

Communication to strengthen connectivity for integration across learning sites: Teachers' purposes and approaches

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The study investigated teachers' purposes and approaches to communication for connectivity and integration of learning, informed by two research questions which examined teachers' approaches to connecting with those responsible for students' learning and integration when they are in the workplace; and what outcomes teachers expected to achieve through such communication. An online survey was completed by 95 vocational education and training (VET) teachers from Queensland, Australia, and the Canton of Ticino, Switzerland. The findings show that teachers are well-connected and achieve multiple purposes when communicating with industry supervisors. Their main purposes of communication are to coordinate and cooperate to improve arrangements for students' learning, and to a lesser extent, to co-construct curricula. Communication to co-design learning activities and scenarios would further enhance the connectivity and integration. This research contributes to a gap in literature on teachers' purposes for communicating for connectivity and integration of learning.

Keywords: Integration, connectivity, communication, work-integrated learning

The physical and social settings in educational institutions and workplaces have been adapted for work-integrated learning (WIL), enabling students to complete academic outcomes and to prepare for employment. Researchers (see Billett, 2004; Fuller et al., 2005; Fuller & Unwin, 2003) concur that students are presented with a multiplicity of learning opportunities when placed in workplaces to gain authentic experiences and supplement what is covered in the curriculum experienced in educational institutions. However, their placement alone is not sufficient. Martin et al. (2012) assert that WIL needs to be "woven through the entire fabric of a program of study as an assessed activity, threading the theoretical knowledge and learning outcomes with an understanding of professional practice and expectations, and the competencies necessary to be successful" (p. 24). This implies that integration needs to be a two-way activity. Securing an architecture for WIL demands effective partnerships to design meaningful and quality experiences for students (Henderson & Trede, 2017), embedded in the everyday business operations of the workplace. Tynjälä (2008) argued that workplaces differ widely in how they support learning, explaining that each has different working cultures; people of different ages, skills, roles, and educational and professional backgrounds; and short- and long-term priorities. Affordances for learning are apportioned, prioritised, and contested differently for workers and for students (Billett, 2014a), making it necessary for teachers (from schools, VET institutions and universities) and other agents from educational institutions, to negotiate distinctive opportunities and affordances for students to optimise experiential learning in practice settings. According to Tynjälä, when key actors hold a collective view of learning across sites, they tend to share a common interpretation of how individuals interpret teaching and learning. This shared understanding allows for a considered approach to facilitating students' learning. Choy and Sappa (2016) maintained that effective communication for collaboration and cooperation between teachers, company trainers/supervisors, and employers underpins co-design and implementation of a connective curriculum for WIL. They recommended an ongoing dialogic process to maintain continuity.

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Tanggaard (2007) suggested that teachers can clarify distinct practices at each site and considerations for ways students can be directed to negotiate the strangeness, familiarity, and legitimacy of practices.

Students' engagement in everyday work assists in developing knowledge, skills, attributes, and understandings about becoming a productive worker if they are adequately supported and encouraged to contribute. Their learning is achieved through collaborative efforts of workers and students and is facilitated through individual agency and the affordances (material, social, and opportunistic) made available to them (Billett, 2014a; Smith, 2018). Importantly, students need to maintain social connectedness and trust for mutual knowledge exchange and to secure support for learning and integration. Their placement in the workplace contributes to mutual gains in terms of individual, group, and organisational learning. Students contribute to work functions by sharing their theoretical knowledge, industry skills, and prior experience (Martin et al., 2012). Over time, they develop personal and professional attributes to become productive and active members of the work community, if adequately supported and encouraged to contribute. Part of becoming a productive worker requires students to connect and integrate what they learn in the different settings. We interpret connectivity as the ability to connect the curriculum that is enacted and experienced in educational institutions and in workplaces. However, connectivity on its own is not sufficient: students also need to integrate what they learn by assimilating experiences from the two sets of curricula. This highlights the role of educational institutions and workplaces in appropriating spaces for learning and integration (Aarkrog, 2005; Schaap et al., 2012). The efficacies of such collaborations are premised on the purposes and quality of communication between teachers and workplace supervisors. However, little is known about teachers' communication practices to facilitate WIL.

