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Process operator students' abilities to assess OSH risks

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Background and objectives

- This study is part of a larger study focusing on workplace learning
  - Carried out in cooperation with process industry VET organizations (n=5) and companies (n=7), and other expert organizations
- The aim of this sub-study was to
  - Discover how well process operator students are able to identify and analyze OSH-related hazards and means to avoid or control related risks
- The differences a) between students and teachers and b) related to students' background are discussed

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Material and methods

- Risk assessment exercises (n=15) with observations and short interviews
  - For process operator students (n=35) in three VET organizations
    - All familiar with the assessment target (sheet mold and press or crushing room)
    - Age between 16 and 53 years, average: 23
    - The older students had more risk assessment and work experience than younger students
  - In groups one group at a time
    - Using pre-prepared checklist (28 items in five categories)
    - Hazard identification, magnitude of risk (on a scale from 1-3), actions to avoid or reduce risks
    - In the same group students either had been in the workplace learning or had not
  - For comparison teachers in each VET organization carried out the risk assessment as well
  - Descriptive statistics and qualitative analysis

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Results

Comparison between students and teachers		
Number of identified hazards		
	Students	Teachers
Hazard average (range)	13 (5–28)	24 (18–30)
Item average (range)	12 (5–20)	17 (14–20)
The students identified some hazards that the teachers did not identify and vice versa		
Magnitude of risk		
Same magnitude		44%
Students defined smaller magnitude		38%
Students defined greater magnitude		18%
Actions to control risks		
Mainly similar, teachers focused more on guidance, students on correct behavior		

The impact of students' background		
Age	**Younger students***	**Adult students***
Avg. nro of hazards per group	<10	Almost 20
Magnitude of risk	Mainly similar magnitudes	
Actions to control risks	No evident differences	
Familiarity with the target	**Worked in the target****	**Target introduced only**
Avg. nro of hazards per group	<10	Almost 20
* Younger students (18 years or under) with less workplace training or experience in work and risk assessment than adult students (over 18 years)		
** Mainly younger students, which may explain the result		

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Obvious hazards

Safe behavior, emergency situations

Specific situations

Accident hazards

Hinder work, safe behavior, emergency situations

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Results

The most obvious hazards:
easy to observe, occur more frequently, have severe consequences

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** Mainly younger students, which may explain the result		
Carrying out the risk assessment: Groups worked mainly well together, some groups more actively moved around in the target, tried out the machines and recalled how the work is carried out		
Students' experiences varied, some considered it more difficult than others, overall students viewed the exercise useful		

E.g. hazards related to working methods: hazards related to poor working postures, use of PPE's and safeguarding

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Comparison between students and teachers

Hazard identification

- All the students were able to identify at least some hazards
  - However, there was considerable variation between students in the number of identified hazards (range 5-28)
  - The most obvious hazards were most often identified
    - Hazards that are easy to observe, occur more frequently, have severe consequences
      - Accident and physical hazards (e.g. objects being dropped, noise)
    - On the other hand, too obvious hazards were not always documented
      - E.g. crushing fingers between the sheet press, (“no one would do it”)
    - Less often students identified e.g. hazards related to working methods
      - E.g. hazards related to poor working postures, use of PPE’s and safeguarding
- Teachers identified more hazards than students
  - The students identified some hazards that the teachers did not identify and vice versa
    - Students
      - Some of the hazards only students identified had already been assessed before, hence the teachers did not regard some of them
      - Many hazards were related to the way work is actually carried out, or emergency or exceptional situations
      - E.g. Safe working methods should be more strictly required, not all students knew how to act in an emergency situation and where to find alarm and rescue equipment, unexpected slow descent of the sheet press while opening the sheet press
    - Teachers identified several different types of hazards
      - Often related to some specific situation while students described related hazard only in general
      - E.g. falling from a ladder while opening the compressed air, local ventilation is not used because of the noise it makes
    - Teachers considered the work assignment as a process and described the hazards in more detail than students

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Comparison between students and teachers

