Journal of Information Systems Education

Volume 37
Issue 4
Fall 2026

Advancing Individual Foundational Competencies Through On-Site and Online Internships in Information Systems Education: A Student Perspective

Johan Petersson and Fredrik Karlsson

Recommended Citation: Petersson, J., & Karlsson, F. (2026). Advancing Individual Foundational Competencies Through On-Site and Online Internships in Information Systems Education: A Student Perspective. *Journal of Information Systems Education*, 37(4), 464-482. https://doi.org/10.62273/PPDO3289

Article Link: https://jise.org/Volume37/n4/JISE2026v37n4pp464-482.html

Received:	May 17, 2025
First Decision:	August 9, 2025
Accepted:	December 17, 2025
Published:	December 15, 2026

Find archived papers, submission instructions, terms of use, and much more at the JISE website:
https://jise.org

ISSN: 2574-3872 (Online) 1055-3096 (Print)

Journal of Information Systems Education, 37(4), 464-482, Fall 2026
https://doi.org/10.62273/PPDO3289

Advancing Individual Foundational Competencies Through On-Site and Online Internships in Information Systems Education: A Student Perspective

Johan Petersson
Fredrik Karlsson
Department of Informatics
Örebro University
Örebro, Sweden
johan.petersson@oru.se, fredrik.karlsson@oru.se

ABSTRACT

Internships are a key element in developing foundational competencies and in maintaining information systems (IS) programmes' relevance to industry practice. While internships were traditionally on-site, they are now increasingly offered online in response to the growing prevalence of remote work. This study examines how IS students perceive their competency development during on-site and online internships. We focus on three individual foundational competencies (IFCs) from the IS2020 model curriculum: problem-solving, lifelong learning and development, and a high tolerance for ambiguity. Drawing on self-evaluations from IS students in Sweden, we conducted a reflexive thematic analysis to identify themes in perceived competency development. Relating these themes to prior research, we proposed eight hypotheses that contribute to incremental theorising on how internship modes support competency development. Our findings highlight three key implications. First, online internships are perceived to enhance problem-solving because limited access to professional supervisors encourages greater independence; supervisors are experienced as co-developers on-site but as tutors online. Second, students' knowledge self-images depend on regular benchmarking with professionals and on daring to seek help, both of which are less consistent in online settings. Third, students who encounter major changes early in projects report stronger readiness to handle ambiguity, while online students place greater value on group learning. These insights extend prior studies by clarifying how internship mode shapes students' perceptions of IFC development. Finally, we outline preliminary guidelines for designing IS internships, emphasising how educators and supervisors can structure professional access, support benchmarking, and introduce students to ambiguity early to cultivate competency development.

Keywords: Online internship, On-site internship, Individual foundational competency, Student perceptions, Information systems education, IS curriculum

1. INTRODUCTION

Graduate employability has become increasingly important in higher education (Divine et al., 2008; Jackson, 2014), and information systems (IS) education is no exception (Faisal et al., 2021; Stefanidis et al., 2013). Universities invest substantial resources in programmes that align with industry needs and thereby support graduates' development of skills required for their future professional lives (Billett, 2015). However, the rapid pace of change in the IT industry challenges educational strategies (Stefanidis et al.,

2013; Topi, 2019; Westfall, 1999), requiring IS institutions to strike a balance between agility and stability in their curricula. While education must reflect current industry standards and practices, it is also essential to foster individual foundational competencies (IFCs) (Cummings & Janicki, 2020; Leidig et al., 2019; Leidig & Salmela, 2022; Topi et al., 2010). The AIS/ACM IS2020 curriculum model highlights critical thinking and problem-solving, lifelong learning and development, and high tolerance for ambiguity as key competencies for future IS graduates (Leidig & Salmela, 2022). In practice, such competencies often make graduates adaptable and valuable to employers beyond their technical training.

Fully remote internships became prominent during the COVID-19 pandemic (Howell & Aryal, 2024), when on-site activities were unavailable (AlGhamdi, 2022; Baker & Fitzpatrick, 2022; Briant & Crowther, 2020; Hammoud et al., 2022). Although lockdowns have ended, the pandemic is expected to have a lasting impact on remote work (Deloitte, 2022; KPMG, 2022). Traditionally, internships involved students working on-site at the organisation to gain professional experience. However, emerging technologies have made it possible to shift internships online (Franks & Oliver, 2012; Schuster & Glavas, 2017), enabling students to work remotely using digital tools. In recent years, this shift has been further driven by employers' demand for cost efficiency, tech workers' desire for flexibility (Eddy, 2022; Mearian, 2023), and the broader move towards hybrid work environments. Therefore, online internships not only support learning but also provide experience in the evolving hybrid workplace.

Given the central role of internships in modern IS programmes, understanding how online internships affect students' IFC development is essential. Leidig and Salmela (2021) note that IS practicums are crucial for learning these competencies, in line with the IS2020 curriculum model. Bay (2021) argues that new internship configurations demand greater emphasis on knowledge development and soft skills. Existing pedagogical approaches are largely grounded in theories of situated learning (Lave & Wenger, 1991), which were developed primarily for traditional office-based environments (Bay, 2021). This raises the need to reconsider how on-site and online internships may shape competency development differently, a task that calls for exploratory theory building. The theoretical challenge here is to examine how digital mediation, reduced physical co-presence, and shifting supervisory roles interact with learning processes to influence the development of foundational competencies.

As Section 2.2 shows, few studies compare on-site and online internships while explicitly engaging in theorising (Weick, 1995), and none addresses IS students' development of IFCs. This study therefore explores how IS students perceive their IFC development during on-site versus online internships. To this end, we develop themes using reflexive thematic analysis, which we translate into a set of hypotheses that future research can test.

The research question (RQ) guiding this study is: *How do students pursuing IS majors perceive the development of their individual foundational competencies in on-site versus online internships?*

The remainder of the paper is structured as follows. Section Two reviews research on on-site and online internships in relation to IFCs. Section Three describes the research method, and Section Four presents the results. Section Five discusses the findings, highlighting implications for research and practice, as well as limitations and directions for future work. Section Six concludes the paper by summarising the key insights.

2. RELATED RESEARCH

2.1 Individual Foundational Competencies in Information Systems Education

A competency is a student's "ability to apply knowledge, skills, and dispositions to effectively complete tasks" (Leidig & Salmela, 2022). Topi et al. (2017) argue that IS students develop a wide range of IFCs during their education that provide a crucial foundation for the IS profession. They further identify three of these competencies as becoming increasingly important in the 2020s: critical thinking and problem-solving, lifelong learning and development, and a high tolerance for ambiguity.

Accordingly, this article focuses on these competencies. Critical thinking and problem-solving are essential yet distinct competencies for IS professionals (Matthee & Turpin, 2019). Critical thinking involves synthesising conflicting arguments and evidence (Light, 2001), whereas problem-solving involves

identifying an issue, planning a resolution, and executing it. This article focuses on problem-solving, as our data (see Section 3.2) did not provide material for analysing critical thinking. We nevertheless acknowledge that the two are closely interrelated in higher education.

Lifelong learning and development concern a student's ability to learn, offering a long-term perspective on both domain-specific and generic forms of learning. Given the rapid pace of change in IT, IS professionals must adopt new technologies and methods, and "[c]ompetencies associated with learning how to learn and continuous growth and development are required core skills" (Leidig & Salmela, 2021).

Finally, IS professionals require a high tolerance for ambiguity, as they often handle complex problems without fully understanding "an IS and the system's relationships with other entities and people" (Leidig & Salmela, 2021). Developing this competency helps them manage and adapt to messy situations (Matthee & Turpin, 2019) where incomplete information and revised understanding continually change conditions.

2.2 Existing Studies on Internships

2.2.1 Internship Studies and Individual Foundational Competencies Development. Initiatives to bridge the readiness gap between academia and industry have a long history (Clear, 2010). To contextualise this study, we reviewed research on on-site and online internships concerning IFCs in higher education, which is summarised in this section. Although this study uses the concept of competency as defined in recent IS model curriculum developments (Leidig & Salmela, 2021; Topi et al., 2017), prior research primarily used the concept of skill. Thus, we take an inclusive approach, treating the concepts interchangeably, while recognising that competency refers to the ability to apply one or more skills (Leidig & Salmela, 2021; Topi et al., 2017).

