



How organizational socialization occurring in virtual setting unique: A longitudinal study of socialization

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ABSTRACT

Based on organizational socialization frameworks used to study newcomers' journey of adaptation from outsiders to insiders, this study develops an evolutionary model to examine their socialization in virtual settings. Extending the existing literature, the proposed model views organizational socialization as a cumulative process that allows the impact of pre-entry variables on accommodation and outcomes. Longitudinal design is used to measure the impact of key socialization factors on newcomers' productivity and commitment by controlling for entry-level perceptions. The virtual setting chosen for this study is the academic units at a premium Business school with multiple campuses in India. Ordinary Least Square (OLS) hierarchical linear regression modeling is used to analyze time-lagged study data of 373 Master of Business Administration (MBA) students. The study reports some unique aspects of newcomers' socialization in a virtual environment, and explains how and why some influential socialization factors might show varying effects if traditional physical settings are missing. Contesting the findings of previous studies, results of this study reveal that in virtual socialization process, pre-entry experience emerges as a strong predictor of accommodation for newcomers. However, dissemination of pre-entry information solely through advanced communication technologies might not produce desired results, unless complemented by face-to-face contact with peers and other stakeholders. Overall, this study offers a cumulative view of socialization in virtual settings in which early stages exert influence over later stages even after intervening variables are controlled.

1. Introduction

As newcomers enter the organization, they encounter an unfamiliar environment with high uncertainty regarding the job role, expectations of organization and peers, social and behavioral norms, and performance evaluation parameters (Jablin, 2001; Thams and Eghdami, 2021). To gain familiarity with the new environment, they get engaged in formal and informal socialization activities. This process of organizational socialization starts even before the newcomers enter the organization and continues until they are fully adjusted in the new workplace (Klein and Weaver, 2000). During the process, newcomers develop clarity of their role and acquire basic knowledge, skills, and

attitude to accommodate in the organization and fit in the assigned role (Gruman and Saks, 2018).

Effective socialization is utmost important for nurturing productive relationship that yields benefits of harmonious working relationship for both, the individual and the organization (Jablin, 2001). Scholars have thoroughly examined tactics and methods, traditionally used for newcomers' socialization, such as formal and informal discussions, formal orientation programs, and training manuals (Gruman and Saks, 2018). However, advancements of information and communication technology (ICT) profoundly impact how organizations and individuals gather and disseminate information and build internal and external relationships (Ajzen and Taskin, 2021; Flanagan and Waldeck, 2004). To socialize in a

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remote technology enabled environment, newcomers need to have basic enablers such as operational, hardware and software requirements, training, and support etc. These requirements need careful consideration as lack of core enablers may create operational and security problems during virtual socialization (Blöndal, 2021). Scholars suggest that role of ICT advancements in organizational socialization seeks scholarly attention and due consideration for future research (Blöndal, 2021; Jablin, 2001). The most capricious change at the workplace was brought by the outbreak of COVID-19 pandemic in the year 2020 (Chamakiotis et al., 2021; Dwivedi et al., 2020; Gkeredakis et al., 2021; Iivari et al., 2020; Islam et al., 2022; Lal et al., 2021; Papagiannidis et al., 2020; Venkatesh, 2020). Given the government regulations, organizations shifted to virtual workplace to follow social distancing requirements and to extend a safe and healthy work environment (Ahmed et al., 2020; Shareef et al., 2021). The socialization process, which was traditionally conducted in a face-to-face environment (Snell, 2006), solely and wholly went to virtual settings (Lal et al., 2021). ICT platforms/tools were used for onboarding new hires and socializing them without a face-to-face meeting and interaction with old-timers and peers in the organization. To be effective, a newcomer needs to learn core knowledge, skills and also social behavior (Gruman and Saks, 2018). Much of this learning happens through observing old-timers and peers. This observational aspect is difficult in the virtual settings because direct observation in virtual settings is difficult (Ahuja and Galvin, 2003; Klein and Weaver, 2000).

Even as ICT opened innovative ways to socialize newcomers in the organization, it is yet to be explored if these technologies facilitate or obstruct socialization process (Blöndal, 2021). This inquiry is important for two primary reasons. First, responding to rapid ICT advancements organizations and individuals have been adopting newer ways to collect and share information, communicate with peers and develop internal and external relationships (Leidner et al., 2020; Flanagan and Waldeck, 2004). Second, responding to technology advancements, pandemic crisis and anticipated post-pandemic challenges, organizations are decentralizing and shifting to virtual settings. These new organizational forms observe a different process in socializing the newcomers, who affiliate with the organizations and peers largely in virtual settings with limited or no opportunity for face-to-face interaction and hand holding. Understanding the dynamics of this form of newcomers' onboarding is a central yet understudied concern of organizational socialization theorists and practitioners (Blöndal, 2021). We argue that socialization frameworks traditionally used to examine the predictor of newcomers' involvement, accommodation and outcomes in physical settings might show variations when settings are changed into virtual. Furthermore, since the pandemic has started, the notion of organizational socialization itself appears to be in a transition. Moreover, much of the existing empirical works depicted socialization as a staged process in which newcomers act as recipients/beneficiaries and not as participants.

This study aims at extending previous socialization works by addressing four major concerns (refer Table 1). First, only a few empirical studies exist that examined socialization process occurring in virtual settings (Adams, 2013; Gruman and Saks, 2018). Second, it is argued that newcomers make sense of the new environment by collecting information and developing social support through active involvement in work-related and social activities (Korte et al., 2015). Extending this logic, this study considers newcomers as participants in socialization process. They get actively involved in organizational activities to understand their role, know their peers, and decipher organizational expectations. Further, depending on the degree of involvement, the later socialization stages are likely to be affected (Cohen and Veled-Hecht, 2010). However, only a few studies investigated the impact of involvement on overall socialization process and outcome. Third, most of the recent socialization studies that adopted longitudinal research design did not collect data on entry-level perceptions of newcomers (Ellis et al., 2017; Fu et al., 2017), which is crucial information to examine net socialization effect (Bauer et al., 2007). Fourth, previous work largely relied on staged approach to socialization that views organizational socialization as a strictly ordered (staged) process. This approach suggests that newcomers have to go through one stage before moving to the next. In this process, factors in one stage directly affect only the immediate next stage while subsequent stages remain immune from their impact (Bengtson et al., 2013; Feldman, 1977). On the other hand, several studies offered counter arguments and supported the collective approach of socialization, contending for a direct influence of factors at early stages on later socialization stages including the outcomes (Bauer and Green, 1994; Kramer and Kramer, 2010).

To address above mentioned concerns and extend organization socialization knowledge to the virtual learning environment, we conducted a longitudinal study to test the conceptual model portraying socialization as a cumulative process in which newcomers are characterized as participants and pre-entry variables are allowed to influence accommodation and outcome stages. We tested the model in a virtual group of Master of Business Administration (MBA) students, who had just joined a premium business school (B-school) for undertaking courses in online mode owing to prevailing Covid-19 conditions. Management education, especially in its virtual format, puts heavy demand on peer-learning. In that direction, scholars from leading business schools (Govindarajan and Srivastava, 2020; Cano and Venuti, 2020) have underscored the importance of socialization in virtual learning environments. Further MBA education typically involves large investment on the part of graduates. Therefore, it is worth to understand their process of socialization in programs offered in online or virtual settings. Also, there is limited research on newcomers' socialization tactics gained from professional education especially MBA programs (Ghanie et al., 2018).

Table 1
Illustrative list of recent organizational socialization studies.

Author/s & year	Research objective	Contextual settings	Socialization process	Data collection	Data
Adams, 2013	To analyze perceptions of belonging/isolation of foreign students in online environments through group and organizational socialization theory	Virtual	Successive stage approach	Cross section interview data	Post-entry data
Bengtson et al., 2013	To examine the processes and practices of school systems that control the organizational socialization of school principals as they succeed into the principalship	Physical	Successive stage approach	Multiple case study data	Post-entry data
Ellis et al., 2017	To examine man-agers' perception of newcomer commitment to adjustment as a cognitive mechanism	Physical	Successive stage approach	Longitudinal survey data	Post-entry data
Fu et al., 2017	To examine the process of self-initiated expatriate organizational socialization.	Physical	Successive stage approach	Longitudinal survey data	Post-entry data
Kowtha, 2018	To study moderating effects of prior related work experience and professional education on the relationship between organizational socialization tactics and newcomer's adjustment	Physical	Successive stage approach	Longitudinal survey data	Pre-entry and post entry data
Woodrow and Guest, 2020	To explore pathways within socialization	Physical	Successive stage approach	Longitudinal interview data	Post-entry data

2. Literature review

2.1. Socialization in traditional vs virtual settings

Both scholars and practitioners have recognized potential advantages offered by virtual settings (Darehshiri et al., 2022). For example, virtual settings lift the geographical and temporal limitations of traditional socialization settings by offering anytime anywhere work environment (Lozi et al., 2022; Martinez-Cerda et al., 2020; O'Leary and Mortensen, 2010). While technological support required for collaboration and communication between newcomers and the organization, which was once a major hurdle, is now readily available (Bower et al., 2017), the communication of social knowledge and behavior control mechanisms seems to be bigger challenges of learning in virtual settings (Walther and Bunz, 2005).

Like traditional groups, newcomers to virtual groups need to acquire both technical and social knowledge as a part of their socialization process. The technical knowledge represents the skills and information required to complete an assigned task (Morrison, 2002). This form of knowledge can be made explicitly available to all group members, who need it, even in virtual settings because the content is clear, unambiguous, and definite. However, sharing the social information in virtual settings may be relatively challenging as this piece of information is informal, tacit, and ambiguous in nature and cannot be easily articulated (Ahuja and Galvin, 2003). Apart from the expectations, norms, and attitudes of group members, social information also communicates some tangible though tacit facts. In traditional group settings, social knowledge about workgroups is primarily learned through observations. However, in the absence of observation opportunities in virtual settings, it is difficult to communicate this information to group members (Berry, 2011). Scholarly research corroborates this argument and finds that social information cannot be effectively conveyed through electronic media (Nydegger and Nydegger, 2010). Bloom's taxonomy of learning outcomes (Anderson and Krathwohl, 2001) also emphasizes the relevance of tacit knowledge gained through socialization processes such as face-to-face communication (Hvorecky et al., 2015).

