

## NEBHE-Problem Based Learning 4/4-Teacher

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### Introduction to the Role of the Teacher in the Learning Process Teacher as Supervisor of Learning

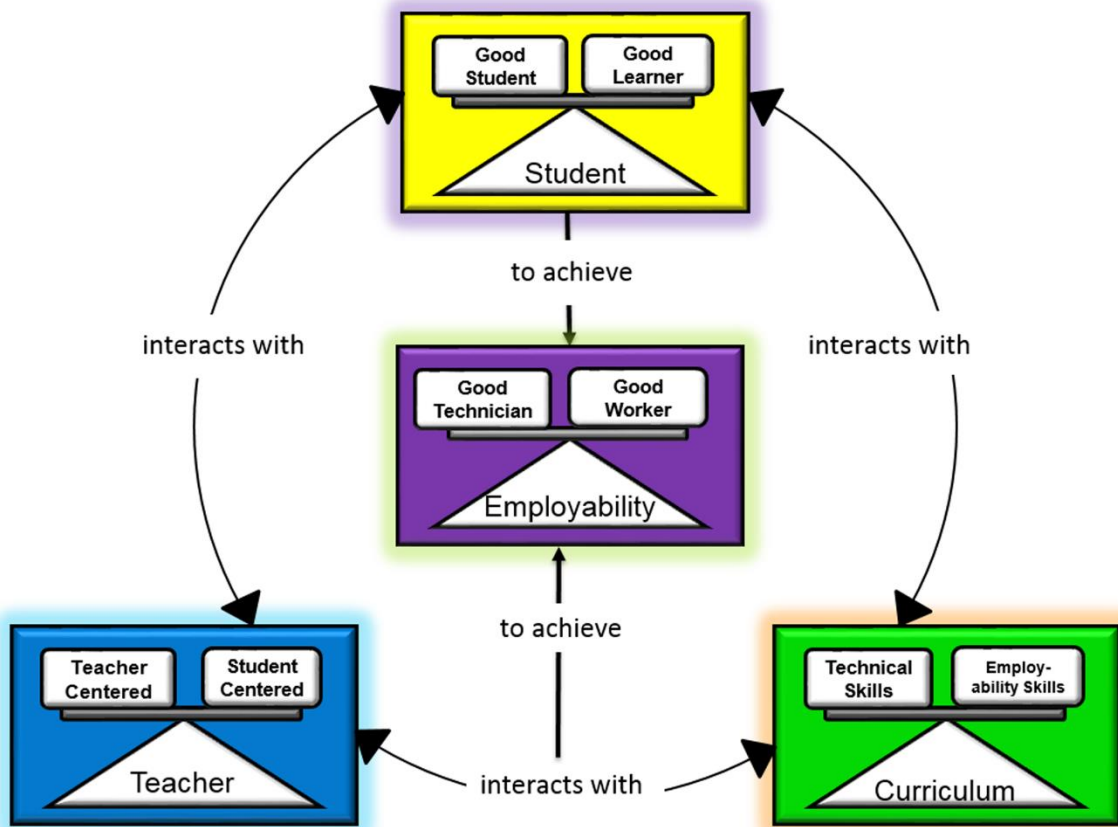


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## A Balanced Approach to Teaching a Manufacturing Course



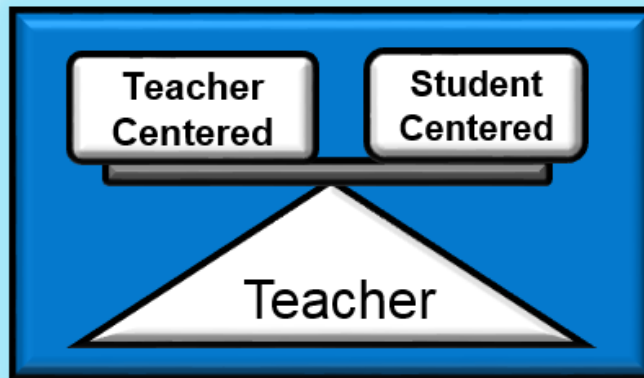
Sheckley, B.G. & Vallieres, K.M (2016)

