodate the differences they observed in their expectations and receivables while pursuing their professional program. These changes were adopted differently by different respondents and probably can be attributed to distinctiveness in their individual-level perceptions and values. It also reciprocated to the initial-level expectations of each respondent. The conflict between the perceived identity of a software professional and their own professional identities was clearly observed; however, few respondents undermined the dissonance and discussed perceived competence as an enriching factor for their professional identities:

Got to learn few interesting and technical subjects, and developed a better technical acumen. I am not saying that I have complete professional knowledge, but I possess basic knowledge of core subjects like programming languages and databases, I have derived some technical expertise in different areas and I believe it will help me in enhancing my knowledge (Respondent 11, male).

I am a more independent person when it comes to developing computer programs and solving queries (Respondent 23, male).

Table I through data illustrations exhibits the role of perceived competence across the identity morphing categories. It is evident from Table I that higher levels of perceived competence result in less severe identity modifications. There were cases where participants were able to partially resolve or could not resolve the conflicts which lead to significant identity modifications. As discussed in detail in the later section of this paper, few of the respondents denied their professional identity and admitted that they lack the practical knowledge, and they need a comprehensive training to understand professional aspects of the job.

Work dynamics	Identity defence	Identity dissonance	Identity endurance	Identity denial
Perceived competence	“All IT companies now days provide corporate trainings [...] our academic background will be helpful to better understand those trainings [...]”	“[...] without proper training I don't think we possess the skill set required for the job”	“[...] That the course offered us enough knowledge and skills [...] I think that we are trained enough to enter the market and enhance our innovative pursuits”	“In future after certain higher studies, I think I will be able to enhance my career prospects Right now I don't think I have sufficient skills to pursue the career of a software engineer”
	“We have got domain knowledge and without that I don't think anybody can understand advance technologies”	“We should be spending more time in labs rather than reading text books”	“This program has given me first exposure to the divergent field of information technologies [...] at least now I am confident to enter the field”	“I think I have not learned much in past four years [...] not enough to become a software professional”
Identity deviation	“[...] after completing this course and with some training in practical aspects I can grow as a successful software engineer”	“Yes [...] very close to becoming a professional software engineer but still quite far from an actual one”	“Yes [...] I think I am on my way to become a full fledged software engineer [...] right now with this degree I have just taken the first step [...]”	“I am more interested in research work and studying about new concepts, so I would like to carry my work in the research field rather than doing a 9-5 job of a software engineer”
	“We are eligible and able to learn everything that is required to become an IT professional”	“I do not think I am a software engineer yet [...] I need to learn a lot of coding and the real things before becoming one”	“[...] it is our engineering degree that makes us a software engineer”	“[...] if I can choose any other career to earn my living I would gladly do [...]”

Table I.
Work dynamics and identity deviation during the course of their professional program

Identity morphing

The adaptation of identity has been studied in different contexts (Ibarra, 1999; Pratt, 2000; Pratt *et al.*, 2006). However the process of adaptation differs in different context and among different respondents. In the present study, we found that deviations observed in their professional identity construction resulted in different forms of identity adaptation. These adaptations termed as identity morphing lead to the construction of their provisional professional identities. Based on the study, we describe “identity morphing” as the process of modification of identities in order to adapt to work-identity conflicts. These modifications can be positive or negative, and it varies in its magnitude. Some modifications can be severe and can cause devaluation of one's professional identity. Identity morphing is the result of the conflicts observed between the work they would be doing and their sense of professional identity. Respondent tried to resolve these identity violations or conflicts by identifying

bridging factors (such as self-efficacy, perceived competency) to achieve identity congruence. The success or failure of this identity management might lead to various forms of identity morphing. In the following sections, we have discussed different categories of identity morphing among the respondents.