Scholars further argue that in virtual settings, social cues that are critical for smooth socialization of newcomers are rarely available due to lack of opportunity or minimal occasions to physically meet their colleagues (Cimperman, 2020). In the absence of physical social environment, newcomers may face difficulty in understanding unspoken expectations and norms of workgroups and therefore, tacit communication must be substituted with explicit communication. Moreover, from a learning viewpoint, as the work picks up, the need for explicit communication may rise further as newcomers physically distant from each other coordinate their work simultaneously towards multiple group-works (Huang and Lin, 2011; DeSanctis and Monge, 2000). In the limited forum provided by ICT-enabled platforms (email, groupware, virtual meeting platforms), it is difficult to achieve mutual understanding and interpretation of information related to a specific context (Weick, 2001). In-fact social information, social cues, norms, standards, and expectations of group members will have to be verbalized, which is otherwise easily communicable through observations in traditional (physical) settings (Ahuja and Galvin, 2003).

Another potential difference between two contextual settings emanates from behavior control mechanisms. The behavior control mechanisms structure the work by introducing rules, procedures, and reward and penalty provisions to enforce the compliance of employed rules, typically in the form of explicit instructions and guidelines for work assignments, procedures, and deadlines for submissions (Walther and Bunz, 2005). Although the behavior control mechanisms stimulate group performance, in the absence of tacit information about norms, standards and unspoken rules, these mechanisms may not produce desired results (Ahuja and Galvin, 2003). In the traditional settings, these mechanisms work well as both forms of information are available while in the virtual settings, a second form of behavior control

mechanism emerges i.e. self-direction (Plews, 2016). It is a type of informal control developed within the workgroups during newcomers' socialization process. In addition to the control mechanisms employed by the organization, newcomers will create their own informal control mechanisms at the accommodation stage to achieve desired performance outcomes (Bowen and Pennaforte, 2017). Previous studies have confirmed that this autonomy has positive implications for newcomers' satisfaction, though no significant relationship with their performance. While newcomers are primarily self-directed, they may appropriate the available technology to find a best fit for their needs, limitations, and skills (Gruman and Saks, 2018). These possible appropriations may obstruct adaptation of organizational environment resulting in lower commitment and productivity. Alternatively, in traditional settings, opportunity to obtain social cues and behavior control mechanisms motivate the newcomers to adapt to organizational environment and norms.

We suggest that due to the above-mentioned limitations of technology, the newcomers' socialization process in virtual settings will differ from socialization process in traditional settings. A few studies have attempted to know whether this proposition is true or not in context of organizational virtual groups (Cimperman, 2020; Flanagan and Waldeck, 2004). However, this proposition has not been tested in context of higher education students' socialization process in institutions or colleges imparting professional education. In this context, this enquiry is even more important because soft-skills such as, group-work skills are highly valued by potential recruiters and stakeholders (Tang, 2019). In sum, this inquiry is warranted for extending the socialization literature into virtual groups of higher education students to understand their peculiar socialization needs. In this study, we have attempted just that.

2.2. The socialization process

We referred to the seminal work of Schein (1968) who defined socialization as a process by which newcomers acquire the knowledge about norms, value system and behavior patterns of the society or organization they are entering. Definitional refinements in subsequent scholarly works introduced the staged approach, viewing socialization as a step-by-step process of getting started in an organization and adopting the new job roles within it (Van Maanen and Schein, 1979). According to recent socialization studies, newcomers can benefit the most in the new roles when task characteristics, socialization tactics and organization systems are aligned (Batistić, 2018). This alignment helps the newcomer develop skills, knowledge and capability required to perform the new job role. Batistić (2018) suggested a framework of socialization tactic for various groups of newcomers. This framework can be used during different stages of organizational socialization process to help newcomers reduce perceived uncertainty and experience smooth entry to the organization. The latest view considers socialization as a multistage process in which newcomers adapt from outsiders to insiders. Most of the socialization theories and models recognize three main stages of this process: (i) pre-encounter, (ii) encounter (accommodation) (iii) adaptation (Yanik and Yildiz, 2019).

The process starts even before the newcomer joins the organization (Yu, 2020). This stage is called pre-encounter stage during which the newcomers develop initial views concerning the expectations of organization for a specific job role and their degree of job-fit (Porter et al., 1976). These pre-entry perceptions are responsible for functional and dysfunctional consequences for their work-related attitude and behavior in the organization at later stages (Bauer and Green, 1994). Initial experience with the organization significantly influences newcomer's later outcomes in terms of work attitude, behavior, and overall productivity (Spagnoli, 2020). The pre-entry knowledge of goals/values of the organization, proficiencies and skills required to perform the job/work etc. are found to be positively related to work group integration and role clarity (Adil et al., 2021). In the research on higher education students, scholars have found that positive previous experience and,

their belief of being knowledgeable, skillful, and competent during the pre-encounter stage assists them in the socialization process (Weidman, 2010). Previous studies have found that pre-encounter stage is the most critical transition stage new entrants have to manage. The degree of effectiveness of socialization at this stage is a key determinant of socialization outcomes as it helps the newcomers cope up with the challenges of upcoming stages (Cooper-Thomas and Anderson, 2005; Harris et al., 2020).

Next is the encounter stage, which begins as newcomer enters the organization. Now, the newcomer meets the realism, tests the expectations and reality by observations and experiences in the organization (Bauer and Green, 1994). The newcomer discovers what the organization and expected work is really like. This stage refers to the accommodation phase in which the newcomers confront multiple tasks to which they accommodate (Yanik and Yildiz, 2019). Previous research works recommend a few important tasks and socially oriented indicators of accommodation such as 'initiation to the task' reflected in newcomers' belief of their competence to perform the assigned work/project (perceived self-efficacy) (Allen et al., 2017), 'initiation to the group', measured as the degree to which students feel accepted by their peers (perceived group acceptance), and clear understanding of what is expected of them in terms of assigned work and authority (role clarity and role conflict) (Sollova, 2019). At this stage, it is not sufficient that participants actively get involved in socialization activities. Organization's commitment to effective socialization is equally important. The extended institutional theory perspective of organizational socialization suggests that organization is required to place sanctioned structures and informal social processes to offer socialization opportunities to the newcomers, since formal elements of socialization may not alone serve as organization's symbolic response to institutionalized expectations (Fogarty and Dirmsmith, 2001). In the organizational socialization process, mutual adaptation is expected from both, the newcomer and the organization (Moyson et al., 2018).

Lastly, the adaptation stage arrives when the newcomers no longer feel new after going through a psychological adjustment process (Kramer, 2010). They adapt to the role articulated by the organization, settle in, and start performing (Kargapolova et al., 2021). Therefore, socialization process results in both higher commitment and performance outcomes (Spagnoli, 2020). In organizational socialization context, three most studied categories of organizational commitment are; (i) affective commitment referring to relative strength of an individual's affective attachment to, identification with and involvement in the organization (Qadeer et al., 2020) (ii) continuance commitment resulting from individual-organizational transactions over time in the structural context (Nishanthi and Kailasapathy, 2018) and, (iii) career commitment described as the degree to which an individual values the importance of current work activities towards future careers (Moradi et al., 2017). The present work considered the above-mentioned categories of commitment to examine the adoption stage of socialization process of business management students. For measuring the performance outcomes, the present work focused on socialization processes that are pertinent to enhancing newcomers' overall productivity by acquiring group-work skills (both mandatory academic and voluntary professional development activities) and improving academic learning outcomes for various courses. Besides academic learnings, group-work skills are valued by business organizations. Therefore, the group activities should be the focus of intense socialization efforts in a business management institute (Alshare and Sewailem, 2018). The professional program studied in this work was selected for their emphasis on group-work activities.

Previous socialization studies relied on a staged approach (Lee and Min, 2019) rather than a cumulative approach, believing that variables of one stage do not directly influence the variables of the stage other than immediate next stage. For further theoretical development, the current work views socialization as a cumulative process. We allowed for a cumulative influence of earlier variables on later outcomes i.e., pre-

entry variables (previous group-work experience, perceived realism and talent) will not only influence accommodation variables (self-efficacy, role ambiguity and so forth) but also, adoption variables (commitment and productivity). Therefore, we propose that the effect of earlier variables is not fully mediated by the intervening process.

3. Hypothesis development

As discussed before, socialization in virtual settings occurs in an environment that affects the socialization process in several ways. Still, it shares several similarities with socialization in the traditional settings. For this reason, and due to the scarcity of a persuasive theory of socialization in virtual settings, we draw from traditional socialization literature (discussed before) to develop the theoretical model and hypotheses for this study. We followed the approach of previous studies supporting the application of existing theory and models to a new setting/environment with appropriate adaptations to account for distinctive characteristics of the new context. Considering the unique aspects of organizational socialization in virtual settings, we draw on socialization literature, technologically mediated communication literature, virtual groups/teams' literature, and early findings of socialization in virtual settings research. In light of these literature streams, we built the theoretical model (Fig. 1) for investigation.

3.1. Pre-entry and involvement

While educational institutes instigate socialization tactics for newcomers, newcomers can themselves act as proactive agents in their transition from outsiders to insiders by acquiring relevant information at pre-entry level (Hatmaker et al., 2016; Chao et al., 1994). The full and accurate picture of the expectations of the institute from a new student of professional course, institutional goals, and the essence of life in an institution, is expected to positively influence their socialization process (Van-Kleef, 2016). The extent to which newcomers can answer the above-mentioned questions is described as the level of their perceived realism (Feldman, 1976). It is related to the accuracy of information sharing and information evaluation done by the newcomers during the admission process (Fetherston, 2017). The more realistic the perceived realism, the better is newcomers' involvement in student-work activities and their resulting overall socialization.