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## A Balanced Approach to Teaching a Manufacturing Course: **The Role of the Teacher in the Learning Process**



Characteristics of student centered verses a teacher centered instruction

Teacher as Supervisor of Learning

Teacher as Supervisor of Learning

Providing Effective Constructive Feedback

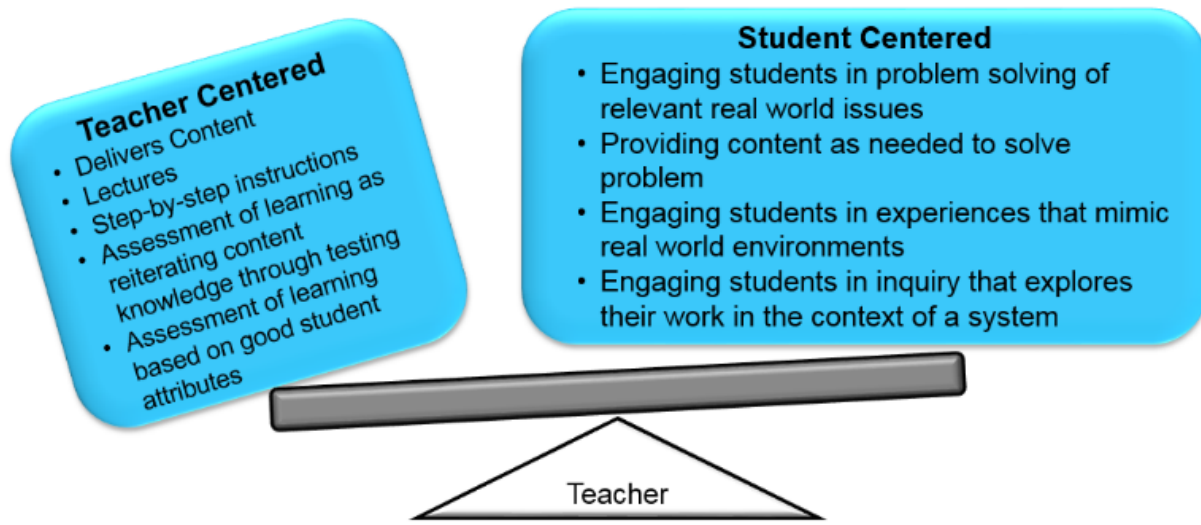
Objective: To develop and implement teaching practices that will improve students' ability to be good problem-based learners.

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## Supervising Learning



Teacher centered learning includes:

- Delivers Content
- Lectures
- Step-by-step instructions
- Assessment of learning as reiterating content knowledge through testing.
- Assessment of learning based on good student attributes.

Student centered learning includes:

- Engaging students in problem solving of relevant real world issues.
- Providing content as needed to solve problems.
- engaging students in experiences that mimic real world environments.
- Engaging students in inquiries that explore their work in the context of a system.

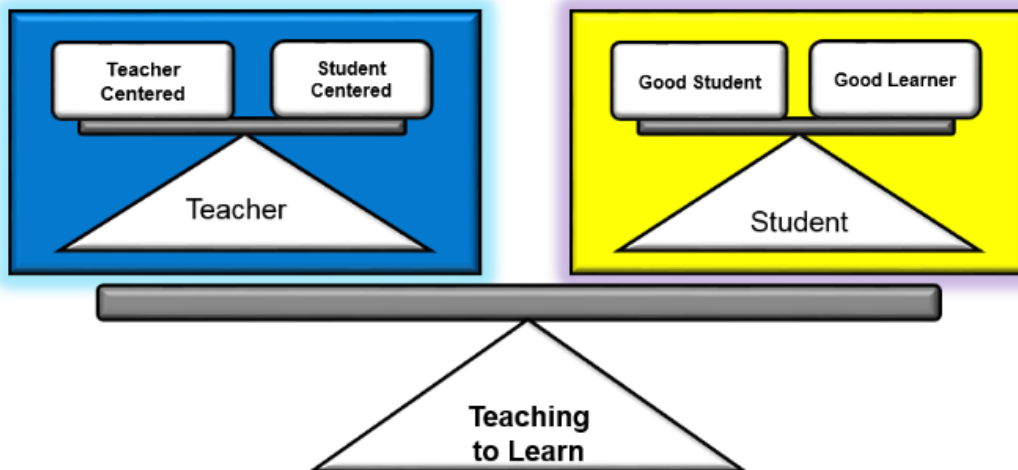
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## Supervising Learning-Teaching to Learn

The role of the teachers is to develop learning environments that enable students to be active participants in the learning process by developing self-regulation skills, critical thinking, and application of knowledge through problem solving.