Despite a substantial body of studies on internships (e.g., Beard, 2007; Briant & Crowther, 2020; Chaffer & Webb, 2017; Jeske & Axtell, 2014; Maini et al., 2021; Mia et al., 2020), few have explored on-site and online internships in relation to course learning and competencies. We identified only eleven relevant studies (AlGhamdi, 2022; Baker & Fitzpatrick, 2022; Cameron et al., 2013; Conroy & Khan, 2009; Hammoud et al., 2022; Handler et al., 2021; Lavy & Rashkovits, 2019; Lim & Mustafa, 2013; MacDonald et al., 2014; Park & Jones, 2021; Saltz et al., 2013). These studies cover diverse student groups, such as biotechnology, economics, finance, and public health. IS (including information technology) students have been addressed by AlGhamdi (2022), Lavy and Rashkovits (2019), and Saltz et al. (2013). Despite differing research goals, all of these latter studies explore IFCs. For example, Cameron et al. (2013) and Conroy and Khan (2009) investigated oral, written, and interpersonal skills, whereas others focused on vocational skills (Lavy & Rashkovits, 2019; MacDonald et al., 2014). A shared finding is that internships foster both generic and vocational skill development, which appears to be transferable across study programmes.

2.2.2 Comparative Studies of Online and On-Site Internships. Few studies have compared on-site and online internships directly (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021). Technological changes may make older studies, such as Conroy and Khan (2009), less directly applicable. Their descriptive study of a biotechnology master's programme examined differences in the design of online internships based on generic and vocational learning outcomes, without directly comparing students' outcomes.

Handler et al. (2021) explored teamwork and leadership skills using pre- and post-surveys of public health students and preceptors. They found that online students, though still gaining teamwork and leadership skills, were less confident in team environments than their on-site peers. Park and Jones (2021) compared online and on-site internships in tourism, hospitality, and events management, considering generic and vocational learning from the perspectives of students and professional supervisors. The authors found that online internships can offer an "empowering learning experience" similar to on-site internships. However, students were divided on whether online internships prepared them for employment as effectively as on-site ones. Supervisors observed no clear difference in skills but could not evaluate professional appearance or public interaction. The authors concluded that site supervisors are crucial for student learning in both online and on-site internships.

2.2.3 Theoretical Engagement in Internship Research. Although studies on online internships do not always explicitly compare them to on-site internships, some relate their results to earlier findings on the on-site mode (AlGhamdi, 2022; Baker & Fitzpatrick, 2022). AlGhamdi (2022) noted that online internships for IT students offer advantages in developing skills such as self-discipline, self-learning, and time management. Baker and Fitzpatrick (2022) argued that online internships provide "similar benefits to in-person internships" for generic skills such as self-management and communication.

Nevertheless, only a few of the reviewed studies draw explicitly on theory or engage in theorising. None of the papers reviewed applied theory to guide data collection or analysis. Most papers refer to existing research primarily to provide background descriptions of the field. We identified three papers that engage more explicitly in theorising: AlGhamdi (2022), who developed and tested three hypotheses on student satisfaction with online internships, and Baker and Fitzpatrick (2022), together with Lavy and Rashkovits (2019), who contributed by abstracting data on students' internship experiences into categories, although these categories were not integrated with previous research.

In summary, while researchers generally agree that internships help students develop generic and vocational competencies, there is limited understanding of how online versus on-site internships influence students' perceptions of individual foundational competency development, particularly in IS. This gap limits the guidance researchers can offer to educators on this topic.

3. RESEARCH METHOD

This study investigates students' perceptions of IFC development using a qualitative, interpretive approach, which assumes that reality is constructed through human interpretations and shared meanings (Walsham, 1995). This premise underpins our approach: to understand how students themselves make sense of their IFC development rather than trying to measure it objectively. We therefore analysed students' self-evaluation reports using reflexive thematic analysis (Braun & Clarke, 2006, 2022), a method that aligns with this assumption by acknowledging the researchers' active role in interpreting the data.

3.1 Research and Education Environment

This research was conducted at Örebro University, a mid-sized Swedish university, within its Information Systems Department. The department is part of the university's School of Business and offers a bachelor's programme in IS development. Throughout this programme, students develop their ability to identify, analyse, and solve problems related to digitalisation. A key component is a one-semester (20-week) systems development project (SDP) internship, typically completed with 1–2 peers in the final semester, which enables students to apply and extend knowledge and skills from earlier modules. By this point, they have completed 20 weeks of programming and 20 weeks of systems development methods. Each student team works on projects initiated by a host organisation. These projects are often undertaken in collaboration with a consulting firm and external clients, or directly with a client organisation that has a specific need. Each team has both an academic and a professional supervisor. The academic supervisor provides overarching support in integrating academic assignments with practical work, while the professional supervisor, based in the host organisation, offers practical guidance.

Before 2020, most project work and supervision took place on-site at host organisations. In Spring 2020, however, the COVID-19 pandemic forced most activities online, with students unable to meet each other or their supervisors in person. However, the type of system development projects students undertook did not change, which made it possible and relevant for us to compare students who participated in the SDP module on-site and online.

3.2 Data Collection

In this study, we draw on qualitative data from students' written self-evaluation reports (Kusnic & Finley, 1993). Self-reported data could be criticised as subjective and biased. Here, however, such subjectivity was considered an asset because the focus was on students' perceptions, and the reports were not graded, making

strategic bias unlikely. All students submitted their reports in the final week of the SDP module. The instructions specified that the self-reflections were to be 500–1,000 words, which most submissions followed, often leaning towards the upper end of this range. Students were instructed to discuss their "personal learning experiences" and write freely, without guiding questions or explicit prompts on specific competencies. This open-ended approach aimed to encourage reflection on individual learning while avoiding standard course-review feedback.

We collected the reports from the university's repository after the 2020 SDP semester, which, in the Swedish context, means using public documents. To ensure comparability, we selected reports from two consecutive years in which the SDP module followed the same curriculum structure. The main difference between these student groups was the internship mode: on-site in 2019 and online in 2020. In total, the selection comprised 61 reports: 33 from 2019 and 28 from 2020.

3.3 Data Analysis

We conducted a reflexive thematic analysis (Braun & Clarke, 2022) of the collected self-evaluation reports. Our focus was on identifying themes based on latent meanings in the students' writing rather than adopting a semantic, line-by-line approach to the analysis (Braun & Clarke, 2021a). We chose this method to let our understanding of the SDP course inform how we interpreted students' competency development as we coded the data to identify patterns and generate themes. Because the self-evaluation reports were written as part of the course, they assumed researcher familiarity with the course. Such familiarity was crucial, as the data existed prior to the study and additional clarifying data could not be collected.

We did not use "coding reliability" measures, such as inter-rater reliability or quantitative counts of codes, as such measures are not relevant in reflexive thematic analysis, where researchers actively interpret underlying meanings and multiple interpretations are possible (Braun & Clarke, 2021b; Finlay, 2021; O'Connor & Joffe, 2020). Two researchers conducted the analysis: the first author initiated the process, and the second author joined in the later phase of theme review after becoming familiar with the data (see below). This collaborative approach strengthened our reflexivity and supported a more multifaceted understanding of the material (Braun & Clarke, 2021a). The two researchers had different levels of prior experience with the course: the first author had taught it for over 15 years, while the second had only a few semesters of experience. This created an opportunity to combine the more experienced teacher's initial analysis with an additional, informed yet slightly more distanced perspective. We found this combination helpful for the thematic analysis, as it supported critical questioning and strengthened the credibility of our work.

Although our analysis was primarily inductive, it was informed by the IS2020 model curriculum (Leidig & Salmela, 2021), focusing on three IFCs: problem-solving, lifelong learning and development, and high tolerance for ambiguity. These competencies provided an initial frame for coding and guided our iterative theme construction. As Braun et al. (2019) noted, the flexibility of thematic analysis is a significant strength, and such combined analytical approaches are common. This framing helped us stay focused on the three IFCs while allowing the self-evaluation reports to guide theme development, supporting a comprehensive capture of perceived competency development. We used a tailored version of Braun and Clarke's (2022) reflexive thematic analysis, and our analytical process followed seven recursive phases as follows.