Similarly, a rich literature suggests that newcomers' previous work experience and achievements significantly affects their adjustment to new workplace (Harris et al., 2020). During the transition from outsiders to insiders, individuals draw the cognitive maps and use them to define situations, events, and information in the new organization. Here the newcomers are deductive in the way that they use previous work experiences to moderate their interpretations (Jones, 1983). Therefore, the lessons learned in the previous times or settings are tested in the later times and settings in the process known as "socialization chain" (Van Maanen, 1984). We believe that newcomers' past group-work experience should provide pertinent skills, knowledge, capabilities, and confidence for greater involvement in group-work activities of a professional education program. The more relevant the past-experience and achievements the newcomer has, the better should be the fit for fruitful involvement in student activities (Wanberg, 2012). In the current work, relevant student activities included are, mandatory academic group activities (e.g. group-projects, group-assignments, group-presentations etc.), and voluntary professional development activities (e.g.; group extra-curricular activities, student-club activities, inter/intra college group competitions etc.). The voluntary professional development activities are important component of socialization process as they represent newcomer's efforts to be involved. To the best of our knowledge, this study is the first one to examine such activities in virtual socialization context of newcomers in professional education institutes/colleges (Bauer and Green, 1994), are an exception, who considered these activities in their study on Ph.D. students, but in a traditional

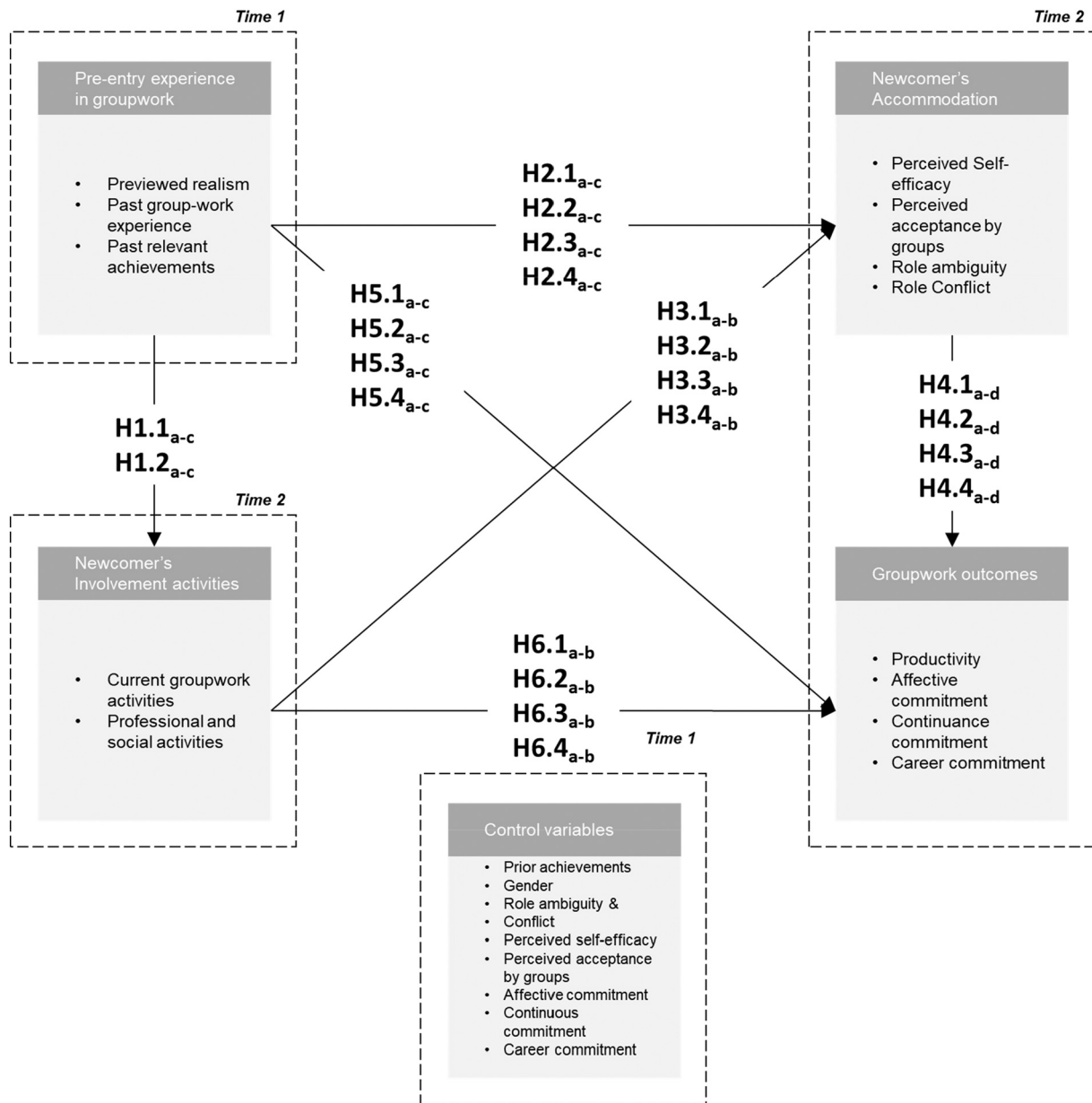


Fig. 1. Conceptual model.

setting.

In sum, the socialization literature makes us believe that newcomers' pre-entry knowledge in terms of perceived realism, experience in mandatory and voluntary student activities and past achievements will equip them with skills, capabilities, knowledge and confidence for involvement in future student activities in the new education institute. However, an open empirical question is whether in virtual settings that offer minimal social cues and tacit information about group norms and expectations of group members (which are unambiguously available in traditional settings), newcomers would be able to use full potential of pre-entry knowledge in their socialization process. To examine whether this widely accepted relationship is true in the virtual settings we propose,

H1.1. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievement are positively associated with current groupwork activities.

H1.2. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with professional

and social activities.

3.2. Pre-entry, involvement, and accommodation

At the second step of learning the basics, the newcomers encounter a major component of socialization process that is 'working through the accommodation issues'. First such concern is the initiation to task measured in terms of newcomers' confidence in their competence to successfully complete the new work-related tasks (Friedman and Kass, 2002). Self-efficacy is commonly used to measure this dimension, which determines how well newcomers cope with the work-related challenges (Gist and Mitchell, 1992). At this stage, past relevant experience of group-work activities and previous achievements will boost their perceived capability to complete the assigned tasks. Therefore, the more previous relevant experience and achievements the newcomers have, the more self-efficacy they are likely to experience during accommodation stage (Smith et al., 2017).

Second and third major accommodation issues are related to role definition; an explicit understanding of which tasks, a new student is

expected to perform. A correct and clearer judgment of institutional and program expectations at pre-entry stage (perceived realism) will appropriately prepare the newcomer for the new role. More familiarity the newcomers have with role expectations, less role ambiguity and role conflict they will encounter during accommodation phase (Bauer et al., 2007). Previous relevant experience guides the newcomer to adapt and deal with accommodation issues related to role ambiguity and role conflict (Jones, 1983). Another accommodation concern included in this study is newcomer's perceived acceptance by fellow students. This dimension decides whether newcomer feels welcomed by the peers. Previous relevant experience and achievements and, realistic judgments of peers' expectation will improve newcomer's confidence in sharing his/her opinion and meaningful suggestions with workgroups whenever required. The more is the engagement of newcomer with peers is, the greater will be the group acceptance. The accommodation stage can be considered as the heart of socialization process as it encompasses initial learnings, sense-making, and adjustments (Harris et al., 2020). All the pre-entry variables will play a critical role here and help the newcomer in accomplishing these goals.

Clearly, the socialization literature motivates us to rely on positive impact of pre-entry variables on accommodation variables. However, due to the scarcity of socialization studies focusing on unique advantages and constraints of virtual settings (Asatiani et al., 2021), it is worth pondering over role of pre-entry variables in the accommodation phase when the settings change from traditional to virtual. Therefore, we propose.

H2.1. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with self-efficacy.

H2.2. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are negatively associated with role ambiguity.

H2.3. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are negatively associated with role conflict.

H2.4. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with perceived acceptance by group.

Similarly, more involvement in diverse student group will create greater opportunities for newcomers to deal appropriately with the accommodation issues. Scholars believe that coworkers and supervisors (fellow students, senior students, and faculty instructors/coordinators in this context) act as socialization agents (Desmidt and Prinzie, 2019). Frequent interactions provide better clarity of role that a newcomer is expected to play, therefore reducing role ambiguity and role conflict. Deeper and insightful information gathered during these interactions will lift newcomers' belief in their capabilities to successfully complete the assigned task (Gist-Mackey et al., 2018). Also, frequent involvement will create more opportunities and avenues to socialize and develop relationships with fellow students and the newcomer is likely to get sooner and better accepted by the peers, (Bauer and Green, 1994). Therefore, the previous works on socialization hint that greater involvement will facilitate newcomer's accommodation irrespective of pre-entry knowledge.

Here again, we draw from virtual social groups' literature revealing minimal exchange of social information (tacit information and social cues) in virtual group interaction (Berry, 2011). This piece of information arguably is critical for dealing with accommodation issues such as clearer judgment of what is expected by group members and faculty instructors from the newcomer, (referring to unspoken elements of role definition), what are the widely accepted norms, standards and behavior patterns (for greater perceived acceptance by peers) and what are the strategies followed by other group members to deal with challenging group assignments (learnings to improve self-efficacy) (Bauer et al., 2007). These inputs are gathered through observations in traditional

settings and are however, difficult in virtual settings (Berry, 2011). Therefore, we expect some variation in the impact of involvement activities on accommodation variables. We examined this thinking by testing these relationships in virtual socialization settings regardless of pre-entry experience.

H3.1. (a) Current group-work activities and (b) Professional and social are positively associated with self-efficacy.

H3.2. (a) Current group-work activities and (b) Professional and social are negatively associated with role ambiguity.

H3.3. (a) Current group-work activities and (b) Professional and social are negatively associated with role conflict.

H3.4. (a) Current group-work activities and (b) Professional and social are positively associated with perceived acceptance by group.

3.3. Accommodation, pre-entry, involvement and outcome

Previous studies have depicted commitment and productivity as outputs of socialization process (Batistić, 2018). Scholars believe that smooth and swift socialization results in higher organizational commitment and better performance of the newcomer (Spagnoli, 2020). Each facet of accommodation plays a critical role in making the socialization experience better and fruitful. For example, in general individuals, who trust their capabilities to perform a task (self-efficacy) generally perform better than the ones who believe otherwise (Bauer et al., 2007). Such people are found to be more productive and excellent performers. Also, self-efficacy significantly and positively impacts the organizational and career commitment of newcomers, over and above negatively influencing their intention to quit (Bauer et al., 2007). Therefore, scholars believe that newcomer's perceived self-efficacy is positively related to both – newcomer's affective response (commitment) and performance behavior (outcomes) (Bandura, 1986, 2014).