The investigation reported in this paper aimed to understand vocational education and training (VET) teachers' approaches and purposes of communication, and the types of outcomes they achieved. The study was informed by two research questions: how do teachers connect with those responsible for students' learning and integration when they are in the workplace and what outcomes do teachers expect to achieve through such communication. The paper is set out as follows: First, we explain why collaboration and communication between actors in education and workplace settings are particularly important for learning and integration. We then draw on Gessler's (2017) four levels of collaboration (initial status of coordinateness, coordination, cooperation, and co-construction) as a conceptual framework to understand teachers' communication. Gessler contends that collaboration between educational institutions and workplaces has not reached full potential and calls for more research to understand this phenomenon. Next, a brief description of the Australian and Swiss VET systems and arrangements for students' experiential learning informs the context for the studies in these nations. Then, we explain the methodology of the study, followed by a summary of the findings and discussions.

Collaboration and Communication for Integration of Learning

Workplaces and educational institutions enact different practices, values, structures, and power relations. Their norms, affordances, and provisions present dissimilarly though complementary sets of learning experiences. Tanggaard (2007) argued that different traditions and social practices in these sites give rise to variations in theoretical and practical interpretations that broaden the nature of participation, subjectivity, and identity. Students are generally more familiar with the traditions and practices of their educational institutions but need also to learn and understand the similarities and differences between traditions, practices, tasks, and situations in workplaces. They are expected to contribute to practices where "many activities at work require collaboration with other people, and

each person's ability to function successfully depends on the performance of several individuals" (Tynjälä, 2008, p. 132). Accordingly, their learning needs to be "enhanced in an adaptive and differentiated way" (Schaap et al., 2012, p. 111) by building on and scaffolding existing levels of thinking and working as they complete the curriculum. Rather than seeing learning in the two sites as separate, Fuller and Unwin (2004) argued that students need to engage in mutual commitments to combine, modify, and connect learning, and at the same time broaden their environments for expansive learning.

Typically, it is the teachers who regularly communicate and collaborate with workplace supervisors to ensure that students have access to opportunities and that they are adequately supported in learning work practices and rules – through appropriate guidance – so that they become active members of the work community. Needless to say, the vigour of activity will depend on students' agency and affordances available at the workplace (Billett, 2014a). Wesselink et al. (2010) cautioned that a mismatch between conceptions of learning in the workplace and poor communication about mutual responsibilities tends to constrain the level of connectivity. In their study, teachers and workplace supervisors expected more input from each other about work tasks that were important for students in order to fulfil the requirements of the formal curriculum. Wesselink and his colleagues recommended co-construction of the curriculum, with joint decisions about components that are taught and learnt in the educational institution and in the workplace. They suggested three key considerations:

1. Clear agreements should be formulated on which learning or working activities should take place in which setting.
2. The stakeholders should be made aware of each other's views on workplace learning.
3. The stakeholders should share each other's expectations concerning mutual responsibilities, and which roles the teacher and workplace training supervisor should fulfil in this learning process (Wesselink et al., 2010, p. 36).

Griffiths and Guile (2003) argued that regular communication for collaboration and cooperation are necessary for four kinds of practices that support students' learning and integration: (a) Thinking-guided by particular procedures and social practices, and facilitated by dialogic processes and argumentation; (b) Dialogic inquiry-working with more experienced others and using appropriate tools to respond to problems; (c) Boundary crossing-engaging in different contexts to experience a range of horizontal development; (d) Resituating knowledge and skills-transitioning from general heuristics to new perspectives. For these four practices, Tanggaard (2007) recommended a structured plan of learning, co-designed by students, teachers, and workplace supervisors. She advised that too much boundary crossing may distract students from full participation, and furthermore, that students will need additional guidance and correct interpretations when they are confronted with new and complex ideas and situations. Krause and Stark (2010) suggested provision of elaborate feedback to encourage deeper levels of reflection. These propositions necessitate close cooperation between educational institutions and workplaces to create appropriate environments and opportunities for students' learning. Indeed, students appreciate teachers' efforts in negotiating arrangements for their learning in the workplace, as was noted in the study by Sappa et al. (2018).