Defining the magnitude of risks and actions to control risks

- Both students and teachers defined the magnitudes of risks for all hazards they identified
  - Only in the case of couple of hazards the groups had not remembered to define the magnitudes
- Students and teachers defined the same magnitude for half of the risks
  - Hazards from several categories, e.g. some accident hazards, physical hazards
- Students defined smaller or greater risks for the other half
  - Smaller e.g. for some accident hazards and greater for some hazards that hinder the work (e.g. noise and dust), or are related to safe behavior or emergency situations
- Actions to avoid or reduce risks were also almost always defined
  - Nevertheless, students more often had not defined control actions
    - For some hazards it was difficult to come up with actions
    - Some of the hazards were minor, which may explain why control actions were not defined
  - The actions students and teachers had defined were mainly similar
    - Teachers defined actions more versatile and detailed, students had good amendments
    - Teachers focused more on guidance, students on correct behavior
    - Sometimes students suggested already existing controls (mainly PPEs and safeguarding) as controls

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Impact of students' background

- Adult students with previous workplace training or experience in work and risk assessment were more capable of identifying a wide range of risks
  - Younger students identified same hazards that were in general most often identified
    - The most obvious hazards: easy to observe, occur more frequently, have severe consequences
- Both adult and younger students had defined mainly similar magnitudes of risks
  - There were some hazards for which younger students had defined smaller or higher risks but the data did not provide proper analyses for these comparisons
- In addition, both adult and young students equally often defined or not defined controls for risks
  - There where no evident differences in the type of suggested actions either
- Students to whom the assessment target had only been introduced identified more hazards than students who had worked in the target
  - Most of the students who had worked in the target were younger students, which may explain this result

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Carrying out the risk assessment

- Most of the groups identified the hazard and defined related magnitude of risk and control actions at the same time
  - Only some groups identified first all hazards and after that defined the magnitudes and actions
- Some of the groups moved around the assessment target more actively than others during the exercise
  - Some of the groups mainly stayed in one place and looked around the target
  - Some groups also tried out the equipment and recalled how the work was carried out
  - One risk would not have been identified if the students had not tried out the machines in practice
- Some groups automatically considered hazards originating from the surrounding work environment and all the people working in the target or nearby
  - For other groups this was not obvious and some asked whether these risks should be considered in the assessment
  - Some students asked whether they should assess only their own work or everyone working in the target
- Groups worked mainly well together
  - Sometimes the more experienced students or those chosen as secretaries lead the conversation
- Some hazards related to exceptional situations were identified in the assessments
  - However, the checklist guided the assessments and hazards were not looked outside the items included in the checklist
- The descriptions of the hazards were sometimes short, lacking detailed information of the hazard location and possible consequences
  - This may have made it more difficult to assess the magnitudes of the risks
- The magnitudes of the risks were quickly defined
  - The related discussions included considerations related to the prevalence of the hazards and probability of the risk, and sometimes but less often consequences of the risk and how acutely actions were required
- Control actions were also quite quickly defined and the groups usually were content with the first solution they came up with

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Students’ experiences in the exercise

- Students experiences in carrying out the risk assessment varied
  - Mainly those who were more familiar with the target considered it easy
  - Those less familiar with the target thought it would have been easier with more familiar target
  - Students considered the previous risk assessment experience useful
  - Some mentioned that if the target had been bigger, it would have been more difficult
- Many students considered it difficult to come up with actions to avoid or reduce the risk
  - Some thought it was easy once you had identified the hazard
- Defining the magnitude of risks was also often considered difficult
- Risk assessment is useful both before working in the target and after (or before workplace training and after)
  - It is useful to get to know the risks before starting the work
  - New risks will be identified when the target becomes more familiar
- The students discussed about differences between the VET organizations and workplaces during the exercise
  - In the workplace the risks seemed more real, even if they are same
  - Students pondered how similar risks would have been treated at workplaces

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Conclusions

- All the students were able to carry out the risk assessment
  - However, there was notable variation in the outcomes of the assessments between students
- In the comparison between students and teachers
  - The teachers' background knowledge could be seen in the assessments as wider perspective, more systematic approach and more detailed descriptions of hazards and control actions
  - Nevertheless, the students identified some hazards that the teachers did not identify and vice versa and students had some good amendments to control actions
- Adult students with previous workplace training or experience in work and risk assessment were more capable of identifying a wide range of risks

➢Students should be included in the risk assessments at the VET organizations and workplaces

➢Risk assessment requires related competence, which should be developed via theoretical and practical learning during different phases of VET