Similarly, social relationship created during the accommodation phase contributes to the smooth adaptation to organizational environment in several ways such as, helping newcomers controlling anxiety, ambiguity and uncertainty and providing clarity about job-roles (Hattmaker, 2015). Newcomers' perception of being accepted by peers promotes their attachment to the organization and helps getting clearer understanding of performance indicators (Korte et al., 2015; Reichers, 1987). Peers are an important source of critical inputs for performance improvement such as, normative and technical information, social feedback and reference of social norms (Wang et al., 2020; Roksa et al., 2018). Another valuable accommodation aspect contributing to socialization process is role definition that is measured in terms of role ambiguity and role conflict. Scholars have found that role ambiguity and role conflict adversely affect the affective response and performance behavior of newcomers. Lack of role clarity due to inadequate understanding of what is expected from the newcomer results in poor performance. Similarly, conflicting tasks lead to a frustrating situation for the newcomer. Under these circumstances commitment and performance outcomes are likely to be inadequate, unexpected and inefficient (Judeh, 2011; Jackson and Schuler, 1985).

The above discussion on socialization literature strengthens our expectation that smoother accommodation of newcomers will enhance their overall commitment and productivity at the new workplace. On the other hand, some worthy questions seek scholarly attention – if these relationships and their direction show any variation when newcomers socialize in virtual settings that offer autonomy of self-directed group-activities and limited or no opportunity to observe social behavior of peers? To answer this empirical question, we propose.

H4.1a. Self-efficacy is positively associated with productivity.

H4.1. (b) Role ambiguity and (c) role conflict is negatively associated with productivity.

H4.1d. Perceived acceptance by group is positively associated with productivity.

H4.2a. Self-efficacy is positively associated with affective commitment.

H4.2. (b) Role ambiguity and (c) role conflict is negatively associated with affective commitment.

H4.2 d. Perceived acceptance by group is positively associated with affective commitment.

H4.3a. Self-efficacy is positively associated with continuance commitment.

H4.3. (b) Role ambiguity and (c) role conflict is negatively associated with continuance commitment.

H4.3 d. Perceived acceptance by group is positively associated with continuance commitment.

H4.4a. Self-efficacy is positively associated with career commitment.

H4.4. (b) Role ambiguity and (c) role conflict is negatively associated with career commitment.

H4.4 d. Perceived acceptance by group is positively associated with career commitment.

Given our cumulative perspectives, pre-entry variables are also expected to influence outcome variables irrespective of the mediation of accommodation variables. Our expectations are based on the findings of previous studies revealing pre-entry aspects to be useful for newcomers not only in active involvement and accommodation but also in their adaptation to new organizational environment (Takeuchi et al., 2021). Also, past performance and achievements are reported to influence future performance and past behavior to predict the future behavior (Liu et al., 2015). Therefore, realistic previews gathered at pre-entry stage and relevant previous experience and achievements may directly influence socialization outcomes such as post-entry productivity and commitment (Takeuchi et al., 2021; Riordan et al., 2001). Scholars considered events in newcomer's life that happened before entry as predictors of post-entry behavioral and performance outcomes (commitment and productivity in the present context) (Uppal et al., 2014). To extend this thinking, we propose.

H5.1. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with productivity.

H5.2. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with affective commitment.

H5.3. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with continuance commitment.

H5.4. (a) Previewed Realism, (b) past group-work experience and (c) past relevant achievements are positively associated with career commitment.

Similarly, involvement in mandatory and voluntary activities is expected to make direct contribution to newcomers' productivity and commitment (Calderon-Mafud and Pando-Moreno, 2018). Deviating from the view of staged models of socialization, we propose that whole effect of involvement activities may not travel through accommodation stage. Following our cumulative effect approach and suggestions of a few previous socialization studies (e.g. Bauer and Green, 1994), we examined involvement of newcomers in broader set of student activities as a mechanism directly affecting adaptation indicators (commitment and productivity). Socialization studies on higher education students have found that newcomers' active involvement in work-related activities, professional and social activities is critical for satisfactory work-

progress and continuous commitment towards the degree programs (Freund et al., 2017; Green, 1991). To examine these associations in virtual settings of socialization, we propose.

H6.1. (a) Current group-work activities and (b) Professional and social are positively associated with productivity.

H6.2. (a) Current group-work activities and (b) Professional and social are positively associated with affective commitment.

H6.3. (a) Current group-work activities and (b) Professional and social are positively associated with continuance commitment.

H6.4. (a) Current group-work activities and (b) Professional and social are positively associated with career commitment.

4. Methods

4.1. Subjects and procedure

Due to exploratory nature of this study, we adopted a longitudinal research design (Menard, 2008; Keppel, 1991). Such an observational research procedure offers an adequate way of gaining knowledge through repeated direct/indirect observation or experience. The quantification of empirical data gathered from a same sample of subjects over an extended period is a usual approach in similar research (e.g. Vancouver et al., 2001). As compared to cross-sectional studies, which allow analyzing multiple variables at a given instance, but do not provide information regarding the influence of time on the measured variable, longitudinal research designs are more valid for examining cause-and-effect relationships (Maxwell and Cole, 2007; Singer and Willett, 2003). Therefore, to achieve our research objective of understanding socialization process among virtual groups of higher education students, we performed an observational representative panel longitudinal study in which data is collected from a group of subjects over prolonged period.

The virtual socialization setting chosen for this study was the academic departments or units at a premium Indian business school (B-school) with two campuses, one at the National Capital Region and second in the state of West Bengal. These departments offered post-graduate programs designed for different specializations of Business Management and were spread over two years. Since March 2019, owing to the spread of COVID-19 across the world, these departments were forced to move classes from face-to-face to online mode. In the online mode, the synchronous classroom sessions were delivered to the enrolled students using the virtual meeting platforms such as Google Meet and Zoom Meeting. Besides, instructors used Canvas, a Learning Management System for posting reading material, handling assignments, streaming videos, discussion forums and other asynchronous activities related to the course. From March 2019 to November 2021, when this article was written, 42 courses offered across 7 trimesters (of 3 to 4 months) of were completed by 660 students across all specializations. The online mode of classes continued as per the prevailing regulatory guidelines to control the impact of waves of COVID-19 in the country.

We selected the distinct academic departments viz. Strategic management, Operations management, Information systems, Marketing, Organization behavior, Human resource management, Accounting and Control, Financial Management, Economics, Public Policy, and Business ethics covering the spectrum of Business Management at the chosen B-school. These departments were selected using two criteria: courses offered by each department used group-work in the form of assignments, projects, or seminars for evaluating student's academic performance; each department engaged students in group activities as part of the orientation and other training programs. This criterion was adopted to confirm that a newcomers' group learning experience would be a part of their socialization process in virtual settings. We assessed the department's fit to the defined selection criteria based on the profile of

academic departments given on the school's website and other catalogues. Out of the eleven departments invited for participation, two declined. The remaining departments agreed to furnish the names and academic details of incoming students for the 2021–23 batch across all postgraduate programs.

660 students joined both the campuses across all postgraduate programs in the fall of 2021. A Google form survey link was mailed to 500 students during the first two weeks of the first trimester (Time 1 or T1) using the internal email system. One of the authors, serving as an instructor in one of the departments, apprised the participants about the purpose of the study during an online session before the distribution of survey link. While the questionnaire was not anonymous, the participants were assured of confidentiality of responses. After a series of follow-ups, a total of 373 completed responses were received. These responses resulted in a Time 1 response rate of 74.6 %. Data was again collected after 16 weeks (4 months) (Time 2 or T2). The survey link for Time 2 was distributed only to the 373 students who initially participated in Time 1, 2 weeks after the first trimester. The response rate of Time 2 participants was 90.8 % (339 out of 373). Participants in the study were 22 to 25 years of age and 69 % of students were male.

4.2. Instrument and measures

The survey instrument for T1 included measures of student's demographics (age, gender, past achievements) and control variables for student's pre-entry experience in group-work, prior commitment towards group-work and accommodation variables. T2 survey included measures for newcomers' involvement in current group-activities, newcomer's accommodation and group-work outcomes. A total of 79 items were used in both T1 and T2 survey.

We adopted established measures with identified psychometric properties. The measures were identified through literature review and pilot tested for establishing reliability and validity.

To ensure content- and face validity, the measures were designed following the recommendations of [Anderson and Gerbing \(1988\)](#) and [Churchill \(1979\)](#). First, a comprehensive literature review was conducted for finding the measurement scales and items of each of the constructs. Second, the measurement scales adopted from prior studies were conceived based on samples from developed countries. Therefore, the items were revised to consider cultural and language differences in developing countries ([Zhao et al., 2006](#)). Next, the measurement scales were piloted using a panel of four academics. Their feedback was incorporated to improve the clarity of the measurement items, as recommended by [Kothari \(2004\)](#).

We computed composite reliability (CR) and Cronbach α , to establish the reliability of measures ([Carmines and Zeller, 1979](#)). A Cronbach α value of 0.8 and a CR value >0.70 is recommended to establish the reliability of measures ([Nunnally, 1978](#)). Further, for establishing the convergent and divergent validity of the selected measures, we performed Confirmatory Factor Analysis (CFA) using AMOS software. The convergent validity was studied by computing the average variance extracted (AVE) value for each measure. An AVE value >0.50 reflect an acceptable convergent validity ([Fornell and Larcker, 1981](#)). For examining the divergent validity, we compared the square root of estimated AVE between a pair of measures with the absolute intercorrelation between the measures (ϕ) following the recommendations of [Fornell and Larcker \(1981\)](#). If $\sqrt{AVE} > \phi$, the divergent validity of the measures is established.

Table 2 shows the descriptive statistics, intercorrelation, CR, AVE and Cronbach α values for all measures.

We then confirmed the goodness-of-fit for measures at both T1 and T2 by comparing the following indexes and their suggested thresholds ([Hu and Bentler, 1999](#); [Hair et al., 2010](#)): relative chi-square index (CMIN/DF < 3), Comparative Fit Index (CFI > 0.90), Tucker–Lewis index (TLI > 0.90) and root mean square error of approximation

Table 2
Descriptive statistics, reliability and validity of measures.