Identity defense. As we have already discussed, students experience identity violations and these violations lead to adaptation and systematic change in their identities. One of the ways in which the respondents exhibited their identity was the process of defending their identity construction. They achieve this by acknowledging the significance of their academic program. Some of the participants in our study stated that they have derived a certain level of competency which will help them to evolve as an IT professional. They explained that the program has given them the opportunity to formally acquire domain knowledge of their profession, such as operating systems and programming languages. The identity construction was not very strong among these respondents, but they were not undervaluing their identities. Their statements confirmed their identities as software professionals. Despite accepting the relevance, this set of respondents shared their concerns about the coverage of the program design. The students acknowledged the fact that the program is rich in academic aspects, but lack technical and practical exposure. However, they offset this fact by stating that some training can help them to become software professionals and the course will be fundamental for their involvement:

I derived particular domain knowledge from this program which I am interested in and which I believe that I can work upon. Here nobody is getting trained for the job so maybe right now I am not good as a professional, but I will be after some on the job trainings. Education should develop a certain aptitude in you so that you can survive in any work environment. In IT industry whatever you learn is never going to be sufficient. New technologies will keep coming so it is better that you be prepared with the ability to learn advance technologies. So despite lacking in many dimensions, this program in a way seems helpful in building a foundation by offering essential courses like databases and operating systems (Respondent 1, male).

This example demonstrates the affirmation of professional identity along with the confession that they lack in a few aspects to become an actual software professional. Few participants shared that there should be some avenues where they can get the opportunity to understand the profession:

I think during the program, we should have some industrial visits each year [...] so that we can interact with people in companies which might help us to know more about the work environment of industry (Respondent 9, male).

We noticed divergences when their expectations were not met by the program. They resolve these conflicts by admitting the need for additional training, but not by undermining the significance of the program in their future professional careers. However, we observed that these expectations were not deterring their professional identity construction. In sum, our finding suggests that despite acknowledging the inadequacies, respondents in this category defended their identities by suggesting that further training and professional exposure will address their requirements.

Identity dissonance. Many of our participants discussed the insufficiency in their education program. There were responses which were directed toward the dissonance in identity construction. They were disappointed by the nature of the professional program and explained how this program was inadequate to train them as software professionals. Since they had exposure to the actual work settings through internship programs, they were able to make comparisons between the knowledge they were

acquiring and the skills they expected to gain. Participants also pointed out the lack of practical exposure and asserted that the curriculum is not appropriate for training software professionals:

If we go into the details of the curriculum it seems that it offers everything in order to become a good software professional. But the course content is stale. It does not focus on new technologies, and technical and practical aspects of knowledge are extremely ignored (Respondent 13, male).

The respondents, however, do not reject their professional identity altogether, but realized the need for further reinforcement. They acknowledged various unmet expectations from the program, but their identity construction as a software professional was not entirely faltered by this. In order to support their identity construction many participants pursued different options. They stated that some professional certification and trainings can help them build their confidence as prospective software professionals:

[...] Labs should be conducted by professionals [...] why they (the institute) do not consider providing training for JAVA and databases certification. Our course syllabus does not require us to experiment with the codes and think creatively. These certifications are difficult to crack so you have to learn many newer dimensions of technologies and programming. At least then we will feel confident in handling the problems that we have to face once we start working as software professionals (Respondent 20, male).

These students were satisfied with their decision of pursuing this program as they mentioned that the program is a preliminary requirement to become a software professional. We can say that in some ways they conceive the program as consequential to their career choices:

[...] engineering now a days is a minimum requirement to apply for a software professional job [...] this program has given me an edge over other non technical applicants [...] (Respondent 16, male).

Identity endurance. There were participants who exhibited reinforcement of their professional identities. These participants expressed their trust on the program and we found that identity construction among such respondents was positive. They accepted that academic concepts and rigor were relevant in their transformation as software professionals. These participants believed that learning these courses even in purely academic context has added value and it will help them to acquire desired skills to become a professional. Respondents also mentioned that the four-year program was extremely rigorous, and they have acquired other skills such as team work, discipline and better time management. They acknowledged that the program has enhanced their problem-solving skills and helped them to develop divergent perspectives to analyze a situation:

[...] We have spent our four years to earn this degree [...] every semester we have to pass many credits (of coursework) and practical exams. We have worked hard for it and we have improved. We can face problems with more confidence [...] we can address lots of technical issues without getting ruffled. I, and many of my friends believe, that we can do anything in life in a somewhat better way. We are going to be successful in the IT industry as software professionals (Respondent 22, male).

They pointed out that studying the professional program in a diligent way has helped them to achieve a sound grounding and a better technical acumen to become a software professional.

We found that this set of respondents has justified their professional identities by strengthening the value of the academic knowledge and technical skills derived from the program.