Phase 1: Familiarising ourselves with the dataset. We read each self-evaluation report several times to gain an initial understanding of the students' thought processes and lessons learnt. We made informal notes to capture spontaneous reflections without a set structure, maintaining an open-minded approach at the start of the analysis (Braun et al., 2019).

Phase 2: Coding. We reread the self-evaluation reports to generate initial codes, using NVivo to manage, organise, and present our qualitative data. As noted above, our coding was at a latent level (Braun & Clarke, 2006), focusing on interpreting the meaning behind students' expressions rather than scanning for specific phrases or counting terms. During this initial coding phase, we fully coded each self-evaluation report without moving between reports. This approach enabled us to understand the discussed aspects within the context of each student's perspective on other elements, prioritising coherence in the analysis.

In practice, we associated data extracts with one or more initial codes, as shown in Figure 1. For example, we assigned the codes "Avoidance of asking others" and "Feeling less competent" to the data extract: "In the beginning, I was quite afraid to ask for help because I didn't want others to perceive me as less competent at programming. I've since learnt that my fellow students felt the same way initially" [On-site 15]. The data extract "I realised early on that it is very important to be 100% transparent in what you understand, and what you do not understand. Only then can you really learn" [On-site 28] was coded as "Honest learning communication."

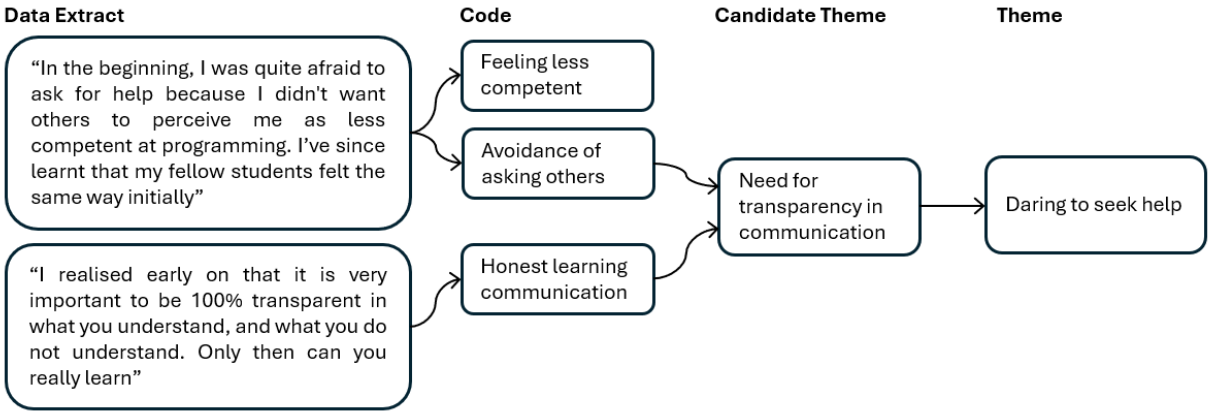


Figure 1. Example of Our Coding Process

We iterated extensively during this phase, focusing on capturing all potentially relevant aspects rather than forcing data into a "best" code. Thus, the coding was conducted as an organic and flexible process, through which approximately 200 initial codes gradually developed across the dataset. At this stage, we also received external feedback from research peers through a conference presentation based on the pre-theme analysis (Petersson, 2021).

Phase 3: Generating initial themes. Using the initial codes related to the IFCs, we identified shared meanings across the dataset. Through iteration, we refined codes and their associations, merging some codes and splitting others. This process led to the development of candidate themes based on recurring patterns. For example, as shown in Figure 1, the previously mentioned codes "Avoidance of asking others" and "Honest learning communication" contributed to the candidate theme "Need for transparency in communication."

Phase 4: Developing and reviewing themes. We reviewed candidate themes and the current classification of statements using NVivo. Our goal was to assess whether the statements within each candidate theme formed a coherent pattern and could be used to "tell a coherent, insightful story about the data in relation to the research question" (Braun et al., 2019) — in our case, focusing on students' perspectives on their development of IFCs. Throughout this review, we aimed to ensure internal homogeneity and external heterogeneity (Patton, 1990), confirming that all student statements within a theme had a clear and meaningful connection to the theme's core, and that differences between themes were clearly distinct and recognisable (Braun & Clarke, 2006). This process led to the identification of sub-themes for certain candidate themes. Sub-themes helped explore each theme's boundaries, identify overlaps between themes, and clarify theme nuances (e.g., various aspects of themes related to encountering change). As this type of thematic analysis is inherently iterative, this phase recurred multiple times. An example of a theme revision concerned how the candidate theme "Importance of recognising the limitations of others" was reinterpreted as an aspect of "Trusting One's Own Knowledge", rather than being treated as a theme in its own right (see Section 4.2.1). Overall, our aim was to maintain a consistent level of conceptual granularity when discussing different IFCs.

Phase 5: Refining, defining, and naming themes. We selected a set of themes to convey an authentic and coherent narrative about the development of the competencies under study. For example, as shown in Figure 1, the candidate theme "Need for transparency in communication" was renamed and redefined as "Daring to seek help." This renaming was necessary because all testimonies initially categorised under "Need for transparency in communication" described situations in which students hesitated to ask for help despite feeling that they needed it. We chose the new theme name because it more accurately reflected the central concept organising the theme's statements. Returning to the earlier example, the renamed theme encapsulates the importance of being transparent about areas of uncertainty and having the courage to take action (that is, asking for help). During this phase, we also decided to forgo the sub-themes mentioned earlier, as we felt it necessary to tell the whole story at a single level for comparability.

Phase 6: Comparing themes from the two student groups. We included this phase to tailor our thematic analysis to the comparative focus of the study's research question. Using our "set of fully worked-out themes" (Braun & Clarke, 2006), we compared insights from both the on-site and online student cohorts. This involved examining each IFC and comparing themes across semesters. For example, in the lifelong learning and development competency, we identified differences associated with the theme labelled "Daring to seek help" (see Section 4.2.2).

Phase 7: Writing up. This phase was crucial for expressing and illustrating the themes (see Section 4) as part of manuscript preparation. The phase further triggered iterations back to Phases 4 and 5 with theme revisions as a result. Braun and Clarke (2022) describe this as a natural consequence of authors seeking analytical clarity when presenting findings to readers, transitioning "into a more 'public' domain." It also involved developing a set of hypotheses based on comparisons between themes, representing a second way in which we tailored the thematic analysis. The reasons for doing so were twofold: first, the concrete form of hypotheses contributes to qualitative theorising by facilitating the transfer of results to other contexts (Eisenhardt, 1989); second, it underscores that our findings are exploratory while also providing a basis for future research to test them.

4. RESULTS

In this section, we present the study's results by describing the six themes developed during the analysis. Figure 2 provides an overview of how the IFCs and themes are related, and the presentation is structured around the IFCs. The figure also shows how the themes map onto the hypotheses developed in Section 5.

4.1 Problem-Solving

During the analysis, we identified two themes related to the IFC of problem-solving. These themes concern collaboration with other students and the relationship with professional tutors, as shown in Figure 2.

4.1.1 Theme: Collaborative Problem-Solving. The collaborative problem-solving theme highlights the perceived need for, and benefits of joint problem-solving. At its core, it shows that IS students place high value on opportunities to work together, seeing it as central to learning. We found no differences between the perceptions of online and on-site students regarding this theme. Students from both modes emphasised that working together during an internship is even more important than in regular courses. As the quotes below illustrate, collaborative problem-solving offers a valued opportunity to discuss and test ideas.

> *I have always thought I work better alone, but this semester has changed my view on group work. I have realised the value of being able to try out ideas on someone else and to look at a problem from more than one perspective. [Online 11]*

In our data, students describe benefits of collaborative problem-solving as both advancing their work and enhancing their learning. Moreover, the process requires students to argue and explain—in essence, creating circumstances that demand argumentation and explanation.

> *I have developed my ability to explain my thoughts on a potential solution to a problem. Since we encountered some problems in our development process, there were some brainstorming situations where both [my partner and I] had to try to find solutions and communicate them in a way that the other [understood]. [On-site 19]*

However, our data also highlighted certain negative perceptions of collaborative problem-solving. Allocating time to it can reduce opportunities to evaluate the efficacy of one's own ideas. The data also suggest that students place a high value on problem-solving conducted independently.