The teacher role is a balance of teacher centered and student centered learning.  
The student role is a balance between being a good student and a good learner.  
The process of teaching to learn is a balance of teacher and student roles.

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## What is Student-Centered Learning?

Students are directly involved and invested in the discovery of their own knowledge.  
Students are engaged in learning content through solving real world problems.

Through collaboration and cooperation with others, students engage in experiential learning that is authentic, holistic, and challenging.

Students are empowered to use prior knowledge to construct new learning.  
Students Reflect on their thinking and learning.

Curriculum and assessment are centered on meaningful performances in real world contexts. as a partner in learning, teachers intentionally create organized and cohesive experiences to assist students in making connections to key concepts.

Students take an active role in learning.  
Teachers are not supervisors of student learning.

Reference - [Characteristics of Effective Instruction: Student-Centered Classrooms](http://www.iglls.org/files/classroom_brief.pdf)  
[http://www.iglls.org/files/classroom\\_brief.pdf](http://www.iglls.org/files/classroom_brief.pdf)

How you supervise your student's learning is very similar to how you supervise employees and will determine the learning outcomes.

Take the self assessment on the following slide.

Consider:

Does your supervising style develop the desired employability skills of your students?

What adjustments can you make to get the desired outcome?

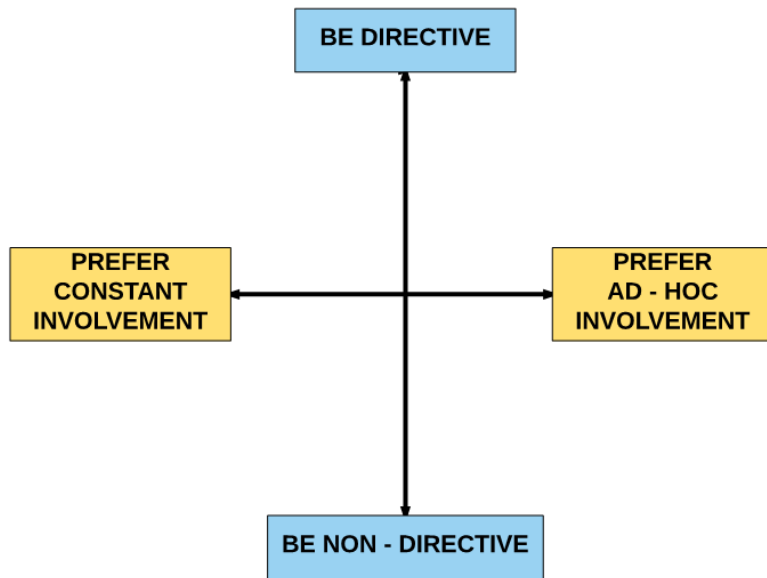
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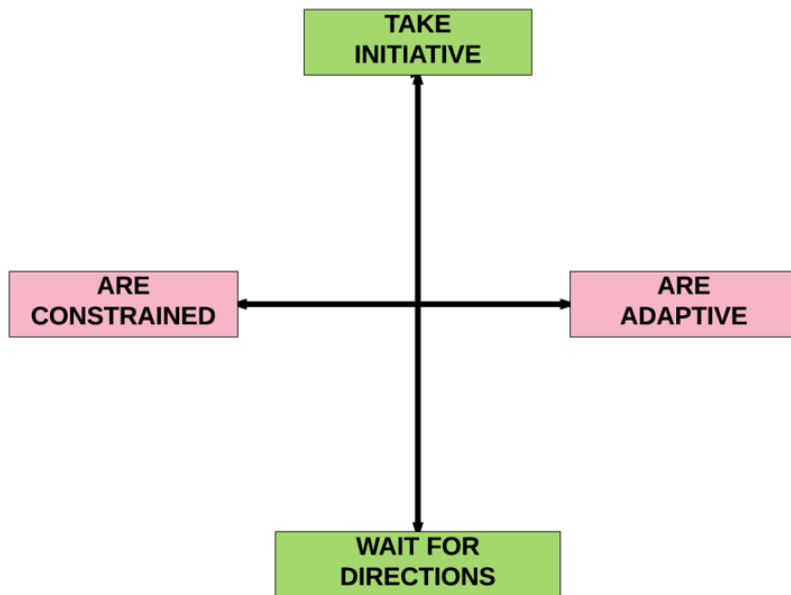
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## Supervising Learning