	Mean	St.Dev	Cronbach α	CR	AVE	Preval α	PastGWork α	Gender	PastAchiv α	SelfEffic α	RoLamb α	RoLCont α	AccepGrp α	AffCom α	ContCom α	CarCom α
PrevRel_T1	5.30	3.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PastGWork_T1	13.81	4.38	-	-	-	0.11	-0.04	-	-	-	-	-	-	-	-	-
Gender	1.81	0.39	-	-	-	0.02	0.14	0.04	-	-	-	-	-	-	-	-
PastAchiv_T1	78.06	9.07	-	-	-	0.03	-0.14	0.02	-	-	-	-	-	-	-	-
T1 SelfEffic	2.05	0.62	0.89	0.89	0.58	0.28	0.14	0.04	-0.09	0.76	-	-	-	-	-	-
T1_RoLamb	1.59	0.51	0.78	0.86	0.51	0.29	0.24	0.06	0.00	0.34	0.71	-	-	-	-	-
T1_RoLCont	3.35	0.89	0.91	0.92	0.61	0.04	0.07	-0.07	-0.03	-0.07	-0.11	0.78	-	-	-	-
T1_AccepGrp	1.99	0.55	0.74	0.75	0.60	0.26	0.25	0.04	-0.10	0.28	0.30	0.00	0.63	-	-	-
T1_AffCom	2.13	0.87	0.89	0.90	0.60	0.36	0.15	-0.05	-0.01	0.28	0.21	-0.15	0.32	0.77	-	-
T1_ContCom	1.79	0.78	0.91	0.92	0.61	0.12	0.02	-0.04	0.04	0.05	0.07	0.12	0.04	0.10	0.00	0.86
T1_CarCom	2.31	1.03	0.94	0.94	0.74	0.18	0.08	0.09	-0.01	0.35	0.20	-0.14	0.04	0.21	0.00	0.00
Productivity_T2	457.71	451.52	-	-	-	0.05	-0.07	-0.01	0.03	0.08	0.05	0.05	-0.07	-0.01	0.03	-0.05
CurrGWork_T2	2.64	1.26	0.93	0.93	0.73	0.03	-0.12	0.04	-0.09	0.03	0.06	-0.03	0.03	0.01	-0.08	0.05
Profilnvol_T2	3.66	0.66	0.81	0.82	0.53	-0.12	-0.11	-0.02	0.04	-0.18	-0.19	0.04	-0.32	-0.09	0.01	-0.11
SelfEffic_T2	1.78	0.52	0.81	0.82	0.53	0.20	0.13	-0.04	-0.04	0.34	0.25	-0.12	0.25	0.22	0.00	0.24
RoLamb_T2	1.41	0.50	0.80	0.82	0.53	0.17	0.05	-0.04	0.06	0.18	0.29	-0.04	0.13	0.15	0.05	0.05
RoLCont_T2	3.65	0.93	0.89	0.89	0.55	-0.06	0.02	-0.08	-0.09	-0.10	0.05	0.17	-0.05	-0.05	0.13	-0.10
AccepGrp_T2	1.57	0.60	0.83	0.84	0.58	0.08	0.09	0.07	-0.03	0.18	0.22	-0.02	0.37	0.08	-0.01	0.04
AffCom_T2	2.12	0.91	0.84	0.90	0.65	0.22	0.08	0.01	0.00	0.22	0.18	-0.10	-0.02	0.15	0.43	0.02
ContCom_T2	1.43	0.68	0.90	0.90	0.59	0.09	-0.05	0.02	0.00	0.11	0.08	-0.06	0.11	0.16	0.37	0.03
CarCom_T2	1.78	0.76	0.86	0.89	0.68	0.15	0.03	0.03	0.01	0.27	0.12	-0.11	0.04	0.15	-0.08	0.58
																0.82

(RMSEA < 0.06). The fit indices: CMIN/dF = 1.25 (T1), 1.49 (T2); CFI = 0.97 (T1), 0.94 (T2); TLI = 0.97 (T1), 0.93 (T2); and RMSEA = 0.02 (T1), 0.04 (T2) showed a good model fit (Shah and Goldstein, 2006).

A brief description of the measures used is provided here. Details are provided in Section 3 (see Annexure A for questionnaire).

Pre-entry experience in group-work measures were assessed at T1. Measures were used for student's previewed realism (PrevRel), and prior group-work experience (PastGWork) as explained in Section 3.1. We adapted a two-item scale (Stevenson et al., 1990) for PrevRel. An index of PrevRel was generated by multiplying the scores from two items and averaging the multiplied scores to generate preview realism score. For PastGWork, the participants were asked to report the frequency of participation in five different group-work (academic or extracurricular) before enrolling in the program. An index for PastGWork was created by summing up the responses for the five items.

Newcomer's involvement measures were collected in T2. These included measurement items for newcomer's current group-work activities (CurrGWork) and professional/social activities (ProfInvol) in virtual settings (Section 3.2). We adapted the five-item scale of Bauer and Green (1994) for CurrGWork. ProfInvol was measured using the six-item scale by Girves and Wemmerus (1988).

Newcomer's accommodation measures were accessed in T2 and also in T1 to control the student's perception on entry. We used four measures of accommodation i.e. perceived self-efficacy (SelfEffic), perceived acceptance by groups (AccepGrp), role ambiguity (RolAmb), and role conflict (RolCon) (Section 3). For measuring SelfEffic, we adapted the ten-item scale of Bandura (1977). For AccepGrp, we adapted the scale called "Acceptability to Others Scale" used by Robinson et al. (1991). Items were coded so that a higher score indicates a high level of group acceptance. The measures of RolAmb and RolCon were adapted from the scale by Rizzo et al. (1990) comprising six items and seven items respectively. Items were coded such that higher scores indicate that higher level of role ambiguity was felt by the students.

Group-work outcomes used two measures of productivity (Prod), first was the % marks (average of first trimester) in the academic group activities and second was the number of extracurricular activities newcomers participated in the first trimester of the program. An index for Prod was computed by multiplying the two scores. These measures were collected in T2. We assessed three categories of commitment i.e. affective (AffComt), continuance (ContComt), and career commitment (CarComt), both at T2 and T1. We used newcomer's gender and past relevant achievements (PastAchiv) as controls.

4.3. Data analysis

Next, we undertook a set of Ordinary Least Square (OLS) hierarchical linear regression models using IBM SPSS Statistics 26 to examine the theoretical model showed in Fig. 1. Before running the regression models, we checked the multicollinearity on the estimated coefficients by computing the variance inflation factors (VIF) for all the variables used in the model. A VIF < 5 indicted that multicollinearity was not an issue (Hair et al., 2010). Also, residual analysis was performed to verify the normality of the error term distribution. Also, linearity was verified with plots of partial regression for each model and homoscedasticity was evaluated by plotting standardized residuals alongside the predicted values. The test results confirmed the requirements of OLS regression (Hair et al., 2010).

We tested eleven regression models (Model 1–22). In Model 1–2, we individually regressed both the Involvement_T2 measures i.e. CurrGWork and ProfInvol (as dependent variable) on the set of pre-entry experience_T1 measures (PrevRel, PastGWork). We controlled for gender and PastAchiv variables. Next, we regressed each of the four accommodations_T2 measures (i.e. SelfEffic, AccepGrp, RolAmb and RolCon) on both the pre-entry experience_T1 and involvement_T2 measures in Model 3–6. We controlled for accommodation_T1, PastAchiv and gender were controlled for running these models. Then, we

individually regressed each of the found group-work outcomes_T2 measures i.e. Prod, AffComt, ContComt and CarComt on pre-entry experience_T1, involvement_T2 and accommodation_T2 as independent variables in Model 7–10, after controlling for accommodation_T1, commitment_T1, gender and PastAchiv.

5. Results and discussion

5.1. Results

The results of hypothesis testing are summarized in Table 3 and Fig. 2.

Hypothesis H1.1a–c and H1.2a–c on the positive influence of pre-entry experience variables i.e. PrevRel, PastGWork and PastAchiv on the two newcomers' involvement variables was tested in Model 1 and 2, controlling for T1 variables. Significant effects were found for CurrGWork, $R^2 = 0.13$, $F(2, 334) = 3.279^*$, and ProfInvol, $R^2 = 0.08$, $F(2, 334) = 3.91^{**}$, PastGWork_T1 ($\beta = 0.14^{**}$) and PastAchiv_T1 ($\beta = 0.11^{**}$) was found to be positively related to indicators of CurrGWork_T2, thereby supported H1.1b and H1.1c respectively. Further, ProfInvol_T2 ($\beta = 0.10^*$) (H1.2b supported). Also, PrevRel_T1 ($\beta = 0.11^*$) and PastGWork_T1 ($\beta = 0.10^*$) were positively related to ProfInvol_T2, thereby supported H1.2a and H1.2b. Therefore, the results showed that PrevRel was better predictor of ProfInvol than the PastGWork. However, PrevRel was found to be not related to CurrGWork.

Hypothesis H2.1a–c, H2.2a–c, H2.3a–c and H2.4a–c on the influence on three newcomers' pre-entry experience variables on the four accommodation variables and H3.1a–b, H3.2a–b, H3.3a–b, H3.4a–b on impact of three newcomers' involvement variables on the four accommodation variables was tested in Model 3–6. Significant effects were found for all four accommodation variables i.e. SelfEffic_T2, $R^2 = 0.304$, $F(2, 328) = 28.07$, $p < .001$; AccepGrp_T2, $R^2 = 0.18$, $F(2, 330) = 4.98^{**}$; RolAmb_T2, $R^2 = 0.238$, $F(2, 328) = 23.75^{***}$; and RolCon_T2, $R^2 = 0.09$, $F(2, 328) = 3.17^*$. The β -values indicated that PrevRel_T1 was negatively related with RolCon_T2 ($\beta = -0.15^{**}$), H2.3a supported. However, PrevRel_T1 was not related to other three accommodation variables, by that means rejecting H2.1a, H2.2a, and H2.4a. Further, the impact of PastGWork on the four accommodation indicators was not supported, thereby rejecting H2.1b, H2.2b, H2.3b and H2.4b.

Further, ProfInvol_T2 was significantly related to all four accommodations_T2 variables, by that means accepting H3.1b, H3.2b, H3.3b and H3.4b with ProfInvol_T2 found to be the strongest predictor of SelfEffic_T2 ($\beta = 0.38^{**}$). Further, as expected, ProfInvol_T2 was found to negatively related to RolAmb ($\beta = -0.37^{***}$) and RolCon ($\beta = -0.14^{***}$). However, CurrGWork_T2 was found to be weakly related to SelfEffic_T2 ($\beta = -0.08^{**}$), (H3.1a supported) with no significant association with other accommodation_T2 variables (H3.2a, H3.3a, H3.4a rejected).