> *I have learnt that I can do much more than I think in programming and that I can actually solve problems independently. This has made me more confident in my own ability to solve problems, which has given me more confidence in my own competence as a developer. [Online 9]*

Thus, we identify the ability to address and successfully solve problems as a critical means of developing confidence in one's problem-solving skills.

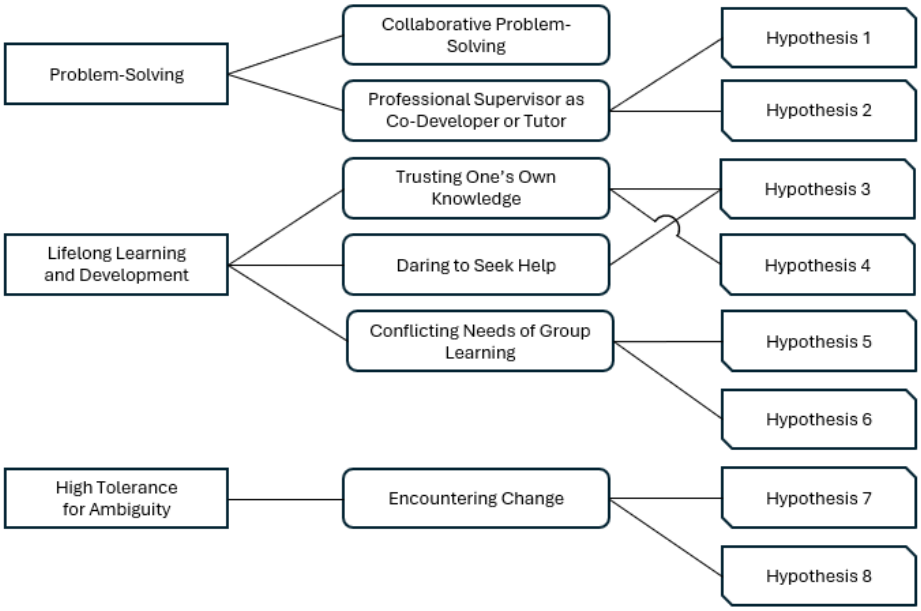


Figure 2. Overview of Individual Foundational Competencies, Themes, and Developed Hypotheses

4.1.2 Theme: Professional Supervisor as Co-Developer or Tutor. The second theme related to problem-solving competence concerns differences in students' views of the professional supervisor's role. Here, the pattern is clearly dichotomous and linked to the internship mode. IS students in on-site internships describe their supervisors as co-developing colleagues involved in problem-solving and direct assistance. In contrast, online students portray the supervisor as more of a tutor who provides general guidance and direction. A prominent pattern in the data is that on-site students see a lack of supervisor competence and/or limited access as problematic, hindering both project progress and IFC development.

> *In previous workplaces, I have received a lot of training or had to walk next to a person to whom I could ask questions all the time. I had probably expected a little more support and*

> *help from supervisors, but it turned out that most things you have to find out and learn yourself. [On-site 32]*

However, for the online students who, as mentioned earlier, hold a tutor-oriented view of the supervisor, this perception differs. They do not see the lack of tutor support as equally problematic and sometimes even regard it as an advantage:

> *As I have carried out the work on my own, without help from colleagues or supervisors, I have learnt that I can do more than I think. I do not need to take help from others to come up with a good solution. Of course, there have been times when certain lines of code or decisions have been discussed, but in the end, I have argued why I have made that decision. [Online 33]*

Like the on-site students, this group also acknowledges that better access to professional supervisors could facilitate further advancement of their projects, yet they still recognise benefits in the current situation.

> *One problem that could arise was that our supervisors were not always available […], so you had to learn to search for information yourself. One can imagine this is something you also have to do later in working life. [Online 7]*

Consequently, the online students indicate that they derive a sense of value from having to solve problems independently of the professional supervisor.

4.2 Lifelong Learning and Development

We developed three themes related to the competency of lifelong learning and development. They address students' self-perceptions, help-seeking, and group learning.

4.2.1 Theme: Trusting One's Own Knowledge. The core of the first theme, trusting one's own knowledge, centres on believing that one's knowledge is sufficient. The theme shows a pattern of students expressing uncertainty about their competence. Students from both groups describe their initial internship experiences as overwhelming, accompanied by feelings commonly associated with imposter syndrome. They feel they should know more, that "everyone else" knows more, and they experience pressure to maintain appearances. Our analysis indicates that testimonies from both groups are consistent regarding this experience. However, initial doubts and feelings of inadequacy are more pronounced among the on-site students.

> *During the first few weeks of the project, it felt difficult to get into programming and learning a new language; I felt stupid and like I wasn't good enough. [On-site 6]*

Another pattern in the data suggests that on-site internships provide more frequent, earlier, and direct opportunities for students to realise that their (basic) level of understanding is often sufficient as a starting point.

> *Without a doubt, the most important thing I have learnt about myself during this project is that I can learn what I do not know. [Online 24]*

Although students in both groups describe this lack of self-confidence as a temporary stage, they view it as a phase that constrains overall learning, for example, due to hesitation in seeking guidance from others. Instead, students try to solve problems on their own, which in hindsight feels like unnecessary effort.

> *I wish I had dared to ask more questions and take more space in the beginning. Then, I think my learning curve would have been more upward from the beginning. [On-site 67]*

Another aspect of this theme involves accepting one's own knowledge, regardless of what other students seem to know. For example, accepting that there will sometimes be students who "know more about everything" [Online 1] and understanding that it is acceptable to be a less skilled developer in a group of peers.

> *I've tried to emulate her, tried to make myself appear better by bragging about the things I'm good at, and sometimes I've just given up and lost interest completely [...] But during the final stage of the project, I started to realise that I shouldn't compare myself to her at all. [Online 1]*

Thus, this aspect of trusting one's own knowledge during an internship concerns understanding and accepting that there are inevitable areas of weakness within one's professional expertise. It also involves recognising that the same applies to both peer students and professionals.

> *I have also learnt during this semester that even those who have worked for several years are very uncertain in programming and that the development in this profession is so fast that you cannot know everything. [On-site 6]*

Ultimately, it is about realising that this is a normal situation in everyday working life as a professional developer.

4.2.2 Theme: Daring to Seek Help. The second theme, daring to seek help, emphasises the importance of transparent communication. Here, students stress the need for fearless and honest dialogue, with a key aspect being the courage to ask questions. This pattern appears more pronounced among online students, who find it more difficult to ask for help. As with the earlier themes on this IFC, there is a close connection between the courage to ask and the ability to trust one's own knowledge.

> *I have also learnt that it is extremely important to be honest with the people you work with about what you do and do not understand. It may very well be that you pretend that you understand everything and have an overview, but you don't really understand, but you don't want to show it to avoid appearing "stupid." [Online 28]*

The reluctance to ask questions or request help stems from a fear of revealing misconceptions or gaps in knowledge. This fear applies not only to professional supervisors but also to fellow students.

> *Afterwards, I wish I had taken more help from my project partner as he had much more experience in programming. [Online 20]*

The significance of seeking assistance lies in the notion that input from both professionals and fellow students is essential for learning during the internship. Feedback from professional supervisors primarily concerns the learning of the "craft" and subject-specific areas such as technology and software development methods. In contrast, feedback from peers tends to focus more on the development of general skills, including communication, cooperation, active listening, and engaging with diverse perspectives.

4.2.3 Theme: Conflicting Needs of Group Learning. The third theme, conflicting needs of group learning, concerns the dynamics of peer interaction during project work. As with collaborative problem-solving in Section 4.1.1, this theme addresses collaboration, but here the emphasis is on the learning aspect of working together. The core idea is that project complexity creates a need for collaborative learning and problem-

solving. Differences appear between internship modes: the on-site setting seems to involve a lower desire or need for collaborative work. While on-site students highlight the need for group work, they place greater emphasis on individual work than the online students.

Both groups perceive this as different from earlier courses, where dividing tasks between team members was often effective, but this approach is considered infeasible within the SDP module.

> *Had I alone had to tackle the bumps that we have encountered during the process, it would have been harder and more stressful for me. But since there were two of us tackling these obstacles, it felt more motivating when we were in the situation together. [On-site 19]*

Another aspect of this theme, noted by online students, is that the aforementioned project complexity is seen as a key argument against collaborative learning, largely because of the added pressure to deliver results.