A multitude of cultural and historical factors underpin collaborations between educational institutions and workplaces, hence effective collaborations take time and effort. Gonon (2014) suggested that readiness of companies to conduct training-despite the risk that a trained apprentice will leave the company-is an essential premise. Readiness to conduct training depends on the training culture at the workplace. A culture based on integrative pedagogy models (Tynjälä, 2008) will stimulate teachers to

appreciate the value in collaborating with companies. In this respect, teachers have to understand learning as a bidirectional and intercontextual process that is premised on opportunities for students to actively participate in authentic work instead of simply “doing practice” in a realistic simulated setting (Billett, 2004; Gurtner et al., 2018). Along these lines, Tynjälä (2008) recommended a transformation in the culture to make integrative learning more effective.

Conceptualizing Communication Between Educational and Workplace Settings

As argued thus far, the success of VET is premised on collaborating and interacting and sharing obligations through genuine partnerships. In this paper we consider communication between educational and workplace settings as a social and interpersonal practice involving individuals from different locations. More specifically, our study concerns collaboration and communication between teachers and those responsible for students’ learning in the workplace (i.e., company trainers or supervisors).

Various researchers (e.g., Euler, 2004; Gessler, 2017; Griffiths & Guile, 2003; Maroy & Doray, 2001) have proposed models that represent and explain collaboration between learning settings. Henderson and Trede (2017) proposed a collaborative governance framework to establish commitment, shared understanding, and trust building. Euler (2004), for instance, reported three levels of possible collaboration, hierarchically ordered. The first level refers to the exchange of information when needed. This level implies exchange that is neither regular nor formalized. The second level indicates a negotiated agreement oriented to achieve a shared aim. A co-designed curriculum where reciprocal roles and responsibilities are indicated is an example of a negotiated agreement. The third level refers to an actual cooperation between teachers and trainers that is framed in a formalized agreement and actualized in their daily practices. This level of cooperation demands reciprocal and continuous support in favor of students’ learning.

Gessler (2017), who approached collaboration as a developmental framework, proposed an alternative model that we adopted as the main framework of our study. His model is based on four different levels of collaboration that are conceptualized in a hierarchical and interrelated way. The first level, initial status of coordinateness between educational institutions and workplace settings, refers to a general and generic partnership that does not imply any personal or direct communications and relationships between actors. This phase of collaboration forms a foundation for deeper collaboration necessary to formalize arrangements for learning. In some cases, this level may be initiated by teachers, but would also involve the agreement of senior managers or decision-makers about the overall scope of the partnership. Their role becomes more pronounced at the coordination level. Teachers become the connective agents, acting as “boundary spanners” (Williams, 2002) to liaise with local actors (e.g., enterprises, workplaces, communities), establish relations, and negotiate training arrangements for students. Harris et al. (2005) argued that these boundary spanners need to be the “right” people: that is, as representatives of educational institutions, teachers need to consider not just students’ learning, but also the everyday business priorities and operations around which negotiated sets of learning opportunities are afforded to students so that they too contribute to productivity in the workplace.

The second level, coordination, involves communication for information exchange to reinforce reciprocal knowledge for the organization of activities, or to collaboratively solve problems. Gessler (2017) distinguished between corrective coordination and expansive coordination. Corrective coordination is intended as “on demand” to address learning or behavioral issues; expansive coordination includes formalizing processes to avoid common problems. This is through meetings and

visits by both parties to decide on reciprocal activities, to understand and agree on learning purposes and processes, as well as to assess students' competences. This form of coordination is similar to Euler's (2004) idea of exchange of information. The first two levels pertain mainly to operational aspects of connectivity. Coordination demands frequent communication for boundary spanners to move across the boundaries of learning settings.

Cooperation between actors represents the third level of collaboration that implies reciprocal involvement in shared learning and teaching projects and activities. It may include review of reciprocal approaches to teach or to share a common view of the teaching-learning processes. That is, it requires timely opportunities for students to engage in tasks using the right tools, and appropriate situated communication that takes into account the peculiarities of particular sites. This level requires more active and project-oriented communication to agree on shared learning objectives and spaces. Tynjälä (2008) recommended Guile and Griffiths' (2001) connective model for such cooperation, where collaborations lead to the development of "polycontextual and connective skills which enable 'boundary crossing' by students, that is, the ability to work in changing new contexts" (p. 144). She further suggested cooperation to agree on and enact integrative pedagogies (integration of theory, practice, and self-regulation). Teachers therefore need to communicate regularly to redesign and renegotiate arrangements for students' learning, importantly with input from the student as well. Essentially, teachers, students, and workplace supervisors need to have a shared view of learning and aims to achieve outcomes during student placement (Virolainen, 2006; Virtanen & Tynjälä 2008). Andersson (2018) argued that a tripartite arrangement between teachers, workplace supervisors, and students is also important for formative and summative assessment.