For testing the hypotheses about the relationship of each of the three pre-entry experiences (H5.1a–c, H5.2a–c, H5.2a–c), four accommodation variables (H4.1a–d, H4.2a–d, H4.3a–d and H4.4a–d) and two involvement variables (H6.1a–b, H6.2a–b, H6.3a–b, H6.4a–b) on the four group-work outcomes, we analyzed Model 7–10. Results indicated significant effects for all the four group-work outcome variables i.e. productivity, $R^2 = 0.08$, $F(4, 321) = 2.413^*$; affective commitment, $R^2 = 0.29$, $F(4, 321) = 9.96^{***}$; continuance commitment, $R^2 = 0.24$, $F(4, 321) = 7.60^{***}$, and career commitment, $R^2 = 0.39$, $F(4, 321) = 14.42^{***}$. Further, analysis showed that RolCon_T2 ($\beta = -0.14^{**}$) was the only accommodation variable that was a significant predictor of Prod_T2, supporting H4.1c. We found RolAmb_T2 ($\beta = -0.24^{***}$) to be stronger predictor of AffComt_T2 (H4.2b supported) than RolCon ($\beta = -0.10^*$) (H4.2c supported). The analysis also showed SelfEffic_T2 ($\beta = 0.30^{**}$) as the strongest and significant predictor of ContComt_T2 (H4.3a supported). Also, as expected RolCon ($\beta = -0.12^{**}$) negatively influence ContComt_T2, thereby 4.3c supported, however, no evidence of relationship of RolAmb_T2 on ContComt_T2 was found, thereby

Table 3
Results of regression analysis.

Hypothesis	Independent variable	Dependent variable	β	t-value	Result
H1.1a	PrevRel_T1	CurrGWork_T2	0.026 ns	0.439	Not supported
H1.1b	PastGWork_T1	CurrGWork_T2	0.142**	2.729	Supported
H1.1c	PastAchiv_T1	CurrGWork_T2	0.114**	2.066	Supported
H1.2a	PrevRel_T1	Proflnvol_T2	0.11*	-1.712	Supported
H1.2b	PastGWork_T1	Proflnvol_T2	0.102*	1.802	Supported
H1.2c	PastAchiv_T1	Proflnvol_T2	0.011 ns	0.204	Not supported
H2.1a	PrevRel_T1	SelfEffic_T2	0.076 ns	1.397	Not supported
H2.1b	PastGWork_T1	SelfEffic_T2	0.042 ns	0.788	Not supported
H2.1c	PastAchiv_T1	SelfEffic_T2	0.12**	2.167	Supported
H2.2a	PrevRel_T1	RolAmb_T2	0.064 ns	1.141	Not supported
H2.2b	PastGWork_T1	RolAmb_T2	-0.031 ns	-0.533	Not supported
H2.2c	PastAchiv_T1	RolAmb_T2	0.079*	1.761	Supported
H2.3a	PrevRel_T1	RolCon_T2	-0.152*	-1.669	Supported
H2.3b	PastGWork_T1	RolCon_T2	-0.011 ns	-0.186	Not supported
H2.3c	PastAchiv_T1	RolCon_T2	-0.096*	-1.768	Supported
H2.4a	PrevRel_T1	AccepGrp_T2	-0.036 ns	-0.642	Not supported
H2.4b	PastGWork_T1	AccepGrp_T2	-0.003 ns	-0.051	Not supported
H2.4c	PastAchiv_T1	AccepGrp_T2	0.003 ns	0.053	Not supported
H3.1a	CurrGWork_T2	SelfEffic_T2	0.083**	1.974	Supported
H3.1b	Proflnvol_T2	SelfEffic_T2	0.383***	10.408	Supported
H3.2a	CurrGWork_T2	RolAmb_T2	0.061 ns	1.237	Not supported
H3.2b	Proflnvol_T2	RolAmb_T2	-0.365***	-8.866	Supported
H3.3a	CurrGWork_T2	RolCon_T2	-0.015 ns	-0.272	Not supported
H3.3b	Proflnvol_T2	RolCon_T2	-0.14***	-3.937	Supported
H3.4a	CurrGWork_T2	AccepGrp_T2	-0.032 ns	0.629	Not supported
H3.4b	Proflnvol_T2	AccepGrp_T2	0.22***	6.410	Supported
H4.1a	SelfEffic_T2	Productivity_T2	0.035 ns	0.447	Not supported
H4.1b	RolAmb_T2	Productivity_T2	0.019 ns	0.252	Not supported
H4.1c	RolCon_T2	Productivity_T2	-0.137**	-2.487	Supported
H4.1d	AccepGrp_T2	Productivity_T2	0.036 ns	0.571	Not supported
H4.2a	SelfEffic_T2	AffComt_T2	0.193 ns	0.792	Not supported
H4.2b	RolAmb_T2	AffComt_T2	-0.243**	-4.253	Supported
H4.2c	RolCon_T2	AffComt_T2	-0.103*	-1.901	Supported
H4.2d	AccepGrp_T2	AffComt_T2	-0.009 ns	-0.156	Not supported
H4.3a	SelfEffic_T2	ContComt_T2	0.31**	4.205	Supported
H4.3b	RolAmb_T2	ContComt_T2	0.071 ns	0.997	Not supported
H4.3c	RolCon_T2	ContComt_T2	-0.116**	-2.984	Supported
H4.3d	AccepGrp_T2	ContComt_T2	-0.09 ns	-1.512	Not supported
H4.4a	SelfEffic_T2	CarComt_T2	0.404**	8.044	Supported
H4.4b	RolAmb_T2	CarComt_T2	-0.027 ns	-0.405	Not supported
H4.4c	RolCon_T2	CarComt_T2	-0.087 ns	-0.780	Not supported
H4.4d	AccepGrp_T2	CarComt_T2	0.171**	2.353	Supported
H5.1a	PrevRel_T1	Productivity_T2	-0.034 ns	-0.560	Not supported
H5.1b	PastGWork_T1	Productivity_T2	0 ns	0.004	Not supported
H5.1c	PastAchiv_T1	Productivity_T2	0.084 ns	1.524	Not supported
H5.2a	PrevRel_T1	AffComt_T2	0.042 ns	0.744	Not supported
H5.2b	PastGWork_T1	AffComt_T2	-0.006 ns	-0.110	Not supported
H5.2c	PastAchiv_T1	AffComt_T2	0.001 ns	0.027	Not supported
H5.3a	PrevRel_T1	ContComt_T2	-0.003 ns	-0.055	Not supported
H5.3b	PastGWork_T1	ContComt_T2	0.094*	1.763	Supported
H5.3c	PastAchiv_T1	ContComt_T2	-0.021 ns	-0.404	Not supported
H5.4a	PrevRel_T1	CarComt_T2	0.05 ns	0.971	Not supported
H5.4b	PastGWork_T1	CarComt_T2	-0.015 ns	-0.310	Not supported
H5.4c	PastAchiv_T1	CarComt_T2	0.016 ns	0.345	Not supported
H6.1a	CurrGWork_T2	Productivity_T2	0.148**	2.075	Supported
H6.1b	Proflnvol_T2	Productivity_T2	0.101 ns	0.864	Not supported
H6.2a	CurrGWork_T2	AffComt_T2	0.071 ns	1.361	Not supported
H6.2b	Proflnvol_T2	AffComt_T2	0.284 ns	0.432	Not supported
H6.3a	CurrGWork_T2	ContComt_T2	-0.001 ns	-0.028	Not supported
H6.3b	Proflnvol_T2	ContComt_T2	0.178 ns	0.333	Not supported
H6.4a	CurrGWork_T2	CarComt_T2	0.08*	1.686	Supported
H6.4b	Proflnvol_T2	CarComt_T2	0.184 ns	0.424	Not supported

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ^{ns} Not significant, Bold indicates hypothesis supported.

rejecting H4.3b. We found SelfEffic_T2 ($\beta = 0.40***$) to be stronger predictor of CarComt_T2 (H4.4a) than AccepGrp_T2 ($\beta = 0.17**$) (H4.4d supported).

Further, the results showed weak effect ($\beta = 0.09^*$) of PastGWork_T1 on ContComt_T2, supporting H5.3b. No support was found for relationship of PrevRel_T1 on any of the four group-work outcome_T2 variables (by that means rejecting H5.1a, H5.2a, H5.3a and H5.4a). Next, CurrGWork_T2 was found to be related to Prod_T2 ($\beta = 0.15**$) (H6.1a supported) and CarComt_T2 ($\beta = 0.08^*$) (H6.4a supported). However,

the impact of Proflnvol_T2 on any of the four group-work outcomes was not supported, by that means rejecting H6.1b, H6.2b, H6.3b and H6.4b.

5.2. Discussion

This study contributes to existing literature by providing unique findings pertaining to organizational socialization in virtual settings. Our results provided support for a positive influence of newcomer's pre-entry group-work experience on their involvement in current activities