> *However, the product owners were clear at the outset about what they expected […] The consequences of this have been that I mostly focused on just getting things done, getting the task done as quickly as possible to keep the estimates, and perhaps didn't take the time to think about how to get the code as optimal as possible and become a more skilled programmer. [Online 6]*

Contrary to their individual preferences, the students must accept that the situation requires dividing tasks, meaning that each group member must follow a separate learning path.

4.3 High Tolerance for Ambiguity

The third and final IFC we analyse is a high tolerance for ambiguity. This part of the analysis develops a single theme, centred on how students perceive and respond to change.

4.3.1 Theme: Encountering Change. The encountering change theme focuses on how students facing shifting project conditions describe their view of change. Here, our analysis highlights a clear difference between the two internship modes. Online students speak more explicitly about the value of experiencing and managing major change. While on-site students do not express an opposing view, such experiences are far less prominent in their accounts.

The central pattern in this theme is that students who encounter major project changes tend to express a more nuanced and positive attitude towards change itself. This is particularly the case when the change is perceived to have been well managed by the host organisation. Examples of major changes include disruptive events such as team member departures, changes in the client organisation, and unexpected changes in internship conditions.

> *If this hadn't happened [the COVID-19 pandemic], we would certainly have come further in the project and learnt more, as we would have had easier access to help and feedback. But I think that, as a group, we made the best of the situation. It was a good exercise in adapting to different situations and an opportunity to practise working remotely. [Online 3]*

Statements like the previous one are central to this theme. Online students report that their projects work well despite experiencing a disruptive transition from on-site to online work. Notably, they state that the experience is positive because it is experienced as contributing to readiness for future situations of uncertainty and change. Another interesting aspect is the experienced consequences of less supervisor support.

> *During the spring, the coronavirus had a global outbreak, which contributed to extra and unexpected challenges [...] Now, we got to practise working more independently and making*

> *many decisions on our own as we were not as prioritised by the client anymore, which is still a good experience for my future working life. The fact that we got to work so independently meant that I learnt to take greater responsibility and be more orderly. [Online 10]*

The view exemplified by the student above recurs in the data: the reduced supervision caused by the unexpected shift to online mode is perceived positively. Students describe their ability to cope with change as increasing not despite but because of the reduced support from professional supervisors. Some on-site students with a more carefree project process also note that changes can be a helpful experience, although this pattern is less clearly articulated.

5. DISCUSSION

5.1 Implications for Research

Our study complements and extends the findings of previous studies that have compared on-site and online internship modes (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021). It contributes to theorising on how IS students perceive the development of IFCs in the two modes. This contribution is made in two steps. First, in the Results section, we developed a set of themes to understand how the two student groups perceived their IFC development. Second, in the following section, we take this theorising further by relating our themes to existing research and develop eight hypotheses. By comparing results from both modes, we examined similarities as well as differences, paying attention to how these aspects are emphasised in each mode. We therefore propose pairs of hypotheses related to the IFCs. Each pair contains a contrasting hypothesis focusing on the differences between the modes and a general hypothesis that applies across the modes.

Our results support previous research findings showing that internships in both modes are perceived to help students develop IFCs (e.g., Baker & Fitzpatrick, 2022; Cameron et al., 2013; Hammoud et al., 2022; Lim & Mustafa, 2013; Saltz et al., 2013). In our study, we focused on IS students' perceptions of competency development rather than the actual competencies, which makes our findings comparable to AlGhamdi (2022) as well as Baker and Fitzpatrick (2022), who report positive student attitudes regarding satisfaction and experiences. We addressed three key IFCs for IS students: problem-solving, lifelong learning and development, and high tolerance for ambiguity. Building on the themes developed in Section 4, we take them a step further by combining them with existing research to develop a set of hypotheses. Figure 2 illustrates how the themes map onto the corresponding hypotheses.

Starting with problem-solving, we found that internships positively influence IS students' perceptions of this IFC. We developed two themes for this competency: collaborative problem-solving (Section 4.1.1) and professional supervisor as co-developer or tutor (Section 4.1.2). In the first theme, both student groups recognised the benefits of collaboration, which is consistent with expectations. However, the second theme highlighted an interesting contrast: on-site students viewed their professional supervisors as colleagues but were frustrated by insufficient support, which they described as hindering their learning. In contrast, online students found the lack of guidance less problematic, sometimes even positive. This suggests that the absence of physical proximity may contribute to stronger problem-solving competencies. Previous research (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021) has not specifically addressed this aspect of problem-solving in internships, although Park and Jones (2021) noted that online internships can offer an "empowering learning experience" similar to on-site ones. As shown in Section 4.1.2, we found that online students reported being more independent. This aligns with AlGhamdi (2022), who observed skill enhancement in online environments, even though problem-solving was not explicitly mentioned. These findings also align with Lavy and Rashkovits (2019), who highlighted that employers view internships as beneficial for students' creativity, a skill closely related to problem-solving.

Our finding that a lack of physical proximity is perceived to enhance problem-solving competencies is significant for IS internship research. It highlights the need to examine how professional supervisors' involvement shapes IS students' development of these skills. While Park and Jones (2021) and Maini et al. (2021) have shown that professional supervisors are important, our results suggest that too much operative

involvement may hinder students from becoming independent problem-solvers. Therefore, carefully balancing supervisor access is essential in both online and on-site internships. As shown in Figure 2, this underpins our first two closely related hypotheses:

Hypothesis 1 (Contrasting): Online internships provide IS students with professional supervisors who are less operationally involved than those in on-site internships.

Hypothesis 2 (General): IS students with less operationally involved professional supervisors during their internships develop stronger problem-solving skills than those with more operationally involved professional supervisors.

Continuing with students' perceptions of lifelong learning and development, we developed three themes related to this competency, two of which are trusting one's own knowledge (Section 4.2.1) and daring to seek help (Section 4.2.2). The former theme shows differences between online and on-site students regarding their knowledge-related self-images. While both student groups reported positive changes during the projects, on-site students perceived greater progress through daily interactions with professionals who openly discussed their varying levels of expertise. Online students, with fewer opportunities for such exchanges, tended to concentrate more on solving immediate problems in their contacts with professionals. We found that on-site students initially experienced stronger doubts about their abilities when working alongside professionals and peers. However, as our results indicate, these doubts were described as subsiding through frequent daily interactions with professionals. Previous research comparing online and on-site internships has not specifically addressed this competency (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021), though our findings align with Handler et al. (2021), who found that online students were less confident than their on-site peers. Park and Jones (2021) emphasised the importance of professional supervisors, a point our results further nuance by showing that students value interactions extending beyond task-related guidance.

We also observed a close connection between trusting one's own knowledge and the second theme, daring to seek help (Section 4.2.2), with online students finding it more difficult to ask for assistance. This suggests that online students were more hesitant to seek help. This hesitation may be interpreted as an attempt to hide perceived shortcomings, thereby prolonging self-doubt into later stages of the projects. As shown in Figure 2, these findings lead to the following hypotheses:

Hypothesis 3 (Contrasting): Online internships offer IS students fewer opportunities to understand professionals' attitudes towards knowledge gaps compared to on-site internships.

Hypothesis 4 (General): IS students who have fewer opportunities during their internships to understand professionals' attitudes towards lacking knowledge perceive weaker knowledge-related self-images than those who have such opportunities.

We found that IS students differed in how they valued learning methods within the lifelong learning and development IFC. As shown in the theme conflicting needs of group learning (Section 4.2.3), online students expressed greater appreciation for group learning than their on-site peers. One plausible reason is that online internships often involve more individual work and provide fewer opportunities to collaborate. This contrasts with previous research showing that peer interaction enhances learning (Kyndt et al., 2013; Springer et al., 1999). At the same time, we found no perceived differences in performance, consistent with Park and Jones (2021) and AlGhamdi (2022), who found that online internships promote self-learning. Because they had limited access to professionals and peers, the online students in our study valued collaborative opportunities more highly. In contrast, such opportunities formed part of the on-site students' routines, for example in Daily Scrums, a standard agile practice (Schwaber & Beedle, 2002). As shown in Figure 2, this leads us to the following hypotheses:

Hypothesis 5 (Contrasting): IS students in online internships place greater value on group learning than those in on-site internships.