Finally, Gessler (2017) described co-construction as the highest level of collaboration, which implies the development of integrated work processes and institutionalized joint working groups. At this level, boundaries between locations are mediated by creating hybrid settings or forming a team (a task force) assigned to achieve shared goals or to solve common problems. Gessler explained that this is mainly at an institutional level, under a formalized joint arrangement, where "boundaries between school and companies lose their relevance" (p. 181). Initial status of coordinateness requires fewer direct communications between the stakeholders, whereas collaborations for co-construction imply a shift from communicating between the boundaries of different locations to within a common space to achieve shared understandings and outcomes. Abeysekera (2006) implied that discussions for co-construction can illuminate the hidden curriculum in both settings, informing better designs for integrative pedagogies.

This literature review shows that direct and personal communication across the learning locations is necessary for connectivity and integration. All forms of collaboration aim to improve connectivity and integration of learning through better communication and cooperation processes and practices. Pylväs et al. (2018) promoted communication for strong connections between workplaces and education providers. However, there remains a deficit in research on how teachers communicate for connectivity.

The purpose of the study reported in this paper was to gain an understanding of teachers' purposes and approaches to communication with workplaces. The focus on VET teachers and on communication adds to the growing body of literature on connectivity and integration in WIL programs. Our interest was mostly in the second and third levels of collaboration (coordination and cooperation) proposed by Gessler (2017) because these contribute implicitly to integration of students' learning.

EMPIRICAL STUDY

The findings reported here follow on from earlier research (see Sappa et al., 2016) on understanding through a convenience sample of Swiss and Australian teachers' conceptions of connectivity. We report how and for what purposes Australian and Swiss teachers engaged in communication for connectivity. The intention was to explore approaches and purposes, not to compare the nations. However, we report on any variations between the national VET systems.

Australian VET System

The Australian vocational education and training sector offers qualifications and specific skill sets for all types of employment. The sector comprises a range of providers such as technical and further education (TAFE) institutes, adult and community education providers and agricultural colleges, private providers, community organisations, industry skill centres, and commercial and enterprise training providers. Some universities and schools also provide VET. The programs offered can include accredited or non-accredited courses that enable participants to enter the workforce for the first time, re-enter the workforce, train or retrain for new jobs, and upgrade existing skills. The curriculum is competency based, and delivery in most instances takes place through a dual training model—in educational institutions and workplaces (Smith, 2010). Apprenticeships and traineeships are a common feature of accredited VET curricula. These operate under a tripartite agreement between the apprentices and trainees, training providers, and employers or, in some cases, group training organisations (Knight, 2011).

Generally, students gain experiences through short-term placements in a single workplace, though they may also be rotated between sites to ensure a comprehensive complement of experiences that allow for the development of required competence. VET providers have very close reciprocal relations with local industry for skilling and employment. Teachers have overall responsibility (albeit some are supported by industry liaison officers) to monitor students' progress and, if needed, to make alternate arrangements with support from industry and employers (Harris et al., 2005). VET teachers also oversee the assessment process before students are deemed competent; hence, they need to ensure strong connectivity between what students learn in educational institutions and in workplaces. Fundamentally, teachers' approaches to communication for collaboration and cooperation set the foundations for successful partnerships, connectivity, and integration of learning in VET institutions and workplaces.

Swiss VET System

In Switzerland, VET pathways are particularly popular and well established. Around two thirds of students enroll in a VET program at the upper secondary level, following compulsory education at the lower secondary level. The main form of VET is the dual-track apprenticeship approach that combines part-time training at a host company and learning at a vocational school. Usually, apprentices spend two days a week at school and three days in the host company where they are trained under the supervision of expert employees (in-company trainers) who are qualified to provide on-the-job training. In addition to attending schools and workplaces, learners attend cross-company training which is arranged by trade associations. Students are provided with additional complementary skills which are difficult to secure in host companies during production demands and deadlines (State Secretariat for Education Research and Innovation, 2016).