Identity denial. Finally, one of the identity adaptations that emerged from our data analysis was about rejecting the relevance and value of the program and even denying themselves as software professionals. They expressed that following their careers in the software field is not what they were expecting, and few of them even denounced the idea of becoming a software professional:

I am more interested in research work and studying about new concepts, so I would like to carry my work in the research field rather than doing a 9-to-5 job of a software professional (Respondent 14, female).

We were interested to understand the reason behind their decision of rejecting their software profession even before actually joining any software organization. Many participants in our study responded that through internship they have got a reasonable idea of the nature of the job. They shared that they understood what a software professional is expected to deliver. They also mentioned that discussions with their seniors have also helped them in arriving at these conclusions:

In our internships we actually work in the identical environment with actual software professionals, we were put into projects so we have a fair idea of what we will be doing once we join. So it is not like an uninformed decision. I have decided not to start my career with this job (Respondent 2, male).

I have talked to many of my seniors and that has helped me in reaching at the conclusion that I might not be a good fit for the job of a software professional (Respondent 6, male).

Some of the respondents mentioned that further education can help them to decide on their career. These respondents did not develop their professional identities from the sources used by other respondents. In the previous section we have discussed that many respondents derived their sense of professional identity from sources such as competency achieved by joining the program, experiences gained from the internships and interactions with alumni. However the respondents of the present category did not acknowledge the significance of any such source. They also expressed disorientation toward their career choices and shared that they were not able to choose a desired career path:

In future, after certain higher studies, I think I will be able to enhance my career prospects. Right now I don't think I have sufficient skills to pursue the career of a software engineer (Respondent 18, female).

This group did not identify with other participants, and unlike others who were concentrating on getting employment, they were thinking about other alternatives and career choices. Some respondents shared their intention to join the industry because of lack of other opportunities. Few respondents also cited supporting family or educational loan as a reason to join the profession:

[...] at this time I see IT as my only possibility [...] I do not have any other choice [...], do not have funds for further studies also (Respondent 10, male).

When I joined this program everybody convinced me that it is a promising career. I don't consider myself as a very technology oriented person, but somehow I choose to become a

software professional. Eventually my parent's expectations are important to me. They took a loan for my education as the costs were high [...] now I have a loan to pay back [...] I want a job right now [...] but I know I will like to quit as soon as I can (Respondent 8, male).

This set of responses actually signifies a change in their initial decision of becoming a software engineer. It is an intriguing observation as it indicates that the vocational choices can be altered under non-favorable situations.

Conceptual framework for identity morphing process

While analyzing data and developing categories we observed that, despite similar contextual settings, our respondents adapted different paths to form and modify their professional identities. Some participants defended their identity by finding value in the professional program they were pursuing, while on the other hand, some participants devalued their identity and showed severe dissonance in their identity construction process. The process we observed was at the individual level. In this way, our study contributes to the body of literature which explores the process of identity construction among individuals in a social context (Dickie, 2003; Ibarra, 1999; Sveningsson and Alvesson, 2003; Van Maanen, 1997).

Figure 2 presents the phenomenon through the aggregate dimensions extracted from the GT and how these dimension relate to explain the process of professional identity construction. The interviews, information from the secondary sources and the literature were the basis of integrating data into theoretical concepts. We demonstrate that the construction of professional identity is a continuous process which involves continuous work-identity assessments. These assessments were influenced by the interplay between an individual's perceptions and experienced violations of professional identity. Literature suggests that individuals use their identities as a source to assign meaning to their work (Weick, 1995). On the grounds of their understanding of professional identity, the participants were able to assess the meaningfulness of their work. For example, they evaluated the usefulness and relevance of the engineering program in their transition as software professionals.