Hypothesis 6 (General): IS students who have fewer opportunities for informal collaboration during their internships place greater value on group learning than those who have more frequent opportunities for informal collaboration.

Turning to the last IFC, developing high tolerance for ambiguity is crucial for IS students. While IS professionals must navigate ambiguity and incomplete information (Leidig & Salmela, 2021), this competency has rarely been examined in studies comparing online and on-site modes (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021) or in those focusing solely on online settings (AlGhamdi, 2022; Baker & Fitzpatrick, 2022). We captured this IFC in the theme encountering change (Section 4.3.1). Our results highlighted a key difference: on-site students described changing conditions as challenging, whereas online students felt more prepared for future ambiguities. This difference did not appear to be tied to internship mode but to the magnitude of the changes experienced. In our study, COVID-19 forced students who had planned to be on-site to begin their projects in a highly uncertain situation. They later perceived emerging issues as less serious, while on-site students regarded similar problems as more concerning. Notably, those who faced major changes early in their projects reported more positive experiences, suggesting that overcoming substantial change made later ones feel less daunting. As shown in Figure 2, this leads us to our final two hypotheses:

Hypothesis 7 (Contrasting): IS students in online and on-site internships do not differ in their development of tolerance for ambiguity.

Hypothesis 8 (General): IS students who experience unexpected changes early in their internships become more aware of the need to respond to change, rather than following a plan, compared to those who do not experience such changes early in their internships.

5.2 Implications for Practice

Our explorative study should be seen in the context of internships as a common way to meet industry needs in education (Billett, 2015). Therefore, our hypotheses may support educational practitioners, such as teachers designing IS curricula and professional supervisors involved in internships. They highlight key considerations for creating internship settings that cultivate problem-solving, lifelong learning and development, and a high tolerance for ambiguity in IS students, with design considerations differing between online and on-site modes. Thus, our hypotheses also serve as a basis for a set of guidelines.

Our first two hypotheses suggest that a certain threshold of access to professional supervisors enhances IS students' problem-solving competencies, and this threshold is naturally higher in online internships. However, as online internships reduce student visibility, providing effective communication tools for interaction with supervisors is essential. We therefore suggest the following guideline:

Guideline 1: Teachers and supervisors implementing internships should structure access to supervisors in order to encourage IS students to apply the problem-solving models they have learnt and attempt their own solutions, thereby avoiding premature intervention.

Furthermore, our results suggest that access to professionals is important for developing lifelong learning and development competencies. Our third and fourth hypotheses indicate that students benefit from seeing that professionals also experience knowledge gaps. On-site internships naturally support such benchmarking, helping students gauge their knowledge in relation to professionals. In contrast, this is more difficult in online settings. Such benchmarking access differs from access to professional supervisors for solving practical problems. This led us to our second guideline:

Guideline 2: Teachers and supervisors implementing online internships should enable IS students to socialise and discuss their roles, projects, and topics beyond problem-solving, thereby providing benchmarking opportunities similar to those in on-site internships.

Finally, preparing IS students for ambiguity is important (Leidig & Salmela, 2022). As discussed above, we found no clear difference between online and on-site settings regarding ambiguity. In line with the eighth hypothesis, early exposure to ambiguity and change during internships appears beneficial, and students should not be "protected" due to inexperience. Instead, organisations should communicate changes—such as evolving user requirements—openly in projects involving IS students, which led to our third guideline:

Guideline 3: Teachers and supervisors implementing internships should expose IS students to early ambiguity and change inherent in projects.

5.3 Rigour, Limitations, and Future Research

We assessed the trustworthiness of our study using four established criteria for qualitative research (Guba & Lincoln, 1989; Lincoln & Guba, 1985): credibility, transferability, dependability, and confirmability. Although these criteria have served to strengthen the rigour of our study during the research process, the study still has certain limitations in each area.

5.3.1 Credibility. Credibility refers to the confidence that can be placed in the "truth value" of our findings (Guba & Lincoln, 1989). The developed themes are based on our interpretive engagement with the students' self-evaluation reports. As noted in the method section, the two authors had different levels of prior experience with the course. According to Lincoln and Guba (1985), credibility can be strengthened through prolonged engagement with the context and peer debriefing, in which a peer examines and reflects on the researcher's interpretations. In our case, the first author's long-standing experience teaching the course provided deep contextual understanding, while the second author's more limited prior experience brought a more distanced perspective and supported critical questioning. We consider this interplay between familiarity and distance to have supported the credibility of our analysis. One limitation is the challenge of fully articulating any interpretative frame explicitly, although we have placed importance on explaining our interpretations in Section 4.

5.3.2 Transferability. Transferability refers to the extent to which findings from one study may be applicable in other contexts, a judgement that ultimately rests with the reader rather than the researcher (Guba & Lincoln, 1989). To strengthen the basis for transferability, we have sought to provide so-called "thick descriptions" (Lincoln & Guba, 1985), that is, descriptions of our data that are as rich as permitted by the space limitations. Anyone drawing on our results should consider the specific context of an IS bachelor's degree at a European business school, and that we studied IS internships specifically designed as SDPs, which constitute only one of the many ways in which IS students' internships can be organised. Furthermore, the 2020 cohort experienced emergency remote internships due to COVID-19, a particular instance of online internships that should be considered when interpreting the results. Finally, it is important to stress that, as our research question focused on IS students' perceptions, we examined perceived rather than objectively measured competencies.

5.3.3 Dependability. Dependability relates to the consistency and stability of our results (Guba & Lincoln, 1989). Given that reflexive thematic analysis is interpretive by nature, we do not claim that other researchers would necessarily arrive at the same interpretations or produce the same themes. Rather, the approach acknowledges that different researchers may construct different, yet equally valid, accounts of the data (Braun & Clarke, 2022). However, as Collingridge and Gantt (2008) note, dependability (which they refer to as reliability) within qualitative research emphasises maintaining consistent quality in the findings rather than achieving identical results. Furthermore, our use of NVivo provided a structured record of coding and analytic decisions, which serves as an audit trail and supports the dependability of the analysis (Lincoln & Guba, 1985). Accordingly, it has been essential to present a transparent description of both the data analysis process and the analysis itself.

5.3.4 Confirmability. Confirmability refers to the degree to which findings are shaped by participants rather than researcher bias or preferences (Guba & Lincoln, 1989). In reflexive thematic analysis, the researcher's active role in theme development is acknowledged and made transparent, meaning that findings are not expected to be free from researcher influence, but rather to be transparent and traceable, and well-grounded in the data. While our understanding of the SDP course informed our interpretations, we followed well-established procedures to reduce the risk of systematic bias. In this respect, the documentation of our coding process in NVivo enhanced confirmability by allowing us to trace how

interpretations were grounded in the data and contributed to dependability by making our analytical process transparent and open to review. Peer debriefing, as described above (Lincoln & Guba, 1985), further helped us critically examine these interpretations.

Taken together, these four criteria underscore both the strengths and limitations of our study. Building on this assessment, future research opportunities abound. At the top of the agenda is empirical testing of our hypotheses. Comparative studies could test them in varied contexts and examine the role of context in developing IFCs, thereby supporting moves towards analytical generalisability. Moreover, as existing studies comparing online and on-site internships have focused on generic skills (Conroy & Khan, 2009; Handler et al., 2021; Park & Jones, 2021), future research could complement knowledge of students' perceptions with understanding of actual competency development.

6. CONCLUSIONS

This study explored differences and similarities in how information systems (IS) students perceive the development of their individual foundational competencies (IFCs) during on-site and online internships. We conducted a reflexive thematic analysis of written student self-evaluation reports from an internship course delivered in both modes. Drawing on our empirical findings and previous research, we propose eight hypotheses to clarify these findings and contribute to theorising how IS students perceive the development of IFCs in internship settings. Our analysis highlights three key differences between the two modes:

- IS students perceive that online internships can support their problem-solving development, as less immediate access to professional supervisors encourages greater independence.
- IS students' knowledge self-images develop through regular benchmarking with professionals, which is less frequent in the online mode.
- IS students in online internships value group learning more than those in on-site internships.