Collaboration and communication between vocational schools and training companies are formally regulated at different levels. Since the reform in 2002 (Legge sulla formazione professionale (LFPr) [Federal Act on Vocational and Professional Education and Training], 2016, Art 16), the three learning sites are required to interact and collaborate for curriculum development, training implementation, and assessment. The curriculum defines exactly what each learning site must provide to collectively facilitate the intended learning goals (Hoeckel et al., 2009; LFPr 2016, Art 19). The assessment committee comprises teachers, company trainers, and representatives from professional associations. These arrangements suggest that collaborations between learning locations in Switzerland can be considered highly and centrally regulated at the macro, exo, and meso levels. At the micro-level, collaboration practices can be very heterogeneous. As reported by Sappa and Aprea (2014), some teachers are very engaged in supporting integrated learning while others lessen their investment in direct communication for collaboration and cooperation with company trainers because they consider a joint curriculum to be a sufficient precondition for integrated learning. Such an assumption by teachers could compromise the level of integration between what students learn in different sites.

METHOD

The study investigated teachers' approaches and aims for communicating to facilitate connectivity. More specifically, two research questions oriented the study:

- How do teachers connect with those responsible for students' learning and integration when they are in the workplace?
- What outcomes do teachers expect to achieve through such communication?

The investigation used a case study approach with two embedded cases (Australia and Switzerland).

Sample

A convenience sample of 95 teachers (71 Australian and 24 Swiss) were involved in the study. Participants were invited through key contacts in VET institutions in Queensland, Australia, and in the Canton of Ticino, the Italian-speaking part of Switzerland. This was a convenient sample accessed through networks of the authors. Only 3% of the total sample was female. This distribution was considered a fair representation of workers in the various occupations represented in the Australian and Swiss sub-samples. The respondents were aged between 20 and 60 years, with a majority (41%) aged between 46 and 60 years, while 28% were aged over 60 years. About 30% had less than 6 years' teaching experience, 34% had between 6 to 10 years' teaching experience, 18% had 10 to 20 years of experience, and 16% had more than 20 years' teaching experience. Collectively, they were considered to have sufficient length of experience to comment on approaches and purposes of communication.

The 71 Australian teachers who responded to the survey were from professional fields such as construction (7%), carpentry (18.3%), automotive (23.9%), engineering (25.4%), and electrical (12.7%). About 12.7% were grouped as representing other fields (i.e., other than those mentioned above). The 24 Swiss teachers were from art (4.2%), business and administration (16.7%), healthcare (20.8%), craft (20.8%), and industry (e.g., mechatronic and polymechanic; 25%). About 12% were grouped as other fields. Due to the convenience sampling procedure, we were not able to select teachers from similar professional fields in the two countries. Thus, analysis related to teachers' professional fields was conducted separately for the Australian and the Swiss sub-samples. Swiss teachers who participated in the research were involved in the initial apprenticeship courses in the Canton of Tessin. Australian teachers were involved in courses for apprentices, trainees, and other VET students.

Teachers involved in the study completed an online questionnaire using Lime Survey. The items in the survey were derived from in-depth interviews with teachers in Australia and Switzerland (Sappa et al., 2016). The purpose of the survey was to gain general insights into teachers' approaches and purposes for communication. Six aspects of communication between school teachers and company supervisors were explored through the survey items: (a) frequency ("How often do you communicate with company supervisors?"; Likert scale: 1=almost never to 6= almost every day), (b) mode ("How do you communicate with company supervisors?"; response options: by phone, in person, by email, by Skype, by text message), (c) purposes ("What are the purposes for communicating with workplace supervisors?"; response options as in Table 1), (d) perceived importance ("In your opinion how important is it for teachers to communicate with workplace supervisors?"; Likert scale: 1=not important at all to 6=very important), (e) difficulty ("In your opinion how difficult is it for teachers to communicate with workplace supervisors?"; Likert scale: 1=not difficult at all to 6=very difficult), and (f) how well informed teachers and workplace trainers were about students' learning in workplaces and VET institutions respectively (Likert scale: 1=not at all informed at all to 6=very well informed). As recommended by Chomeya (2010), we selected a six-point Likert scale to avoid the neutral point and to give participants a sufficiently wide range of possibilities.