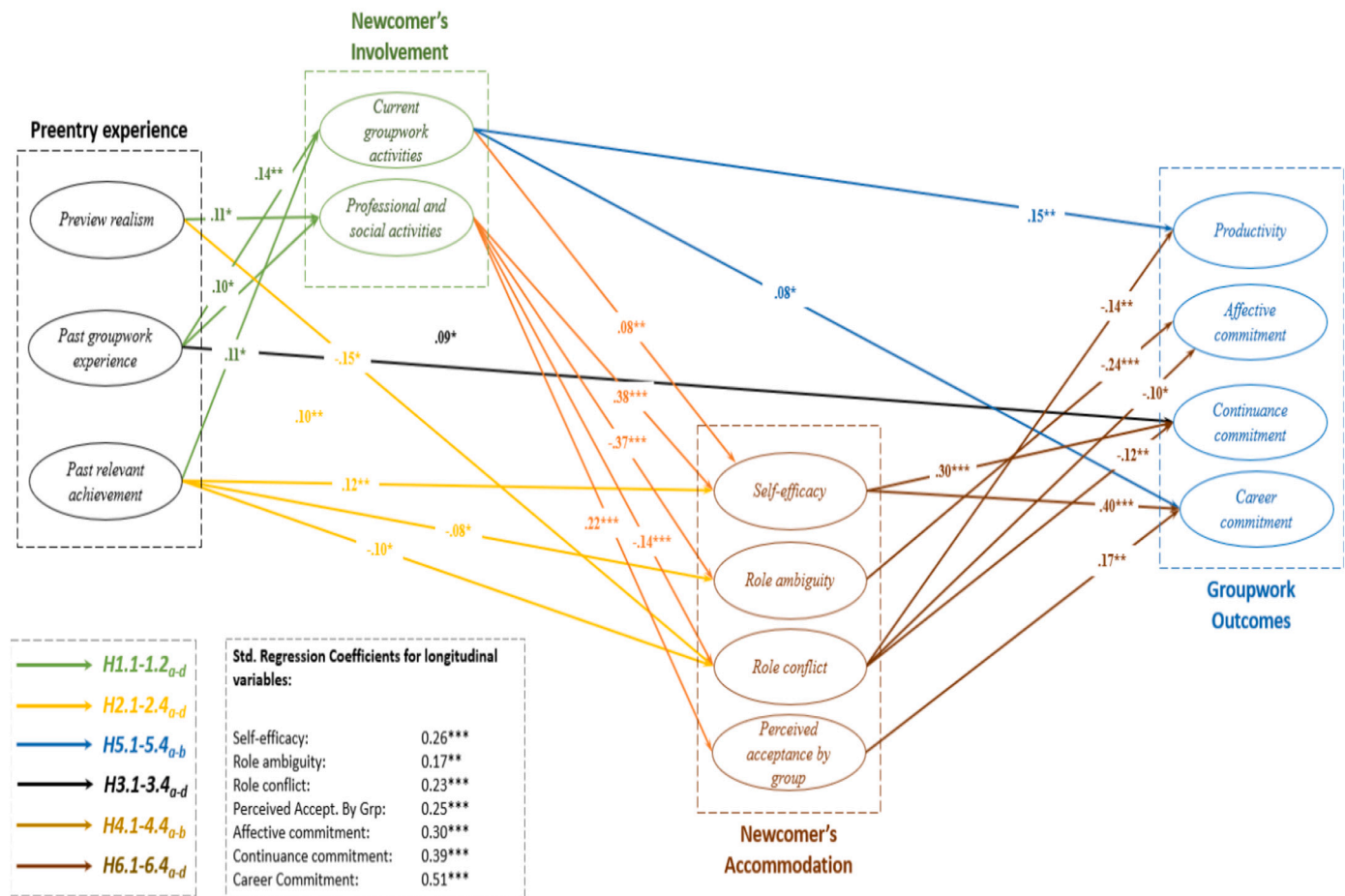


Fig. 2. Empirical model.

* $p < .05$; ** $p < .01$; *** $p < .001$.

All significant regression coefficients are reported on significant path.

(H1.1b and H1.2b). Previous group-work experience was a good indicator of their involvement at new workplace in both current group-work and professional development activities. On the other hand, perceived realism and past relevant achievements impacted only one of the two involvement indicators (H1.1a and H1.2 c rejected). Newcomers' involvement in professional and social activities was greatly impacted by perceived realism (H1.2a) while their participation in academic activities were influenced by their previous achievements (H1.1c). The results imply that pre-entry work-experience overall is a better predictor of newcomers' involvement at a new workplace in comparison to perceived realism and past relevant achievements. Previous work-experience helps newcomers developing clearer understanding of expectations of the new workplace and therefore encourages them to actively participate in work and social activities. Students having prior group-work experience showed higher involvement in both academic, and professional and social activities. However, we noted that perceived realism in virtual settings is a stronger predictor of involvement in professional activities than past work experience. During the transition from an outsider to insider in the virtual settings, an individuals' clearer understanding of organizations and peers' expectations and, previous experience help gaining confidence to get involved in professional activities (Van-Kleeef, 2016). Formal and informal interactions with faculty and peers at the entry level are more critical in virtual settings for predicting newcomers' involvement in professional activities (Boh, 2007). Tacit knowledge transfer in online environment is limited, which is otherwise smooth in face-to-face interactions and practice sessions conducted in physical settings (Lam, 2000; Yi and Uen, 2006).

Therefore, in virtual settings, an individual will rely more on knowledge acquired at pre-entry level to develop realistic perceptions about professional demands and behavior (Holley and Taylor, 2009). In the absence of this knowledge and prior work-experience, newcomers may resist involvement, especially in professional activities. Here the newcomer may not rely much on prior achievements unless he/she gets full and accurate picture of what is expected from him/her. However, newcomer's involvement in current work-activities remains unaffected by perceived realism, it is significantly affected by prior work experience and achievements. Prior work-experience and achievements reflect newcomer's readiness for the given work-assignment. In online environment, when the faculty members and peers have only limited ways to explain a given work-assignment, newcomer's readiness plays a critical role in his/her involvement in work-related activities (Appana, 2008). We found that students with more group-work experience in past were more involved in current group-assignments and projects.

Overall, in virtual settings, pre-entry experience was found to be strong predictor of newcomer's involvement in current activities. On the other hand, it only marginally contributed to accommodation of newcomer in virtual settings. A unique pattern of the results was recorded for pre-entry variables where accurate perceived realism contributed to newcomer's accommodation only in a limited way by helping him/her escaping the role conflicts at new workplace (H2.3a). However, it may not directly help the newcomer avoiding role ambiguity and improving perception about self-efficacy and group acceptance (H2.1a and H2.2a rejected). Similarly, direct impact of prior group-work experience on the four accommodation indicators was not

supported (H2.1b, 2.2b, 2.3b and 2.4b). Except past-relevant achievement, none of the pre-entry variables could have significant direct impact on newcomers' accommodation. It is important to note that a newcomer can get benefits of pre-entry experience only when previous experience was gained in the same or similar work environment (Feldman, 1994; Yu, 2020). When a student tries to utilize the experience of studying in physical settings to get adjusted in online study environment, he/she may get reality shock. Therefore, pre-entry variables may not directly predict smooth accommodation of newcomers in online study environment. Contrary to the findings of many studies on socialization in physical settings (Kulkarni, 2013), overall pre-entry experience was found to be a weak predictor of newcomer's accommodation in the virtual setting.

On the other hand, newcomer's involvement in current activities showed mixed results. Involvement in professional activities contributed significantly towards newcomer's accommodation while current group-work activities showed no impact except on self-efficacy of newcomers. We found a significant relationship of involvement in professional activities with all four accommodation variables (H3.1b–3.4b). It implied that students who are more involved in professional and social activities are better accommodated. The lack of physical connection with institution's community and peers in a virtual setting is displaced by formal and informal professional and social engagements (Holley and Taylor, 2009). These activities help the newcomer adjusting in new work environment by providing more opportunities for collaborative thinking and building social connects (McCombs and Vakili, 2005). Involvement in work-activities may limit the scope of peer interactions to the subject matter of discussion. Therefore, involvement in professional and social activities is stronger predictor of accommodation than involvement in work-related activities. It may be noted that involvement in current activities (both work and professional activities) is found to be the strongest predictor of self-efficacy (H3.1a and H3.1b). Through involvement newcomers acquire knowledge of issues relevant to their role in a given assignment (Weidman et al., 2001). This knowledge helps students in refining skills needed to successfully complete the assigned task and become a proficient member of the community. It strengthens newcomer's belief in his/her ability to compete the given task. However, involvement in current group-work was found to be a weak predictor of other accommodation variables. The results highlight the importance of social processes in smooth accommodation occurring through social contract between newcomers. In virtual settings, the coconstruction of knowledge, which is transmitted through professional and social activities, contributes more to accommodation of newcomer than the individual acquisition of knowledge resulting from work activities (Holley and Taylor, 2009). This is because students get rare opportunity to establish the physical connect with institutional community and peers. It implies that current work-related activities only slightly help the newcomer during accommodation phase while involvement in professional and social activities is the key to faster and smoother accommodation (Whillans et al., 2021). These findings draw our attention to some distinctive dimensions of socialization in virtual settings.

Impact assessment of accommodation variables on the outcomes (productivity and commitment) exposed a few more striking findings. Out of the four accommodation predictors, role conflict was found to influence three out of four newcomer's outcome deliverables (H4.1c–H4.3c). It showed strong negative impact on newcomer's productivity. Prevailing role conflict in virtual settings is detrimental to newcomer's success at new workplace. Except role conflict, accommodation variables could not leave a noticeable impact on newcomer's productivity. Well-accommodated newcomers are expected to demonstrate higher levels of productivity and commitment (Batistić and Kaše, 2015). However, in virtual settings, these assertions may not hold good. We found that prominent indicators of accommodation such as newcomers' confidence on their capabilities and perceived group acceptance could not help them in enhancing their productivity (H4.1a, b and d rejected). This is probably due to classroom environment, which is

considered as one of the strongest predictors of educational productivity even when all other relevant factors are hold constant (Dorman, 2002). The work-environment in virtual setting is different from that of traditional work settings. Moreover, it is found that learners in a learner-centered environment (online classroom) tend to overestimate their capabilities and therefore self-efficacy may not correctly predict productivity (Berdrow and Evers, 2011). Due to these differences, smooth accommodation may not be used as a strong predictor of outcomes in virtual settings.

While productivity is unaffected, newcomers' commitment is considerably affected by accommodation variables. The students, who are confident and feel accepted by peers, show higher levels of career commitment. Newcomers, who are well integrated into the peer group, demonstrate higher level of commitment towards his/her degree program and, institutional and career goals (Bauer and Green, 1994). Diverting from the scholarly claims of previous socialization studies for job stress to be a strong predictor of newcomer's outcome (Gormiley, 2005) in virtual settings, two major components of job stress - role ambiguity and role conflict (Williams et al., 2001), do not adversely impact newcomers' commitment for the chosen career. Unlike newcomer's accommodation in physical settings where self-efficacy and warm welcome by peer groups produce desirable affective dispositions, these factors fail to make any difference in newcomers' affective commitment in virtual settings (H4.2a and H4.2d rejected). On the other hand, supporting the claims of previous studies (Allen and Meyer, 1990) newcomer's affective outcomes are badly impacted by role conflict and role ambiguity (H4.2b and H4.2c accepted). In virtual settings, these job stressors are expected to yield even more severe consequences because virtually is reported to be related with higher level of isolation, conflict and ambiguity (Tannenbaum et al., 2012). In the absence of traditional face-to-face setup, changed structural changes can elevate the level of uncertainty about one's role and can quickly result into role conflicts. The heightened levels of job stress adversely affect newcomer's willingness towards a continued association with the organization (Ahuja et al., 2002).