7. REFERENCES

AlGhamdi, R. A. (2022). Virtual Internship During the Covid-19 Pandemic: Exploring IT Students Satisfaction. *Education + Training*, 64(3), 329-346. https://doi.org/10.1108/ET-12-2020-0363

Baker, I., & Fitzpatrick, D. (2022). Student Experiences in Pre-COVID Virtual Internships: Integration, Barriers, Motivation Challenges, Supportive Supervisors, and Intern Growth. *American Journal of Distance Education*, 36(2), 90-102. https://doi.org/10.1080/08923647.2022.2034399

Bay, J. L. (2021). Beyond Situated Learning: Rethinking Internship Theory and Practice in the Distributed Workplace. In M. J. Klein (Ed.), *Effective Teaching of Technical Communication: Theory, Practice, and Application*. WAC Clearinghouse. https://doi.org/10.37514/TPC-B.2020.1121.2.01

Beard, D. F. (2007). Assessment of Internship Experiences and Accounting Core Competencies. *Accounting Education*, 16(2), 207-220. https://doi.org/10.1080/09639280701234625

Billett, S. (2015). *Integrating Practice-Based Experiences With Higher Education*. Springer. https://doi.org/10.1007/978-94-017-7230-3

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021a). Can I Use TA? Should I Use TA? Should I Not Use TA? Comparing Reflexive Thematic Analysis and Other Pattern-Based Qualitative Analytic Approaches. *Counselling & Psychotherapy Research*, 21(1), 37-47. https://doi.org/10.1002/capr.12360

Braun, V., & Clarke, V. (2021b). One Size Fits All? What Counts as Quality Practice in (Reflexive) Thematic Analysis? *Qualitative Research in Psychology*, 18(3), 328-352. https://doi.org/10.1080/14780887.2020.1769238

Braun, V., & Clarke, V. (2022). *Thematic Analysis: A Practical Guide*. SAGE. https://doi.org/10.53841/bpsqmip.2022.1.33.46

Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic Analysis. In P. Liamputtong (Ed.), *Handbook of Research Methods in Health Social Sciences* (pp. 843-860). Springer Singapore. https://doi.org/10.1007/978-981-10-5251-4_103

Briant, S., & Crowther, P. (2020). Reimagining Internships Through Online Experiences: Multidisciplinary Engagement for Creative Industries Students. *International Journal of Work-Integrated Learning*, 21(5), 617-628.

Cameron, C., Freudenberg, B., & Brimble, M. (2013). Making Economics Real–The Economics Internship. *International Review of Economics Education*, 13, 10-25. https://doi.org/10.1016/j.iree.2013.04.011

Chaffer, C., & Webb, J. (2017). An Evaluation of Competency Development in Accounting Trainees. *Accounting Education*, 26(5-6), 431-458. https://doi.org/10.1080/09639284.2017.1286602

Clear, T. (2010). A Place for Learning Agreements in Capstone Computing Courses? *ACM Inroads*, 1(4), 10-11. https://doi.org/10.1145/1869746.1869749

Collingridge, D. S., & Gantt, E. E. (2008). The Quality of Qualitative Research. *American Journal of Medical Quality*, 23(5), 389-395. https://doi.org/10.1177/1062860608320646

Conroy, R., & Khan, R. (2009). Integrating Virtual Internships Into Online Classrooms. *Journal of Commercial Biotechnology*, 15(2), 97-112. https://doi.org/10.1057/jcb.2008.35

Cummings, J., & Janicki, T. N. (2020). What Skills Do Students Need? A Multi-Year Study of IT/IS Knowledge and Skills in Demand by Employers. *Journal of Information Systems Education*, 31(3), 208-217.

Deloitte. (2022). *Operationalize Remote Work: Five Steps to Manage Tax and Business Risks*. https://www.deloitte.com/global/en/services/tax/research/global-tax-remote-work-survey.html

Divine, R., Miller, R., Wilson, J. H., & Linrud, J. (2008). Key Philosophical Decisions to Consider When Designing an Internship Program. *Journal of Management and Marketing Research*, 2(1), 1-8.

Eddy, N. (2022). IT Industry Outlook 2023: Trends Likely to Impact the Industry and Tech Pros. *InformationWeek*. https://www.informationweek.com/it-life/it-industry-outlook-2023-trends-likely-to-impact-the-industry-and-tech-pros

Eisenhardt, K. M. (1989). Building Theories From Case Study Research. *The Academy of Management Review*, 14(4), 532-550. https://doi.org/10.2307/258557

Faisal, N., Chadhar, M., Stranieri, A., & Gorris-Hunter, A. (2021). Rethinking IS Graduates Work-Readiness: Employers' Perspectives. In *Proceedings of the 27th Americas Conference on Information Systems* (AMCIS 2021).

Finlay, L. (2021). Thematic Analysis: The 'Good', the 'Bad' and the 'Ugly'. *European Journal for Qualitative Research in Psychotherapy*, 14, 1-19. https://doi.org/10.24377/EJQRP.article3062

Franks, P. C., & Oliver, G. C. (2012). Experiential Learning and International Collaboration Opportunities: Virtual Internships. *Library Review*, 61(4), 272-285. https://doi.org/10.1108/00242531211267572

Guba, E. G., & Lincoln, Y. S. (1989). *Fourth Generation Evaluation*. Sage.

Hammoud, R., ElGarah, W., & Bouarich, B. (2022). Internship in the Time of COVID-19. *Communications of the Association for Information Systems*, 50, Article 12. https://doi.org/10.17705/1CAIS.05012

Handler, A., Greenleaf, R., Bozlak, C. T., Moerchen, V., Pizur-Barnekow, K., San Miguel, C., Sappenfield, O., & Masini, G. (2021). Learning From Graduate and Undergraduate Public Health Virtual Internship Experiences With State Title V Agencies During COVID-19, Summer 2020. *Maternal and Child Health Journal*, 26, 229-239. https://doi.org/10.1007/s10995-021-03278-1

Howell, P., & Aryal, A. (2024). IS Capstone Course Design: Quasi-Internships Using Harvard Business Cases. *Journal of Information Systems Education*, 35(1), 14-24. https://doi.org/10.62273/MJVL6063

Jackson, D. (2014). Factors Influencing Job Attainment in Recent Bachelor Graduates: Evidence From Australia. *Higher Education*, 68(1), 135-153. https://doi.org/10.1007/s10734-013-9696-7

Jeske, D., & Axtell, C. (2014). E-Internships: Prevalence, Characteristics, and Role of Student Perspectives. *Internet Research*, 24(4), 457-473. https://doi.org/10.1108/IntR-11-2012-0226

KPMG. (2022). *Current Trends in Remote Working: Work From Anywhere*. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2022/04/current-trends-in-remote-working-04-2022.pdf

Kusnic, E., & Finley, M. L. (1993). Student Self-Evaluation: An Introduction and Rationale. *New Directions for Teaching and Learning*, 56, 5-14. https://doi.org/10.1002/tl.37219935603

Kyndt, E., Raes, E., Lismont, B., Timmers, F., Cascallar, E., & Dochy, F. (2013). A Meta-Analysis of the Effects of Face-to-Face Cooperative Learning. Do Recent Studies Falsify or Verify Earlier Findings? *Educational Research Review*, 10, 133-149. https://doi.org/10.1016/j.edurev.2013.02.002

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press. https://doi.org/10.1017/CBO9780511815355

Lavy, I., & Rashkovits, R. (2019). Engaging Information Systems Students in a Practicum-Based Project: Employers' Perceptions and Comparison. *International Journal of Information and Communication Technology Education*, 15(1), 67-82. https://doi.org/10.4018/IJICTE.2019010105

Leidig, P., Ferguson, R., & Reynolds, J. (2019). IS2010: A Retrospective Review and Recommendation. *Journal of Information Systems Education*, 30(4), 298-302.

Leidig, P., & Salmela, H. (2021). *IS2020: A Competency Model for Undergraduate Programs in Information Systems*. The Joint ACM/AIS IS 2020 Task Force; Association for Computing Machinery & Association for Information Systems. https://doi.org/10.1145/3460863

Leidig, P., & Salmela, H. (2022). The ACM/AIS IS2020 Competency Model for Undergraduate Programs in Information Systems: A Joint ACM/AIS Task Force Report. *Communications of the Association for Information Systems*, 50, 470-480. https://doi.org/10.17705/1CAIS.05021

Light, R. J. (2001). *Making the Most of College: Students Speak Their Minds*. Harvard University Press. https://doi.org/10.4159/9780674417502

Lim, H.-E., & Mustafa, M. M. (2013). Effectiveness of Industrial Training in Improving Students' Generic Skills. *International Journal of Business and Society*, 14(3), 368-375.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Sage Publications. https://doi.org/10.1016/0147-1767(85)90062-8

MacDonald, K., Cameron, C., Brimble, M., & English, D. (2014). Realizing the Professional Within: The Effect of Work Integrated Learning. *Asia-Pacific Journal of Cooperative Education*, 15(2), 159-178.