As a supervisor I tend to...



I try to develop employees who...



A supervisor can encourage their employees to wait for directions or take initiative. Supervisors can either constrain their employees or encourage them to adapt.

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### Teaching to Learn: Applying your Supervisory Experience

- Moving from Teacher Centered Instruction -> Student Centered Learning
- Helping students move from Good Students -> Good Learners

Drawing on your prior experiences as a supervisor, how you will help students move along this path in your course.

### Teaching to Learn: Applying your Supervisory Experience

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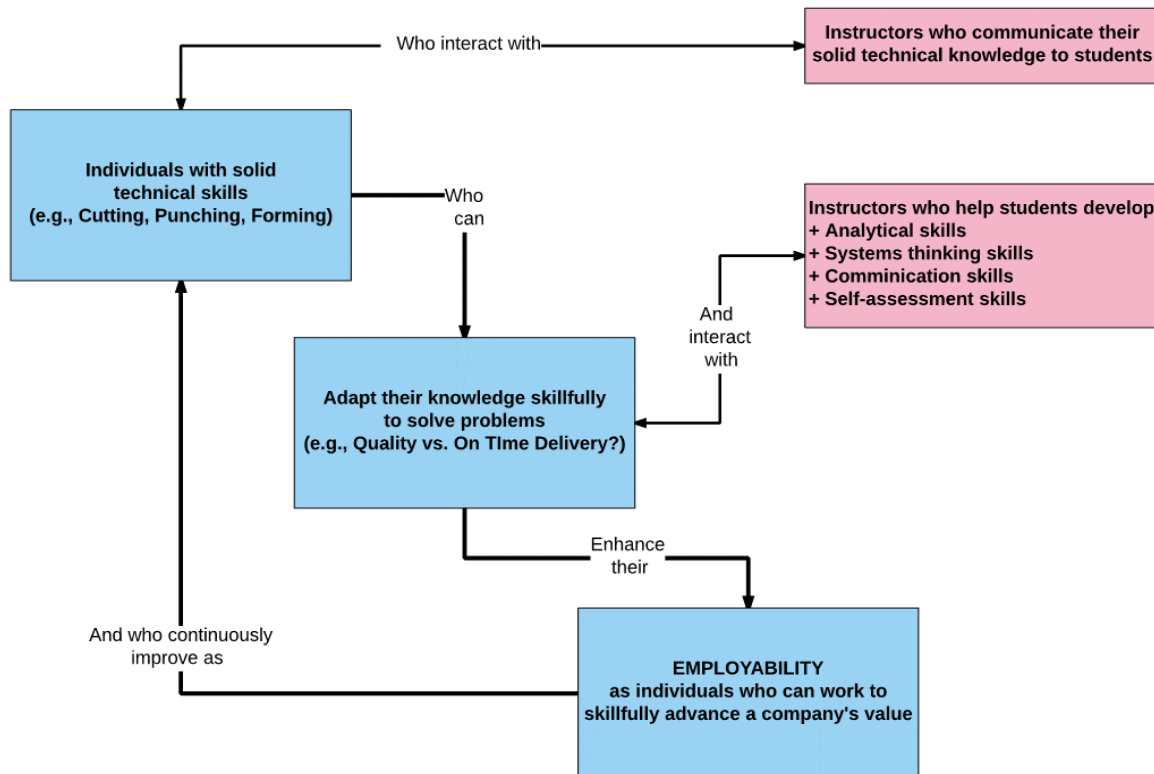


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## Teacher Application of Problem-Based Learning

The research that supports this concept map is provided on the following 2 slides.