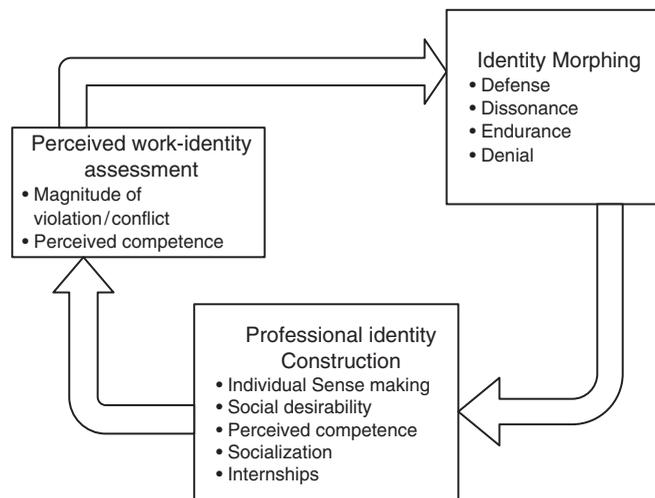


Figure 2.
Developing the framework for the identity morphing process

Discussion

The identity of an individual passes through many stages, making transitions from one role to another (Ashforth, 2001; Hall, 1968, 1995; Nicholson, 1984). There are events and activities that characterize these transitions such as completing the education and joining an organization. The present study suggests that derived self-esteem and perceived competence influence the identity transition of an individual. As we found in our data, individuals having higher levels of perceived competencies, derived from their graduate program experienced lesser conflict in their identity construction process. To illustrate: individuals, who experienced identity denial, expressed significant amount of distrust on their education. On the other hand, identity defense demonstrated that the professional identity construction of the students is not violated by the subjected conflict. The violations in the identity construction process were observed as a result of the continuous evaluations of “what they should do” and “what they were doing.” In response to these violations participants modify their identities through identity morphing and the nature of morphing depends upon their self-assigned meanings and their perceived competence. The identity morphing contributes in the construction of a revised professional identity.

The magnitude of the identity conflict determines the path through which identities are constructed. For example, if the conflicts or the violations are substantially large, students can respond by rejecting the professional identity altogether as seen in the process of identity denial. These adjustments to the professional identity might be temporary adaptations and we propose that in the long run the identity construction of these students might take a different course. Sveningsson and Alvesson (2003) argued that “[...] individuals create several more or less contradictory and often changing identities rather than one stable, continuous and secure identity.” It will be interesting to find out the changes in professional identity after they join an organization. Further study on this account might provide more insights into the process of identity construction of software professionals. Our study contributes to the prevailing work on professional identity construction by not only exploring the underlying process, but also in identifying the factors which facilitate the construction of a positive identity. Thus, the present study advises to ensure positive identity construction among students as their future professional identity will be closely related to their previous identity conceptions cultivated during their years of education.

Implications for theory

The present study contributes to theory by addressing three major issues. First, by explaining how identities are constructed at the time of professional education; second, it examines the factors that influence the process of identity construction and thus explains the situations that lead to the conflict in identities. Third, it explores the ways through which the conflict in identity gets resolved. Our findings contribute to the stream of literature which explores the professional identity construction among software engineering students. Despite the significance of education in the life of a software professional (Kling, 2003), the process of identity construction during the education years has not much been explored (Hall, 1968). In fact, researchers highlighted the need to study the process of identity construction during transitions (Ibarra, 1999; Pratt, 2000). The present study contributes to software professional research by building a grounded theoretical explanation of how identities are formed among the software engineering students who are in the phase of a transition into the role of software professionals. The iterative data collection and constant comparative

method helped us in gaining insights about different type of identity negotiations among the students during the phase of identity transition. We explored how these identities are modified and adapted according to the perceived significance of their academic program. The conflict between expectations and experiences is resolved by the process of identity morphing. Identity morphing is a process through which identities are customized based on various internal and external factors.

We explored opinions and expressions of the final year students, which define their understanding of professional identity and often lead to identity negotiations due to observed conflicts between their expectations and experienced reality. While examining various factors that lead to these identity negotiations, we found that factors like individual career aspiration and perceived competency can pave the path for identity construction.

Different categories of identity morphing provide information about the nature of identity construction which may be positive or non-positive. Positive identity enhances the capacity to deal with adversity and stress (Hobfoll, 1989), facilitates individuals' access to different knowledge domains, thus fosters creativity (Cheng *et al.*, 2008), provides a vehicle for learning from different cultural experiences, enhances work processes (Ely and Thomas, 2001), and promotes adaptation to new work settings (Beyer and Hannah, 2002). Positive work-related identity uncovers different pathways through which identity construction can build social resources for individuals (Dutton *et al.*, 2010), which provides strength to endure stress and hardship (Baker, 2000; Burt, 2000) and to take on new and demanding challenges (Higgins and Kram, 2001; Ragins and Kram, 2007).