The survey was piloted, and the wording adjusted to ensure consistent interpretations by Australian and Swiss participants. Ethical clearance for the study was obtained from Griffith University, the institution of the first author [GU ref no: 2016/878]

Responses to the survey were imported into the SPSS software to conduct descriptive analysis and to generate cross-tabulations and comparison of mean values. Responses about purposes for communication were categorized in terms of coordination and cooperation, using Gessler's (2017) framework. Demographic comparisons were conducted by using cross tabulation analysis, including the Chi-square calculation, when categorical data were considered. The one-way analysis of variance (ANOVA) was used when metrical data were considered.

FINDINGS AND DISCUSSION

About three quarters of the sample (74%) communicated with workplace supervisors who oversaw training for their students, mostly through face-to-face meetings or by telephone. Only rarely did teachers use email, Skype, or text messages. This implies that a direct mode of communication is favoured in interacting with workplace supervisors or trainers. While more Australian teachers communicated primarily by phone, (65.7 [AUST] vs 7.7 [CH]), their Swiss colleagues met face-to-face more frequently (34.7 [AUST] vs 84.6 [CH], $\chi^2 = 15.846$, $p < .001$). Some Australian teachers were supported by industry liaison officers, reducing the need for teachers to communicate frequently. Telephone conversations complemented teachers' regular site visits to observe students, to check whether they needed intervention to broaden access to specific learning experiences, and to moderate assessment. The frequency of communication by teachers varied from a few times a semester (34.8%) to once a month (25.8%) or less. Only 16.7% said they communicated once a semester. There was no significant difference regarding the mode of communication in terms of participants' age, professional field, or length of teaching experience.

Teachers were also asked to report how important and how difficult it is for them to communicate with workplace supervisors. They indicated their responses on a Likert scale ranging from 1 to 6 (e.g. Not important at all–Very important; Not at all difficult–Very difficult). Teachers considered communication to be very important ($M = 5.15$, $SD = 1.09$; 50% responded as 6) although not very easy

($M = 3.5$, $SD = 1.47$, 48.9% responded as 5 & 6). Communication was perceived as more important for Australian teachers than for their Swiss colleagues ($F(1,92) = 8.236$, $p = .005$). No differences were found by age, years of teaching experience, or professional field.

Specifically, Australian teachers were much more involved in communication across learning locations than were Swiss teachers (82% [AUST] vs 54% [CH], $\chi^2 = 7.073$, $p = .008$). We interpret this as a reflection of differences in levels of regulation in Switzerland and Australia. In Switzerland, collaboration between VET and workplace settings is intensely regulated at the macro level through joint development of the curricula. Thus, teachers' responsibility for integration is shared under a formalised arrangement. Their counterparts in Australia have overall responsibility to ensure that students achieve all their learning outcomes before being awarded a qualification by their training organisation. It is the teachers who oversee the pedagogical design of the enacted and engaged curriculum (Billett, 2014b) in the workplace, making it more connective for integration. No differences in responses were shown by age, years of teaching experience, or professional field.

The survey contained 12 purposes for communication with workplace supervisors; the participants were asked to indicate those that were relevant to them. They could select more than one purpose and also add others that were not listed in the survey. Their responses were analysed using Gessler's (2017) purposes for coordination and cooperation. Table 1 summarises the responses. The first column lists the purpose and the second indicates the percentage of responses from highest to lowest.

TABLE 1: Purposes of communication with workplace supervisors.

Purposes for communication	Percent ($n = 95$)
<i>Coordination</i>	
a) To discuss students' performance and ways teachers can help	83.6
b) To discuss specific problems apprentices have	77.6
c) To ensure we are delivering the most current and contextualised workplace learning to meet job and industry outcomes	67.7
d) To keep informed about what students are practising in the workplace	65.7
e) To inform workplace supervisors about what students are learning at the VET	58.2
f) To learn how supervisors and others in the workplace support students in learning on the job	49.0
<i>Cooperation</i>	
g) To update my own professional practice and currency	64.2
h) To confirm competency	56.8
i) To develop collaborative learning activities	40.0
j) To conduct assessment tasks	38.8
k) To adjust my teaching to the workplace requirements	38.3
l) To collaborate in designing learning scenarios	29.9

The majority of participants indicated communication for coordination. In particular, most common purposes related to "corrective coordination" (Gessler, 2017, p.180) aimed at discussing students'

performances (83.6%) and specific problems they encountered during their learning (77.6%). These interactions enabled teachers to monitor progress and negotiate any adjustments to ensure learning and integration met the requirements of the curriculum. Through these interactions, teachers monitored progress and negotiated any adjustments to ensure that learning and integration met the requirements of the curriculum. The frequencies also indicate that teachers are in regular contact with students.