Instructors interact with students with solid technical skills (e.g., Cutting, Punching, Forming). The students adapt their knowledge skillfully to solve problems (e.g., Quality vs On Time Delivery?). The students interact with Instructors, who help the students develop analytical skills, systems thinking skills, communications skills, and self-assessment skills. Thus the students enhance their employability as individuals who can work to skillfully advance a company's values. The students continue to improve as individuals with solid technical skills, and continue to interact with instructors, repeating the process.

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## Problem-Based Learning: Research 1

Different Teaching Methodologies on Learning Outcomes

**Inductive Teaching** (d=0.59, N=3595): Students learn how to generate generalizations, rules, regularities across a range of examples

**Inquiry-based Teaching** (d=0.33, N=7437): In open-ended situations (no single right answer) students observe and question phenomena, collect and analyze data, pose explanations, and build models. Low effect may occur because students did not have prior experience working in this way

**Problem-Solving Teaching** (d=0.61, N=15,235): Students learn heuristics of defining the cause of a problem, identifying possible solutions, adopting multiple perspectives, designing interventions, evaluating outcomes

d = effect size: The magnitude or the size of the difference between 2 groups  
The higher the number the greater the effect

N = sample size: The number of observations or the population in the study

## Problem-Based Learning Research 2

**Problem-based learning** (d=0.15, N=38,090): PBL is student-centered, occurs in small groups, tutor is present as a guide, authentic problems are presented, problems are tools to achieve required knowledge and skills to solve the problem, new information is acquired through self-directed learning.

### **PBL Compared to Direct Instruction:**

1. PBL has negative effect on learning content (d=-0.78) but a positive effect on learning skills (d=0.66);
2. PBL has zero effect on learning content (d=-0.04) but a positive effect on application (d=0.40) and principles (d=0.75)

### **In Summary:**

- The application of knowledge, not development of knowledge, is the heart of the success of PBL
- PBL has a negative effect on the accumulation of knowledge – which appeared to be the major outcome for most studies on PBL

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## Effective Constructive Feedback: Feedback can be Powerful

There have been at least 12 previous meta-analyses covering 196 studies and 6,972 effect sizes on specific information on feedback in classrooms.

The average effect size on feedback was 0.79 (twice the average effect).

To place this average of 0.79 into perspective, it fell in the top 5 to 10 highest influences on achievement in Hattie's (1999) synthesis.

John Hattie and Helen Timperley, (2007) The Power of Feedback, REVIEW OF EDUCATIONAL RESEARCH 2007 77: 81

Simply providing students with a advice, instructions, evaluations, and grades is not effective constructive feedback and will not advance learning. In some cases, these types of teacher feedback can harm the learning process.

Negative, general feedback, like a poor grade, can negatively affect motivation and feelings of self-worth causing students to disengage from the learning process.

### 5 Key Components to Effective Feedback

#### Effective feedback must be:

- 1. Specific to the task:** What information specifically they are doing right or wrong.
  - For example, feedback like "Great job!" doesn't tell the learner what they did right, and a statement such as "Not quite there yet" doesn't give them any insight into what the learner did wrong and how they can improve.
  - Specific feedback provide learners with information on what exactly they did well, and what may still need improvement.
- 2. Timely:** Feedback is most effective when it is given right away. Do not put off feedback until a grade is given or an assignment is complete.
- 3. Goal Orientated:** Feedback is most effective when oriented on a specific goal students are working towards. The feedback should clearly provide students with information on helping them progress towards achieving their goal.
- 4. Constructive not Critical:** The way feedback is presented can have an impact on how it is received. Focus on the task not on the person. Always provide positive along with constructive feedback. For example: The set up of the machine is correct, but there was a misinterpretation of the rotation on the blueprint that caused the part to be bent backward. Review 3rd projection view of blueprint reading and try again.
- 5. Involve the Learner in the Process:** Students must be given access to information about their performance and their learning strategies. Providing students feedback on their learning journals as well as their work will provide useful information for them to make adjustments to achieve goals.