Identity endurance, for instance, aid the students imbibe competency to define a "worthy" self-meaning (Dutton *et al.*, 2010). This in turn helps the students to construe a valuable and favorable sense of self. Another inference can be drawn from identity denial. In this category students develop a non-positive professional identity. Studies focussed on work-related identities (i.e. occupational identity, professional identity, organizational identity, etc.) demonstrate that individuals wish to construct positive identities in their work domain (Gecas, 1982; Turner, 1982). These positive identities infuse meaningfulness in individual's work. The absence of a positive identity might reduce commitment toward one's profession, sense of self-worth and the capabilities to manage stress. The study is conducted among final year students who are expected to join organizations in a few months. The perceived professional identity at this particular time is significant in forming initial-level professional orientations as they join the organization. Studying the professional identity enriches the understanding of the identity construction process that will occur over time after they have joined organizations as IT professionals.

Implications for practice

The study holds managerial implications for both the academic institutions and the work organizations in guiding positive identity construction among software professionals. Despite a good amount of research on professional identity construction among different professionals, less is known in the case of software professionals. In the present study, we have focussed on understanding the initial orientation regarding the profession among software engineering students who are ready to join the profession. In certain ways, our study provides insights which have not yet been explored in the well-founded literature on professional identity construction. For instance, present study explores sources of professional

identity (such as interaction with IT professionals, internship and corporate trainings as well as through interaction with their seniors) among these students which is unique to the studied context. In fact, during the interview many of the students highlighted the importance of internship, interaction with seniors, industry visits and course requirements. For instance, one of the students highlighted the bonding between the current students and the alumni and asserted that strong communication with the seniors help them to build a more realistic understanding of the profession (refer Table AI for student responses). The process through which perceived identities are violated and modified is redefined through the concept of “identity morphing.” Since these students are currently not working as professionals, their identity modification process is primarily intrinsic unlike the research work conducted on professionals (such as Pratt *et al.*, 2006) where the identity modification is driven by work place experiences such as feedback, role model, etc. Thus, our findings can be adapted as a guiding foundation while exploring professional identity construction among software professionals in their early careers. Specific dimensions from the GT, such as perceived competence, need for technical training, closeness to the profession can be further captured in order to explore the phenomenon over a specific time period. Findings of this study can be instrumental for IT organizations to address turnover in IT industry. Previous studies and industry report have cited that attrition among software professionals is a significant concern for human resource managers (Joseph *et al.*, 2007; NASSCOM, 2013). Studies suggest that individuals who do not develop identity as software professionals during the education phase are more likely to leave the profession (Cross and Vick, 2001; Lee, 2002). Thus, findings can be useful in addressing issues related to the management of IT professionals.

Limitations and directions for future research

The present study was conducted among final year engineering students who are about to join organizations in the software industry. However, the cross-sectional design of our study limits us in exploring changes over a certain period of time (as compared to the studies by Pratt *et al.*, 2006; Ladge *et al.*, 2012). Increasingly, there is a call for longitudinal research to understand professional identity in the periods of transition. The assumption in longitudinal studies is that one is undertaking a prospective rather than retrospective study. This design has certain advantages over retrospective studies. Exploring the identity of students after they join software organizations might enrich our understanding of identity construction among the software professionals. In spite of the limitations, the present study has certain advantages. Cross-section research design is not uncommon in this research area. In the recent literature, cross-sectional research design has been employed to study professional identity construction among final year students (Smith *et al.*, 2014; Wiles, 2013). In addition the present study was conducted over a period of six months and we have interviewed the students multiple times to ensure the validity of emerging categories. The GT employed in the present study has the advantage of building a theory from the data and removing the researcher bias. The present study offers interesting insights for understanding professional identity construction process as an ongoing process for these future IT professionals.

Our study was limited to one institution. Extending the study to different contexts might provide different dimensions for further exploration. Future studies can explore the phenomenon of identity construction in more diverse populations of engineering students. We would also like to address the question of generalizability of our findings.

The current study is an attempt to provide naturalistic generalizability emphasizing on in-depth description of the findings. Although our study was conducted in one institution in India; the transference of findings can be established if sufficiently similar institution and circumstances are chosen (Lincoln and Guba, 2002). The purpose of this study is not to achieve statistical validation, but to provide comparability and transferability of results (Denzin and Lincoln, 2000).