Maini, R., Sachdeva, S., & Kaur Mann, G. (2021). Unveiling Business School Interns' Satisfaction Toward Online Summer Internship Program Amid COVID-19. *Higher Education, Skills and Work-Based Learning*, 11(5), 1210-1223. https://doi.org/10.1108/HESWBL-10-2020-0226

Matthee, M., & Turpin, M. (2019). Teaching Critical Thinking, Problem Solving, and Design Thinking: Preparing IS Students for the Future. *Journal of Information Systems Education*, 30(4), 242-252.

Mearian, L. (2023). IT Leads Industries in Remote Jobs. *Computerworld*. https://www.computerworld.com/article/3685232/it-leads-industries-in-remote-jobs.html

Mia, R., Zahid, A. H., Dev Nath, B. C., & Hoque, A. S. M. L. (2020). A Conceptual Design of Virtual Internship System to Benchmark Software Development Skills in a Blended Learning Environment. *The 23rd International Conference on Computer and Information Technology (ICCIT)* (pp. 1-6). https://doi.org/10.1109/ICCIT51783.2020.9392670

O'Connor, C., & Joffe, H. (2020). Intercoder Reliability in Qualitative Research: Debates and Practical Guidelines. *International Journal of Qualitative Methods*, 19. https://doi.org/10.1177/1609406919899220

Park, M., & Jones, T. (2021). Going Virtual: The Impact of COVID-19 on Internships in Tourism, Events, and Hospitality Education. *Journal of Hospitality & Tourism Education*, 33(3), 176-193. https://doi.org/10.1080/10963758.2021.1907198

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd ed.). SAGE.

Petersson, J. (2021). Student Perception of Learning During On-Site and Online Internships. In *Proceedings of the 20th European Conference on e-Learning* (ECEL 2021).

Saltz, J., Serva, M. A., & Heckman, R. (2013). The Get Immersion Experience: A New Model for Leveraging the Synergies Between Industry and Academia. *Journal of Information Systems Education*, 24(2), 121-131.

Schuster, L., & Glavas, C. (2017). Exploring the Dimensions of Electronic Work Integrated Learning (eWIL). *Educational Research Review*, 21, 55-66. https://doi.org/10.1016/j.edurev.2017.04.001

Schwaber, K., & Beedle, M. (2002). *Agile Software Development With Scrum*. Prentice Hall. http://catalog.hathitrust.org/api/volumes/oclc/48241360.html

Springer, L., Stanne, M. E., & Donovan, S. S. (1999). Effects of Small-Group Learning on Undergraduates in Science, Mathematics, Engineering and Technology: A Meta-Analysis. *Review of Educational Research*, 69(1), 21-52. https://doi.org/10.3102/00346543069001021

Stefanidis, A., Fizgerlad, G., & Counsell, S. (2013). IS Curriculum Career Tracks: A UK Study. *Education + Training*, 55(3), 220-233. https://doi.org/10.1108/00400911311309297

Topi, H. (2019). Reflections on the Current State and Future of Information Systems Education. *Journal of Information Systems Education*, 30(1), 1-9.

Topi, H., Karsten, H., Brown, S. A., Carvalho, J. A., Donnellan, B., Shen, J., Benard CY, T., & Thouin, M. F. (2017). MSIS 2016 Global Competency Model for Graduate Degree Programs in Information Systems. *Communications of the Association for Information Systems*, 40, Article 18. https://doi.org/10.17705/1CAIS.04018

Topi, H., Valacich, J., Wright, R., Kaiser, K., Nunamaker, J., Sipior, J., & de Vreede, G. J. (2010). IS 2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems. *Communications of the Association for Information Systems*, 26, 359-428. https://doi.org/10.17705/1CAIS.02618

Walsham, G. (1995). The Emergence of Interpretivism in IS Research. *Information Systems Research*, 6(4), 376-394. https://doi.org/10.1287/isre.6.4.376

Weick, K. E. (1995). What Theory Is Not, Theorizing Is. *Administrative Science Quarterly*, 40(3), 371-384. https://doi.org/10.2307/2393789

Westfall, R. D. (1999). Meta-Skills in Information Systems Education. *Journal of Computer Information Systems*, 40(2), 69-74. https://doi.org/10.1080/08874417.1999.11647441

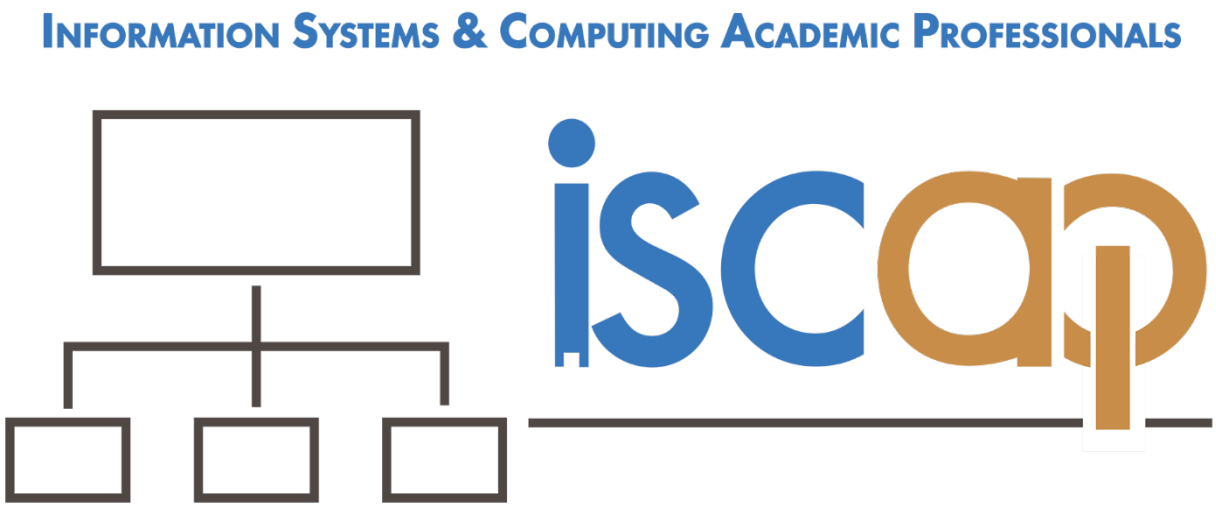
AUTHOR BIOGRAPHIES

Johan Petersson is an Assistant Professor of Information Systems at Örebro University in Sweden, where he is affiliated with the Center for Empirical Research on Information Systems. He received his Ph.D. from the Department of Management and Engineering (IEI) at Linköping University, Sweden. His research interests include information security, electronic commerce, and pedagogy in information systems education, with a particular emphasis on student-centred learning. He is the chair of the Swedish Information Systems Academy (SISA) Educational Committee. Together with his colleagues, he was awarded the SISA Educational Prize in 2023 for his work on student-centred pedagogy in programming education.



Fredrik Karlsson is a Professor of Information Systems and Dean of the Faculty of Business, Science and Engineering at Örebro University in Sweden, where he is affiliated with the Center for Empirical Research on Information Systems and the AI, Robotics, and Cybersecurity Center. He has been awarded the title of Excellent Teacher. He received his Ph.D. from the Department of Computer and Information Science at Linköping University, Sweden. His research interests include information security management, software development practices, requirements engineering, and situational method engineering. He has published in *Computers & Security*, *European Journal of Information Systems*, *Government Information Quarterly*, *Information & Management*, *Information and Software Technology*, *Journal of the Association for Information Systems*, and *Journal of Strategic Information Systems*.





STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the ***Journal of Information Systems Education*** have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©2026 by the Information Systems & Computing Academic Professionals, Inc. (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to the Editor-in-Chief, ***Journal of Information Systems Education***, editor@jise.org.

ISSN: 2574-3872 (Online) 1055-3096 (Print)