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## Bias in Thinking and the Effect on Learning

Biased judgment and decision making is a systematic error in thinking that affects the decisions and judgement that people make. Bias in thinking can lead to problems in all aspects of work and personal lives. (www.verywell.com)

Researchers have identified 6 bias in thinking. They found that in most cases folks are prone to these bias errors and that the errors on not correlated with IQ (even so-called smart people make dumb mistakes). Because most people have little or no prior training in these biases, training interventions can have a great influence.

Making people aware of their bias in thinking can improve problem solving skills.

Carey K. Morewedge<sup>1</sup>, Haewon Yoon<sup>1</sup>, Irene Scopelliti<sup>2</sup>, Carl W. Symborski<sup>3</sup>, James H. Korris<sup>4</sup>, and Karim S. Kassam<sup>5</sup> Debiasing Decisions: Improved Decision Making With a Single Training Intervention, Policy Insights from the Behavioral and Brain Sciences 2015, Vol. 2(1) 129–140

### 6 Biases that Influence (Erroneous) Thinking

1. Bias Blind Spot: Perceiving oneself to be less biased than one's peers (Scopelliti et al., 2015)
2. Confirmation Bias: Gathering and interpreting evidence in a manner confirming rather than disconfirming the hypothesis being tested (Nickerson, 1998)
3. Fundamental Attribution Error: Attributing the behavior of a person to dispositional rather than to situational influences (Gilbert, 1998; Jones & Harris, 1967)
4. Anchoring: Overweighting the first information primed or considered in subsequent judgment (Tversky & Kahneman, 1974)
5. Bias Induced by Overreliance on Representativeness: Using the similarity of an outcome to a prototypical outcome to judge its probability (Kahneman & Tversky, 1972)
6. Social Projection: Assuming others' emotions, thoughts, and values are similar to one's own (Epley, Morewedge, & Keysar, 2004; Robbins & Krueger, 2005)

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### Activity: Improve Problem Solving Skills by Identifying Bias Thinking

- Introduce your students to these 6 biases.
- Continually monitor how students used bias in discussing items throughout the course.
- When you engage students in active problem solving, provide feedback to on how students committed these bias errors.

**Identifying when bias thinking occurs has a positive effect on students' problem solving skills.**

### Resources

[Why student-centered classrooms are effective instruction](#)

[http://www.iglls.org/files/classroom\\_brief.pdf](http://www.iglls.org/files/classroom_brief.pdf)

[Why student-centered classrooms are effective literature review](#)

[http://www.gwaea.org/iowacorecurriculum/docs/StudCentClass\\_LitReview.pdf](http://www.gwaea.org/iowacorecurriculum/docs/StudCentClass_LitReview.pdf)

[How student-centered classrooms need to start with the educator to empower learners](#)

<http://www.edutopia.org/blog/student-centered-learning-starts-with-teacher-john-mccarthy>

[A guide for educators to engage students with relevant and high quality learning experiences](#)

[http://www.curtin.edu.au/cli/local/docs/TandL\\_Handbook\\_2014\\_FINAL\(1\).pdf](http://www.curtin.edu.au/cli/local/docs/TandL_Handbook_2014_FINAL(1).pdf)

[Literature Review: Student-Centered Classrooms](#)

[http://www.gwaea.org/iowacorecurriculum/docs/StudCentClass\\_LitReview.pdf](http://www.gwaea.org/iowacorecurriculum/docs/StudCentClass_LitReview.pdf)

[Seven Keys to Effective Feedback](#)

<http://www.ascd.org/publications/educational-leadership/sept12/vol70/num01/Seven-Keys-to-Effective-Feedback.aspx>

[The Power of Feedback](#)

<http://education.qld.gov.au/staff/development/performance/resources/readings/power-feedback.pdf>

[The understanding of self determination and motivation](#)

[https://selfdeterminationtheory.org/SDT/documents/2000\\_DeciRyan\\_PiWhatWhy.pdf](https://selfdeterminationtheory.org/SDT/documents/2000_DeciRyan_PiWhatWhy.pdf)

[How reciprocal interaction between cognitive, behavioral, and environmental influences effects behavior](#)

<https://www.learning-theories.com/social-learning-theory-bandura.html>

[Characteristics of Good Student Feedback](#) (youtube video)

<https://www.youtube.com/watch?v=Huju0xwNFKU>

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