Conclusion

The purpose of this study was to extend the theory on professional identity construction among the students who are pursuing their careers in software technology. Our findings indicate that identities are morphed in an attempt to resolve the violations. These violations were caused by differences in their expectation and the education received. However, morphing is guided by multiple intervening factors such as an individual's core values, their entry-level aspirations and expectations from the degree program.

Our findings contribute to the extant work on professional identity and identity construction of the individuals (Ibarra, 1999; Pratt, 2000). It explains how the understanding of identity morphing can be employed to build professional identity in a more meaningful and positive way. The present study contributes to the extant literature on software professionals (Duliba and Baroudi, 1991; Iivari *et al.*, 2001; Orlikowski and Baroudi, 1988; Shapiro, 1994) by elaborating the identity construction process of software engineering students during their professional degree program. Growing demand of software professionals adds significance to our study as it attempts to elaborate the behavior of software professionals regarding the work-identity interplay. This understanding of the identity morphing process might enable organizations to enrich their interaction with their employees, thus provide avenues of improvement in work-related outcomes.

Notes

1. This preliminary information was sourced from few pilot interviews, based on which our present sample was chosen. The detailed explanation based on data collected is given in the findings section of the paper.
2. Data regarding the eligibility criteria was collected from the admission office of the institute.
3. For nomenclature of categories we are inspired by the work of Pratt *et al.* (2006) where they have used medical terms to name their categories which emerged after grounded theory-based data analysis. They have used medical terms like patching, splinting to explain the phenomena among medical resident's work life. In a similar manner we coined the term morphing (a technical terminology) to explain the phenomenon of change in identity among software engineering students.

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Appendix 1. Example of data analysis using constant comparison method

One of our research objectives was to understand the ways in which the students respond to identity deviations. We believed that this will help us to comprehend their identity construction process.

Step 1: Both the researchers identified that the following passage to be related to experienced identity deviation and explains one of the important factors to categorize a particular identity deviation:

I derived particular domain knowledge from this program which I am interested in and which I believe that I can work upon. Here nobody is getting trained for the job so maybe right now I am not good as a professional, but I hope I will be after some on the job trainings. I find education as a means to develop a certain aptitude in you so that you can survive in any work environment. If I evaluate my current curriculum for professional skills, I will be disappointed. We are compromising on many expectations, but on the other hand, I believe that in IT industry whatever you learn is never going to be sufficient. New technologies will keep coming, so it is better that you be prepared with the ability to learn advance technologies. So despite lacking in many dimensions, this program in a way seems helpful in building a foundation by offering essential courses like databases and operating systems.

Step 2: One of the researcher coded the passage as "defending identity" and the other assigned code was "Surviving identity deviation." We followed a careful reading of all the transcripts and collated narrations and passages with similar underlying themes and coded them in different theoretical categories. For instance, another similar narrative which we kept under the tentative category of "defending identity" was:

Yes [...] I think I am on my way to become a full fledged software professional [...] right now with my graduation degree I have just taken the first step [...] I am hopeful that after joining I will be able to learn and acquire requisite skills to perform a software professional's task. Why I am saying that my education is just a first step because I do not think we are trained as per the role requirements [...] general tasks that software professionals perform in their work life is different from what we have learnt here [...] I am counting on in-company training, in fact most of my friends are hoping to get a technical training before they are put into actual job.

Other categories were created similarly in an iterative fashion. Categories were grouped based on analysis of data and discussions among researchers. We were going back and forth on the transcripts to extract similar meaning narrations. We contemplated on issues such as whether our groups or tentative categories can be represented in the form of theoretical constructs. In the above example, we agreed that both narrations indicate two significant issues, first, expectations of the respondents with their education or program were not completely fulfilled; second, despite the dissatisfaction, their professional identity was not completely faltered but they strengthened their identity by highlighting what they have achieved from their professional program. Before naming the category we reviewed literature for similar concepts and we found Pratt *et al.* (2006) work very helpful. As mentioned in the footnote three, our nomenclature was inspired by their work.

Step 3: After literature review and discussion we agreed on the code “Identity defense.” We describe and define this category as follows.