A slightly lower percentage of teachers indicated expansive coordination through reciprocal knowledge exchange to achieve four aims: (a) ensure delivery of the most current and contextualised content that meets job and industry outcomes (67.7%); (b) keep informed about the currency and relevance of students' practices in the workplace (65.7%); (c) inform workplace supervisors about school learning (58.2%) and share a collective view of the curriculum (Tynjälä, 2008); and (d) learn and monitor how students are guided in the workplace (49%) and consider corrective coordination, for example, by reorganising learning in adaptive and differentiated ways (Baartman & Bruijn, 2011). Although more than half the respondents indicated their purposes of communication were for coordination, it seems expansive coordination is not fully exploited.

Referring to cooperation, almost two thirds (64.2%) of teachers communicated with company supervisors to update their vocational practices and to include more contemporary content for students. Many participants (56.8%) also mentioned discussions around assessment of students' performance to confirm competence. Surprisingly, only a small proportion of teachers (29.9%) referred to designing collaborative learning practices (i.e., learning activities and learning scenarios) to extend the scope of students' learning. It is not clear from the survey responses if other teachers felt current practices were adequate and there was not a need for collaborative learning practices.

Teachers in both countries interpreted and approached communication between education and workplaces in a comprehensive way. Generally speaking, the purposes of communication were consistent across nations despite differences in VET delivery models in the two nations. Indeed, as reported in Table 2, differences in responses from teachers from the two countries were noted only around three purposes.

TABLE 2: Differences in teachers' purposes for communicating with workplace supervisors.

Purposes	Australian teachers	Swiss teachers	χ^2 value	P value
a) To discuss students' performance and ways teachers can help	88.9%	61.5%	5.712,	.031
b) To inform workplace supervisors about what students are learning at the VET institute	72.2%	30.8%	8.184,	.005
c) To update their own professional practice and currency	88.9%	61.5%	7.831,	.005

Compared to the Swiss sample, a higher proportion of Australian teachers communicated to discuss students' performance and ways teachers could help; to inform workplace supervisors about what students are learning at the VET institute and design training plans; and to update their own

professional practice and currency. The Australian sample attributed greater importance to communicating with workplace supervisors to adjust teaching at the VET institute in order to align with workplace requirements. This approach demonstrates their intentions to align the curriculum to contemporary skills requirements rather than fulfilling only what is stipulated in the curriculum for a particular course. As such, teachers consider the enhanced, adaptive, and differentiated approach that Schaap et al. (2012) recommended. There was no difference in responses by age and years of teaching experience, though there was a difference by professional field. Referring to the Australian sub-sample, a higher percentage of teachers in the construction (75%) and carpentry (66.7%) fields responded to these purposes compared to their colleagues working in the engineering (37.2%) or electrical (10%) fields ($\chi^2 = 11.112$, $p = .049$). Swiss teachers working in the industry sector (e.g., mechatronic and polymechanic; 25%) reported communicating frequently with job supervisors to keep adequately updated about the profession, compared to teachers from other professional fields ($\chi^2 = 9.479$, $p = .050$). This is possibly because mechatronic and polymechanic engineering are professions that evolve very rapidly from a technological viewpoint. Hence, teachers need to be continuously updated so that they can guide their students when confronted with new and complex situations (Tanggaard, 2007).

Finally, the participants were asked to evaluate (on a scale ranging from 1 to 6) how well they were informed about exactly what their students learnt in the workplace and how well workplace supervisors were informed about what students learnt at the VET institute. Teachers reported medium levels of knowledge about what students do in the workplace ($M = 3.94$, $SD = 1.45$). This, together with about half the sample (49.0%) responding that they communicated to learn how supervisors and others in the workplace supported students with their learning, implies that more effort is needed for corrective coordination. Furthermore, teachers believed that supervisors in the workplace are less informed about learning in the VET institute ($M = 3.34$, $SD = 1.26$, $t = 4.028$, $p > .001$). This calls for more communication to achieve a shared understanding of the curriculum that is enacted and engaged in both learning sites, as recommended by Wesseling et al. (2010).