Overall, the results indicate that even a self-confident and well-integrated newcomer, who is socializing in virtual settings may not be desirous of remaining with the organization/institute if he/she encounters role conflict and role ambiguity. Theoretical and empirical evidence claiming direct impact of pre-entry variables on outcomes in physical setting (Bauer and Green, 1994) are not supported in virtual settings (5.1a–d, H5.2a–d, H5.3a,b and, H5.4a–d rejected). The results reveal that only one pre-entry variable i.e. past group-work experience directly influence continuance commitment of newcomers (H5.3c). This makes sense as students who have invested time and efforts in group-work activities during graduation program may be more confident and will demonstrate higher continuance commitment towards current group-work activities. Other pre-entry variables fail to show significant impact on any of the outcome variables.

Despite these peculiar observations for virtual settings, our findings also reveal a few common points of consideration for both contextual settings. Like in traditional face-to-face classroom settings, involvement in professional and social activities in virtual settings emerges as stronger predictor of newcomers' accommodation than current work-related activities (Hatmaker, 2015). Formal and informal discussions held during these activities help newcomers build social network that can play an instrumental role in lowering anxiety and elevating self-confidence. Those involved in professional and social activities are easily accommodated than the ones who remain more engage in work-related activities (Hatmaker, 2015). Therefore, informal relationships with peers and other stakeholders developed through active involvement in professional and social activities is an important means of smooth accommodation in virtual settings. However, strong direct effects are recorded for current group-work activities on outcome variables related to productivity (H6.1a) and career commitment (H6.4a). Conversely, involvement in professional and social activities shows no

direct impact on any of the outcome variables (H6.2b–H6.4b rejected). Further, involvement in professional and social activities only indirectly predicts the outcome of the newcomer through smooth accommodation. Our findings support the claims of previous socialization studies that current work-related activities can be used to directly predict productivity and career commitment of the newcomers (Bauer and Green, 1998). Mentoring by faculty during involvement in work-related activities help the newcomer acquires critical skills, domain expertise and provides them a sense of completeness. These advantages translate into improved productivity and career outcomes (Griffin et al., 2000).

6. Theoretical and practical implications

6.1. Theoretical and research implication

The results of this study indicate that one should not hold on to an inflexible view on socialization stages in virtual setting context. Stages denoted by pre-entry experience, involvement in current activities, accommodation and outcome appear not to exhibit the same relationship as suggested by previous studies examining socialization in physical settings (Batišć and Kase, 2015). In virtual settings, these stages may only provide relevant variables of study in a given time frame, but their order of occurrence and causal structure should not be overemphasized. Our results offer a cumulative view of socialization in virtual settings in which early stages exert influence over later stages even after intervening variables are controlled. Further, most of the pre-entry variables, which are considered strong predictors of outcome variables, fail to show significant impact on newcomer's outcome in virtual settings. For involvement variables, only current group-work involvement impacts only some of the outcome variables while involvement in professional activities influences none of them. Most studies examining accommodation of newcomers in physical settings place considerable emphasis on post-entry experience gained through involvement activities. However, our results reveal that in virtual socialization process, for post-entry experience current group-work activities do not significantly contribute to smooth accommodation of the newcomer. On the other hand, pre-entry experience emerges as a strong predictor of accommodation of newcomers. These distinctive findings offer an evolutionary socialization model for virtual settings.

6.2. Practical implications

The study replicates previous results by using rigorous socialization test and controlling for entry-level perceptions of accommodation and commitment, and a few other variables. Our findings offer broadly four sets of implications for practitioners and organizations. First, we observe that perception of accommodation and commitment were almost stable across the two data collection phases even though phase 1 was conducted in the first week of term I, while the second phase of data was collected after the completion of term I. The similarity in the perception measures indicates that newcomers could successfully develop fair perceptions of commitment and accommodation at the entry level of their program. These initial perceptions turn out to be strong predictors of accommodation and outcome at term's end. The effect of later socialization stages can be overestimated if the entry-level perceptions are not accounted for.

Second set of implications relates to impact of virtual settings on overall contribution of pre-entry variables to newcomers' adjustment in new workplace. Previous research indicated that among newcomers, ICT can be substantially used to disseminate pre-entry knowledge, which is otherwise perceived to be difficult to access (Flanagin and Waldeck, 2004). However, our findings reveal that pre-entry information dissemination solely through advanced communication technologies may not produce desired results, if not complemented by face-to-face contact with peers and other stakeholders. Due to various technology attributes such as, directionality, degree of non-simultaneity, number of

access points etc. pre-entry knowledge disseminated solely through technology may not serve the purpose of newcomer's faster and smoother adjustment at new workplace. Past relevant achievements also show no impact on outcome variables. Contrary to what is expected in physical settings, pre-entry variables, in general fail to show significant impact on outcome variables, especially productivity. However, we believe that socialization effects may be more evident as the program progresses.

Third, out of four accommodation variables, role conflict is found to be the strongest predictor of outcome variables. It is negatively related to productivity and commitment. The communication in virtual settings is found to be a major source of conflict as the message senders are often not trained to communicate in these environments (Soucek and Moser, 2010). The receiver decodes the message without having visual cues and an opportunity to get clarifications from the sender (Friedman and Currall, 2003). In these penurious contexts, an incorrectly interpreted message may lead to escalated conflict (Byron, 2008). The increasing level of role conflict in the socialization phase of newcomer may be even more detrimental to his/her productivity and commitment towards the organization (Bauer et al., 2007). Given the challenges and limitations associated with virtual communications, practitioner may consider developing cyber civility training as part of socialization program to reduce role conflict and ambiguity for the newcomer.

Fourth set of implications relates to involvement of newcomers. Organizations should focus more on involving newcomers in professional and social activities than work-related activities during their orientation program. Informal interactions with peers and others may better accommodate the newcomer at lower cost than work-related interactions happening in the formal orientation activities (Louis et al., 1983). More virtual events should be organized to engage the newcomers in professional development and social activities as social tie-ups built through the formal and informal interactions in these activities are instrumental in reducing role ambiguity and conflicts (Hatmaker, 2015).

6.3. Implications for organizations

Our study offers three take away points for organizations. First, our results indicate that organizations should be mindful of the contribution of entry-level perceptions while developing and designing the socialization tactics in virtual settings. The socialization effects should not be overemphasized. Second, organizations should note that when organizational socialization is occurring completely in virtual settings, overall contribution of pre-entry experience to later socialization stages may be diluted, if technology attributes and media characteristics (Flanagin and Waldeck, 2004) are not duly considered. Finally, our findings suggest that to address peculiar challenges of virtual settings resulting in high role conflict, organizations should plan cyber civility training for the newcomers. Training sessions in the beginning of the socialization program can be effective in reducing the role ambiguity.

7. Conclusion

In this study, a socialization model was longitudinally investigated to examine how key factors of socialization process show variation in virtual settings. The present study complements the existing literature in broadly two ways. First, the socialization process is viewed as a cumulative process allowing the impact of pre-entry variables not only on current involvement but also on later accommodation and outcomes. Longitudinal design is used to record the changes in key variables of socialization at workplace by controlling perceptions at entry level. Second, the study reports some distinguishing aspects of socialization occurring in virtual settings.

7.1. Future research directions

There are many ways that future research can build on this work.

This longitudinal study was conducted for 16 weeks (appx. 4 months), which may be considered as an appropriate time frame for a full-time higher education program of two years. However, outcomes measured at a later point in time may provide more accurate predictions of socialization effects. We invite scholars to study socialization process in even longer time frame. Further, involvement does not predict outcome in the virtual settings. In this sample, we consider involvement of newcomers only in a few work-related and professional and social activities. Considering unique aspects of organizational socialization in virtual settings as revealed in this study, future studies may extend this model to include more activities for newcomers' virtual engagement with peers. Some innovative social engagement activities may be included to verify their seemingly prominent role in newcomers' accommodation. Similarly, we observed that role of pre-entry variables is significantly diluted in virtual organizational socialization. Scholars may consider conducting an experimental study to examine the effect of entry-level virtual workplace training modules on later socialization stages. Another potential area of inquiry is testing for technostress, work-life conflict and personal attributes. It may also be noted that in virtual organizational socialization, factors influencing technology adoption may be as important as traditional socialization factors. Lastly, our findings are based on single test of proposed model pertaining to a limited sample of students of a professional course having technical and non-technical background. Therefore, difference in entry-level knowledge, skill sets and experience of group-work, and extra-curricular activities may affect the generalizability of our findings. We invite future researchers to test this model in other organizational and environmental contexts i.e., non-academic settings. However, general inquiry, processes and findings of this study should generalize in other academic and nonacademic settings. We believe that different contextual settings may reveal diverse and interesting findings. For example, involvement in work-related activities and productivity of a new student can be easily and fairly identified and measured. The measurement of productivity may not be possible in non-academic settings. Diverse and innovative involvement activities and productivity measurement scales may exist in those settings. The role of emerging technology, namely the metaverse, should also be examined to explore the impact of its immersive environment (Dwivedi et al., 2022a) on virtual socialization of newcomers. Finally, increasing use of digital technologies for various purposes is likely to pose negative consequences (Dwivedi et al., 2022b), which should be examined in relation to virtual socialization.

7.2. Limitations

One of the limitations of the study is the range of group-work outcomes such as productivity and commitment. Nevertheless, we find significant associations for the outcome variables. Second, a study over a longer time-period may result in larger effects. Third, considering that the study is based on self-reporting surveys, social desirability and CMV may cause potential limitation. Some associations in the model may be reciprocally causal, for example, variables of perceived group acceptance and affective commitment may influence each other over time. Finally, these findings relate to socialization tactics in organizations offering professional courses to newcomers with both technical and non-technical background. Any difference in entry-level knowledge and skill set may affect the generalizability of our findings.

CRedit authorship contribution statement

Parul Gupta: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing – original draft, Writing – review & editing, Project administration. **Anupama Prashar:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing – original draft, Writing – review & editing, Project administration. **Mihalis Giannakis:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Vincent Dutot:**

Conceptualization, Methodology, Writing – review & editing, Supervision. **Yogesh K. Dwivedi:** Conceptualization, Methodology, Writing – review & editing, Supervision.

Declaration of competing interest

Authors have no conflict of interest.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.techfore.2022.122097>.

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