“Identity defense” is a process of constructing professional identity, where individuals while experiencing conflicts in their perceived professional identity and actual professional experiences devise a mechanism to adapt to the present condition in order to define themselves. In this way we can suggest that their professional identities are customized in response to observed conflicts.

Step 4: We found through our data that professional identity is modified, adapted and customized through different ways in different respondents. Using the above described process we named them identity dissonance, identity denial and identity endurance. These categories were abstracted as second-level categories as prescribed in GT methodology. After discussions, literature review, we found “Identity morphing” as an appropriate theoretical dimension to represent the identity modification, customization and adaptation process.

We also followed a thorough peer review process to validate our findings. We shared our data analysis results along with our transcription with independent researchers. We removed the name of categories from our data analysis results and used numbers for identifying separate categories (i.e. category 1, category 2). We then collected opinions from each researcher and compared our findings. We conducted face to face discussion with our peers in order to achieve common understanding of the phenomenon. Disagreements were resolved through discussions, existing work and subsequent data collection. GT recommends constant comparison method and also encourage iterative data analysis which helped us in resolving discrepancies and ambiguity in our data interpretations.

We repeated all the above steps for the entire transcriptions. We concluded our data analysis when all the responses were coded into theoretical categories.

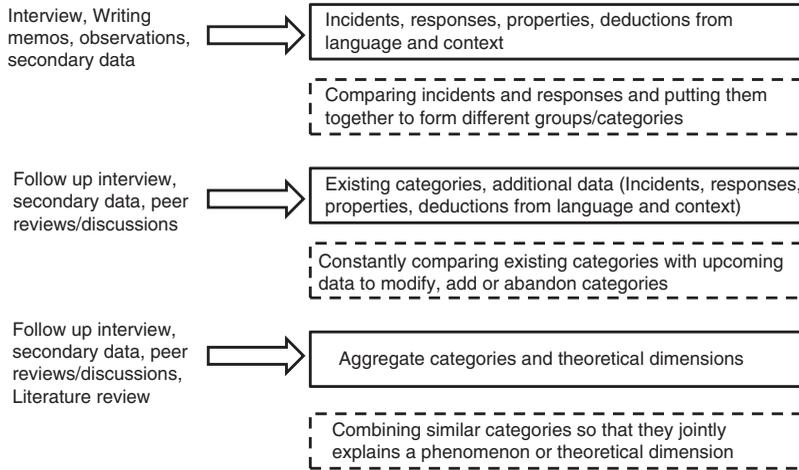


Figure A1.
Diagrammatic
illustration of data
analysis using
grounded theory

Appendix 3. Sample questions used in the interviews

We conducted semi structured interviews with the respondents; however in the initial session, mostly open ended questions were asked. Responses to these open ended questions enriched our understanding of the phenomenon and also guided our consequent data collection. Few sample questions we asked in our interview are given below:

- Q1: What are the important factors you considered while making your present career choice?
- Q2: What do you think a typical software professional does?
- Q3: Tell us something about the course content and academic activities?
- Q4: What do you think about the resources your institution is providing?
- Q5: How far you have come to become a software professional?
- Or
- How close you are to become a software professional?
- Q6: Do you consider yourself capable to perform the job role of a software professional?
- Q7: What you have learned through your professional program?

Sources	Evidences from the data	Archival sources
Internships	"I was assigned a mentor who had helped me in understanding the processes in the company. He was very helpful and the team I was working with was supportive. They included me in their meetings and they showed me some of their work. I was able to complete my assignment which was appreciated back at the institute"	University Curriculum, Information from the placement department of the institute
Alumni/seniors	"We (referring to seniors) shared a bonding. In the initial years, I use to take advice for anything, courses, faculty feedback [...] Often I needed assistance with few assignments. Even after passing out from the institute, we keep connected through Facebook, mails. We have a strong alumni network and they keep posting new vacancies in their companies and help us in choosing which company or job profile to apply"	Placement department
Industry visits	"There are a few industry visits where we visit IT companies and try to understand how these companies function. There were not many visits though but they gave us some idea about what kind of environment we will be working in"	Placement department
Hands-on training and courses attended	"There is not much of practical training in our institute. Most of us feel that hands-on training is required even for clearing placement process. Many of my classmates join trainings on Java, Oracle in outside training institutes. There people who have worked with IT companies come to teach, that is why exposure was good"	Interviews

Table A1.
Sources of
professional identity

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