IMPLICATIONS

The findings suggest that communication for collaborations between education and workplace settings in both countries extends beyond simple coordination of learning arrangements. A higher level of cooperation is in fact achieved by direct and personal interactions and exchanges between people who are engaged daily with students' learning in the two locations. In the teachers' views, workplace supervisors need to be better informed about the curriculum that students complete in VET institutions. This finding suggests that higher investments are needed to reinforce reciprocal and bidirectional communication to favour integration of learning. Moreover, not as many teachers reported that they communicate for cooperation purposes, especially in terms of collaborative learning activities (40%) and designing learning scenarios (29.9%). Communication for cooperation seems to be related mainly to teachers' motivation and intent to be personally updated on new trends and practices in a particular professional field so they could adjust their teaching. This aim is certainly relevant for appraising the learning content for it to be more consistent and well aligned with what students experience in the workplace, and for employing appropriate teaching approaches to supplement what students learn in work sites.

However, collaborative learning activities would bridge support for students to integrate their learning across the educational and workplace settings. Further investments are needed to reinforce collaborative pedagogical practices. Moreover, integration could be further enhanced through reciprocal exchanges between teachers and workplace supervisors for co-construction (Gessler's fourth

level of collaboration) of a holistic and shared approach to learning and teaching across educational institutions and workplaces. Furthermore, discussions with workplace supervisors will inform teachers about how practices are structured and what is valued in particular settings. Teachers can then secure opportunities for students, brief them about the workplace practices and rules, and advise about agency to engage in a combination of routine and non-routine tasks, thereby extending the scope of activities that will broaden their experiences. Reciprocal knowledge exchange about what students learn is strongly advocated by Griffiths and Guile (2003) and Wesselink et al. (2010). Similarly, Sappa and Aprea (2014) contend that personal and direct exchange is necessary to be reciprocally informed about the situational and contextual experiences of students in different learning locations.

LIMITATIONS

While the findings reported here add to some understandings about teachers' approaches and purposes for communicating to strengthen connectivity across learning sites, we are aware of the limitations of the study. First, we did not investigate communication about expectations, roles, and responsibilities of students, supervisors, or other agents. There is no mention of dialogic inquiry, although it is assumed to take place during debriefings between teachers and their students. Furthermore, we did not explore whether teachers and workplace supervisors share common views about learning and assessment in the workplace. These aspects form a firm basis for further research. The study is also limited in explaining specific details such as how coordination and cooperation for connectivity enhance integration of learning by students. While teachers are communicating for coordination and cooperation mainly to improve arrangements for students' learning, more targeted engagement in designing learning activities and scenarios would further enhance connectivity and integration of the VET curriculum. Integration necessitates tripartite communication between teachers, workplace supervisors, and students. Further research to investigate workplace supervisors and students' viewpoints about communication for connectivity and integration of learning will also enrich understandings. We are also not sure if the proximity between the VET institute and workplaces influenced the mode and frequency of communication. Finally, the respondents were volunteers, and it is not known if non-volunteers held similar views. Regardless of these limitations, the study reported here gives some insights into communication to strengthen connectivity for integration across learning sites.

CONCLUSIONS

Our findings show that communication between teachers and workplace supervisors is well established in both countries. Teachers consider communication to be very important for connectivity purposes. Direct and frequent communication between teachers and workplace supervisors assists with realising two main purposes: coordination and cooperation (Gessler, 2017). Bidirectional communication for integration of learning in educational institutions and workplaces is evident where teachers are regularly engaged in reciprocal exchange. Given that educational achievements are a primary responsibility of teachers, they are expected to initiate communication with workplace supervisors. It seems that in the dual VET system responsibility is distributed. In the Swiss system for instance, there is distinct division of responsibilities. Curriculum, delivery, and assessment are regulated by different committees comprising teachers, company trainers, and representatives from professional associations. Even then, communication and collaboration can vary between institutions because some teachers for instance consider a joint curriculum to be a sufficient precondition for integrated learning (Sappa & Aprea, 2014).

Tynjälä (2008) advocated integrative and connective pedagogy through close partnerships between educational institutions and workplaces to agree on shared responsibilities and engaging more workplace supervisors. In this respect, collaborations for learning activities should be strongly encouraged for mutual benefits—integration of the institutional curriculum into the workplace and vice versa.

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